ROSE TOOLS, INC.

For Latest List Prices of Tools Shown in This Catalog and Tools Now Being Manufactured, Refer to Separate List Price Booklet No. 103-V

Buy Through Your Distributor

Starrett Tools are sold only through authorized distributors located in all principal cities of the world.

FINE MECHANICAL TOOLS
FROM THE WORLD'S GREATEST TOOLMAKERS

Catalog 26
Manufactured by THE L. S. STARRETT COMPANY
Athol, Massachusetts, U. S. A.

Cable Address: Starrett, Athol

Code

Starrett

Starrett

NEW YORK CHICAGO
53 Park Place (Corner West Broadway) 17 N. Jefferson St.
LONDON LONDON
30, 36, 37, Upper Thames St., E.C. 4

Printed in U.S.A.
Our Pledge
TO INDUSTRY

To the trade without whose loyal cooperation we should never have attained our present ability to render useful service on a large scale—

To the thousands of men who use STARRETT TOOLS to earn their daily bread, whose skill and integrity alone have made possible the tremendous industrial expansion of the world—

To all who know and love fine tools—

We pledge ourselves to protect and carry on the high standards set by our founder to the end that The L. S. Starrett Company shall continue to merit the distinction of the "world's greatest toolmakers" and that Starrett Tools shall continue to be known and accepted as standard the world over.

L. S. STARRETT
1880 to 1909
THE L. S. STARRETT CO.
1909 to 1938

WORLD'S GREATEST TOOLMAKERS
Manufacturers of
PRECISION TOOLS—Standard for Accuracy
DIAL INDICATORS—For Every Requirement
STEEL TAPES—Accurate and Reliable
HACK SAWS—Cut Quicker—Last Longer

Copyright 1938 by
THE L. S. STARRETT CO.
The accuracy, utility and lasting dependability of Starrett Tools is unquestioned. Machinists look for the name Starrett on precision tools as assurance of fine, accurate work.

Made since 1880 by the world's greatest toolmakers.
Display Cases for Distributors

To assist our Trade in promoting additional sales for Starrett Tools, we are pleased to furnish Display Cases or Panels on which our tools are mounted.

These cases not only make an attractive Display of Starrett Tools, but also keep the tools in perfect condition, free from unnecessary handling, thus providing a very valuable store fixture for any dealer.

We are equipped to and will gladly mount our tools on display panels sent in by any of our dealers, charging only for the tools at our regular prices.

Full particulars, with prices, quoted upon application.

Electrotypes

We are glad to furnish electrotypes of the tools we make to any dealer who will use them. We can supply them in the large size (approximately 3 inches), or reduced to 1½ inches the longest way, as in the following examples:

We send out only new electrotypes, and will furnish either size, as may be preferred by the dealer, without charge.

We are constantly using large space in the best mechanical papers to acquaint mechanics with the merits of our tools. Dealers can turn this publicity to their own account, and focus on their own stores the benefit of the sales promotion we do by advertising locally in newspapers, street cars, by circulators, catalogues, etc., that they sell Starrett Tools.

When calling for electrotypes kindly state whether large or small size, as explained above, are required.

The Starrett Books

Handy volumes, 7 × 4½ inches, printed in clear type, on good paper and strongly bound in serviceable Atoll imitation leather.

Volume I
For Machinists' Apprentices
184 pages of material that shows "how to do it." Essential to the beginner, valuable to the experienced machinist. It deals with the layout and precise measurement of work. Also shows use of tools. Helpful to the apprentice and handy for the foreman.

Price

Volume II
Data Book for Machinists
180 pages of important technical data, tables that relate to machine speeds, power transmission, drilling, turning and milling, materials, etc. This book is of exceptional value to the practical machinist, foreman, and superintendent.

Price

Volume III
For Motor Mechanics and Auto Repairmen
206 pages of information which motor mechanics and auto repairmen will appreciate. With many reference tables it covers, in an easily understandable manner, the methods and general practices in automobile and engine repair work. A particularly valuable book for the beginner. Useful to the most experienced. Should be in every garage.

Price

Special Work

Our many years of manufacturing experience, combined with our excellent equipment, enable us to manufacture special tools and gages in large or small quantities at the lowest possible cost.

In addition to special inquiries for odd sizes and graduations of steel rules, straight edges, etc., we will gladly estimate on any specifications sent us, if they are such as we are in a position to handle.

Practical Advertising Specialties

Steel Rules—Steel Tapes—and many other numbers from our line have proven most effective items for direct specialty advertising.

Such high-grade articles with their accuracy and durability are not only attractive but useful. Special markings to meet individual requirements increase the Advertising and Good Will value.

We solicit such work and welcome the opportunity to submit sketches and quote on large or small quantities.
**Starrett**

Sets of Tools

For Students and Apprentices

These sets of tools will be found indispensable to the Student or Apprentice Mechanic. Compact and convenient to carry.

---

**No. 900**

Set complete in folding case, about 1½ x 4½ x 7 inches. Contains the following tools, as shown in cut:

- **No. 11** 6-inch Combination Square, complete.
- **No. 320** 6-inch Flexible Steel Rule.
- **No. 117 B** Center Punch.
- **No. 290** Center Gage.
- **No. 241** 4-inch Caliper.
- **No. 79** 4-inch Outside Caliper with solid nut.
- **No. 73** 4-inch Inside Caliper with solid nut.

**Price**

---

**No. 901**

In substantial and nicely finished wood case, about 1½ x 7 x 12 inches. Set complete, as shown in cut, contains:

- **No. 11** 6-inch Combination Square, complete.
- **No. 320** 6-inch Flexible Steel Rule.
- **No. 117 B** Center Punch.
- **No. 290** Center Gage.
- **No. 27** 5-inch Divider with spring nut.
- **No. 79** 6-inch Outside Caliper with solid nut.
- **No. 73** 6-inch Inside Caliper with solid nut.

The Starrett Book for Machinists’ Apprentices, Volume I.

**Price**

---

**Starrett Educational Sets**

Recommended where a more complete set of tools is desired by the apprentice. Similar in style to the set No. 900, only that it contains tools of different patterns, with a 1-inch micrometer included.

- In folding case, about 1½ x 9½ x 8 inches.
- Set complete, as shown in cut, contains:
  - **No. 436** 1-inch Micrometer, without ratchet stop and without lock nut.
  - **No. 11** 8-inch Combination Square with center head.
  - **No. 391** Center Gage.
  - **No. 117-D** Center Punch.
  - **No. 323** 6-inch Flexible Rule.
  - **No. 277** 4-inch Divider.
  - **No. 274** 4-inch Caliper.
  - **No. 243** 4-inch Caliper.

**No. 902** Complete Set, with case...

---

Starrett Tools are standard equipment in Manual Training and Vocational Education classes, just as they are in Industrial Tool Rooms—and for the same reasons. The special features that make them efficient for skilled workmen make them easy for beginners to use.

The Set of Fourteen Blueprinted Student Notebook Pages, each showing a different tool and how to use it, punched and trimmed to fit the standard 8 x 10½ inch notebook size, furnished at

per set.
## Starrett

### Ground Flat Stock

No. 495

Made of first quality tool steel ground to .001 inch in thickness. Ranging in thickness from 1/8 inch to 1 inch or larger. It is nicely annealed so that it is easily machinable. Indispensable for making templates, gages, tool and cutting tools, parallels, machine parts, etc. Many shops, as individuals, do not have the facilities to grind to close limits, consequently this stock provides worthwhile economy.

Our Ground Flat Stock is made to our own specifications and each piece is packed in a properly labeled envelope showing the dimensions. A most convenient way of handling. Buy it through your Mill Supply Dealer.

For hardening, we recommend as follows: Heat between 1400 degrees and 1800 degrees F., depending on size and shape to be hardened. Quench in water, brine or oil, depending on hardness required. At a slightly increased heat, stock is in certain thickness limits will harden satisfactorily in oil with less danger of cracking. After quenching, to obtain medium temper, draw in oil at a temperature of 500 degrees F. for approximately fifteen minutes or heat until stock shows a very dark blue. To obtain more hardness, draw in oil at 350 degrees F. for the same duration or heat until stock shows a light straw color.

<table>
<thead>
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<th>Size, Inches</th>
<th>Price, Per Piece</th>
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<th>Price, Per Piece</th>
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<th>Size, Inches</th>
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<td>9 x 10 x 1/2</td>
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<td>9 x 10 x 1/2</td>
<td>4-16</td>
<td>9 x 10 x 1/2</td>
</tr>
</tbody>
</table>

Other sizes furnished to order. Prices upon application.

---

## Use Starrett Ground Flat Stock

Made of High Grade Annealed Tool Steel

Easily Machined

Some of the jobs on which Starrett Ground Flat Stock will save time and money

- **TEST TOOLS**
- **DIE WORK**
- **JIGS**
- **FIXTURES**
- **PARALLELS**
- **MACHINE PARTS**
- **SHIMS**
- **PUNCH DIES**
- **FLAT GAGES**
- **TEST GAGES**
- **SNAP GAGES**
- **STAMPS and CUTTERS**
- **TEMPLATES**

---

### Starrett

- **Template**
- **Fly Tools**
- **Machine Parts**
- **Jig and Fixture Parts**
- **Gages**
Steel Rules

Machine Divided—Distinctive Graduations

The many advantages of light, thin, spring-tempered steel rules over ordinary thick, soft rules are so apparent that they are at once adopted by mechanics. The simplicity of our spring-tempered rules is shown not only by the increasing demand for them among mechanics and draftsmen but also by the fact that other manufacturers have been forced to imitate them and to adopt as near as they are able our improved methods of making them.

Attention is invited to the variety of rules that we make: Spring-tempered, both light and heavy, Flexible, Semi-Flexible, Narrow and Wide; Spring-tempered and Flexible Rules graduated in the Metric System as well as combining both the Metric and the English measures, also our latest achievement—Stainless Steel Rules.

In 1882, the late Mr. L. H. Starrett began the manufacture of spring-tempered steel rules. At once they became the favorite among mechanics and are still the leaders in this class of fine tools. Our many years’ experience in making temper rules has naturally led to a continually improved product, and our present methods have been made possible by new graduating machines from Mr. Starrett’s own designs. Our new department, equipped with every perfected appliance needed in the manufacture of accurate scales, is meeting every requirement.

Our rules are made to agree with the accurate standards furnished by the United States Government. From time to time we forward our standards to the Bureau of Standards at Washington where they are compared with the government standards.

In this manner our standards are not only strictly accurate, but are kept so. The most minute error due to wear of the standards we use for comparison is provided for.

English Measure

Graduations

These Rules are divided into parts of inches as follows:

<table>
<thead>
<tr>
<th>Graduation</th>
<th>1st corner</th>
<th>2d corner</th>
<th>3d corner</th>
<th>4th corner</th>
<th>5th corner</th>
<th>6th corner</th>
<th>7th corner</th>
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<td>16, 32, 64</td>
<td>14, 28</td>
<td>10, 20, 50, 100</td>
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<td>14, 28</td>
<td>10, 20, 50, 100</td>
</tr>
<tr>
<td>No. 2</td>
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<td>16, 32, 64</td>
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<td>100</td>
<td>50</td>
<td>32</td>
<td>64</td>
<td>100</td>
<td>50</td>
<td>32</td>
</tr>
</tbody>
</table>

Approximate Thickness, inches 1/6 or No. 18 gauge

Approximate Width, inches 1 2 3 4 5 6 7 8 9 10 18 24 38 48

Length, inches

Price, each

No. 300 has No. 4 graduation. Made in lengths 1 inch to 48 inches inclusive.
No. 301 has No. 1 graduation. Made in 6-inch and 12-inch lengths only.
No. 302 has No. 2 graduation. Made in 6-inch and 12-inch lengths only.
No. 307 has No. 7 graduation. Made in lengths 1 inch to 48 inches inclusive.
No. 309 has No. 16 graduation. Made in 6-inch and 12-inch lengths only.
Prices same as corresponding lengths of No. 300 Rules, as shown above.
No. 307 Rules, 36-inch and 48-inch, are made 1/8 inch wide and 1/8 inch thick.
Packed 1 to 12-inch, inclusive, 6 in a box; 18 inch and up, inclusive, 1 in a package.

Spring-Tempered Steel Rules

Machine Divided—Distinctive Graduations

Approximate Thickness, inches 1/6 or No. 18 gauge

Approximate Width, inches 1 2 3 4 5 6 7 8 9 10 18 24 38 48

Length, inches

Price, each

No. 300 has No. 4 graduation. Made in lengths 1 inch to 48 inches inclusive.
No. 301 has No. 1 graduation. Made in 6-inch and 12-inch lengths only.
No. 302 has No. 2 graduation. Made in 6-inch and 12-inch lengths only.
No. 307 has No. 7 graduation. Made in lengths 1 inch to 48 inches inclusive.
No. 309 has No. 16 graduation. Made in 6-inch and 12-inch lengths only.
Prices same as corresponding lengths of No. 300 Rules, as shown above.
No. 307 Rules, 36-inch and 48-inch, are made 1/8 inch wide and 1/8 inch thick.
Packed 1 to 12-inch, inclusive, 6 in a box; 18 inch and up, inclusive, 1 in a package.

Nos. 600 and 603

Quick Reading with Graduated End

No. 603 has No. 4 graduation and is graduated in 32nds of an inch on opposite sides of one end; the 64ths and 32nds with quick reading.

These rules are of the same widths and thicknesses as corresponding lengths of No. 300 Rules. Made in 2-inch to 12-inch lengths only, inclusive.

Prices: The same as for No. 300 Rules, listed above. Packed 6 in a box.

No. 600 Front

With Quick Reading Figures

Special attention is called to the fact that these rules are figured so as to assist the user to quickly read the 64ths and 32nds, as shown by the cut.

No. 603 has No. 4 graduation, which consists of 64ths and 32nds on one side, and 32nds and 64ths on the other. Made in 1-inch to 8-inch lengths, inclusive. Longer lengths have two rows of figures.

No. 603 has 2-Inch with End Graduations

No. 603 has No. 4 graduation, with the 64ths and 32nds figured, like No. 600, and is graduated in 32nds of an inch on both ends of one side, as shown by the cut. Made in 2-inch to 12-inch lengths, inclusive.

Approximate Thickness, inches

Approximate Width, inches

Length, inches

Price, each

No. 303 has No. 4 graduation. Made in lengths 1 inch to 48 inches inclusive.
No. 301 has No. 1 graduation. Made in 6-inch and 12-inch lengths only.
No. 302 has No. 2 graduation. Made in 6-inch and 12-inch lengths only.
No. 307 has No. 7 graduation. Made in lengths 1 inch to 48 inches inclusive.
No. 309 has No. 16 graduation. Made in 6-inch and 12-inch lengths only.
Prices same as corresponding lengths of No. 300 Rules, as shown above.
No. 307 Rules, 36-inch and 48-inch, are made 1/8 inch wide and 1/8 inch thick.
Packed 1 to 12-inch, inclusive, 6 in a box; 18 inch and up, inclusive, 1 in a package.
Spring-Tempered Steel Rules No. 607
Machine Divided—Distinctive Graduations—Quick Reading

No. 607 has No. 7 graduation, which consists of 16ths and 32nds on one side, and 64ths and 100ths on the other. Special attention is called to the fact that these rules are figured so as to assist the user to quickly read the 32nds, 64ths and 100ths, as shown by cut. No. 607 made only in 4, 6, 12, 18 and 24 inch lengths.

Same widths and thicknesses as No. 600 and No. 603, listed on page 15.

Length, inches ........................................ 4 6 12 18 24
Price, each ..............................................
Packed 1 to 12 inch, 6 in a box; 18 and 24 inch, 1 in a package.

NOS. 400 AND 407
Machine Divided—Distinctive Graduations
With One Beveled Edge

No. 400 has No. 4 graduation, with 64ths on the beveled edge.

Approximate Thickness, inches ... 1/16 or No. 18 gauge
Approximate Width, inches ... 0.02 0.04 0.06 0.08 0.10 0.12 0.14 0.16
Length, inches ... 1 2 3 4 5 6 9 12 18 24
Price, each ..............................................
Packed 1 to 12 inch, 6 in a box; 18 inch and up, 1 in a package.

No. 407 has No. 7 graduation with 100ths on the beveled edge.

Approximate Thickness, inches ... 0.02 0.04 0.06 0.08 0.10 0.12 0.14 0.16
Approximate Width, inches ... 0.02 0.04 0.06 0.08 0.10 0.12 0.14 0.16
Length, inches ... 1 2 3 4 5 6 9 12 18 24
Price, each ..............................................
Packed 1 to 12 inch, 6 in a box; 18 inch and up, 1 in a package.

Heavy Spring-Tempered Steel Rules No. 410
Machine Divided—Distinctive Graduations

No. 410 Heavy, spring-tempered. No. 4 graduation.

Thickness, about 1/16 inch.

Width, about, inches ... 0.02 0.04 0.06 0.08 0.10 0.12 0.14 0.16
Length, inches ... 1 2 3 4 5 6 9 12 18 24 30 45 60 72
Price, each ..............................................
Packed 12 inch, 6 in a box; 18 inch and up, 1 in a package.

Semi-Flexible Steel Rules No. 325
Machine Divided—Distinctive Graduations—Quick Reading

No. 325 Semi-Flexible. No. 4 graduation and graduated in 32nds of an inch on both sides.

These rules are about 1/16 inch thick, slightly heavier than the Flexible Rules and lighter than the Spring-Tempered Rules. They are of the same widths as the corresponding lengths of Spring-Tempered Rules. Packed 6 in a box.

Length, inches ........................................ 6 12
Price, each ..............................................
Flexible Steel Rules
Nos. 320, 321 and 322
Machine Divided—Distinctive Graduations

These are very thin, spring-tempered rules, nicely graduated on one side only. Use only where a small size rule is desired. These from 1 inch to 12 inches are ½ inch wide, and will easily conform to a ½ inch circle. Those from 12 inches to 60 inches are ¼ inch wide, and are made from a trifle heavier stock.

Length, inches: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46

Price, each, No. 320 2.50
No. 321 3.50
No. 322 4.50

Packed 6 in a box.

No. 323
Machine Divided—Distinctive Graduations
With Quick Reading Figures

Has the usual 64ths and 32nds graduations. Every 4th graduation of 32nds and 8th graduation of 64ths, numbered. Gives mechanism another choice of flexible rules with quick readings.

Price, each, No. 323 2.00

Packed 5 in a box.

No. 324
Patented
Machine Divided—Distinctive Graduations
Graduated Both Sides Quick Reading

A departure from the conventional flexible steel rule as both sides are graduated, as shown by the above cuts. Graduated 64ths on one side and 32nds on the other, with the addition of our quick reading figures.

As illustrated, it is graduated on opposite sides and opposite edges and from one end.

Close working mechanics, more and more, lean to the 6-inch flexible rule as the one rule they carry on their person. It is always in the natural position to use, it is always very handy. (No turning and for end nor measuring with figures upside down.) Made only in 6-inch length.

Price, each, No. 324 3.50

Packed 5 in a box.

No. 320 K
Patented
Machine Divided—Distinctive Graduations
With Pocket Clip

Designed specially for shopmen who use a rule many times a day. Mechanism has been and devised numerous methods for fastening rules to their clothes but here is a combination which we believe superior to all others. Simple—just a Clip permanently attached to a 6-inch flexible rule.

The Clip is positioned at the 4-inch mark, garment pocket depths being considered. Rule cannot be released without slight downward pressure on the paw.

The No. 320 K comprises our No. 320—6-inch Rule with Clip. Rule is graduated on one side only—one edge in 32nds and the other edge in 64ths of an inch.

Price, each, No. 320 K 6-inch

Packed 5 in a box.

Note: Cases with Clips, for Flexible Rules, will be supplied at a price of each, list.

Flexible Steel Rules
Nos. 338 and 339
Machine Divided—Distinctive Graduations

Figured Graduations in 10ths—50ths—32nds—64ths

Facilitates measurement where dimensions are in decimals, eliminating necessity of converting decimals into fractions. One side graduated in 10ths and 50ths of an inch. Each 10th of an inch in the 50th graduations is figured—a great help for quick and easy reading in decimals. Hundredths of an inch are estimated readily.

Opposite side of rule graduated in 32nds and 64ths, the 64ths graduations being figured every 8th of an inch. The combination of 10ths and 50ths on one side, with 32nds and 64ths on the other, together with the handiness of the figured graduations, make this rule especially useful and desirable for up-to-date shop work.

Price, each, No. 338 3.50
No. 339 4.50

Packed 5 in a box.

No. 327
Machine Divided—Distinctive Graduations
With Simplified Quick Reading

An improved flexible steel rule—graduated in 10ths, 32nds and 64ths, and on both sides of the rule, from one end. No turning and for end nor measuring with figures upside down. Graduations that are used mostly, 32nds and 64ths, are on the lower edge, with quick reading features. The 10ths, regular graduation, is on the upper edge of the 32nds side. Made from finest quality spring-tempered steel. This thin rule being graduated on both sides, caution is recommended against bending too sharply.

Price, each, No. 327 6-inch only

Packed 5 in a box.

Note: Cases with Clips, for Flexible Rules, will be supplied at a price of each, list.

No. 328
6-inch only

Packed 5 in a box.

An improved flexible steel rule—graduated in 10ths, 32nds and 64ths, and on both sides of the rule, from one end. No turning and for end nor measuring with figures upside down. Graduations that are used mostly, 32nds and 64ths, are on the lower edge, with quick reading features. The 10ths, regular graduation, is on the upper edge of the 32nds side. Made from finest quality spring-tempered steel. This thin rule being graduated on both sides, caution is recommended against bending too sharply.

Price, each, No. 328 6-inch only

Packed 5 in a box.

Note: Cases with Clips, for Flexible Rules, will be supplied at a price of each, list.
Shrinkage Rules

For all ordinary instruments a STANDARD RULE is used, but for laying out or for working patterns, or any part of a pattern or core box, a SHRINKAGE RULE should be used. The reasons are that when a mould made from the wooden pattern in the sand is filled with molten metal, its temperature is very high, and as it cools and solidifies it contracts. Accordingly, to compensate for this, the patternmaker must add to the size of the pattern. In order that this may be done and exact relations be maintained for all dimensions a SHRINKAGE RULE is used. This rule is graduated like an ordinary rule, but if the two are compared the SHRINKAGE RULE will be found to be longer. EXAMPLE: Cast iron will shrink about 1/8 inch to the foot, so the rule in reality would be 1 1/8 inches long, the additional length gradually being gained in the length of the rule. The contraction of different metals in the moulds varies greatly, that for cast iron being about 1/4 inch to each foot, 1/6 inch to the foot for brass, while for many of the softer metals it is as great as 1/2 inch to the foot. The usual allowance for each foot in length is as follows:

In large cylinders ....... 1/8 in. 
In cast iron pipe ....... 1/4 in. 
In copper ....... 1/8 in. 
In brass and bronze ....... 1/4 in. 
In steel ....... 1/8 in. 
In lead ....... 1/8 in. 
In malleable iron ....... 1/8 in. 
In aluminium ....... 1/6 in. 


Steel Shrink Rules

These rules are spring-tempered and are of the same width and thickness as Spring-Tempered Standard Rules, listed on page 15. Made with No. 4 graduation, 6ths, 18ths, 32nds and 64ths.

Price: 6 inch ......... No. 370 Shrink, 1/4 foot No. 372 Breeze Shrink, 1/4 foot, 6-inch only, flexible No. 373 Shrink and Standard, 1/4 foot No. 377 Double Shrink, 1/4 foot No. 378 Shrink, 1/4 foot, 12-inch only No. 379 Breeze Shrink, 1/4 foot, 12-inch only

No. 370 Shrink, 1/4 foot No. 374 Shrink, 1/4 to foot, 12 and 24 inch only No. 375 Breeze Shrink, 1/4 to foot, 12 and 24 inch only No. 383 Shrink, 1/4 to foot, 12 and 24 inch only No. 384 Shrink, 1/4 to foot, 12 and 24 inch only

No. 377 Double Shrink, 1/4 foot No. 387 Shrink, 1/4 foot, 12-inch only No. 388 Shrink, 1/4 foot, 12-inch only

No. 379 Breeze Shrink, 1/4 foot, 12-inch only

No. 379 Breeze Shrink, 1/4 foot, 12-inch only

1-inch and 12-inch, packed 6 in a box: 24-inch packed 1 in a package.

No. 373 Shrink, 1/4 inch to foot, 12 and 24 inch only, and on the other side 2 edges in 64ths and 32nds, 1 1/4 inches long, or with 1/4 inch shrink, and on the other side 2 edges in 64ths and 32nds, 1 1/4 inches long, or the standard foot for comparison.

"Double shrink is used when 2 shrinkages are necessary, as in a master pattern. Take cast iron which shrinks 1/8 inch to foot, for example, a master pattern is made to make a gate pattern, the result being 1/16 inch shrink, then the production piece is a pattern in another 1/2 inch, consequently 1/16 inch shrink is used to make the master pattern.

Metric Steel Shrink Rules

These rules are spring-tempered, and at the same width and thickness as the 12-inch Shrink Rules listed above. Packed 1 in a package.

Graduated three edges in millimeters, one edge in 1/10 millimeters. Made in 30 cm. lengths only. Price, each:

No. 468 Metric Shrink, 1 mm. to 100 mm. No. 469 Metric Shrink, 2 mm. to 100 mm.

Steel Rules

Metric

Machine Divided—Distinctive Graduations

Spring Tempered

No. 340 Graduated three corners in millimeters, one corner in 1/10 mm. The same width and thickness as our No. 300 Spring-Tempered Rules of English measure, listed on page 15. Lengths and prices given below.

Length Prices
5 cm. = 1.9655 inches $20.00 20 cm. = 7.7840 inches
10 cm. = 3.9370 inches $30.00 30 cm. = 11.8110 inches
15 cm. = 5.8055 inches $50.00 60 cm. = 19.2690 inches
1 m. = 35.7000 inches

No. 345 Graduated on one side only, one corner in millimeters, the other in 1/10 mm. The same width and thickness as Flexible Rules of English measure, listed on page 16. Made in the following lengths: 10, 15, 20, 30, and 1 meter. Prices the same as for corresponding lengths listed above.

No. 347 About 1/10 inch wide, and about 1/16 inch thick. Graduated one side in millimeters, the other in 1/10 mm. Made in the following lengths: 10 and 15 cm. Prices the same as for corresponding lengths listed above.

Metric and English

Machine Divided—Distinctive Graduations

Spring Tempered

No. 350 Graduated one corner each in millimeters, 1/10 mm., 32nds and 64ths of an inch, all lengths.

Length Prices
5 cm. = 1.9655 inches $20.00 20 cm. = 7.8740 inches
10 cm. = 3.9370 inches $30.00 30 cm. = 11.8110 inches
15 cm. = 5.8055 inches $50.00 60 cm. = 19.2690 inches
1 m. = 35.7000 inches

No. 351 Made in the following lengths: 10 and 30 cm. only. The 10 cm. length graduated as follows: first corner in 1 mm., second corner in 1 mm., third corner in 64ths, fourth corner in 100ths of an inch. The 30 cm. length graduated as follows: two inches of third corner in 64ths, the rest of that corner in 16ths of an inch. Two inches of fourth corner in 100ths, the rest of that corner in 50ths of an inch.

No. 359 Graduated one edge in millimeters, the other in 64ths. Made in the following lengths: 10, 15, 20 and 30 cm. Prices the same as for corresponding lengths listed above. Graduated on one side only.

No. 357 Graduated one edge in millimeters, the other in 64ths.

English and Metric with One Beveled Edge

No. 352 Graduated on beveled edge in 64ths, the other edge of same size in millimeters. Reverse side, one edge in 64ths, the other in 16ths.

Length, Inches

Prices, each:
6 cm. to 30 cm. 6 inches, 8 inches in a box: 60 cm. 18 inches in a box: 1 in a package.
Adjustable Hook Rules No. 418

Very convenient in taking measurements from points where one cannot see if rule is even with measuring edge, from round corners through holes of pulleys, setting inside calipers, etc. The hook may be quickly removed by turning the eccentric stud one half turn. "End Graduation" means both sides of one end graduated to 3 inch.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price</th>
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<tbody>
<tr>
<td>6</td>
<td></td>
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<td>8</td>
<td></td>
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<tr>
<td>12</td>
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<td></td>
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<tr>
<td>60</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td></td>
</tr>
</tbody>
</table>

No. 418 and 419: Our No. 303 Direct Reading Rule, with hook graduated to 6 inch total length. Our No. 303 Direct Reading Rule, with hook graduated to 12 inch total length. Our No. 303 Direct Reading Rule, with hook graduated to 18 inch total length. Our No. 303 Direct Reading Rule, with hook graduated to 24 inch total length. Our No. 303 Direct Reading Rule, with hook graduated to 36 inch total length. Our No. 303 Direct Reading Rule, with hook graduated to 48 inch total length. Our No. 303 Direct Reading Rule, with hook graduated to 60 inch total length. Our No. 303 Direct Reading Rule, with hook graduated to 72 inch total length.

Narrow Hook Rules No. 422

These rules, while very similar to our No. 418 line, are designed for taking measurements through small holes. Measurements through the other side of 3 inch total length. Our No. 330 Rule, with hook.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>9</td>
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</tr>
<tr>
<td>12</td>
<td></td>
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</tbody>
</table>

Above Numbers: 4 to 12 inch, inclusive, 3 in a box; 18 inch and up, 1 in a package.

Steel Slide Caliper Rules No. 296

The rules are 4 inches long, 1 inch wide and 1/8 inch thick, with jaws 1/2 inch deep. With No. 4 Graduation, furnished with either 32nds or 64ths graduation on the lower edge of front side as may be desired, and 1/32nds graduation on the reverse side. The thumb piece is highly satisfactory to any mechanic, by removing any degree from, stock, and saving space.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
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</tbody>
</table>

No. 296: The above rule is furnished with graduations in millimeters and millimillimeters at the same price.

Steel Rules with Thumb Slide No. 290

The rules are 6 inches long, about 1/4 inch wide and 1/16 inch thick. These are fitted with a thumb slide. Useful in measuring against a shoulder, the width of ranges, collars, etc. The slide may be pushed on, either edge of the rule, or removed and the rule used alone. Made in 6 inch length, No. 4 graduation.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price, each</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Brass Hook and Handle Rule No. 465

Assembling slotted to more conveniently measure a lot of parts, and for convenience in measuring through holes, or from the inside when held against a corner, etc., the blacksmiths' hook and handle rule has been devised. This is an ordinary rule with a hook at one end, so that by placing the hook against the work the reading may be made from the scale at the edge. A handle on the opposite end from the hook permits using the rule without getting the hand near the work. These rules are made from hard rolled sheet steel of 1/4 inch thickness, 1/16 inch wide, with heavy graduations and figures, graduated from the end to 1/4 inch on one side, and from the inside of the hook in 1/16ths of an inch on the other, adapting them for taking measurements either from the hook or from the inside edge. They are graduated 12 inches, have flat handles and measure overall 15 inches.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Tempered Steel Rules with Holder No. 423

These rules, while very similar to our No. 418 line, are designed for taking measurements through small holes. Measurements through the other side of 3 inch total length. Our No. 330 Rule, with hook.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price, each</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Above Numbers: 4 to 12 inch, inclusive, 3 in a box; 18 inch and up, 1 in a package.

ROSE TOOLS, INC.
**Starrett**

**Folding Steel Rules No. 460**

Made of best quality spring-tempered steel, ½ inch wide. Graduated the first one inch in 32nds, remainders in 16ths, on one side, and 8ths of an inch on the other. Cut shows rail width. Lock joints. Black finish, with large, raised bright figures and graduations.

- Length 6-ft., 7 fold, 12-inch joints
- Price Each Per Dozen

**Folding Steel Rules No. 460 M and E**

The same as No. 460, except that one side is graduated in Metric measure (centimeters and millimeters), reverse side 16ths of an inch.

- Length 2-ft., 60 cm., 2 fold, 12-inch joints
- Price Each Per Dozen

**Folding Brass Rules No. 462**

With Stop Joint

Made of hard brass. Two feet long, ½ inch wide, 12-inch joints, 2 fold. Graduated in 8ths of an inch on one side and 16ths on the other.

- Length 2-ft., 8 fold, 12-inch joints
- Price Each Per Dozen

**Folding Steel Pocket Rules No. 450**

No. 450 Made of best quality spring-tempered steel, ½ inch wide. Graduated the first one inch in 32nds of an inch, remainders in 16ths on one side, reverse side graduated in 8ths on the other. Length: 6-ft., 3 fold, 4-inch joints; 2-ft., 4 fold, 6-inch joints. Raised figures and double lock joints.

- Length 1-ft., 3 fold, 4-inch joints
- Price Each Per Dozen

**No. 450 M and E**

The same as No. 450, except that they are graduated in Metric measure (centimeters and millimeters) on one side, and 16ths of an inch on the other.

- Length 1-ft., 50 cm., 3 fold, 4-inch joints
- Price Each Per Dozen

**Steel Rules No. 471**

With Circumference Measurement

Made of spring-tempered steel, about ½ inch thick and ½ inch wide. Length, 2 feet, 12-inch joints, 2 fold. Has distinct inner and outer figures and stop joint. One edge on one end graduated 18ths, reverse side on one end 8ths and circumference inches by 32nds. Shows direct reading circumference measurement up to 78 inches (outside the respective diameter). Packed 6 in a box.

- Price Each

**Center Gages**

For use in grinding and setting screw cutting tools. Graduated in 14ths, 20ths, 24ths and 32nds of an inch, except Nos. 397 and 398, which are graduated in millimeters and ½ mm. These graduations are useful in finding the number of threads to the inch. Packed 6 in a box.

- Price Each

**Center Gage Attachment No. 392**

V Block with a slot above the V, for holding center gage against a lathe spindle or face plate. For both external and internal work.

- Price Each

Packed 3 in a box.
Starrett

Ready Reference Table with Rule
Handy Equivalent Tables

Made from Spring Steel

These Ready Reference Tables are but .012 inch thick, 3 inches wide, and about 8 inches long. With the black markings and polished surface they are very distinct. Carried in the pocket or used around the shop, they are invaluable to machinists, tool makers, steel workers, etc.

No. 588
Spring Steel—Quick Reading
Has decimals, fractions and inch rules with 32nds divisions on one side, and tab and drill data on 6-inch rule with 64ths divisions on the other, as illustrated. Handy for toolmakers and machinists. Markings distinct and easy to read.

Packed 13 in a box.

No. 589
Decimal Equivalents
Price, each

No. 590
Tap Drills—For Machine Screws
Price, each

No. 591
Drill Size Tables
Price, each

Above numbers packed 12 in a box.

Key-Seating Rules No. 105

It is manifestly impossible to hold an ordinary rule on the cylindrical surface of a shaft and keep it parallel with the axis, while laying off measurements or drawing lines. The round surface of the work makes it difficult to hold the rule in place and is liable to form a slight angle with the axis causing a measurement to be shorter than the true length, which should be made as it will be machined. This is an important matter when measuring lengths for splining keyways on shafting. To overcome this difficulty there have been designed rules with flanges, called key-centers. The Starrett Key-Seat Rule is an improvement over the ordinary type in that the machinist's scale is used as part of the key-seat rule. This is made possible by a device which holds two straight edges together in the form of a box square. One of these rules is a plain, straight edge and the other the machinist ordinarily works. The two edges forming the box square when applied to the surface of the cylindrical piece keep the graduated edge of the rule in a line parallel with the axis, permitting a line or series of lines to be so drawn.

The steel auxiliary straight edge is either plain or graduated in 32nds and 64ths as desired, and sent when ordered. Unless otherwise ordered the key-seat rule is sent without auxiliary straight edges.

PRICES

No. 105 A Without auxiliary straight edge, 6-inch
No. 105 B With auxiliary straight edge, plain, 6-inch
No. 105 C With auxiliary straight edge, graduated, 6-inch

No. 105 D 6 inch
No. 105 E 8 inch
No. 105 F 10 inch

No. 105 M—Metric
One side of scale graduated both edges in millimeters, the other side graduated one edge in millimeters and the other in 1/8 millimeters. The auxiliary straight edge graduated in millimeters and 1/8 millimeters.

PRICES

No. 105 M A Without auxiliary straight edge, 15 cm.
No. 105 M B With auxiliary straight edge, plain, 15 cm.
No. 105 M C With auxiliary straight edge, graduated, 15 cm.

Above numbers packed 1 in a box.

Key-Seat Clamps No. 298

Designed to transform any common steel scale into a key-seat rule, and a valuable addition to any machinist's set. They are made of steel, case-hardened and accurately ground. A pair weights but an ounce. They may be put on or taken off almost instantly and are a complete substitute for a more costly tool. They may be used with our Combination Square Blades or with any straight rule with accurate results.

No. 298 Per pair

Rule Clamps No. 299

This little tool is used to clamp two steel rules together, end to end, making one long rule. The rules may be of the same or different widths up to 1/4 inch. This clamp will hold them securely, and their edges will usually not hold rules longer than 12 inches.

No. 299 Price

Packed 1 pair in a box, 6 boxes in a carton.
**Starrett**

**Hardened Steel Straight Edges No. 382**
These straight edges are accurately ground and hardened.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Approximate Width (inches)</th>
<th>Approximate Thickness (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3(\frac{3}{4})</td>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{4})</td>
</tr>
<tr>
<td>5(\frac{1}{2})</td>
<td>(\frac{3}{4})</td>
<td>(\frac{1}{4})</td>
</tr>
<tr>
<td>7(\frac{1}{2})</td>
<td>(\frac{3}{4})</td>
<td>(\frac{1}{4})</td>
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<tr>
<td>10(\frac{1}{2})</td>
<td>(\frac{3}{4})</td>
<td>(\frac{1}{4})</td>
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<td>13(\frac{1}{2})</td>
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<td>(\frac{1}{4})</td>
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<tr>
<td>16(\frac{1}{2})</td>
<td>(\frac{3}{4})</td>
<td>(\frac{1}{4})</td>
</tr>
<tr>
<td>20(\frac{1}{2})</td>
<td>(\frac{3}{4})</td>
<td>(\frac{1}{4})</td>
</tr>
</tbody>
</table>

Packed 1 in a package.

**Straight Edge Set No. 472**
Small, short length straight edges have an equally important place in tool equipment, where true alignment and accuracy play a part, as those of larger proportions. With this in mind we list this set with beveled narrow edges in leather case.
Made of tempered steel, \(\frac{1}{2}\) inch thick and 1\(\frac{1}{2}\) inch wide. Six lengths as follows: \(\frac{1}{4}\) in., \(\frac{1}{2}\) in., \(\frac{3}{4}\) in., 1 in., 1\(\frac{1}{4}\) in. and 2 inches.

No. 472 Set Complete, with Case Price.

**Tempered Steel Rules with Beveled Edges Nos. 484 and 484A**
The edges are beveled on opposite sides so that while one of the edges is always clean the paper the other stands up from it. Pressure on one edge will raise the other so that it can be picked up instantly. The raised edge is right to draw a pen against for inking without blotting the paper. Nickel plated, dull finish.

No. 484 Graduated in 10ths, 20ths, 50ths, and 100ths.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price, Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-inch</td>
<td>12-inch</td>
</tr>
</tbody>
</table>

Packed 6 in a box.

No. 484A Graduated in 20ths, 40ths, 80ths, and 160ths.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price, Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-inch</td>
<td>12-inch</td>
</tr>
</tbody>
</table>

Packed 6 in a box.

**Draftsmen's Scales No. 405**
This scale has tilting studs, so placed that anyone of the four edges, with different graduations, will come in contact with the paper by its own weight when resting on the studs, with the back edge raised at an angle of about 30°. The scales are graduated in parts of inches as follows:

No. 405 Graduated in 10ths, 20ths, 50ths, and 100ths.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price, Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-inch</td>
<td>12-inch</td>
</tr>
</tbody>
</table>

Packed 1 in a box.

No. 405A Graduated in 20ths, 40ths, 80ths, and 160ths.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price, Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-inch</td>
<td>12-inch</td>
</tr>
</tbody>
</table>

Packed 1 in a box.

**Draftsmen's T-Squares No. 163**
Nickel Plated — Not Graduated

The blades are made of aluminum, 10 inches long, weighing only from 4 to 6 ounces, and the blades of spring-tempered steel all newly finished and warranted accurate. Edges of blade are beveled on underside.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Price, Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-in. blade, 1(\frac{1}{4}) in. wide, (\frac{3}{8}) in. thick</td>
<td>36-in. blade, 1(\frac{1}{4}) in. wide, (\frac{3}{8}) in. thick</td>
</tr>
<tr>
<td>24-in. blade, 1(\frac{1}{4}) in. wide, (\frac{3}{8}) in. thick</td>
<td>40-in. blade, 1(\frac{1}{4}) in. wide, (\frac{3}{8}) in. thick</td>
</tr>
</tbody>
</table>

Packed 1 in a package.

**Improved T-Squares No. 164**
Graduated

A nickel-plated T-square, with spring tempered steel blade and aluminum head, weighing only about five ounces, which has an automatic locking device to hold it by a spring pressure against a metal straight edge attached to the end, or end and side, of a drafting board or table (see description of Metal Edge, No. 168), or by a slight turn of the knurled nut locked firm. The top side of the graduated blade provides a scale to set dividers.
Graduated 32nds of an inch. Edges of blade are beveled on underside.

<table>
<thead>
<tr>
<th>Blade Head</th>
<th>Price, Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 x 1(\frac{3}{4}) inch, 10-inch, graduated</td>
<td>30 x 1(\frac{3}{4}) inch, 13-inch, graduated</td>
</tr>
<tr>
<td>25 x 1(\frac{1}{4}) inch, 10-inch, graduated</td>
<td>40 x 1(\frac{1}{4}) inch, 13-inch, graduated</td>
</tr>
</tbody>
</table>

Packed 1 in a package.

**Adjustable Metal Edges No. 168**
Designed to be attached to end, or end and side, of drafting board or table, insuring a more accurate guide for the T-square.
The cam device at the end permits fine adjustments in forming a perfect right angle when two of the metal edges are used together. By loosening the knurled locking nut the screw can be adjusted.

<table>
<thead>
<tr>
<th>Price, Each</th>
</tr>
</thead>
</table>

23\(\frac{3}{4}\)-inch

34-inch

38-inch

48-inch

40-inch

Packed 1 in a package.
**Starrett**

Draftsmen's Protractors
No. 362

This is a protractor for draftsmen, which can be quickly set to any angle, used either side up and on either of the outside edges of the frame. Very advantageous in dividing a circle, transferring angles or laying off any given angle, without resetting, on either side of a line.

This protractor forms an extension for a T-square and very often takes the place of 45° and 60° triangles. Graduations are clear and sharp. With the vernier it reads to 1/10 of a degree or 1 minute. Blade is 8½ inches long, frame approximately 6 inches square. Furnished nickel plated.

No. 362 A ........................................ Price, each.
No. 362 B ........................................ Price, each.
Case only ........................................... Price, each.
No. 362 B sent unless otherwise ordered. ........................................... Price, each.

Packed 1 in a box.

Draftsmen's Protractors
No. 361

This protractor is made of sheet steel, nickel plated, graduated in degrees and figured to read from either right or left—will vernier to read in five minutes. The three straight edges of the protractor are graduated in inches and 180°, the longer part 6 inches. The tool will lie flat on the paper. The knurled locking nut is convenient for picking up the instrument. To obtain the complement of an angle without resetting, place the opposite straight part of the stock against the T-square or straight edge of a drawing board, and the reverse angle can be obtained by placing the straight part of the arc against the T-square or straight edge. By loosening the binding nut, friction is taken off, making it easy to adjust to degrees, when the tool may be again firmly locked.

This is a high grade protractor and one greatly appreciated by draftsmen.

No. 361 A ........................................ Price, each.
No. 361 B ........................................ Price, each.
No. 361 B sent unless otherwise ordered.

---

**Starrett Steel Tapes**

Standard for Accuracy

Starrett Steel Tapes are made in the following types:

- Pocket Tapes
- Builders' Tapes
- Millmen's Tapes
- Stainless Steel Tapes
- Measuring Tapes
- Reel Tapes
- Engineers' Tapes
- Surveyors' Chain Tapes
- Oil Gaging Tapes

In lengths and graduations to suit every requirement.

---

ROSE TOOLS, INC.
Starrett

Steel Measuring Tapes

Where anything approaching correct measures of long lengths is required nothing gives such close results as a steel tape. All worn tapes will stretch or shrink, and cannot be depended upon. Where accurate measurements are necessary one of our steel tapes should be used. They can be positively relied upon for quality of material, workmanship and accuracy. Each tape is carefully inspected and tested before leaving our factory.

Accuracy and Tension

Temperature standard is 68° Fahrenheit. Co-efficient of expansion of steel tapes as determined by U.S. Bureau of Standards is 0.00000845 per degree Fahrenheit, amounting on a 100-foot tape to 0.00274 inch per degree. Our standard tension for tapes of ordinary length when supported throughout is 15 pounds. (For metric tapes, 5 kilogram.)

Quick Reading

An important feature used in our steel tapes consists in placing the foot figures before each inch mark, as shown in cut below. This feature eliminates the possible chance of error in reading and also saves time.

Black Finish

By this we designate the superior finish we put on all our steel tape lines. It produces an over black background with bright steel figures and graduations. This finish wears well. Starrett Steel Tapes are acknowledged as standard for accuracy and convenience in reading.

Important Instructions Regarding the Use of Steel Tapes

1. In drawing the tape from the case at the opening, do not pull backward as at A (see cut), as this is liable to injure the tape.
2. In pulling the tape out, hold the case in a position that will avoid its being pulled against the edges of the opening. Many tapes are broken by holding the case in an awkward position, thereby preventing them running freely.
3. Occasionally tapes will pull hard and sometimes stick, which is due to their springs nature and which prevents their being drawn back in the case in perfect alignment. This is more prevalent in large tapes. To overcome this difficulty slip the side of the case against any flat surface, and the tape will invariably free itself.
4. A spring wired pocket tape should not be allowed to be drawn back into the case unchecked as it is thereby liable to become twisted or broken. It should be guided with the hand and kept straight as at B (see cut).

Special Graduations of Tapes

Made to Order

Tapes, ¾ inch wide, graduated in 16ths, numbered in consecutive inches up to 1200 inches (100 feet), in addition to No. 510, listed on page 38, prices quoted on application.

Reparing Tapes

We will attend to any repairs of broken steel tapes promptly, in a workmanlike manner, and at a reasonable charge. Such tapes should be sent to our factory at Athol, Mass.—not to any of our branches—prepaid, with name of sender plainly marked on the package for identification.

Tapes only, without Cases

<table>
<thead>
<tr>
<th>Length, feet</th>
<th>Prices</th>
</tr>
</thead>
<tbody>
<tr>
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<td>75</td>
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</table>

<table>
<thead>
<tr>
<th>Length, meters</th>
<th>Prices</th>
</tr>
</thead>
<tbody>
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<tr>
<td>15</td>
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<table>
<thead>
<tr>
<th>Graduated one side</th>
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</tr>
</thead>
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<td>22</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Graduated two sides</th>
<th>Prices</th>
</tr>
</thead>
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Starrett

Pocket Steel Tapes No. 500

No. 500 These tapes are ½ inch wide, in well finished
nickel-plated cases, with rounded edges. Spring wind
in center stops. Graduated in inches and sixteenths of an
inch.

38-inch Price, each... 36
60-inch Price, each... 36
72-inch Price, each... 36
90-inch Price, each... 36
120-inch Price, each... 36... 38

No. 500A—Metric Same as No. 500, except that it is graduated on one side only:

 millimeters. 1 meter Price, each... 10
10 meters Price, each... 10
10 meters Price, each... 10
20 meters Price, each... 20
30 meters Price, each... 30

No. 500B Architects' Tape—50 inches. Graduated one side full length consecutive inches on
sixteenths; other side containing ⅛, ¼, ½, ⅜ and ⅝ inch architects' scales.
Price, each... 5

No. 549 Builders' Tape—60 inches. Graduated with ½-inch scale from 1 to 600 on one side, and with ¼-inch scale from 1 to 260 on the other side. Specially recommended for builders, contractors and architects, as each full tape will be either a quarter or a half of a thousand ft depending on the scale of the plans, making it very simple to figure out the total length.
Price, each... 5

Above numbers packed 1 in a box; 6 boxes in a carton.

No. 501 M and E Metric and English

No. 501 Same style as our No. 500A, but graduated in inches and sixteenths of an inch on one side, millimeters on the other side.

Length, inches Length, millimeters Price, each
38 1
60 1½
72 2
90 2½
120 3

Above numbers packed 1 in a box; 6 boxes in a carton.

Millmen's Steel Tapes No. 504

With Hook

This style of tape with markings starting from the inner side of the hook and marked consecutive inches from 1 to
144, in 16th divisions, enables workmen in steel mills, carpenters, etc., to readily measure metal sheets without con-
secutive.
Standard ½ inch wide ribbon. Steel case, nickel plated.
Folding flush handle and push button. Diameter about 2¼ inches.

Note: Same tapes marked feet, inches and 16ths for
staked on request at regular list prices below.

Length, inches 144 inches (12 feet)
No. 504 Length, 240 inches (20 feet)

Packed in 1 box.

Starrett

Steel Measuring Tapes No. 530

The Popular Priced Tape—Quick Reading

A moderate priced tape without sacrificing disability.
The case consists of two metal sections, covered with Atalor black artificial leather, which is drawn and held in position by a conic-conic convex ring. The opening in the case has a metal re-inforcement with roller, thereby preventing damage to either
the case or the tape. All metal parts have bright nickel finish.

Hang ¼ inch wide, quick reading tape, push button and holding
handle. Graduated in feet, inches and eighths of an inch.
Length, feet... 35 60 75 100
Price, each... 8

Above sizes and listing for Domestic Trade.
For Export Trade we furnish these tapes in the above and
some additional sizes, graduated Metric, Metric and English,
size inches and links.

Information regarding Export list and sizes sent on request.

Note: See page 40 describing Tape Hooks.

No. 502

In Steel Cases—With Push Button—Quick Reading

The tapes are ¼ inch wide, in strong and well finished nickel-plated steel cases, with flush handle and push button on opposite side, a slight pressure of which will instantly release the handle.

Length, feet... 25 50
Price, each... 10

No. 502A Graduated in Metric measure (centimeters and millimeters) the entire length.
Length, meters... 10 15
Price, each... 10

No. 502B Graduated Metric on one side, English on the other side.
Length, feet... 33 50
Price, each... 10 15

For special graduations which may be supplied, see page 35.

For prices of tapes only, see page 35.

No. 512

In Leather Cases—With Push Button—Quick Reading

These tapes are ½ inch wide, in hard leather cases, with flush handle and push button on the opposite side, a slight pressure of which will instantly release the handle. Trimmings nickel plated.

Length, feet... 25 50
Price, each... 10

No. 512A Graduated in Metric measure (centimeters and millimeters) the entire length.
Length, meters... 10 15
Price, each... 10

No. 512B Graduated Metric on one side, English on the other side.
Length, feet... 33 50
Price, each... 10 15

For special graduations which may be furnished, see page 35.

For price of tapes only, see page 35.

Above numbers packed 1 in a box.
Steel Measuring Tapes
Nos. 505 and 506
In Steel Cases with Push Button—Quick Reading

These tapes are ¼ inch wide, in strong and well-finished nickel-plated steel cases, with flush handle and push button on opposite side, a slight pressure of which will instantly release the handle.

| No. 505 | Graduated in feet, inches and 8ths of an inch. |
| No. 506 | Graduated in feet, 16ths and 100ths of a foot. |
Length, feet | 25 | 33 | 50 | 66 | 75 | 100 |
Price, each | |
| No. 505A | Graduated Metric (centimeters and millimeters) the entire length. |
Length, meters | 10 | 15 | 20 | 25 | 30 |
Price, each | |
| No. 506B | Graduated Metric on one side, English on the other side. |
Length, feet | 25 | 33 | 50 | 66 | 75 | 82 | 100 |
Price, each | |

For special graduations which may be supplied, see page 35. For price of tapes only, see page 38.

Packed 1 in a box.

Nos. 510 and 511
In Leather Cases with Push Button—Quick Reading

These tapes are ½ inch wide, in hard leather cases, with flush handle and push button on opposite side, a slight pressure of which will instantly release the handle. Trimmings nickel plated.

| No. 510 | Graduated in feet, inches and 8ths of an inch. |
| No. 511 | Graduated in feet, 16ths and 100ths of a foot. |
Length, feet | 25 | 33 | 50 | 66 | 75 | 100 |
Price, each | |
| No. 510A | Graduated Metric (centimeters and millimeters) the entire length. |
Length, meters | 10 | 15 | 20 | 25 | 30 |
Price, each | |
| No. 510B | Graduated Metric on one side, English on the other side. |
Length, feet | 25 | 33 | 50 | 66 | 75 | 82 | 100 |
Price, each | |

For above tapes graduated in links and poles on reverse side, also for special graduations, see page 35. For price of tapes only, see page 38. Packed 1 in a box.

No. 510 Steel Tapes in Consecutive Inches
For work requiring long measurements expressed in inches

Our No. 510 Tape supplied graduated on one side only in 16ths, with inches numbered consecutively.

| No. 510 | Graduated 300 inches (50 feet) |
| No. 511 | Graduated 600 inches (100 feet) |
Price, each | |

Prices for longer lengths quoted on application.

Stainless Steel Measuring Tapes
Nos. 520 and 521
Quick Reading—Constant Legibility—Resistant to Corrosion under All Ordinary Conditions

Users of tapes whose work is largely in the open, where rust and corrosion play havoc, recognize in these STAINLESS STEEL-TAPE a real service in maintenance and added accuracy and a timesaver in reading and cleaning.

In wet turning work, around salt water, and in damp and dirty locations such as often prevail, the usual frequent cleanings which wear down the markings of non-stainless tapes are greatly reduced, thus prolonging the life of the tape.

On account of the properties of stainless tape-steel we recommend that ordinary care be used against tape being bent too sharply.

| No. 520 | Graduated in feet, inches and eighths of an inch. |
| No. 521 | Graduated in feet, tenths and hundredths of a foot. |
Length, feet | 50 | 100 |
Price, each | |

Packed 1 in a box.
Starrett
Tape Hooks

Can be Furnished on Any of Our 3/4-inch Wide Steel Tapes

A most satisfactory hook: Inbuilt with end link. Folds neatly out of the way when not in use. A tape with this hook attached might well be termed the “one man” tape.

In ordering tapes with Tape Hook—specify “with hook” after catalog number.

Tape Hook supplied on any of our 3/4-inch wide Steel Tapes.

For No. 530 Tape without hook, see page 37.

Price extra per Tape...

Hooks for Steel Tapes
No. 514

These hooks are made from brass casting and see nickel plated. They are easily attached to our 3/4-inch, except pocket tapes.

4-inch tapes and are designed to take measurements from the inside of the hook.

No. 514A For 3/4-inch Tapes ............................... Price, each.

No. 514B For 4-inch Tapes ............................... Price, each.

Above numbers packed 1 in a box.
Starrett

Surveyor's Chain Tapes Nos. 528 and 529
With ¼-inch Heavy Steel Tape

Frames nickel coated, rosewood handle. Folding winding handle. Two detachable rings (No. 524 B), each tape. Tapes are readily detached from reel, kept with a ring at each end. These tapes are graduated on one side only in feet or inches and poles. Tape graduated in feet with first foot graduated in tenths or hundredths. Unless otherwise ordered, those in tenths will be sent.

Graduations and figures will wear out on the tape.

The graduations are etched on the tape and will not put on with washers which weaken the tape or with soft metal which wears off these tapes.

No. 528 100 links, 25 feet, Tape only, with rings. Price, each...

No. 529 100 feet, Price, each ...

Price each...

Packed 1 in a box.

Oil Gaging Steel Tapes No. 507
4¼-inch Tape—Quick Reading—With Lock Handle

This tape meets the demand for a real tape for gaging the heaviest of slabs; one that will withstand severe usage. The tape ribbon being ¼ inch wide is stronger and heavier than in our regular tapes and is mounted in a strong nickel-plated metal frame. The drum is cored for lightness and is about 2½ inches in diameter, and with the long winding handle assures increased leverage and in turn makes it quick and easy to operate. The winding handle is hinged to fold to the right or left, making it possible to lock the tape at the desired length, the knob folding neatly.

No. 507 With plumb bob, length 33 feet...

No. 507 With plumb bob, length 50 feet...

Graduated in feet, inches and 8ths of an inch on one side only...

Price, each...

Packed 1 in a box.

Oil Gaging Steel Tape No. 508
With Lock Handle and Brass Plumb Bob

When sounding for the bottom of the tank the lock handle is most convenient and is preferred by many gagers.

Our black finish, standard weight tape line, distinctly marked with bright steel figures and graduations, provide easy reading with accurate measurements. Polished hardwood handle and nickel-plated frame.

The lock handle permits good grip and holds the tape at any point.

Fitted with our No. 515 B Solid Brass Plumb Bob, 2½ inches long, 1½ inches diameter; weight, 6 ounces.

Length of bob and swivel snap hook, which allows quick removal, is included in the markings on the tape.

Graduated in feet, inches and 8ths of an inch.

No. 508 With No. 515 B Bob—25 feet, each...

No. 508 With No. 515 B Bob—33 feet, each...

No. 508 With No. 515 B Bob—50 feet, each...

We can also furnish the tapes listed above with Stainless Steel lines at an additional cost. Prices quoted upon application.

Oil Gaging Steel Tape No. 509
With Folding Handle and Brass Plumb Bob

When gaging light crude oils, gasoline, etc., this tape is very popular.

Our black finish, standard weight tape line distinctly marked with bright steel figures and graduations provide easy reading with accurate measurements. Polished hardwood handle and nickel-plated frame.

Fitted with our No. 515 B Solid Brass Plumb Bob, 2½ inches long, 1½ inches diameter; weight, 6 ounces.

Length of bob and swivel snap hook, which allows quick removal, is included in the markings on the tape.

Graduated in feet, inches and 8ths of an inch.

No. 509 With No. 515 B Bob—25 feet...

No. 509 With No. 515 B Bob—33 feet...

No. 509 With No. 515 B Bob—50 feet...

We can also furnish the tapes listed above with Stainless Steel lines at an additional cost. Prices quoted upon application.

No. 509 may be supplied with tape line going between rolls in end of frame (as shown in end of frame).
Starrett

Plumb Bobs for Steel Tapes No. 515

These plumb bobs are used on oil burning boats and in oil fields for gaging the oil in tanks. The attachment, as shown in the cut, is included in the measurement of the tapes. The plumb bobs may be detached from the nickel-plated swivel snap when not in use. The No. 515A is made of cast iron with an enameled finish; the No. 515B and No. 515C are made of solid brass. We can attach these plumb bobs to any of our steel tapes at the prices listed below.

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<th>Type</th>
<th>Description</th>
<th>Weight</th>
<th>Price</th>
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<td>No. 515A</td>
<td>Plumb Bob only, with Swivel Snap, approx. weight, 13 ounces</td>
<td>Price, each</td>
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<td>No. 515B</td>
<td>Plumb Bob only, with Swivel Snap, approx. weight, 8 ounces</td>
<td>Price, each</td>
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<tr>
<td>No. 515C</td>
<td>Plumb Bob only, with Swivel Snap, approx. weight, 18 ounces</td>
<td>Price, each</td>
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Improved Mercury Plumb Bobs No. 87

The improvement consists in our patented device for fastening the string without a knot to tie or twist, simply by drawing it into the peculiarly slotted neck at the top, after unwinding the required length, when the bob will hang perfectly true.

These plumb bobs are made from solid steel, bored and filled with mercury. Noteworthy features are their great weight in proportion to size, low center of gravity, small diameter, hardened and ground points, knurling on the body and the simple and effective device at top for fastening and of line after winding up. Nickel plated. Each is provided with a braided silk line.

- **4 inches long, 1/4 inch diameter, 3½ ounces**: Price, each
- **5 inches long, 1/4 inch diameter, 8 ounces**: Price, each
- **6 inches long, 1/4 inch diameter, 12 ounces**: Price, each
- **6 inches long, 1 inch diameter, 16 ounces**: Price, each

Steel Plumb Bobs No. 177

The same in design as No. 87, but made from solid steel, the mercury being omitted.

- **4 inches long, 1/4 inch diameter, 2½ ounces**: Price, each
- **5 inches long, 1/4 inch diameter, 5 ounces**: Price, each
- **6 inches long, 1/4 inch diameter, 8½ ounces**: Price, each
- **6 inches long, 1 inch diameter, 14½ ounces**: Price, each

Above numbers packed 1 in a box.

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Starrett Levels and Transits are designed with the needs and training of farmers, contractors, carpenters, millwrights, masons and similar craftsmen in mind. They are practical, accurate instruments, yet they can be used without the knowledge of higher mathematics or engineering principles.

---

STARRETT
LEVELING INSTRUMENTS AND TRANSITS
Inexpensive—Does not require a trained engineer to use it.

To meet the demands of contractors, builders, carpenters, farmers, and others for a transit and level, low in price, yet sufficiently accurate for their needs, we have developed the Starrett Transit and Level. These instruments are very simple; they do not have the expensive attachments found on engineers' instruments. The builder and contractor find them indispensable in laying out buildings, locating batter boards, leveling foundation walls, and in pouring concrete floors. Farmers and ranchers use them in laying out modern tile drainage systems, irrigation ditches, and new roads. Millwrights and machinists may use the Starrett Level to advantage in leveling and aligning machinery in mill or factory. In general, it may be said that the Starrett Transit or Level can be used for the same purposes as any engineer's transit and level. Free from complications and confusing adjustments, any man may use these instruments without the knowledge of higher mathematics or engineering principles necessary for using the much higher priced engineers' transit.

A comprehensive booklet, explaining in detail the uses and illustrating practical problems accompanying each instrument. One of these booklets will be mailed on request to anyone interested.

The instrument is composed of iron and brass, and consists of a tripod, to the head of which is connected a ball-and-socket joint, an upper plate which can be leveled by the leveling screws.

This plate is recessed to contain a graduated arc for taking horizontal angles. This arc is 1/4 of a circumference, reading 90° each side of 0°, and being independent of level and sight tube can be turned and used at any point of a complete circle. On this plate rests a triangular frame to which are attached a level, a graduated arc for taking vertical angles, graduated 45° each side of 0°, and a sight tube or telescope.

The Plain Sight Tube has no lens, is brass, twelve inches long; in one end is a steel plate, which is a curved glass, the other a usual lens. It has a long handle, which can be adjusted from two feet to eight inches in height. The sight tube, level case, and graduated arc are nickel plated, the other parts are japanned.

The advantages of this transit are as follows: The head is held to the tripod with a bolt and knurled nut, so as to make it stationary at any given point; the graduated arc can be changed to the base plate by throwing a small cam arrangement, and a spring index finger to mark the arc graduations. The transit with short legs is housed in a substantial wood box about 4 ft. x 14 in. high, with a leather strap running completely over the box cover, weighing approximately 8 pounds, making it easily carried about. The extension legs are not packed in the box. They weigh about 3 pounds, so when used with the short legs the transit weighs about 11 pounds.

Directions for setting up and using are enclosed with each leveling instrument.

Furnished in wood carrying case.

Weight, packed in box for shipment, approximately 20 pounds.

PRICES

No. 101A With plain sight tube, long legs and plain level vial......Price, each......

Iron target, without pole......

No. 999A sent unless otherwise ordered.

Send for free copy of Starrett Transit and Level Booklet.
Combination Squares

The combination square is, as its name indicates, a tool that can be used for the same purposes as an ordinary try-square but it differs from the try-square in that the head can be made to slide along the blade and clamp at any desired place, and combined with the blade is adjustable in height. This sliding of the head is accomplished by means of a central groove in which travels a guide in the head of the square. The groove in all blades being concaved eliminates compaction of dirt, giving a free and easy slide. This permits the scale to be pulled out and used simply as a rule. It is frequently desired to vary the length of the blade of a try-square and this is readily accomplished with the combination square. It is also convenient to square a piece with a constant and at the same time tell whether one or the other is level or plumb. The spirit level in the head of the square permits this to be done without the use of a separate level. The head of the square may also be used as a level.

Because the blades may be moved in the head, the combination square makes a good marking gage, by setting the blade at the proper position and clamping it there. The whole combination square may then be slid along as with an ordinary gage. As a further convenience, a scriber is held frictionally in the head by a small brass bushing. The scriber head projects from the bottom of the square stock in a convenient place to take out quickly.

In laying out, preliminary to machining, the combination square may be used in the same manner as a drawing tool at right angles as well as at right angles, for one edge of the square head is at 45°. Wherein an error of accuracy is not essential the blade of the combination square may be set at any desired position and the square used as a depth gauge to measure in millimeters. The end of the blade may be set flush with the edge of the square, and used as a depth gauge.

The head may be unclamped and entirely removed from the blade and a center head substituted so that the same tool can quickly be used to find the centers of shafts and other cylindrical pieces. An attachment described on a succeeding page and a second blade or rule can be clamped at any point so that it may be drawn parallel to the head. When combined with the center head this attachment is convenient for scribbling parallel chords on the ends of cylindrical work.

The hardness of the blade of this combination square prevents the corners from wearing down and destroying the graduations, thus keeping the blade at all times accurate. This combination square combining as it does a rule, square, miter, depth gauge, height gauge, and center head permits of more rapid work on the part of the mechanic, saves time, and tends toward the goal for which all mechanics are striving—greater efficiency.

No. 11 M

Metric—With Hardened Blade

The same as No. 11, except that the blade is graduated three edges in millimeters and one edge in 1/32 millimeters.

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 in.</td>
<td>Price</td>
<td>without</td>
</tr>
<tr>
<td>6 in.</td>
<td>Price</td>
<td>without</td>
</tr>
<tr>
<td>8 in.</td>
<td>Price</td>
<td>without</td>
</tr>
<tr>
<td>10 in.</td>
<td>Price</td>
<td>without</td>
</tr>
<tr>
<td>12 in.</td>
<td>Price</td>
<td>without</td>
</tr>
</tbody>
</table>

No. 11 M and E

Metric and English—With Hardened Blade

The same as No. 11, except that the blades are graduated in Metric and English, as follows: one side graduated in 1/32 millimeters and 32nds of an inch, the reverse side graduated in millimeters.

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 in.</td>
<td>Price</td>
<td>without</td>
</tr>
<tr>
<td>6 in.</td>
<td>Price</td>
<td>without</td>
</tr>
<tr>
<td>8 in.</td>
<td>Price</td>
<td>without</td>
</tr>
<tr>
<td>10 in.</td>
<td>Price</td>
<td>without</td>
</tr>
<tr>
<td>12 in.</td>
<td>Price</td>
<td>without</td>
</tr>
</tbody>
</table>

Sent with center head unless otherwise ordered. Pack 1 in a box.
Starrett

Combination Squares No. 11S

With Shrink Graduations, for Pattern Makers

These squares are the same as our No. 11, with hardened blade, except that the blades graduated the same as shrink rules, made in No. 4 graduation only and in 1/4 and 1/2 inch shrinkage to the foot, as listed below.

Blades Only

12-inch blade only .................................................. Price, each,

Sent with center head and with 1/4-inch shrinkage, unless otherwise ordered.

12-inch combination squares and sets, also our level vices.

Prices of Separate Parts of Squares No. 11, No. 11 M, No. 11 M and E

<table>
<thead>
<tr>
<th>Blade</th>
<th>Stock</th>
<th>Center Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-inch or 10 cm.</td>
<td>6-inch or 15 cm.</td>
<td>8-inch or 20 cm.</td>
</tr>
<tr>
<td>12-inch</td>
<td>13-inch or 30 cm.</td>
<td>16-inch or 40 cm.</td>
</tr>
<tr>
<td>24-inch or 60 cm.</td>
<td>28-inch or 70 cm.</td>
<td>32-inch or 80 cm.</td>
</tr>
</tbody>
</table>

Note: Blades—12-inch size only—supplied with Readable Graduation in No. 4 Graduations (5ths, 10ths, 25ths and 50ths), also in No. 16 Graduations (32nds, 64ths, 100ths and 200ths). Price, each

Combination Squares No. 94

With Level, Miller and Plumb

Stainless Steel Square Blades
No. 1033

And now the Stainless Steel Square Blade, made to go with our 12-inch Combination Squares and Sets and interchangeable so the machinist and the carpenter who have often wanted a blade, resistant to corrosion and rust, can now own one. Made in 12-inch length only, and with 5ths and 10ths graduations on one side and 32nds and 64ths on the other.

12-inch blade. .................................................. Price, each.

18 and 24 inch sizes quoted on application.

Drop-Forged Steel Combination Squares
No. 33

With Hardened Heads and Hardened Blades

Both stock and center head are hardened, as well as the blade, which is graduated with heavy squares reading both ways. All sizes except 4-inch have level.

No. 33 M Metric

The same as No. 33, except that the blade is graduated three edges in millimeters and one edge in 1/4 millimeters. Sent with center head unless otherwise ordered.

No. 33 M and E Metric and English

The same as our No. 33, except that the blade is graduated in Metric and English, as follows: one side graduated in 1/4 millimeters and 32nds, the reverse side in millimeters and 64ths.

Prices of Separate Parts of Squares No. 33, No. 33 M and No. 33 M and E Drop-Forged Hardened Heads and Blades

<table>
<thead>
<tr>
<th>Blade</th>
<th>Stock</th>
<th>Center Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-inch</td>
<td>6-inch or 15 cm.</td>
<td>8-inch or 20 cm.</td>
</tr>
<tr>
<td>12-inch</td>
<td>13-inch or 30 cm.</td>
<td>16-inch or 40 cm.</td>
</tr>
<tr>
<td>24-inch or 60 cm.</td>
<td>28-inch or 70 cm.</td>
<td>32-inch or 80 cm.</td>
</tr>
</tbody>
</table>

Note: Blades—12-inch size only—supplied with Quick Reading Graduation in No. 4 graduation (5ths, 10ths, 25ths and 50ths), also in No. 16 graduation (32nds, 64ths, 100ths and 200ths). Price, each.
ROSE TOOLS, INC.

Starrett

Drop-Forged Steel Combination Square No. 33 J
Small Size with 6-inch Blade—Quick Reading

The center head on this tool is made with broader sides than on our other center heads. Its feature, while doing the work of any center head, is in connection with angle and gear work, as the broad sides taper on one side of the head only, enabling one to find centers and scribe lines on angles. The sides are 1/16 inches wide at the ends. This center head can be furnished to fit the 12, 18 and 24 inch sizes of our Combination Squares and Sets, and No. 10 Inclinometer as well as the same tools graduated in millimeters.

The center head is a "baby" or "junior" of Drop-Forged Steel Combination Squares. Should appeal to tool and die makers. Patterned after our No. 9 line but much reduced in size and weight. The 6-inch hardened blade is also proportionately smaller with the conventional 8ths, 16ths, 32nds, and 64ths graduations, the latter having wide reading figures. Weighs about 5 ounces.

PRICE
With 6-inch blade

Center Squares No. 32

Sent with No. 4 graduation, 8ths, 16ths, 32nds, 64ths, unless otherwise ordered.

Center head, alone

Center head, with 12-inch blade

Center head, with 16-inch blade

Center head, with 24-inch blade

Large Combination Squares No. 8

With Hardened Blade

This square is designed for the use of every one desiring a heavier and larger adjustable square. Blade graduated in 8ths, 16ths, 32nds and 64ths.

18-inch blade 1/2 inch wide, 1/32 inch thick.
8-inch stock, with 5-inch miter.
Without center head Price, each.

24-inch, blade 1 3/16 inch wide, 1/32 inch thick.
9-inch stock, with 5-inch miter.
Without center head Price, each.

Center head only, for either size.

Sent without center head unless otherwise ordered.

Above numbers packed 1 in a box.

Starrett

Attachments for Combination Squares
No. 289

The use of this attachment is so well shown by the illustrations that a further description is hardly necessary. The attachment is made to fit the 12, 18 and 24 inch blades of our Nos. 11 and 33 squares, and can be used in connection with any of our regular rules as wide as 1 inch, or with our long steel Square No. 21, for laying out keyways, etc. The illustrations on this page show just a few of the ways in which the attachment can be used.

PRICES
No. 289 A 1 1/4 x 1 1/2 inch. Each.
No. 289 B 2 1/4 x 2 1 1/2 inch. Each.
Packed 4 in a box.

No. 266

This attachment will adapt itself to many uses where a device of this kind is needed. It clamps to a 12-inch blade of our regular combination square, and can be used as a height gauge, for scribing lines, leveling planer work, etc. It was primarily designed as a simple attachment to line up locomotive guides by placing the base of square stock against the guide, and lining with the center line of piston.

No. 266

Packed 1 in a box.
**Starrett**

**Bevel Protractors No. 12**

With Hardened Blade

An adjustable rule, held firmly at any point by a thumb nut, passes through a revolving turret which is finely graduated in degrees from 0 to 180, both right and left, and can be accurately adjusted to show any angle. A valuable feature is the small level attached to the head, forming an adjustable level to show any degree, thus greatly increasing the usefulness of the instrument.

This level is attached to one side of the head as shown in the small engraving. The blades are of the same material as used on our No. 11 squares, and furnished with our No. 4 or No. 7 graduation. These protractors will be sent with 12-inch blades of No. 6 graduation unless otherwise ordered. The head is 7 inches long.

- 9-inch, complete: Price
- 12-inch, complete: Price
- Protractor Head only, with Level: Price

Note: The Protractor Head for 9-inch blade is not interchangeable with the other sizes.

**No. 12 M Metric**

The same as No. 12, except that the blade is graduated in millimeters and 1/16 millimeters.

- 20 cm: Price
- 30 cm: Price

**No. 12 M and E Metric and English**

The same as No. 12, except that the blade is graduated in Metric and English, as follows: one side graduated in 1/16 millimeters and 32nds, the reverse side graduated in millimeters and 1/32nds.

- 20 cm: Price
- 30 cm: Price

Above numbers packed 1 in a box.

**V-Edge Protractor No. 490 B**

For Checking the Perpendicular Alignment of Motor Cylinders

Mechanics doing cylinder reconditioning work will find this V-Edge Protractor a very valuable tool.

Any error in alignment will be quickly detected. By ascertaining the variation between protractor head and face of block, with the new or failure leaves, the operator can correctly adjust the reconditioning machine.

No. 490 B 12-inch, complete: Price

**Starrett**

**Bevel Protractors No. 490**

With Hardened Blade and Reversible Head

This tool is of the same general design as our No. 12 Protractor, with the additional feature of having the head extend both sides of the blade. This greatly increases the usefulness of the tool, as the same angular may be transferred from either side of the blade without resetting. Another improvement is that the turret is graduated to read both ways from 0 to 180 degrees. Mechanics will clearly appreciate this point, as direct readings may be had from the turret, indicating the supplement of the angle, as well as the angle required.

The head of the Protractor is 7 inches long and is supplied with an accurate level attached to one side as shown by small cut. The blades are hardened and graduated with heavy figures reading both ways. The blades are made with fine smooth finish to match the finish of our No. 33 Combination Square. The heads will also fit the blades of our No. 11 Combination Square and our Combination Sets. Furnished with No. 4 or No. 7 graduation. These Protractors will be sent with 12-inch blades of No. 6 graduation unless otherwise ordered.

- 6-inch, complete: Price, each
- 12-inch, complete: Price, each
- 18-inch, complete: Price, each
- 24-inch, complete: Price, each
- Protractor Head only, with Level: Price, each

Note: The Protractor Head for 9-inch blade is not interchangeable with the other sizes.

**No. 490 M Metric**

The same as No. 490, except that the blade is graduated in millimeters and 1/16 millimeters.

- 20 cm: Price, each
- 30 cm: Price, each

**No. 490 M and E**

Metric and English

The same as No. 490 and No. 490 M, except that the blade is graduated in Metric and English, as follows: one side graduated in 1/16 millimeters and 32nds, the reverse side graduated in millimeters and 1/32nds.

- 20 cm: Price, each
- 30 cm: Price, each

Above numbers packed 1 in a box.
Starrett
Bevel Protractors No. 491
With Hardened Blade

This is the same as our No. 450, except that the head is made with checked face to match the heads of our Combination Squares No. 11. Furnished with No. 4 and No. 7 graduations. No. 4 graduation sent unless otherwise ordered.

<table>
<thead>
<tr>
<th>Blade Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-inch, complete</td>
<td>Price</td>
</tr>
<tr>
<td>12-inch, complete</td>
<td>Price</td>
</tr>
<tr>
<td>Protractor Head only, with Level</td>
<td>Price</td>
</tr>
</tbody>
</table>

Note: The Protractor Head for 9-inch blade is not interchangeable with the other sizes.

No. 491 M — Metric

<table>
<thead>
<tr>
<th>Blade Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 cm., complete</td>
<td>Price</td>
</tr>
<tr>
<td>30 cm., complete</td>
<td>Price</td>
</tr>
<tr>
<td>Protractor Head only, with Level</td>
<td>Price</td>
</tr>
</tbody>
</table>

No. 491 M and E — Metric and English

The same as No. 491 and 491 M, except that the blade is graduated in Metric and English. One side graduated in $\frac{1}{8}$ millimeters and 32nds, the reverse side graduated in millimeters and $\frac{1}{8}$ millimeters.

<table>
<thead>
<tr>
<th>Blade Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 cm., complete</td>
<td>Price</td>
</tr>
<tr>
<td>30 cm., complete</td>
<td>Price</td>
</tr>
<tr>
<td>Protractor Head only, with Level</td>
<td>Price</td>
</tr>
</tbody>
</table>

Bevel Protractors No. 492
With Hardened Blade

These are the same as our No. 12, except that the heads are made with smooth finish and match the finish of our No. 33 Combination Squares. Furnished with No. 4 and No. 7 graduations. No. 4 graduation sent unless otherwise ordered.

The turret is graduated to read both ways from 0 to 180 degrees.

<table>
<thead>
<tr>
<th>Blade Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-inch, complete</td>
<td>Price</td>
</tr>
<tr>
<td>12-inch, complete</td>
<td>Price</td>
</tr>
<tr>
<td>Protractor Head only, with Level</td>
<td>Price</td>
</tr>
</tbody>
</table>

No. 492 M — Metric

The same as No. 492, except that the blade is graduated in millimeters and $\frac{1}{8}$ millimeters.

<table>
<thead>
<tr>
<th>Blade Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 cm., complete</td>
<td>Price</td>
</tr>
<tr>
<td>30 cm., complete</td>
<td>Price</td>
</tr>
<tr>
<td>Protractor Head only, with Level</td>
<td>Price</td>
</tr>
</tbody>
</table>

No. 492 M and E — Metric and English

The same as Nos. 492 and 492 M, except that the blade is graduated in Metric and English. One side graduated in $\frac{1}{8}$ millimeters and 32nds, the reverse side graduated in millimeters and $\frac{1}{8}$ millimeters.

<table>
<thead>
<tr>
<th>Blade Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 cm., complete</td>
<td>Price</td>
</tr>
<tr>
<td>30 cm., complete</td>
<td>Price</td>
</tr>
<tr>
<td>Protractor Head only, with Level</td>
<td>Price</td>
</tr>
</tbody>
</table>

Above numbers packed 1 in a box.
**Starrett**

**Combination Sets**

**No. 433**

Drop-Forged Stock and Center Head—Hardened Blade

This set consists of our No. 33 Combination Square with hardened drop-forged stock and center head as shown on page 81 and our No. 492 Protractor Head. Furnished with No. 4 and No. 7 graduations. Sent with blades of No. 4 graduation unless otherwise ordered.

<table>
<thead>
<tr>
<th>PRICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-inch, set complete</td>
</tr>
<tr>
<td>12-inch, set complete</td>
</tr>
<tr>
<td>18-inch, set complete</td>
</tr>
<tr>
<td>24-inch, set complete</td>
</tr>
</tbody>
</table>

**No. 433 M**

Metric

The same as No. 433, except that the blade is graduated three edges in millimeters and one edge in 1/2 millimeters.

<table>
<thead>
<tr>
<th>PRICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 cm., set complete</td>
</tr>
<tr>
<td>30 cm., set complete</td>
</tr>
<tr>
<td>50 cm., set complete</td>
</tr>
</tbody>
</table>

**No. 433 M and E**

Metric and English

The same as No. 433 and 433M, except that the blade is graduated in Metric and English. One side graduated in 1/2 millimeters and 32nds, the reverse side graduated in millimeters and 64ths.

<table>
<thead>
<tr>
<th>PRICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 cm., set complete</td>
</tr>
<tr>
<td>30 cm., set complete</td>
</tr>
<tr>
<td>50 cm., set complete</td>
</tr>
</tbody>
</table>

Above numbers packed 1 in a box.

**Starrett**

**Combination Sets**

**No. 434**

Drop-Forged Stock and Center Head—Hardened Blade

Reversible Protractor Head

This set consists of our No. 33 Combination Square with hardened drop-forged stock and center head as shown on page 81 and our Reversible Protractor Head No. 490 as shown in cut. Furnished with No. 4 and No. 7 graduations. Sent with blades of No. 4 graduation unless otherwise ordered.

<table>
<thead>
<tr>
<th>PRICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-inch, set complete</td>
</tr>
<tr>
<td>12-inch, set complete</td>
</tr>
<tr>
<td>18-inch, set complete</td>
</tr>
<tr>
<td>14-inch, set complete</td>
</tr>
</tbody>
</table>

**No. 434 M**

Metric

The same as No. 434, except that the blade is graduated three edges in millimeters and one edge in 1/2 millimeters.

<table>
<thead>
<tr>
<th>PRICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 cm., set complete</td>
</tr>
<tr>
<td>30 cm., set complete</td>
</tr>
<tr>
<td>50 cm., set complete</td>
</tr>
</tbody>
</table>

**No. 434 M and E**

Metric and English

The same as No. 434 and No. 434M, except that the blade is graduated in Metric and English. One side graduated in 1/2 millimeters and 32nds, the reverse side graduated in millimeters and 64ths.

<table>
<thead>
<tr>
<th>PRICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 cm., set complete</td>
</tr>
<tr>
<td>30 cm., set complete</td>
</tr>
<tr>
<td>50 cm., set complete</td>
</tr>
</tbody>
</table>

Above numbers packed 1 in a box.
Starrett

Combination Sets
No. 435
Reversible Protractor Head—Hardened Blade

This set consists of our No. 11 Combination Square with hardened blade as shown on page 49 and our Reversible Protractor Head No. 491, as shown in cut. Furnished with No. 4 and No. 7 graduations. Sent with blades of No. 4 graduation unless otherwise ordered.

PRICES
9-inch, set complete.......................... 8
12-inch, set complete.......................... 12
18-inch, set complete.......................... 15
24-inch, set complete.......................... 22

No. 435 M
Metric
The same as No. 435, except that the blade is graduated three edges in millimeters and one edge in 1/16 millimeters.

PRICES
20 cm., set complete.......................... 8
30 cm., set complete.......................... 12
50 cm., set complete.......................... 17
60 cm., set complete.......................... 23

No. 435 M and E
Metric and English
The same as No. 435 and No. 435 M, except that the blade is graduated in Metric and English. One side is graduated in 1/16 millimeters and 32nds, the reverse side graduated in millimeters and 5ths.

PRICES
20 cm., set complete.......................... 8
30 cm., set complete.......................... 12
50 cm., set complete.......................... 17
60 cm., set complete.......................... 23

Starrett

Inclinometers No. 10
With Hardened Blade

This cut represents an inclinometer try-square and level protractor combined. It is compact, convenient, and a complete and perfect substitute for several costly tools. It consists of a stock and disc both slotted to receive the blade, which folds in the stock. The blade attached to the graduated rotary disc may be secured at any angle from 0 to 90 degrees, and by loosening the clamp screw, it may be shortened or extended full length, or removed for a straight edge.

The stock is furnished with center head and center head, to fit all sizes. With 12-inch blade, without center head 8
With 18-inch blade, without center head 15
With 24-inch blade, without center head 22

No. 10 M Metric

The same as No. 10, except that the blade is graduated three edges in millimeters and one edge in 1/16 millimeters.

PRICES
50 cm. blade, without center head 5
50 cm. blade, without center head 13
Center head, to fit all sizes 2

Above numbers packed 1 in a box.

Double Protractor No. 16

This protractor blade closes in the stock either way against a stop, making a square, plum and level. With a 24-inch blade it weighs about 1/2 pounds. The turret is graduated on both sides, one in degrees, the other to show pitch to the foot, so that the blade may be set by the graduation for laying off angles to any degree or any pitch, and the opposite branch of the stock will be right to lay out the complementary angle without mental calculation or effort, for valley roofs, brickwork, stair gages, etc. The levels are so arranged that work can be leveled up to any degree or pitch underneath or on top of a roof, rafters, stair stringers, etc. A square or protractor with the sliding blade can be used in places where a fixed blade could not, and is a substitute for a whole kit of squares from the shortest to the full length of blade, enabling a depth gage for squaring in mortises and transferring measurements. It may be used in place of the carpenter's old-time steel square with the advantages of being packed in a chest without taking up so much room.

With 12-inch blade .................................. 12
With 18-inch blade .................................. 18
With 24-inch blade .................................. 24

Stock only .......................................... 4

The 12, 18 and 24 inch blades of our combination squares will fit the protractor stock.

Furnished with No. 4 graduation. Protector with 12-inch blade, No. 4 graduation sent unless otherwise ordered.

Packed 1 in a box.

ROSE TOOLS, INC.
Starrett

Combination Tool
No. 439

Patented
For Carpenters, Builders, Pattern and Cabinet Makers

The success of our combination square and combination sets led us to develop a combination tool for carpenters and builders. In this one instrument there are combined seven ordinary tools—rule, square, level, protractor, bevel, pitch-to-foot indicator and plum. It consists of a stock 9 inches long, with sliding blade, 18 or 24 inches in length and 1½ inches in width, with No. 4 graduation. The blade is adjustable through the revolving turret in the stock, which is graduated on one side in degrees, with two rows of figures reading either right or left, and on the other side, graduated to show pitch-to-foot, the graduations showing 1/8-inch pitch (see small cut). With levels set in each side of the stock any incline by degrees or pitch-to-foot can be leveled either on top or under the work.

The combination tool is also used for laying out or for cutting valleys or hips of different pitch. The blade is first set to show the pitch desired. Then place the face of the stock against the work and draw a line against the blade; then place the square end of the stock against the work and draw the complementary line, which will give the complementary angle without mental calculation. For a try-square it is far superior to the carpenters' two-foot square, which cannot be folded to put in the chest nor can the blade be shortened when it needs abstructions. Neither can the carpenters' square be used as a level or plum or depth gauge as can this simple tool.

After using this combination tool a short time carpenters will find it very convenient in laying out many kinds of complicated work for which otherwise would require considerable calculation. It is a very compact tool, weighing less than three pounds.

18-inch..............Price, each, 24-inch..............Price, each, 20 inches.
Packed 1 in a box.

Starrett

Hardened Steel Squares
No. 20

Not Graduated—Recommended as a Standard Square

These squares are fine precision instruments and should be handled with reasonable care. The beams and edges are hardened and accurately ground to insure parallelism and straightness.

Unusual care in manufacturing insures their accuracy.

<table>
<thead>
<tr>
<th>Approximate Length of Beams</th>
<th>Approximate Length of Blade</th>
<th>Price</th>
<th>Wood Case Extra</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch</td>
<td>1 inch</td>
<td>1 inch</td>
<td>Price Extra</td>
</tr>
<tr>
<td>1½ inches</td>
<td>1½ inches</td>
<td>1½ inch</td>
<td>Extra</td>
</tr>
<tr>
<td>2 inches</td>
<td>2 inches</td>
<td>2 inches</td>
<td>Extra</td>
</tr>
<tr>
<td>3 inches</td>
<td>3 inches</td>
<td>3 inches</td>
<td>Extra</td>
</tr>
<tr>
<td>4½ inches</td>
<td>4½ inches</td>
<td>4½ inches</td>
<td>Extra</td>
</tr>
<tr>
<td>6 inches</td>
<td>6 inches</td>
<td>6 inches</td>
<td>Extra</td>
</tr>
<tr>
<td>9 inches</td>
<td>9 inches</td>
<td>9 inches</td>
<td>Extra</td>
</tr>
<tr>
<td>12 inches</td>
<td>12 inches</td>
<td>12 inches</td>
<td>Extra</td>
</tr>
<tr>
<td>16 inches</td>
<td>16 inches</td>
<td>16 inches</td>
<td>Extra</td>
</tr>
<tr>
<td>18 inches</td>
<td>18 inches</td>
<td>18 inches</td>
<td>Extra</td>
</tr>
<tr>
<td>24 inches</td>
<td>24 inches</td>
<td>24 inches</td>
<td>Extra</td>
</tr>
</tbody>
</table>

*The 15, 18, and 24 inch squares have a stock support as shown in cut.
Packed 1 in a box.

Note: Prices for larger sizes quoted on application.
For the 30-inch and larger sizes of this type, special bases are used to secure the blade to the beams.
Hardened Bevel Edge Squares No. 55

These squares are similar to our No. 20 Solid Steel Squares shown on page 63, except the two edges of the blade are bevelled on both sides, furnishing practically a close contact with the work. They are made only in the sizes listed below.

<table>
<thead>
<tr>
<th>Length of Blade</th>
<th>Length of Beam</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2 inches</td>
<td>1 1/2 inches</td>
<td></td>
</tr>
<tr>
<td>2 inches</td>
<td>2 inches</td>
<td></td>
</tr>
<tr>
<td>3 inches</td>
<td>3 inches</td>
<td></td>
</tr>
<tr>
<td>4 1/2 inches</td>
<td>4 1/2 inches</td>
<td></td>
</tr>
<tr>
<td>6 inches</td>
<td>6 inches</td>
<td></td>
</tr>
</tbody>
</table>

Sectional view of blade

Packed 1 in a box.

Graduated Hardened Steel Squares No. 63

This cut represents a hardened, solid steel try-square. The square has concave depressions in each side of the stock which not only reduce its weight but make it more convenient to hold between the thumb and finger while being used. The stocks are case-hardened, the blade hardened to spring-temper and graduated in 32nds of an inch on one side and 96ths on the other.

<table>
<thead>
<tr>
<th>Length of Blade</th>
<th>Length of Beam</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 inches</td>
<td>2 1/2 inches</td>
<td></td>
</tr>
<tr>
<td>6 inches</td>
<td>3 1/2 inches</td>
<td></td>
</tr>
<tr>
<td>8 inches</td>
<td>4 inches</td>
<td></td>
</tr>
<tr>
<td>10 inches</td>
<td>5 inches</td>
<td></td>
</tr>
<tr>
<td>12 inches</td>
<td>6 inches</td>
<td></td>
</tr>
</tbody>
</table>

No. 63 M — Metric The same as No. 63, except that the blade is graduated in millimeters on one side and 1/100 millimeters on the other side.

<table>
<thead>
<tr>
<th>Length of Blade</th>
<th>Length of Beam</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 cm.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 cm.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 cm.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Above numbers packed 1 in a box.

Thin Steel Try-Squares No. 21

For Machinists and Draftsmen

**PRICES**

2 x 1 inch, 1/16 inch thick, grad. 16ths, 64ths one side; 32nds, 64ths other...
3 x 2 inch, 1/16 inch thick, grad. 16ths, 64ths one side; 32nds, 64ths other...
4 x 3 inch, 1/16 inch thick, grad. 16ths and 32nds both sides...
5 x 4 inch, 1/16 inch thick, grad. 16ths and 32nds both sides...
6 x 6 inch, 3/32 inch thick, grad. 16ths and 32nds both sides...

No. 21 M — Metric The same as No. 21, except the graduation is in millimeters and 1/100 millimeters on both sides.

<table>
<thead>
<tr>
<th>Length of Blade</th>
<th>Length of Beam</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 x 3 cm., 1.3 mm. thick</td>
<td>Price, each</td>
<td></td>
</tr>
<tr>
<td>10 x 7 cm., 1.6 mm. thick</td>
<td>Price, each</td>
<td></td>
</tr>
<tr>
<td>15 x 10 cm., 1.6 mm. thick</td>
<td>Price, each</td>
<td></td>
</tr>
</tbody>
</table>

Prices for larger sizes quoted on application. Above numbers packed 1 in a package.

"Reliable" Try-Squares No. 60

With Graduated Blade Not Hardened

This cut represents a line of Try-Squares, attractive in design, light and convenient. The blade is firmly held by our patent bolt and nut; by means of which the tool can be readily taken apart, and when worn the blade and stock can be reground or lapped, and put together again as good as new.

Graduated one side in 64ths, as shown by illustration, and in 32nds on the other side.

<table>
<thead>
<tr>
<th>Length of Blade</th>
<th>Length of Beam</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 inches</td>
<td>2 1/2 inches</td>
<td></td>
</tr>
<tr>
<td>6 inches</td>
<td>3 1/2 inches</td>
<td></td>
</tr>
<tr>
<td>8 inches</td>
<td>4 inches</td>
<td></td>
</tr>
<tr>
<td>10 inches</td>
<td>5 inches</td>
<td></td>
</tr>
<tr>
<td>12 inches</td>
<td>6 inches</td>
<td></td>
</tr>
</tbody>
</table>

No. 60 M — Metric The same as No. 60, except that the blades are graduated in millimeters on one side and 1/100 millimeters on the other side.

<table>
<thead>
<tr>
<th>Length of Blade</th>
<th>Length of Beam</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 cm.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 cm.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 cm.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Above numbers packed 1 in a box.

"Reliable" Try-Squares No. 61

With Hardened Blade Not Graduated

The 18 and 24 inch sizes of No. 61 Squares are equipped with the convenient stock support, as illustrated, which projects beyond the side of the stock, or, when not in use, is contained wholly within the stock, and may be clamped firmly in either position.

<table>
<thead>
<tr>
<th>Length of Blade</th>
<th>Length of Beam</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 inches</td>
<td>2 1/2 inches</td>
<td></td>
</tr>
<tr>
<td>6 inches</td>
<td>3 1/2 inches</td>
<td></td>
</tr>
<tr>
<td>8 inches</td>
<td>4 inches</td>
<td></td>
</tr>
<tr>
<td>10 inches</td>
<td>5 inches</td>
<td></td>
</tr>
<tr>
<td>12 inches</td>
<td>6 inches</td>
<td></td>
</tr>
<tr>
<td>16 inches</td>
<td>8 inches</td>
<td></td>
</tr>
<tr>
<td>20 inches</td>
<td>10 inches</td>
<td></td>
</tr>
</tbody>
</table>

Showing stock support

Sizes 4 to 12 inch, inclusive, packed 1 in a box; 18 and 24 inch, 1 in a package.
Starrett

Double Squares No. 13
With Hardened Blade

This square is conceded to be the most practical one for machinist's tool makers and pattern makers ever offered. The sliding blade, shortened or extended full length, makes it more valuable than a full set of common squares. An extra angle blade will hexagon angle at one end and octagon angle on the other, advantageous to pattern makers.

The seat against which the blade is clamped has a convex, should corner of the blade get Indiana, the accuracy of the square is not affected.

9-inch, without bevel blade... Price, each.
12-inch, without bevel blade...

These squares furnished in No. 44 graduation. The 4 and 6 inch sizes can also be supplied in:

No. 7 graduation.
The 4 and 6 inch sizes sent with both blades unless otherwise ordered.

There is a level in the stocks of the 6, 8 and 12 inch squares.

No. 13 M—Metric

The same as No. 13, except that the blade is graduated three edges in millimeters and one edge in 1/10 millimeters. Corresponding metric sizes, same prices as for No. 13.

No. 13 D

An auxiliary blade fitting 6 and 9 inch squares only. One end of the bevel 90 degrees, the cutting angle of drills, and so graduated to measure perpendicularly to the axis of the drill. The opposite end is bevelled 41 degrees, the angle of counterbore and flat head machine screws. Graduations are 64ths with quick reading feature. See cut.

No. 13 D—Blade only... Price, each.

Above numbers packed 1 in a box.

Double Steel Squares No. 14
With Hardened Head and Blades

This cut represents a double steel square, with a 2½-inch sliding blade, and is especially designed for tool makers. The rule blade be used where it would be impractical to use any square with a steel blade. The blade is graduated on one side only, in 32ths and 64ths one and on the other, but a very narrow straight one, about ½ inch wide, highly appreciated by tool makers for squaring small holes, both of which will be sent with the square unless otherwise ordered.

No. 14 A—Square... Price, each.
No. 14 B—Square complete... Price, each.
No. 14 D—With larger stock, approximately 2½ inches long, and 4-inch sliding blade, graduated in 32nds and 64ths on one side and 5ths and 10ths on the other...

No. 14 E—Same as No. 14 D, with bevel blade added...

Bevel blade will be sent with No. 14 E unless otherwise ordered.

No. 14 M—Metric

The same as No. 14, except that the blade is graduated in millimeters and 1/10 millimeters. Prices the same as for No. 14.

Above numbers packed 1 in a box.

Starrett

Die Makers' Square
No. 453

The purpose in designing this tool was to provide simple means whereby the blade could be adjusted at an angle with the beam. This makes an excellent gap for filing the clearance in dies, etc., as shown by the sectional view.

By releasing the smaller screw (see sectional view) the blade can be clamped firmly to its seat and used as a regular square. Fitted to take the standard, bevel, narrow graduated and offset blades.

These dimensions may be of interest. STANDARD BLADE—approximately ¾ inch wide by 2½ inches long with 64ths and 32nds graduations. BEVEL BLADE—¾ inch wide and to determine 30° and 45° angles. NARROW BLADE (graduated)—approximately ½ inch wide and 2½ inches long with 64ths and 32nds graduations. Cut away at one end and ½ inch back to ½ inch width. OFFSET BLADE—protrudes from square about 1¼ inches, is ¼ inch wide and beveled on each edge to give a fine contact.

No. 453 A—Square, with Standard Blade... Price.
No. 453 B—Square, with Standard and Bevel Blades... Price.
No. 453 C—Square, with Standard and Narrow Graduated Blades... Price.
No. 453 D—Square, with Standard, Bevel and Narrow Graduated Blades... Price.
No. 453 E—Square, complete, with Standard, Bevel, Narrow Graduated and Offset Blades... Price.

No. 453 E complete set sent unless otherwise ordered.

No. 453 M—Metric

The same as No. 453, except that the blade is graduated in millimeters and half millimeters. Price same as for No. 453.

Above numbers packed 1 in a box.
Starrett

Improved Die Makers' Squares
No. 457

A tool and die makers' square with degree markings on the stock or beam and an offset blade so light it is not obstructed in small holes. Useful for setting angles and drafts on patterns. Angle measuring capacity is 18 degrees, 8 degrees either side of 0, the angle of the blade being indicated by the line on the pointer. The offset blade 1/4 inch wide, beveled on each edge to give a line contact, protrudes from the square about 1/16 inches. The straight and graduated blade is 1/4 inch wide, and 22 1/2 inches long. Graduated 64ths on one side, 32nds on the other. Attention is called to the narrow end of this blade. For 1/4-inch length it has a width of 1/8 inch. The beam dimensions of this square are approximately 1/4 inch wide, 1/8 inch thick and 2 1/2 inches long.

No. 457 A Square, with straight blade only ................................................. Price.
No. 457 B Square, with offset blade only ................................................ Price.
No. 457 C Square, complete with straight and offset blades .......................... Price.
No. 457 M C complete sent unless otherwise ordered.

No. 457 M

Metric

The straight and graduated blade is 33 mm. long. Graduated in millimeters on one side to millimeters on the other. Otherwise this square is similar to No. 457, as shown above.

No. 457 M A Square .............................................................................. Price.
No. 457 M B Square .............................................................................. Price.
No. 457 M C Square .............................................................................. Price.
No. 457 M C sent unless otherwise ordered.

Above numbers packed 1 in a box.

Starrett

Universal Bevel Protractors No. 360

When angles other than 90° and 45° are to be laid off, a protractor must be used because all angles are not obtainable with a square or bevel. The Starrett Universal Bevel Protractor is a graduated disc with a fixed blade and adjustable stock. Any given angle may be laid off or measured by setting the stock at that angle by the graduated disc. This tool has a very wide range of usefulness as shown by the illustrations.

The blade is either 7 or 12 inches by 1/4 inch and the stock is 4 inches long; both are made from steel steel black finished. The tool weighs 6 ounces. The disc is graduated in degrees from 0 to 90 each way and rotates the entire circle on a center stud. The blade, clamped by a nut and stud at the end of the disc, may slide back and forth its full length or turn through any angle around the circle and be clamped firmly at any point. It is thus adapted to positions impossible with other protractors and renders unnecessary the use of the common bevel in transferring angles.

One side of the center being flat makes it a convenient tool for laying on paper in drafting and it has double the utility of any similar tool.

The acute angle attachment shown in the small cut but not included with the protractor unless so ordered, at additional price as shown below, will be found convenient in obtaining small angles.

No. 360 A With 7-inch blade ........................................................................ Price.
No. 360 B With 7-inch blade in case .......................................................... Price.
No. 360 C With 12-inch blade .................................................................... Price.
No. 360 D With 12-inch blade in case ...................................................... Price.
No. 360 E With both 7 and 12 inch blades .................................................. Price.
No. 360 F Same as E, in case ..................................................................... Price.
No. 360 G Acute angle attachment, extra .................................................. Price.

No. 360 B sent unless otherwise ordered.

A few uses of the Universal Bevel Protractor

Packed 1 in a box.
Starrett

How to Read Universal Bevel Protractor with Vernier

The arc of the protractor is graduated in degrees from 0 to 90 each way. The Vernier plate is graduated so that 12 divisions on the Vernier occupy the same space as 23 degrees on the disc. The difference between the width of one of the 15 spaces on the Vernier and two of the 23 spaces on the disc is therefore 1/12 of a degree.

Each space on the Vernier is 1/12 of a degree, or five minutes shorter than two spaces on the disc. If a line on the Vernier coincides with a line but one on the disc, the Vernier has been moved through an arc of 1/12 of a degree, or 5 minutes.

To read the protractor, note the number of whole degrees between 0 on the disc and 0 on the Vernier. Then count in the same direction the number of spaces from 0 on the Vernier to a line that coincides with a line on the disc. Multiply this number by 5 and the product will be the number of minutes to be added to the number of whole degrees.

EXAMPLE: In the above cut the number of degrees between 0 on the disc and 0 on the Vernier is 52. The line (46) on the Vernier coincides with the line (70) on the disc, as indicated by the number of minutes to be added to the number of degrees. The reading of the protractor is therefore 52 degrees and 45 minutes (52°45').

Universal Bevel Protractors No. 364
With Vernier and Acute Angle Attachment

This protractor is the same as our No. 360 described on page 75, except that it is made with Verniers reading five minutes or one-twelfth of a degree.

The Vernier has been placed with relation to the graduated half circle so as to make the protractor readable by Vernier in any position. The protractor stock is 4 inches long and has either a 7 or an inch blade, 1/4 inch wide. With the 7-inch blade, the tool weights 8 ounces. The disc is graduated in degrees from 0 to 90 each way and rotates the arbor circle on a central stud inside the case. The blade, clamped by an eccentric stud against the edge of the disc may be slipped back and forth its full length, or turned at any angle around the circle, and firmly clamped at any point. Attention is called to the fact that the figures on the Vernier are placed close to the line, thus making it easy to read the tool when taking measurements. Attention is also called to the central locking nut on the angle attachment which is included with the protractor to enable the user to obtain very small angles.

No. 364 A With 7-inch blade
No. 364 B With 12-inch blade
No. 364 C With 12-inch blade in case
No. 364 D With both 7 and 12 inch blades
No. 364 E Same as 4 in case

Above prices include acute angle attachment.

No. 364 G Acute angle attachment only
No. 364 H sent unless otherwise ordered.

Packed 1 in a box.

70
**Starrett**

**Protractor No. 568**

For Acute Angles

Handy small ACUTE ANGLE protractor, range 0° to 60°. With square shaped end plate, its utility is increased, as aligned with work, layout and check can be made from the ends. Primarily designed to facilitate fairly close and quick tool of sharp included angles, etc.

Thickness of parts, from about 1/4 to 1/8 inch.

Length, about 3½ inches. Height, about 2½ inches.

Price, each: $...

Packed 1 in a box.

---

**Steel Protractor No. 19**

Graduated in degrees from 0 to 180, both ways. The blade is 6 inches long, and by means of our patent lock joint is set firmly by a slight turn of the nut. The back of the tool is flat. This protractor is accurate, and is convenient for setting levels, for transferring angles, as a small T-square, or for a large number of other uses.

Price, each: $...

Packed 1 in a box.

---

**Steel Protractor No. 193**

Similar to No. 19 but with rectangular head, giving four working faces. Also two rows of figures reading both ways to show the complementary degree. The blade is 6 inches long and by means of our patent lock joint is set firmly by a slight turn of the nut. The back of the tool is flat. This protractor accurate, nicely finished, and convenient for a draftsman or machinist for setting levels, transferring angles, or for use as a T-square, etc.

Price, each: $...

Packed 1 in a box.

---

**Steel Protractor No. 182**

This protractor is designed particularly for field engineers, for plotting drawings requiring lines to radiate from the center of a working point to any degree point desired. In use, the fulcrum pin containing the needle or cone point is withdrawn from the protractor hub and braded into the central point from which lines are to radiate, then the hub of the protractor is slipped on to it, when the working edge of the blade will line through the needle point to any degree desired. When not in use the needle is drawn back. The protractor has a 6-inch blade, lies flat on paper, weights but three ounces, is positively accurate, and by field engineers and draftsmen is much appreciated.

Price, each: $...

Packed 1 in a box.

---

**Starrett Protractor and Depth Gages**

**No. 493 and 493 B**

This tool will readily be appreciated by machinists, draftsmen and architects. Any angle in one half of a circle (180°) may be obtained and the back is finished to permit its being laid flat upon the paper or work. The blade being adjustable permits its being set at any angle with its capacity, permitting its use as a depth gage. The scale, which is stamped on one side of it by 32nds of an inch, and on the other by 64ths of an inch.

Corresponds to our No. 493, except it is made with a rectangular head, like our No. 183, shown on page 72, thus providing four working edges or faces.

Price, each: $...

Packed 1 in a box.

---

**Steel Protractor No. 193**

Used for setting levels Nos. 18, 47 and 49, shown on page 74, at any desired angle, thus converting them into Steel Protractors at slight cost.

Price, each: $...

Packed 2 in a box.
Starrett

Universal Bevel
No. 15

The set-off in the blade increases its capacity and usefulness for bevel gear work, etc., so that any angle, however slight, may be obtained. Another valuable feature is, one edge of the blade, where thin templates may be placed, is accurately fitted. It is also useful in working to draft on patterns and in turning angles on the lathe which cannot be reached with an ordinary bevel.

May be used with No. 193 Protractor listed on page 73.

No. 15 3-inch .................................. Price, each.

Improved Bevel
No. 47

The advantages of this bevel over any other tool of this kind made, consist in its having not only the blade slotted but the stock as well, thus admitting adjustments that cannot be obtained with a common bevel. The clamping screw head, which the cut does not show, is set into a cabinet flush with the surface of the stock allowing it to lie flat on the work.

May be used with No. 193 as a bevel protractor.

(See page 73.)

PRICES

No. 47 6-inch (length of stock, 94 inches)
No. 47 9-inch (length of stock, 44 inches)

Combination Bevel
No. 49

This bevel has a stud riveted in the straight edge stock, or head, on which its split blade is hinged, so as to swing over the stock and be clamped at any angle. The auxiliary blade with clamp bolt may be slipped on to the split blade and be clamped at any desired angle and used, in combination with the stock of the other, for laying out work, measuring, or shewing any angle of size, and when so combined will lie flat upon the work.

The stock is about 4 inches long.

May be used with our No. 193 Protractor listed on page 73.

No. 49 ........................................ Price, each.

Above numbers packed 1 in a box.
Starrett

Micrometer Depth Gages
No. 440

With Three Measuring Rods

This type gage has been added to our line to meet the demand of mechanics who prefer a 1-inch movement of the screw. It provides measurements of the depths of holes, projections, etc., from 0 to 3 inches by thousands of an inch. Each gage has three measuring rods with hardened and lapped ends, with ranges for adjustment. The rods are inserted through a hole in the screw and brought to a positive stop by a small knurled nut. The base is hardened, ground and lapped.

Note: The end of the rod is flat, but can be furnished very slightly convex, if so ordered, at the same price.

Sent with flat point unless otherwise ordered.

Furnished with or without ratchet stop.

Sent without ratchet stop and without case unless otherwise ordered.

No. 440 A With 2-inch base, without ratchet stop ............... Price.
No. 440 B With 4-inch base, with ratchet stop .......... Price.
Case for above ........................................... Price.
No. 440 B With 4-inch base, without ratchet stop .......... Price.
Case for above ........................................... Price.
No. 440 D With 6-inch base, without ratchet stop .......... Price.
Case for above ........................................... Price.

Extra Rode for No. 440 A, 440 B and 440 D

(Providing Range to 6 inches)

3 to 4 inch rod only ..................................... Price, each.
4 to 6 inch rod only ..................................... Price, each.
8 to 6 inch rod only ..................................... Price, each.

No. 440 M Metric

For metric measurements. These gages are of the same proportions as those of English measure, but have 25 mm. movement of the screw, and read by hundreds of a millimeter from 0 to 75 mm.

No. 440 M A With 2-inch base, without ratchet stop .......... Price.
No. 440 M A With 4-inch base, with ratchet stop .......... Price.
No. 440 M B With 4-inch base, with ratchet stop .......... Price.
Case for above ........................................... Price.
No. 440 M B With 4-inch base, without ratchet stop .......... Price.
Case for above ........................................... Price.
No. 440 M D With 6-inch base, with ratchet stop .......... Price.
Case for above ........................................... Price.
No. 440 M D With 6-inch base, without ratchet stop .......... Price.
Case for above ........................................... Price.

Sent without ratchet stop and without case unless otherwise ordered.

Above numbers packed 1 in a box.

76
Dial Depth Gage
No. 640

Showing our standard depth gage with dial indicator, 2½ inches across the face. The base is 1/8 inch thick and 2½ inches long, hardened, ground and lapped. We will gladly quote on quantities or deviations from the standard specifications, such as other styles of indicators, thicker and longer bases, base beveled to knife edge, the ends of rods tapered, rounded or pointed, etc. This gage can also be had with reverse movement, the rod protruding from the base, so in application, the rod, contacting the work instead of the base, it regulates the depth automatically. The reverse movement is sometimes preferred in gauging shallow depths, as in half tones, engastings, etc. Standard specifications follow:

Width of base—1/8 inch
Length of base—2½ inches
Operation—Push Button
Jewel Bearings, Side Bezel Clamp and Tall Tale
Hand, which records each revolution of large hand.
Plain Bearings

Price, each.

Sent with Jewel Bearings unless otherwise ordered.

Vernier Depth Gage
No. 448

This gage is invaluable where accurate measurements are necessary, and appeals to the class of mechanics whose work requires close limits, such as gauging the depth of holes and recesses in jig, die and fixture work, etc. The head is 1 inch thick and 2½ inches long, and is hardened, ground and lapped. The 6-inch blade permits measurements to be made 3 inches or 28 mm. in depth and for the 12-inch blade 9½ inches or 335 mm. in depth.

Blades graduated on one edge only, which, by means of the vernier, permit reading by thousandths of an inch.

Gage with 6 inch blade
Gage with 6 inch blade, with case
Gage with 6 and 12 inch blades
Gage with 6 and 12 inch blades, with case

Price, each.

No. 448 M

Metric
Blades graduated on one edge only to read, by means of the vernier, in 1/10 mm. Prices the same as for No. 448.

No. 448 M and E

Metric and English
Graduated to read on one edge by means of the vernier in 1/10 mm. and on the other edge in thousandths of an inch. Price the same as for No. 448.

Above numbers sent without case unless otherwise ordered.
Above numbers packed 1 in a box.
Starrett

Spring Depth Gages
No. 48

This depth gage is particularly adaptable when taking quick measurements, as the spring in the barrel automatically forces the rod downward. The clamp screw locks the rod in position. Its capacity is 3 inches.

The gage is made with a base about 1/8 inch thick and 2 1/2 inches long. The rod is 1/4-inch diameter. Both the base and contact end of the rod are hardened and ground.

No. 48 ........................................... Price, each.

Depth Gages
No. 237

The head of this gage is steel, nicely finished, and case-hardened, 2 inches wide across the base, 1/4 inch thick.

The blade, which is conveniently held in the groove of the head by a knurled lock nut, is a 6-inch narrow spring-tempered rule, the same as furnished with our No. 46 Depth Gage, and can be used separately from the gage. Blades graduated in 32nds and 64ths of an inch will be sent unless otherwise ordered, but we can also supply them graduated in 64ths and 100ths.

No. 237 ........................................... Price, each.

No. 237 M

Metric

The same as No. 237, except that the blade is 15 cm. long, graduated on one side in millimeters and on the other in 1/5 millimeters.

No. 237 M ........................................... Price, each.

Above numbers packed 1 in a box.

80

Starrett

Combination Depth and Angle Gage
No. 236

This depth gage, although resembling our popular No. 237, is made slightly larger and with degree lines on both sides of the head. Extreme protractor accuracy is not claimed in this construction but for certain classes of work, as a sort of ready reference or for duplicating an angle or chamfer, in combination with a desirable form of depth gage, it is a convenient tool for measuring.

As the cut shows, both sides of the head are marked with 30, 45 and 60 degree lines, so when set to the line on the turret, convenience to the user is doubled. The head of this gage is 2 1/2 inches across the base and 1/4 inch thick. Recess in base to facilitate setting to divisions on rule not shown in cut. Spring-tempered rule used is 1/4 inch wide and 6 inches long. Graduated 32nds one side, other side 64ths.

No. 236 ........................................... Price, each.

Packed 1 in a box.

Combination Depth Gage and Hook Rule
No. 236 H

So that mechanics may have the combination like the illustration, we have designed a special hook rule, applicable to our Nos. 236, 237, 48 and 495 depth gages. Hook adjusts parallel to the base for caliper work and the rule can be used independently as a regular hook rule. Reverse hook and use as a depth gage. Rule is graduated 64ths and 32nds. The rod is 1/4 inch diameter and 8 inches long. Used for measuring in small holes where the rule will not enter. Rod feature on No. 236 only.

No. 236 H-A Depth Gage, with Hook Rule ................................ Price.
No. 236 H-B Depth Gage, with Hook Rule and with rod .................... Price.
No. 236 H-C Hook Rule only for Nos. 235, 237, 48 and 495 ................ Price.
No. 236 H-D Rod only .................................................... Price.
No. 236 H-B Complete as shown, sent unless otherwise ordered. Above numbers packed one in a box.
Starrett

Measurements between Contacts

The instruments described on preceding pages of this catalogue are such that it is necessary to judge by the eye the position of the edge or point to be measured in relation to a certain graduated line, and therefore, for some kinds of work this is sufficiently accurate and for others it is the only method possible. But where the distance between two surfaces, either external or internal, is to be measured, it is frequently difficult to place the edge of a rule in a position that will allow accurate determination of the distance. To meet the requirements for this kind of measuring, instruments having two points of contact are necessary and are described on the following pages.

With these tools one surface is generally fixed and the other adjustable so that the fixed contact may be placed against one surface and the adjustable contact brought up against the other. This is then no possibility of a mistake, for the distance may be read directly from the scale.

Caliper Squares No. 426

This caliper square is designed both for inside and outside measurements. It is made with a firm and adjustable jaw. The beam is graduated on one side in 64ths and on the other in 100ths of an inch. With the adjusting screw the sliding head can be more accurately set to the graduation of the head. Width of nibs when closed, .350. Depths of jaws: size A, 1/4 inch; sizes B and C, 1/2 inch. Die sinkers find this tool very valuable.

| No. 426 A | 3-inch, without case | Prices |
| No. 426 B | 4-inch, without case | With case |
| No. 426 C | 6-inch, without case | With case |

No. 426 M

This is a metric equivalent of No. 426, except that the beam is graduated on one side in 1/10 millimeters and on the other in 100ths of an inch.

| No. 426 M-B | 10 cm., without case | Prices |
| No. 426 M-C | 15 cm., without case | With case |

No. 426 M and E

This is a metric and English equivalent of No. 426, except that the beam is graduated on one side in 1/10 millimeters and on the other in 100ths of an inch.

| No. 426 M & E-B | 4-inch, without case | Prices |
| No. 426 M & E-C | 6-inch, without case | With case |

Above numbers sent without case unless otherwise ordered. Packed 1 in a box.

Starrett Micrometer Caliper Gages

No. 24

This gage is specially adapted to the tire industry, in measuring tire treads, and by affording greater scope than any tool of its kind made, and is valuable in many other lines. The beams are 1/4 inches wide, .005 inch thick and are furnished in 12, 18, 24, 30, and 48 inch lengths, and are graduated in 8ths, 16ths, 32nds and 64ths. The head or jaws carry auxiliary items and may be removed so that the beam may be used separately as a gage. Attachments are also made to slip on and off the ends of the caliper so they may be used to set inside or outside calipers for marking close or drive fits, etc. The inside calipers are set against the inside face of gage and resting on the seat of the attachments keep them in perfect line. The outside calipers are set against an extended slot of the attachment in line with the inside faces of the gage so that both inside and outside calipers may be set to agree with each other. This gage may not only be set by the graduated beam but varied by the micrometer adjusting nut to read in thousandths. The beam and attachments, like the jaws, are hardened and ground ensuring long service. The jaws are 1 inch wide when closed and are furnished having 3-inch depth.

| No. 24 A |
| Larger Size
| Especially Adaptable to the Use of Automobile Tire Manufacturers

| No. 24 A | Price, each |
| 12-inch | 
| 18-inch | 
| 24-inch | 
| 30-inch | 
| 48-inch | 

No. 24 B

| No. 24 M |
| Metric

| No. 24 M | Price, each |
| 6-inch | 
| 9-inch | 
| 12-inch | 
| 18-inch | 

Above numbers packed 1 in a box.
Starrett

Pocket Slide Calipers
No. 425

Graduated in 32nds on the stock and 64ths on the slide. The improved clamping device, with left hand thread (see cut), is a valuable feature as it may be locked by the thumb of the same hand in which the tool is held. The two lines on the stock as shown in lower cut enable the user to set either inside or outside measurements.

<table>
<thead>
<tr>
<th>Size</th>
<th>Depth of Jaw</th>
<th>Size</th>
<th>Depth of Jaw</th>
<th>Price</th>
</tr>
</thead>
</table>
| 3-inch | 1/4 inch     | 6-inch | 3/8 inch     | 1/4 inch
| 4-inch | 1/4 inch     | 10-inch| 1 inch      | 1/8 inch

No. 425 A

Same as No. 425, except that it is graduated in 32nds on the stock and 100ths on the slide. Prices and dimensions the same as for No. 425.

No. 425 M

Metric

Same as No. 425, except that the graduations are Metric.
The 13 cm is graduated in 1 millimeter on slide and millimeters on stock.
The 13 cm is graduated in millimeters on one edge and 1 millimeter on the other edge of slide, and in millimeters on stock.

<table>
<thead>
<tr>
<th>Size</th>
<th>Depth of Jaw</th>
<th>Rule when Closed</th>
<th>Price</th>
</tr>
</thead>
</table>
| 7 cm   | 1/4 inch     | 3 mm             | 1/4 inch
| 10 cm  | 1/4 inch     | 6 mm             | 1/8 inch

No. 425 M and E

Metric and English

Same as No. 425, except that the graduations are in 1/4 millimeters on one edge and 64ths inch on the other edge of slide, and in 32nds inch on the stock.

<table>
<thead>
<tr>
<th>Size</th>
<th>Depth of Jaw</th>
<th>Rule when Closed</th>
<th>Price</th>
</tr>
</thead>
</table>
| 3-inch 7 cm | 1/4 inch     | 1 1/4 inch       | 1/4 inch
| 8-inch 13 cm | 1/4 inch     | 3/4 inch         | 1/8 inch

Button Gage No. 431

This gage is the same size and similar to our No. 425 Pocket Slide Caliper. The difference is that this gage graduated on the slide to 4ths of an inch. Stock graduated in 32nds on the front.

No. 431 3-inches, Price, each.
No. 431 5-inches, Price, each.

Slide Rule Caliper and Circumference Scale
No. 424

This gage has a double function—being graduated to read the circumference as well as the diameter of the object measured, the relation of circumference to diameter being shown by the graduations on upper corners of the rule (capacity 3 inches, about 11 inches circumference). It was originally designed for pipe and cordage manufacturers. It makes a first-class slide rule caliper of large scope, and will caliper a cylinder up to 2 inches in diameter. The rule is graduated in 32nds of an inch standard and 10ths of an inch circumference. All corners of the tool are rounded smooth to make it fit to carry in the pocket and agreeable to handle. The circumference measure will assist in calculating how many feet a minute the cutting tool in a lathe is doing on any diameter within the scope of the gage and help determine whether the tools should have a faster or slower speed.

No. 424 3-inch size, Price, each.

ROSE TOOLS, INC.
Starrett Vernier Tools Have Many Features

Sharp, clean-cut, machine-divided graduations of uniform width and depth insure accurate readings and settings, and are most essential to correct matching of the graduations on the bar or scale to those on the Vernier plate.

Tightly yet smoothly fitted Vernier slides help to prevent errors at measuring points.

Materials used, workmanship, finish and final inspection provide tools which are reliable and accurate.

Such features make Starrett Verniers outstanding.

How to Read Height Gage or Caliper with Vernier

The bar of the tool is graduated in fourtieths or .025 of an inch; every fourth division, representing a tenth of an inch, being numbered. On the Vernier plate is a space divided into twenty-five parts and numbered 0, 5, 10, 15, 20, 25. The twenty-five divisions on the Vernier occupy the same space as twenty-four divisions on the bar.

The difference between the width of one of the twenty-five spaces on the Vernier and one of the twenty-four spaces on the bar is therefore $1/240$ or $1/480$ of an inch. If the tool is set so that the 0 line on the Vernier coincides with the 0 line on the bar, the 0 line to the right on the Vernier will differ from the 0 line on the bar by $1/480$ of an inch; the second line by $2/480$ of an inch and so on. The difference will continue to increase $1/480$ of an inch for each division until the line 24 on the Vernier coincides with the line 24 on the bar.

To read the tool, note how many inches, tenths (or .10) and fourtieths (or .025) the 0 mark on the Vernier is from the 0 mark on the bar; then note the number of divisions on the Vernier from 0 to a line which exactly coincides with a line on the bar. EXAMPLE: In the above cut the Vernier has been moved to the right one and four-tenths and one-fourtieth inches (1.425), as shown on the bar, and the eleventh line on the Vernier coincides with a line, as indicated by the star, on the bar. Eleven-thousandths of an inch are therefore to be added to the reading on the bar and the total reading is one and four hundred and thirty-six thousandths inches (1.436).
Vernier Calipers
No. 122
Hardened Beams

These calipers are graduated either English or Metric for outside and inside measurements, also English and Metric or Metric and English for outside measurements direct. Points are placed on the beams and slides of all sizes except 36-inch and 48-inch for setting dividers' transfer distances. Full directions for using the vernier are sent with each caliper.

These calipers are sent with finely finished case.

We can furnish a 1/4-inch cylindrical plug standard for testing the adjustment of the calipers when desired.

No. 122

These calipers are graduated on the front side to read 50ths of a millimeter for outside measurements and on the back to read direct in thousandths of an inch for inside measurements by means of a vernier on each side.

<table>
<thead>
<tr>
<th>Size</th>
<th>Approximate Depth of jaws mm.</th>
<th>Approximate Width of jaws when Closed mm.</th>
<th>Price with Case</th>
<th>Price without Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 mm.</td>
<td>20 1/8</td>
<td>6 1/2</td>
<td>$ .236</td>
<td></td>
</tr>
<tr>
<td>200 mm.</td>
<td>30 1/4</td>
<td>6 1/2</td>
<td>$ .315</td>
<td></td>
</tr>
<tr>
<td>300 mm.</td>
<td>50 1/16</td>
<td>6 1/2</td>
<td>$ .315</td>
<td></td>
</tr>
<tr>
<td>400 mm.</td>
<td>60 1/8</td>
<td>6 1/2</td>
<td>$ .315</td>
<td></td>
</tr>
</tbody>
</table>

Sent with case unless otherwise ordered.

Packed 1 in a box.

Prices for larger sizes quoted on application.

No. 122 M and E

Metric and English

These calipers are graduated on the front side to read 50ths of a millimeter and on the back to read in thousandths of an inch. Both sides read in outside measurements direct by means of a vernier on each side.

<table>
<thead>
<tr>
<th>Size</th>
<th>Approximate Depth of jaws mm.</th>
<th>Approximate Width of jaws when Closed mm.</th>
<th>Price with Case</th>
<th>Price without Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 mm.</td>
<td>20 1/8</td>
<td>6 1/2</td>
<td>$ .236</td>
<td></td>
</tr>
<tr>
<td>200 mm.</td>
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<td>$ .315</td>
<td></td>
</tr>
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<td>50 1/16</td>
<td>6 1/2</td>
<td>$ .315</td>
<td></td>
</tr>
<tr>
<td>400 mm.</td>
<td>60 1/8</td>
<td>6 1/2</td>
<td>$ .315</td>
<td></td>
</tr>
</tbody>
</table>

Sent with case unless otherwise ordered.

For inside measurements, it is necessary to add the following thickness of measuring nibs to caliper reading:

<table>
<thead>
<tr>
<th>Size</th>
<th>Approximate Depth of jaws mm.</th>
<th>Approximate Width of jaws when Closed mm.</th>
<th>Price with Case</th>
<th>Price without Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 mm.</td>
<td>20 1/8</td>
<td>6 1/2</td>
<td>$ .236</td>
<td></td>
</tr>
<tr>
<td>200 mm.</td>
<td>30 1/4</td>
<td>6 1/2</td>
<td>$ .315</td>
<td></td>
</tr>
<tr>
<td>300 mm.</td>
<td>50 1/16</td>
<td>6 1/2</td>
<td>$ .315</td>
<td></td>
</tr>
<tr>
<td>400 mm.</td>
<td>60 1/8</td>
<td>6 1/2</td>
<td>$ .315</td>
<td></td>
</tr>
</tbody>
</table>

Sent with case unless otherwise ordered.
Starrett

Dovetail Vernier Caliper
No. 438

This caliper will prove a valuable asset to any manufacturer’s tool equipment where dovetail work is involved. With the vernier it measures by thousandths of an inch from 0 to approximately 12 inches.

Hitherto dovetails were commonly gauged by using pieces of round wire or standard plugs kept in contact with angle sides and below the upper edges or corners of the dovetail. Then calipers the overall or inside distance of the wire, as the case might be for male or female dovetails, and consult a formula. The result: considerable time and expense which is eliminated by using this caliper.

The reading of the caliper is the distance invariably given on drawings from corner to corner of the dovetail, the direct measurement being obtained by the buttons in contact with the sides of the angle. See Figures 1, 2, and 3 which correspond to the figures on the sliding jaw. A stop plug locates this slide in relation to the construction and angle required. The beveling pin and buttons are hardened, ground and lapped.

The range of application, 45°, 50°, 55°, and 60° angle, leaves little to be desired in this tool.

With case ........................................... Price, each.
Without case ....................................... Price, each.

Sent with case unless otherwise ordered.

Packed 1 in a box.

Starrett

Gear Tooth Vernier Calipers
No. 456

For work in connection with gear teeth, gear cutters, hob, etc., this tool is almost indispensable. With it, the thickness at pitch line or chordal thickness of gear teeth and the distance from the top of a tooth to the chord can be measured by thousandths of an inch.

Allowance may be made for variation or error in blank diameter when setting for distance from top to pitch line of tooth.

The thickness of a tooth at pitch line and the addendum are measured by a jaw and tongue respectively, which are adjustable on the graduated arms. (See cut.)

A substantially constructed and well-balanced tool with distinct graduations.

<table>
<thead>
<tr>
<th>No. 456 A</th>
<th>No. 456 B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English</strong></td>
<td><strong>English</strong></td>
</tr>
<tr>
<td>Reads by thousandths of an inch. 20 diametral to 2 diametral pitch.</td>
<td>Reads by thousandths of a millimeter. 2 mm. to 20 mm. module.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>With case</th>
<th>Price, each.</th>
<th>With case</th>
<th>Price, each.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without case</td>
<td>Price, each.</td>
<td>Without case</td>
<td>Price, each.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. 456 M-A</th>
<th>No. 456 M-B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metric</strong></td>
<td><strong>Metric</strong></td>
</tr>
<tr>
<td>Reads by thousandths of a millimeter. 1/4 mm. to 12 mm. module.</td>
<td>Reads by thousandths of a millimeter. 1/4 mm. to 26 mm. module.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>With case</th>
<th>Price, each.</th>
<th>With case</th>
<th>Price, each.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without case</td>
<td>Price, each.</td>
<td>Without case</td>
<td>Price, each.</td>
</tr>
</tbody>
</table>

Sent with case unless otherwise ordered.
Starrett Vernier Height Gages
No. 454

Hardened Bars
English, Metric, and English and Metric Measure

The Vernier Height Gage will be found indispensably used where a high degree of accuracy is required. It is essential for jig and fixture making. Designed to measure or mark off vertical distances from a plane surface and by the use of toolmakers' buttons (No. 494 shown on page 90), the location of center distances of jigs, dies, etc., can be accurately obtained.

For measuring or scribing lines on the work, a combination marker and extension is supplied in the movable jaw.

The Depth Gage Attachments C (for use with the 10-inch gauge) and H (for use with the 18-inch and larger size gauges) are used for measurements taken on the inside of the frame of a jig, in deep recesses, or over high projections. Measures depths scale accurately. These attachments are easily adjusted, after which accurate measurements can be had with the vernier.

10-inch Gages
Base (approximately), 3 1/2 inches long, 1 1/4 inches wide, and 3/4 inch high. Graduated to read on both sides.

18-inch Gages
Base (approximately), 5 1/2 inches long, 2 1/4 inches wide, and 1 1/4 inch high. Graduated to read on one side only.

24-inch Gages
Base (approximately), 8 1/2 inches long, 3 inches wide, and 1 1/4 inches high. Graduated to read on one side only.

Instructions when Using 10-Inch Starrett Vernier Height Gages

Measurements by use of the height gage are generally obtained in connection with the Toolmakers' Buttons (Nos. 494, page 90) in locating the center distances of bushings in jigs, dies, etc., or in ascertaining the height of projections from a plane surface. The bar is graduated to read by means of the vernier to 1/1000 inch, and is graduated to read from 0 to 6 inches inside of jaws, and from 1 to 10 inches outside of jaws, enabling this gage to be used for either inside or outside measurements.

To explain: On the front side, when the jaws are closed the lines at 0 on both bar and Vernier plate will coincide, and the tool is designed for outside measurements only. On the reverse side, the movable jaw is back to point where lines at 0 of both Vernier plate and bar coincide, the distance from the bottom of the base to the top of the movable jaw now equals 1 inch, and the tool is designed for inside measurements only. The hardened base is recessed in the bottom and ground and lapped square with the bar, allowing the gage to stand upright. An extension or scriber, as shown in cut (page 92) on the movable jaw, is also furnished which allows reverse measurements to be taken from the top or bottom side of the jaw. This extension permits measurements over projections and is hardened, ground, and lapped to a point so that a line or series of lines may be drawn and spaced as required in laying out of dies, etc.

A valuable feature in connection with this gage is the attachment by which measurements may be taken inside the frame of a jig or in ascertaining the depth of recesses, etc., which could not readily be accomplished in the ordinary way. All measurements outside only.

The rod shown with this attachment is 6 inches long, and is held by a spring bushing and is similar to a chuck. It can be readily adjusted to approximate measurements, after which accurate measurements can be had with the Vernier.

See pages 91 and 92 for prices.

The 18 and 24 inch Starrett Vernier Height Gages are designed for use as height gages only, measurements being taken only on the outside of the jaws. They differ from our 10-inch gage in range and proportion.

Offset Scriber

The Offset Scriber will also be found valuable. It makes measurements from the base possible, although held like the straight scriber. Adjust to plane with base and take reading for working point.

prices

No. 494 D For 10-inch height gage
No. 494 K For 18-inch and larger height gages
Vernier Height Gages No. 454

No. 454—English Measure 10-Inch Gage

The bar approximately 1/16-inch wide and 1/64-inch thick, is graduated to read by means of the vernier to 1/1000 inch. The base is hardened, ground and lapped on top and bottom and on both inside and outside of jaw enabling the gage to be used for either inside or outside measurement.

One side of the bar is graduated (for use as a height gage) to read from 1 to 10 inches in thousandths of an inch; the other side (for use as an outside caliper) measuring between jaws, to read from 0 to 9 inches by thousandths of an inch.

Price:
- No. 454 A, 10-inch Vernier Height Gage, with Attachment C: 
- Price
- No. 454 B, 10-inch Vernier Height Gage, without Attachment C: 
- Price
- No. 454 C, Attachment only: 
- Price

No. 454 A Gage with Attachment sent unless otherwise ordered.

Height Gages sent with case unless otherwise ordered.

No. 454 M—Metric Measure 10-Inch Gage

One side of bar is graduated Metric measure to read from 25 mm. to 26 cm. by 50ths of a millimeter (for use as a height gage); the other side (for use as an outside caliper), measuring between jaws, to read from 0 to 23 cm. by 50ths of a millimeter.

Price same as for No. 454—10-inch.

No. 454 E and M—English and Metric Measure 10-Inch Gage

One side of bar is graduated English measure to read from 1 to 10 inches in thousandths of an inch (for use as a height gage). The other side is graduated Metric measure to read from 25 mm. to 26 cm. by 50ths of a millimeter (for use as a height gage).

Using this gage as an outside caliper, measurements between the jaws are determined by deducting from the reading on the bar the thickness of the jaw and base, obtained by bringing the jaw and base into closed position and recording the tool reading at that point.

Prices same as for No. 454—10-inch.
Starrett Micrometer Calipers meet the demands of the most critical mechanics. Being established as the standard for accuracy, utility, and durability in service, they are available with many important advantages, such as the lock nut which, by a slight turn, locks the spindle firmly; the ratchet stop or thumbscrew friction which permits measuring with the same degree of pressure at every point of contact; with carbonyl facing or neobole inserts on anvils and spindle to insure long life; with chromium plating to resist stains; with decimal equivalents of .001, .005, .002nds and .001s on the frame or spindle; and with the cut-away frame which can be inserted where ordinary frames will not go.

STARRETT MICROMETERS
All furnished with hardened and ground threads

STARRETT
Toolmakers' Buttons
No. 494
Patented
For Jig and Die Work

These buttons are hardened, ground and lapped square with the end to diameter sizes of .300, .400, .500 and 1 inch to allow the mechanic easy fitting in laying out work. Each set contains four buttons of the same diameter. In A, B and C sets, these buttons are ¼ inch long and one button ½ inch long. In D set, these buttons are 1 inch long and one button 1½ inches long. The reason for the longer button is to facilitate bringing up when two buttons are positioned very close together. Any hole or series of holes where positive accuracy must be had in relation to each other, or from given points as in drill jigs, die and fixture work, toolmakers' buttons should be used. These buttons are nearly always used with a vernier height gage, although in many cases micrometers and size blocks may be used. In using these buttons the work to which they are clamped should be true, for if not the buttons will slant parallel with the base and cause error in measurement. Once the work has been ground or planed true any hole or series of holes to be bored should be laid out with scriber, scale and dividers, which can be done within approximately .010 inch. Pick punch lines intersecting at points to be bored, drill and tap sufficient depth, so that the 125-40 pitch screw shall enable the button to be clamped tight. File the burr caused by tapping until the screw will fit the hole. Once the buttons are in position, the holes are bored. The buttons are furnished in sets of four and are screwed to the base plate. The set of four buttons with screws and washers are placed compactly in the tool chest.

Set of four buttons with screws and washers.

No. 494 A Set .300 x ¼ inch
No. 494 B Set .400 x ¼ inch
No. 494 C Set .500 x ¼ inch
No. 494 D Set 1.000 x 1 inch

Taps (125-40) to use with A, B, and C sets

Price, each.

Price, each.
Starrett

Starrett Micrometer Calipers

The limit of accuracy obtained by measuring between contacts depends on the graduations on the instrument. It is evident that as the fineness of the graduation increases, the chances for mistaking one graduation for another also increase, so that some other method of determining extremely accurate measurement must be devised.

The common instrument for making such measurements is known as a micrometer caliper. It combines the double contact of the slide calipers with a screw adjustment which may be read with great accuracy.

Our calipers have a more exact and easier way of adjustment than by the old method of a movable anvil. This is obtained by placing over the barrel a thin graduated sleeve which carries the base or zero line, instead of having this line marked on the barrel itself. This sleeve may be turned by means of a small spanner wrench to bring the zero line correct to compensate for wear. The thin sleeve also keeps dust from the screw. A knurled locking nut contracting a split bushing around the spindle tightens and keeps the spindle central and true, or by a slight turn locks it firm, making a solid gage when desired. The anvil and spindle are hardened, ground and lapped.

Through years of experience in manufacturing micrometer calipers, which is perhaps the most discussed of all mechanical tools, we are able to meet the demands of the most critical mechanics. Among the many Starrett features are the lock nut, which by a slight turn locks the spindle firmly; the ratchet, permitting the same degree of pressure at points of contact in measuring; the decimal equivalents of 8ths, 10ths, 32nds and 64ths, on the frame, or on the thimble; the quick adjusting micrometer, reducing the time in reading from 1 inch to 0 or forty complete turns of the screw to an instant; the concave cut in the frame back of the anvil for insertion where the ordinary style will not go; anvils and spindles with Carboloy or Norhide facings; thimble friction mechanism; the attachment for our 2-inch micrometers permitting measurements from 0 to 2 inches; and many others meeting all possible demands of a micrometer. Cuts and descriptions of our line will be found on the following pages.
How to Read a Micrometer Caliper

The spindle C is attached to the thimble E, on the inside, at the point H. The part of the spindle which is concealed within the sleeve and thimble is threaded to fit a nut in the frame A. The frame being held stationary, the thimble E is revolved by the thumb and finger, and the spindle C being attached to the thimble revolves with it, and moves through the nut in the frame, approaching or receding from the anvil B. The article to be measured is placed between the anvil B and the spindle C. The measurement of the opening between the anvil and the spindle is shown by the lines and figures on the sleeve D and the thimble E.

The pitch of the screw threads on the concealed part of the spindle is 40 to an inch. One complete revolution of the spindle therefore moves it longitudinally one-fourth (or twenty-five thousandths) of an inch. The sleeve D is marked with 40 lines to the inch, corresponding to the number of threads on the spindle. When the caliper is closed, the beveled edge of the thimble coincides with the line marked 0 on the sleeve, and the 0 line on the thimble agrees with the horizontal line on the sleeve. Open the caliper by revolving the thimble one full revolution, or until the 0 line on the thimble again coincides with the horizontal line on the sleeve; the distance between the anvil B and the spindle C is then 1/40 (or .025) of an inch. The beveled edge of the thimble will coincide with the second vertical line on the sleeve. Each vertical line on the sleeve indicates a distance of 1/40 of an inch. Every fourth line is made longer than the others, and is numbered 0, 1, 2, 3, etc. Each numbered line indicates a distance of four times 1/40 of an inch, or one-tenth.

The beveled edge of the thimble is marked in twenty-five divisions, and every fifth line is numbered from 0 to 25. Rotating the thimble from one of these marks to the next moves the spindle longitudinally 1/25 of twenty-five thousandths of an inch. Rotating it two divisions indicates two thousandths, etc.

To read the caliper, therefore, multiply the number of vertical divisions visible on the sleeve by 25, and add the number of divisions on the bevel of the thimble from 0 to the line which coincides with the horizontal line on the sleeve. For example, as the tool is represented in the engraving, there are seven divisions visible on the sleeve. Multiply this number by 25, and add the number of divisions shown on the bevel of the thimble, 3. The micrometer is open one hundred and seventy-eight thousandths. \(7 \times 25 + 3 = 178\).

How to Read a Ten-Thousandths Micrometer Caliper

Readings in ten-thousandths of an inch are obtained by the use of a vernier, so named from Pierre Vernier, who invented the device in 1631. As applied to a caliper this consists of ten divisions on the adjustable sleeve, which occupy the same space as nine divisions on the thimble. The difference between the width of one of the ten spaces on the sleeve and one of the nine spaces on the thimble is therefore one-tenth of a space on the thimble. In engraving B the third line from 0 on thimble coincides with the first line on the sleeve. The next two lines on thimble and sleeve do not coincide by one-tenth of a space on thimble; the next two, marked 3 and 2, are two-tenths apart, and so on. In opening the tool, by turning the thimble to the left, each space on the thimble represents an opening of one-thousandth of an inch. If, therefore, the thimble be turned so that the lines marked 3 and 2 coincide, the caliper will be opened two-tenths of one-thousandth or two ten-thousandths. Turning the thimble further, until the line 10 coincides with the line 7 on the sleeve, as in engraving C, the caliper has been opened seven ten-thousandths, and the reading of the tool is .0070.

To read a ten-thousandths caliper, first note the thousandths as in the ordinary caliper; then observe the line on the sleeve which coincides with a line on the thimble. If it is the second line, marked 1, add one ten-thousandth; if the third, marked 2, add two ten-thousandths, etc.

Directions for Adjusting

When calipers will read correctly if there is no dirt between the anvil and spindle. When it becomes necessary to readjust the tool to compensate for the wear of screw and nut, this is done, not by the anvil, but by means of our friction sleeve, as follows: Take up the wear of screw and nut, then remove all dirt from face of this sleeve and spindle and bring them together carefully. Insert the small spanner wrench in the small hole and turn until the line on the sleeve coincides with the same line on the thimble.
Starrett

Features as Applied to Micrometer Calipers

Ratchet Stop for Micrometer Calipers

In using this device, the ratchet slips by the pull when more than a certain amount of pressure is applied, and so prevents the spindle from turning either way. Microspringing the instrument.

It is valuable when a number of measurements have to be taken quickly, and especially when measurements are taken by more than one person with the same caliper, as by its use the exact amount of pressure is applied in each case to the objects measured.

Micrometers

With All Thousandths Divisions Numbered

Some mechanics, also instructors in trade schools, etc., prefer micrometers where the intermediate lines on the thimble denoting thousandths are numbered consecutively. Some think they lend for confusion. To satisfy all, however, we will furnish any micrometer, excluding our Nos. 238 and 239, with this feature without extra charge.

Micrometers

With Half Thousandths Divisions

We desire to call your attention to the hundred thousandths divisions on the thimble. May be had on any micrometer, excluding our Nos. 238 and 239, without extra charge.

Ball Attachment No. 247

Fits either Anvil or Spindle

Offers a clever little arrangement easily applied to certain micrometers for measuring tightly and other receding surfaces. Fitting both, anvil and spindle, one of the attachments can be used at once. The ball is hardened and measured 1 16 of inch or 0.063 in diameter. It moves freely; it must be borne in mind, when using.

Fix the following micrometers: Nos. 100, 112, 120, 123, 124, 125, 130, 131, 132, 133.

No. 247 .................................................. Price, each.

Packed 12 in a box.

Starrett

Screw Thread Micrometer Calipers Nos. 575 and 585

In our line of Screw Thread Micrometer Calipers the movable spindle is pointed, and the end of the anvil is of the same form as the thread to be measured. In measuring screw threads the angle of point and sides of the V come in contact with the cut surface of the thread, so that the reading of the caliper indicates the pitch diameter or the full size of thread less the depth of one thread. In the illustration the spindle is shown closed, and the 0 on the thimble represents a line drawn through the plane A-B, so that readings are taken the same as in a regular micrometer caliper.

Notes: Owing to the varied opinion of mechanics, these micrometers are furnished with either fixed or movable anvils. Sent with movable anvil unless otherwise ordered.

Table of Pitch Diameters for American National and A.S.I. Standard Form of Screw Threads

<table>
<thead>
<tr>
<th>Basic Pitch Diameter</th>
<th>Threads Per Inch</th>
<th>Caliper Reading for Pitch Diameter</th>
<th>Single Depth of Thread</th>
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</thead>
<tbody>
<tr>
<td>1/8</td>
<td>24</td>
<td>0.667</td>
<td>0.667</td>
</tr>
<tr>
<td>3/32</td>
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<tr>
<td>1/16</td>
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<tr>
<td>1/16</td>
<td>32</td>
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</table>

For Screw Thread Comparator see our No. 210 Micrometer Caliper, page 118.

ROSE TOOLS, INC.

ROSE TOOLS, INC.
### Starrett

#### Screw Thread Micrometer Calipers

**Table of Pitch Diameters**

For "V" Standard Form of Screw Threads

<table>
<thead>
<tr>
<th>Diameter Inches</th>
<th>Threads per Inch</th>
<th>Caliper Reading or Pitch Diameter for &quot;V&quot; Threads = D</th>
<th>Single Depth of Thread</th>
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**Table of Pitch Diameters**

For American National and U.S. Standard Form of Screw Threads

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<th>Diameter Inches</th>
<th>Threads per Inch</th>
<th>Caliper Reading or Pitch Diameter for U.S. Threads = D</th>
<th>Single Depth of Thread</th>
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**Table of Pitch Diameters**

For Whitworth Standard of Screw Threads

<table>
<thead>
<tr>
<th>Diameter Inches</th>
<th>Threads per Inch</th>
<th>Caliper Reading or Pitch Diameter for Whitworth Threads = D</th>
<th>Single Depth of Thread</th>
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**Table of Pitch Diameters**

For Metric Standard Form of Screw Threads

<table>
<thead>
<tr>
<th>Thread Size mm.</th>
<th>Pitch mm.</th>
<th>Ind. Std.</th>
<th>French Std.</th>
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---

**Formula**

\[
p = \frac{1}{d}
\]

\[
d = \text{pitch} \times 0.6485
\]

\[
f = \text{frac} \times \text{pitch}
\]
Starrett

Quick Adjusting Micrometer Calipers
No. 204

This micrometer caliper can be instantly opened or closed to any point within its capacity. To operate the caliper it is only necessary to press with the finger against the end of the plunger, as in the may be instantly made. Reloading the pressure, the nut instantly engages the screw.

This caliper also has our adjustable sleeve, as described on a preceding page, as well as the lock nut and ratchet. It will at once be recognized as a distinct advance in tools of this class; in fact it is in a class by itself.

For measurement by thousandths up to one inch, has ratchet stop and lock nut.

No. 204 Range 0 to 1 inch Price
No. 204 C With cut-out frame Price
With case Price

No. 204 M Metric
For measurement by hundredths of a millimeter up to twenty-five millimeters. Has ratchet stop and lock nut. Prices same as for No. 204.

Hub Micrometer Calipers No. 228

This caliper is especially useful in the manufacture of cutters and such articles where exact hub lengths are required. The frame will easily pass through a 3/8-inch hole.

The caliper is made for measurement by thousandths up to one inch. Has lock nut and ratchet stop.

No. 228 With case Price
No. 228 M The same as No. 228, except that the caliper is for measurement by hundredths of a millimeter up to twenty-five millimeters. Prices same as for No. 228. Above numbers sent without case unless otherwise ordered. Packed 1 in a box.

Starrett

Micrometer Calipers
Chromium Plated

To supply the demand for Chromium-Plated micrometers, which are Stain Resistant and longer wearing, we are now prepared to furnish from stock the following micrometers as listed below, specifying Chromium Plated in addition to catalog number.

No. 436
With Black Enamed Frame. Decimal Equivalents on Thimble

Range 0 to 1 inch
For measurements by thousandths up to one inch.

No. 436
Without lock nut, no ratchet, chromium plated Price
No. 436
Without lock nut, with ratchet, chromium plated Price
Case, extra Price
Sent without lock nut and without ratchet unless otherwise ordered.

Packed 1 in a box.

Nos. 230 and 231

Range 0 to 1 inch
For measurements by thousandths up to one inch. Frame is cut out for use in places where the ordinary frame cannot be inserted. Width of anvils end of frame is approximately 3/8 inch.

No. 230 Chromium plated Price
Case, extra Price

No. 231
Same as No. 230, except graduated for measurements by ten-thousandths up to one inch.

No. 231
Chromium plated Price
Case, extra Price
Above numbers sent without case unless otherwise ordered.
**Starrett**

**Micrometer Calipers**

**Nos. 230 X and 231 X**

Anvil and Spindle with Carboly (Tungsten Carbide) Facings

Range 0 to 1 inch

Carboly (Tungsten Carbide) faced spindles and anvils on Starrett Micrometers. An alloy of practically diamond-point hardness, and, because of its exceptional resistance to abrasion, should prove most economical. In the constant inspection of fine tolerances, measuring of harder materials, where an abrasive condition exists, grinding with compound, etc., in fact where there is a noticeable wear of spindle and anvil ends, the carboly feature insures a vastly greater endurance.

<table>
<thead>
<tr>
<th>No. 230 X</th>
<th>For measurements by thousandths up to one inch</th>
<th>Price</th>
<th>With case</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 231 X</td>
<td>Same as No. 230 X, except graduated for measurements by ten-thousandths up to one inch.</td>
<td>Price</td>
<td>With case</td>
<td>Price</td>
</tr>
<tr>
<td>Case extra, for either of above numbers</td>
<td>Price</td>
<td>With case</td>
<td>Price</td>
<td></td>
</tr>
<tr>
<td>Above numbers sent without case unless otherwise ordered.</td>
<td>Price</td>
<td>With case</td>
<td>Price</td>
<td></td>
</tr>
</tbody>
</table>

* Norlide. For severe applications of micrometers we will be glad to quote Norlide inserts in anvils and spindles. Harder than Tungsten Carbide.

* Trade name of Norton Company for Borton Carbide.

**Note:** Other Starrett Micrometer Calipers can be supplied with carboly faced spindles and anvils if desired. Price quoted on application.

---

**Micrometer Calipers**

**With Thimble Friction**

Range 0 to 1 inch

Designed to eliminate the disadvantages in certain inspection work, etc., that exist where the friction stop is positioned at the end of the thimble. The friction stop mechanism embodied in the thimble reduces the size of the thimble and fingers and enables the operator to more easily use the micrometer with one hand.

<table>
<thead>
<tr>
<th>No. 203 F</th>
<th>By thousandths</th>
<th>Price</th>
<th>With case</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 230 F</td>
<td>By thousandths and with lock nut</td>
<td>Price</td>
<td>With case</td>
<td>Price</td>
</tr>
<tr>
<td>No. 209 F</td>
<td>By ten-thousandths</td>
<td>Price</td>
<td>With case</td>
<td>Price</td>
</tr>
<tr>
<td>No. 231 F</td>
<td>By ten-thousandths and with lock nut</td>
<td>Price</td>
<td>With case</td>
<td>Price</td>
</tr>
<tr>
<td>Case extra, for any of above numbers</td>
<td>Price</td>
<td>With case</td>
<td>Price</td>
<td></td>
</tr>
<tr>
<td>Above numbers sent without case unless otherwise ordered.</td>
<td>Price</td>
<td>With case</td>
<td>Price</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* Other Starrett Micrometer Calipers can be furnished with thimble friction feature if desired. Price quoted on application.
Starrett

Micrometer Calipers

No. 203
Range 0 to 1 inch
For measurement by thousandths up to one inch. Has neither lock nut nor ratchet stop.

Price

No. 203 M
Metric
Range 0 to 25 mm. For measurement by hundredths of a millimeter up to twenty-five millimeters. Has neither lock nut nor ratchet stop.

Price

No. 203 M C
With cut-out frame
Price

No. 209
Ten-Thousandths—Range 0 to 1 inch
Same as No. 203, except graduated for measurement by ten-thousandths up to one inch. Has neither lock nut nor ratchet stop.

Price

No. 209 C
With cut-out frame
Price

Either number in case

No. 209 C
With cut-out frame
Price

Above numbers sent without case unless otherwise ordered. Packed 1 in a box.

No. 201
Range 0 to 1 inch
For measurement by thousandths up to one inch. Has lock nut but no ratchet stop.

Price

No. 201 M
Metric
Range 0 to 25 mm. For measurement by hundredths of a millimeter up to twenty-five millimeters. Has lock nut but no ratchet stop.

Price

No. 201 M C
With cut-out frame
Price

No. 207
Ten-Thousandths—Range 0 to 1 inch
Same as No. 201, except graduated for measurement by ten-thousandths up to one inch. Has lock nut but no ratchet stop.

Price

No. 207 C
With cut-out frame
Price

Above numbers sent without case unless otherwise ordered. Packed 1 in a box.

Micrometer Caliper Stand

No. 206
Where frequent reference is to be made to a caliper that is set at a given size, or where a number of pieces must be made of the same size, it is sometimes more convenient to bring the work to the micrometer than to bring the micrometer to the work. The use of a caliper also occupies one hand, while if the mechanic could use both hands he could work faster. To meet such conditions as these we offer the Starrett Improved Micrometer Caliper Stand. This consists of a solid base with a tilting bracket having a clamp which holds the caliper in any convenient position. A turn of the winged nut locks in place both the hinged bracket and the caliper. Both hands are therefore free for the work. This tool is nickel plated and is specially adapted to our 1 inch and 2 inch micrometers, excepting our No. 226 and No. 436 lines.

Price

Packed 1 in a box.
Starrett Micrometer Calipers

No. 2

Range 1 to 2 inches

For measurement by thousandths from one inch to two inches, with lock nut, ratchet stop, and one-inch test gap. Fitted with lock nut at each end of frame when so ordered. See cut of No. 226 on page 124.

No. 2

Either number in case...Price.

No. 2C With cut-out frame...Price.

No. 2M-Metric Range 25 to 50 mm. For measurement by hundredths of a millimeter from 25 mm. to 50 mm. Has lock nut and ratchet stop.

No. 2M

Price.

No. 2M

With case...Price.

Note: This micrometer caliper can be furnished with lock nut at each end of frame when so ordered.

Starrett Micrometer Calipers with Attachment

No. 2A

Range 0 to 2 inches

This is our No. 2 Micrometer, fitted with No. 212 attachment and one-inch test gap.

No. 2A

With case...Price.

No. 2M-A

Metric Range 0 to 50 mm.

This is our No. 2M Micrometer with No. 212M attachment and 25 mm. test gap.

No. 2M-A

With case...Price.

Sent without case unless otherwise ordered.

No. 212 M

Metric

This attachment, by means of which a two-inch micrometer may be converted into a one-inch micrometer, will be furnished when ordered, with either our No. 2 or No. 217 two-inch Micrometers. It will not fit our No. 226 or No. 436 Micrometers.

No. 212 M

Price.

No. 212 M

Price.

No. 212 M

Price.

Above numbers packed 1 in a box.

No. 213

Ten-Thousandths—Range 1 to 2 inches

Same as No. 2, except graduated for measurement by one-thousandths from one inch to two inches, with lock nut, ratchet stop, and one-inch test gap.

No. 213

Price.

No. 213C With cut-out frame...Price.

No. 213C

Above numbers sent without case unless otherwise ordered. Packed 1 in a box.

No. 212 attachment (page 113) can be used with No. 2 Micrometer.

No. 217

Range 1 to 2 inches

For measurement by thousandths from one inch to two inches. Has lock nut and one-inch test gap, but no ratchet stop.

No. 217

Either number in case...Price.

No. 217C With cut-out frame...Price.

No. 217M-Metric Range 25 to 50 mm. For measurement by hundredths of a millimeter from 25 mm. to 50 mm. Has lock nut, without ratchet stop.

No. 217M

Price.

No. 217M

With case...Price.

No. 214

Ten-Thousandths—Range 1 to 2 inches

Same as No. 217, except graduated for measurement by ten-thousandths from one inch to two inches. Has lock nut and one-inch test gap, but no ratchet stop.

No. 214

Either number in case...Price.

No. 214C With cut-out frame...Price.

No. 214C

Above numbers sent without case unless otherwise ordered. Packed 1 in a box.

No. 218 attachment can be used with No. 217 Micrometer.
Starrett

Micrometer Calipers No. 232
Range 0 to ½ inch
For measurement by thou-
sandths up to one-
half inch. The frame is cut out for use in
places where the ordinary frame cannot be inserted.
No. 232
With case
Price

No. 233
Range 0 to ½ inch—Ten- Thou-
sandths
Same as No. 232, except graduated for measurement by ten-thousandths up to one-half inch.
No. 233
With case
Price

No. 576
For Measuring Tubing
Range 0 to ½ inch
This caliper is of the same general design as our No. 232, but with
out lock nut and has the face of the anvil rounded, which adapts it
for accurately measuring the thickness of tubing, etc. The anvil touches
only one point on the inside, while the end of spindle, being set
at only one point on the outside, thus measuring accurately
the thickness of tubing. It will enter a ½ inch hole freely.
For measurement by thousandths up to one-half inch with decimal equivalents stamped in
the frame, with ratchet stop. Without ratchet stop, 50 cents less.
No. 576
With case
Price
No. 576 M—Metric Range 0 to 12 mm. The same as our No. 576, except that it is made for
measurement by hundredths of a millimeter up to 12 millimeters. Prices same as for No. 576.
Above numbers sent without case unless otherwise ordered. Packed 1 in a box.

Tube Micrometer Caliper No. 569
With Black Enamed Frame. Decimal Equivalents on Thimble
Range 0 to 1 inch
Anvil positioned upright to provide a good tool for measuring
bore diameters and thickness or small parts.
No. 569
Without ratchet
Price
No. 569 M—Metric Range 0 to 25 mm. The same as No. 569, except that it is graduated
and diameter of anvil may be furnished when desired.
No. 569 M—Metric
Price

No. 215
With lock nut and without ratchet stop
Price
Case, extra... Price
No. 216
Without lock nut and with ratchet stop
Price
Case, extra... Price
No. 215 M—Metric Range 0 to 12 mm. For measurement by hundredths of a millimeter
up to 12 mm.
No. 215 M
With lock nut and without ratchet stop... Price
Case, extra... Price
No. 215 M
With lock nut and with ratchet stop... Price
Case, extra... Price
No. 219
Ten-Thousandths—Range 0 to ½ inch
Same as No. 215, except graduated for measurement by ten-thousandths up to one-half inch.
No. 219
With lock nut and without ratchet stop... Price
Case, extra... Price
No. 219
With lock nut and with ratchet stop... Price
Case, extra... Price

No. 216
Range 0 to ½ inch
For measurement by thou-
sandths up to one-half inch.
No. 216
Without lock nut and without ratchet stop... Price
Case, extra... Price
No. 216
Without lock nut and with ratchet stop... Price
Case, extra... Price
No. 216 M—Metric Range 0 to 12 mm. For measurement by hundredths of a millimeter
up to 12 mm.
No. 216 M
Without lock nut and without ratchet stop... Price
Case, extra... Price
No. 216 M
Without lock nut and with ratchet stop... Price
Case, extra... Price

No. 218
Ten-Thousandths—Range 0 to ½ inch
Same as No. 215, except graduated for measurement by ten-thousandths up to one-half inch.
No. 218
Without lock nut and without ratchet stop... Price
Case, extra... Price
No. 218
Without lock nut and with ratchet stop... Price
Case, extra... Price
Above numbers sent with ratchet stop and without case unless otherwise ordered.
Packed 1 in a box.
ROSE TOOLS, INC.

Starrett

Paper Gage Micrometer Calipers

No. 223
With Ring

This caliper is used in measuring the thickness of paper, sheet rubber, cardboard, etc. It means of the floating disc on the anvils, it readily adjusts itself to surfaces being measured. Measures all sizes less than 3/16 of an inch by thousandths of an inch.

Without ratchet stop and with ring Price
With case Price

No. 223 M
The same as above, except that it is graduated to read in hundredths of a millimeter.
Prices same as for No. 223.

No. 225
The same as our No. 223, without the ring attachment.

Without ratchet stop Price
With ratchet stop Price

No. 225 M
Metric
The same as our No. 225, except that it is graduated to read in hundredths of a millimeter.
Prices same as for No. 225.

Above numbers sent with ratchet stop and without case unless otherwise ordered.
Packed 1 in a box.

Micrometer Calipers

No. 210
Screw Thread Comparator

This micrometer, while it will not measure the actual diameter of a V thread, for the purpose of comparison it has a wide range of use when cutting screw threads and for measuring in small grooves and recesses not possible with regulation micrometers.

The anvils and spindle central contact points are flattened about 1/16 inch and the micrometer is adjusted to 0 when flats are in contact. Frame has black finish and thimble bears fractions and decimals equivalents.

No. 210 A Range 0 to 1/8 inch
No. 210 B Range 1 to 13/16 inches

Note: Larger sizes quoted on application. Metric measure by hundredths of a millimeter furnished in corresponding size and prices as above.

Above numbers packed 1 in a box.

Starrett

Micrometer Calipers No. 222
For Measuring Sheet Metal

These micrometers have 2 and 6 inch depths of U cut in frame to reach over the edge of sheet metal to gage its thickness nearest the center. The gage with 2-inch depth is made from a forging, has bright finish, decimal equivalents on the frame and 1/4 inch movement of the screw. The gage with 6-inch depth is made from a steel casting of 1 construction, has black enamel finish, decimal equivalents on the thimble and 1-inch movement of the screw.

Both sizes have regular friction sleeve adjustment and are furnished with ratchet stop. The 2-inch only has lock nut.

No. 222 With 2-inch depth in frame Price
No. 222 With 6-inch depth in frame Price
Case for 2-inch depth only Price

No. 222 M Metric The same as No. 222, except that they are graduated for measurements by hundredths of a millimeter. Prices same as for No. 222.

Pocket Micrometer Case No. 911

Closed

This case is much like the ordinary spectacle case, made of steel with snappy spring cover. It is plush lined and covered with Athol artificial leather.

It is light in weight, compact in size and safe from protection of the micrometer against dirt and grit when carried in the pocket, it is less cumbersome than other types.

For 2-inch micrometers only, regular size, not for heavy duty types, see our No. 910.

No. 911 Price

Packed 1 in a box.

Soft Leather Cases for Micrometer Calipers No. 455
For use in carrying a micrometer in the pocket. Made to hold 1/4-inch, 1-inch or 2-inch calipers.

1/4-inch Price, each
1-inch Price, each
2-inch Price, each
Micrometer Caliper Heads

Starrett Micrometer Heads are easily attached to fixtures, special gages, tools and machines, and will be found most useful when fine measurements and adjustments are required.

No. 463

Range 0 to 1/2 inch

Length of clamping surface is 1/2 inch; diameter, 1/2 inch. When micrometer is set at zero the spindle projects 1/4 inch (approximately). Made without lock nut but will be furnished with or without ratchet stop. Sent with ratchet stop unless otherwise ordered. Graduated for measurement by thousandths of an inch up to 1/2 inch.

Price (with or without ratchet stop)

No. 463 M—Metric

Range 0 to 13 millimeters. Length of clamping surface is 9.5 mm.; diameter, 9.5 mm. When micrometer is set at zero the spindle projects 19 mm. (approximately). Made without lock nut but will be furnished with or without ratchet stop. Sent with ratchet stop unless otherwise ordered. Graduated for measurement by hundredths of a millimeter up to thirteen millimeters.

Price (with or without ratchet stop)

No. 464

Ten-Thousandths—Range 0 to 1/2 inch

Length of clamping surface is 1/4 inch; diameter, 1/2 inch. When micrometer is set at zero the spindle projects 1/4 inch (approximately). Made without lock nut but will be furnished with or without ratchet stop. Sent with ratchet stop unless otherwise ordered. Graduated for measurement by ten-thousandths of an inch up to 1/2 inch.

Price (with or without ratchet stop)

No. 263

Range 0 to 1 inch

Length of clamping surface is 1/2 inch; diameter, 1/2 inch. When micrometer is set at zero the spindle projects 1/4 inch (approximately). Made and sent with ratchet stop and lock nut but will be furnished without ratchet stop or lock nut when so desired. Graduated for measurement by thousandths of an inch up to 1 inch.

Price (with or without ratchet stop or lock nut)

No. 263 M—Metric

Range 0 to 25 millimeters. Length of clamping surface is 10 mm.; diameter, 12.7 mm. When micrometer is set at zero the spindle projects 20 mm. (approximately) nut when so desired. Graduated for measurement by hundredths of a millimeter up to twenty-five millimeters.

Price (with or without ratchet stop or lock nut)

No. 363

Ten-Thousandths—Range 0 to 1 inch

Length of clamping surface is 1/4 inch; diameter, 1/2 inch. When micrometer is set at zero the spindle projects 1/4 inch (approximately). Made and sent with ratchet stop and lock nut but will be furnished without ratchet stop or lock nut when so desired. Graduated for measurement by ten-thousandths of an inch up to 1 inch.

Price (with or without ratchet stop or lock nut)

This line of micrometers will be found most popular with the mechanics, especially to those who are engaged in inspection work.

We also recommend this type micrometer for vocational training students and apprentices.

See pages 120, 121, 122 and 123 for further description and prices.
Black Enamede Frame Micrometer Calipers Nos. 436 and 436 M

Range 0 to 1 inch
Range 0 to 25 mm.

Furnished with or without Ratchet or Lock Nut

Starrett

These micrometer calipers combine strength and rigidity, yet are light in weight. Popular priced, but with the same Starrett dependability. Decimal equivalents on the thimble.

Frames on sizes 1 to 9 inches inclusive are solid type; those 10 inches and larger have perforated type (see page 121) for lightness.

The above cut shows the 1-inch size of our micrometer calipers, No. 436. See pages 121, 122 and 123 for other sizes and prices. This line made in sizes 1 inch to 24 inches inclusive. Packed 1 in wooden box. Sent without ratchet, without lock nut and without standards unless otherwise ordered.

SIZEs and PRICES

<table>
<thead>
<tr>
<th>Size</th>
<th>Size mm.</th>
<th>Range (inches)</th>
<th>Range (mm.)</th>
<th>Without Ratchet or Lock Nut</th>
<th>With Ratchet or Lock Nut</th>
<th>Standards Extra</th>
<th>Case Extra</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>0-1</td>
<td>0-25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>1-2</td>
<td>25-50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>2-3</td>
<td>50-75</td>
<td></td>
<td></td>
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<td>100</td>
<td>3-4</td>
<td>75-100</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>125</td>
<td>4-5</td>
<td>100-125</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>150</td>
<td>5-6</td>
<td>125-150</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7</td>
<td>175</td>
<td>6-7</td>
<td>150-175</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>200</td>
<td>7-8</td>
<td>175-200</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>9</td>
<td>250</td>
<td>8-9</td>
<td>200-225</td>
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<tr>
<td>10</td>
<td>300</td>
<td>9-10</td>
<td>225-300</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>11</td>
<td>350</td>
<td>10-11</td>
<td>250-350</td>
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<tr>
<td>12</td>
<td>400</td>
<td>11-12</td>
<td>275-400</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Any of the above micrometers, English measure, can be furnished to read to tenths of thousandths of an inch at an additional cost of each to above list prices.
Micrometer Caliper Sets

No. 436

With Black Enamelled Frame. Decimal Equivalents on the Thimble

<table>
<thead>
<tr>
<th>PRICES PER SET</th>
<th>No. 436 A</th>
<th>Set of three micrometer calipers comprising 1, 2 and 3 inch sizes, all without ratchet stop</th>
<th>Set of two standards for above</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. 436 B</td>
<td>Set of six micrometer calipers comprising 1, 2, 3, 4, 5 and 6 inch sizes, all without ratchet stop</td>
<td>Set of five standards for above</td>
</tr>
<tr>
<td></td>
<td>No. 436 C</td>
<td>Set of three micrometer calipers comprising 1, 2 and 3 inch sizes, all with ratchet stop</td>
<td>Set of two standards for above</td>
</tr>
<tr>
<td></td>
<td>No. 436 D</td>
<td>Set of six micrometer calipers comprising 1, 2, 3, 4, 5 and 6 inch sizes, all with ratchet stop</td>
<td>Set of five standards for above</td>
</tr>
<tr>
<td></td>
<td>No. 436 E</td>
<td>Set of six micrometer calipers, range 6 inches to 12 inches, comprising 7, 8, 9, 10, 11 and 12 inch sizes, all without ratchet stop and without standards, in finished wood case</td>
<td>Set of standards for above</td>
</tr>
<tr>
<td></td>
<td>No. 436 F</td>
<td>Same as Set E, except all with ratchet stop</td>
<td>Set of standards for above</td>
</tr>
<tr>
<td></td>
<td>No. 436 G</td>
<td>Set of twelve micrometer calipers, range 0 to 12 inches, comprising all sizes from 1 to 12 inch, inclusive, all without ratchet stop, and without standards, in finished wood case</td>
<td>Set of standards for above</td>
</tr>
<tr>
<td></td>
<td>No. 436 H</td>
<td>Same as Set G, except all with ratchet stop</td>
<td>Set of standards for above</td>
</tr>
</tbody>
</table>

Sets A, B, C and D are sent without case and without standards and without lock nut unless otherwise ordered.

Sets E, F, G and H are all furnished in finished wood cases at prices shown above.
**Starrett**

**Micrometer Calipers No. 226**

These calipers meet the demand for accurate and easy-to-use micrometers. They are better adapted for general use than the vernier or bar micrometer, as they can be set quickly for different measurements and are more easily read.

Each caliper is graduated to read by thousandths of an inch, is furnished with lock nut, and is sold with or without ratchet stop as desired.

The frames are deep-forged from bar steel and are nicely finished.

The 1-inch size has the decimal equivalents stamped on the frame. The other sizes are marked to show their capacity.

Standards for use in adjusting these calipers will be furnished when desired at prices given below.

Calipers will be supplied singly or in sets as desired; and will be sent with ratchet stop and without case or standard unless otherwise ordered.

- 1-inch, with decimal equivalents, without ratchet stop (our No. 201) ...............Price
- 1-inch, with decimal equivalents, with ratchet stop (our No. 3) ..................Price
- 2-inch case only ........................................Price
- 1-inch, from 1 inch to 2 inches, without ratchet stop .................................Price
- 2-inch, from 1 inch to 2 inches, with ratchet stop .....................................Price
- 3-inch case only ........................................Price
- 3-inch, from 2 inches to 3 inches, without ratchet stop .................................Price
- 3-inch, from 2 inches to 3 inches, with ratchet stop .....................................Price
- 4-inch case only ........................................Price
- 4-inch, from 3 inches to 4 inches, without ratchet stop .................................Price
- 5-inch case only ........................................Price
- 5-inch, from 4 inches to 5 inches, without ratchet stop .................................Price
- 5-inch, from 4 inches to 5 inches, with ratchet stop .....................................Price
- 6-inch case only ........................................Price
- 6-inch, from 5 inches to 6 inches, without ratchet stop .................................Price
- 6-inch, from 5 inches to 6 inches, with ratchet stop .....................................Price

Packed 1 in a box.

*Note:* The 1, 2, 3, 4, 5, and 6 inch sizes can be furnished to read to ten-thousandths of an inch, at an additional cost of.......

**Micrometer Calipers No. 226 M**

The same as No. 226, except that they are graduated for measurement by hundredths of a millimeter. Furnished in corresponding sizes and prices as above.

ROSE TOOLS, INC.
Starrett

Micrometer Caliper Sets
No. 226

Prices Per Set

No. 226 C Set of three micrometer calipers comprising our No. 201 1-inch, No. 229 2-inch and 3-inch, all without ratchet stop.
Set of two standards for above.

No. 226 D Set of three micrometer calipers comprising our No. 3 1-inch, No. 226 2-inch and 3-inch, all with ratchet stop.
Set of two standards for above.

No. 226 E Set of six micrometer calipers comprising our No. 3 1-inch, No. 226 2-inch, 3-inch, 4-inch, 5-inch, and 6-inch, all without ratchet stop.
Set of five standards for above.

No. 226 F Set of six micrometer calipers comprising our No. 3 1-inch, No. 226 2-inch, 3-inch, 4-inch, 5-inch, and 6-inch, all with ratchet stop.
Set of five standards for above.

No. 226 G Set of four micrometer calipers reading to ten-thousandths, comprising our No. 201 1-inch, with decimal equivalents, No. 226 2-inch, 3-inch, and 4-inch, all with lock nut and without ratchet stop.
Set of three standards for above.

No. 226 H Set of four micrometer calipers reading to ten-thousandths, comprising our No. 113 1-inch, with decimal equivalents, No. 226 2-inch, 3-inch, and 4-inch, all with lock nut and with ratchet stop.
Set of three standards for above.

No. 226 M Metric

Prices Per Set

No. 226 M-C Set of three micrometer calipers comprising our No. 201 M, 25 mm.; No. 226 M, 50 mm. and 75 mm., all without ratchet stop.
Set of two standards for above.

No. 226 M-D Set of three micrometer calipers comprising our No. 3 M, 25 mm.; No. 226 M, 50 mm. and 75 mm., all with ratchet stop.
Set of two standards for above.

No. 226 M-G Set of six micrometer calipers comprising our No. 201 M, 25 mm.; No. 226 M, 50 mm., 75 mm., 100 mm., 125 mm., and 150 mm., all without ratchet stop.
Set of five standards for above.

No. 226 M-H Set of six micrometer calipers comprising our No. 3 M, 25 mm.; No. 226 M, 50 mm., 75 mm., 100 mm., 125 mm., and 150 mm., all with ratchet stop.
Set of five standards for above.

The above sets are sent without case, and without standards, unless otherwise ordered.
See page 124 for illustrations of cases.

Starrett

Micrometer Calipers
Heavy Duty Type
No. 238

Range 0 to 1 inch

These calipers are made with the frame and the other parts much heavier than the regular one-inch micrometers and will last longer under hard usage, on account of their stiffness and because of larger bearing surface for the threads. They are especially useful on grinding work and wherever it is necessary to take measurements after the lock nut is set. Many mechanics prefer this micrometer for lathes and milling machine work where constant measurements are required under trying conditions and in the grinding room where dirt and moisture are found.

To prevent wear the measuring surfaces and bearing parts are hardened. These calipers have the decimal equivalents stamped on the frame and are packed in a strong wooden box.

For measurement by thousandths up to one inch. Has ratchet stop and lock nut.

Note: Can be furnished to read to ten-thousandths of an inch at an additional cost of each to list price.

Prices

No. 238

With case

No. 238 M

Metric—Range 0 to 25 mm.

The same as above except that they are made for measurement by hundredths of a millimeter up to twenty-five millimeters.

Prices

No. 238 M

With case

No. 238 and No. 238 M sent without case unless otherwise ordered.
Packed 1 in a box.

ROSE TOOLS, INC.
# Starrett Heavy Micrometer Calipers

## No. 239

These calipers were designed to meet the exacting demands of heavy and severe usage. The spindle and screw portion is of larger area than in the regular micrometer, thus insuring longer wear and greater rigidity; those from 2 inches to 8 inches, inclusive, are made from drop-forged steel castings with holes in frame and the same means provided for adjustment as in our other micrometers. Made with lock nut and ratchet stop. Sizes are stamped on these tools to show their capacity.

<table>
<thead>
<tr>
<th>Case</th>
<th>1 inch to 2 inches</th>
<th>Price</th>
<th>With standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case extra</td>
<td>2 inches to 3 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>3 inches to 4 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>4 inches to 5 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>5 inches to 6 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>6 inches to 7 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>7 inches to 8 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>8 inches to 9 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>9 inches to 10 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>10 inches to 11 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>11 inches to 12 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
</tbody>
</table>

## Sets of Heavy Micrometer Calipers

### No. 239 M

The same as our No. 239, except that they are graduated for measurement by hundredths of a millimeter.

<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>Price</th>
<th>With standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 to 50</td>
<td></td>
<td>With standard</td>
</tr>
<tr>
<td>50 to 75</td>
<td></td>
<td>With standard</td>
</tr>
<tr>
<td>75 to 100</td>
<td></td>
<td>With standard</td>
</tr>
<tr>
<td>100 to 125</td>
<td></td>
<td>With standard</td>
</tr>
<tr>
<td>125 to 150</td>
<td></td>
<td>With standard</td>
</tr>
<tr>
<td>150 to 175</td>
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<td>With standard</td>
</tr>
<tr>
<td>175 to 200</td>
<td></td>
<td>With standard</td>
</tr>
<tr>
<td>200 to 225</td>
<td></td>
<td>With standard</td>
</tr>
<tr>
<td>225 to 250</td>
<td></td>
<td>With standard</td>
</tr>
<tr>
<td>250 to 275</td>
<td></td>
<td>With standard</td>
</tr>
<tr>
<td>275 to 300</td>
<td></td>
<td>With standard</td>
</tr>
</tbody>
</table>

Cases not supplied for sizes above 150 mm. Micrometers sent without case, and with standard unless otherwise ordered. Sizes 60 mm to 150 mm sent in strong wood boxes. Larger sizes sent in finished wood cases.

### Sets of Heavy Micrometer Calipers

#### Metric

<table>
<thead>
<tr>
<th>Case</th>
<th>1 inch to 2 inches</th>
<th>Price</th>
<th>With standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case extra</td>
<td>2 inches to 3 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>3 inches to 4 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>4 inches to 5 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>5 inches to 6 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>6 inches to 7 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>7 inches to 8 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>8 inches to 9 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>9 inches to 10 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>10 inches to 11 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
<tr>
<td>Case extra</td>
<td>11 inches to 12 inches</td>
<td>Price</td>
<td>With standard</td>
</tr>
</tbody>
</table>

Cases not supplied for sizes above 6 inch. Micrometers sent without case, and with standard unless otherwise ordered. Sizes 2 inch to 8 inch sent in strong wood boxes. Larger sizes sent in finished wood cases.

**Note:** Any of the above micrometers can be furnished to read to ten-thousandths of an inch at an additional cost of each to list prices.
Micrometer Caliper Sets
No. 224
For Automobile and Aviation Service Shops

No. 224 AA
Range 0 to 4 inches

No. 224 A
Range 2 to 6 inches

One micrometer for all intermediate measurements from 0 to 4 inches or 2 to 6 inches by 0.001 inch, furnished with accurately positioned and readily interchangeable anti-friction pistons, ratchet stop, and wrench pin.

The frames are made from forgings and have black enamel finish. Decimal equivalents are stamped on the thimbles and the micrometers are provided with lock nuts.

See page 131 for prices.

LARGER SIZES

No. 224B 6-inch to 9-inch range
With lock nut, ratchet stop and three standards in substantial wood case

No. 224C 8-inch to 12-inch range
With lock nut, ratchet stop and three standards in substantial wood case

No. 224D 12-inch to 16-inch range
With lock nut, ratchet stop and four standards in substantial wood case

No. 224E 16-inch to 20-inch range
With lock nut, ratchet stop and four standards in substantial wood case

No. 224F 20-inch to 24-inch range
With lock nut, ratchet stop and four standards in substantial wood case

No. 224G Set Complete. Range 2 inches to 24 inches, with standards, lock nuts and ratchet stops, in substantial wood cases

No. 224H Set Complete. Range 0 to 24 inches, with standards. Same as No. 224 G Set with the addition of our No. 436 Micrometers with ratchet stops, sizes 1 and 2 inch, as listed on pages 120 to 123 inclusive, in substantial wood cases

No. 224I Set Complete. Range 0 to 24 inches, with standards. Consisting of our No. 436 Micrometers with ratchet stops, sizes 1, 2, 3, 4, 5 and 6 inch, as listed on pages 120 to 123 inclusive, and our No. 224 H, C, D, E and F, in substantial wood cases

Notes: Larger sizes of the following ranges: 24 to 26 inches, 22 to 24 inches, and 32 to 36 inches can be furnished when desired. Prices quoted upon application.

No. 224 M
Metric

The same as No. 224, except that they are graduated for measurement by sixteenths of a millimeter and the thimbles are plain, not marked with decimal equivalents. Furnished in corresponding sizes and prices as above.
United States Government Micrometer Caliper Gages

No. 127

These gages were designed and made to meet the requirements of the Government in making big guns and other work in the Ordnance Department of Government shops, where they are used. The frames are cut from steel plates, nicely finished. The slides are covered with hard rubber, put on with brass screws, preventing inaccuracy through expansion caused by change in temperature when held in the hands. The micrometer screw adjusts one inch, reading by 1/100 of an inch, and is provided with lock nut. The different length spindles, forming anvils, are interchangeable and have positive stops to set against their socketed seats. The adjusting collar of these anvils have notches to facilitate the removal of dirt, which would prevent them from sliding accurately against the seat. The contact ends of spindles are slightly convex. Furnished with ratchet stop.

No. 127

English

<table>
<thead>
<tr>
<th>Model</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>127 A</td>
<td>0 to 4 inches</td>
</tr>
<tr>
<td>127 B</td>
<td>4 to 8 inches</td>
</tr>
<tr>
<td>127 C</td>
<td>8 to 12 inches</td>
</tr>
<tr>
<td>127 D</td>
<td>12 to 16 inches</td>
</tr>
<tr>
<td>127 E</td>
<td>16 to 20 inches</td>
</tr>
<tr>
<td>127 F</td>
<td>20 to 24 inches</td>
</tr>
</tbody>
</table>

No. 127 M

Metric

<table>
<thead>
<tr>
<th>Model</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>127 M1</td>
<td>0 to 100 mm</td>
</tr>
<tr>
<td>127 M2</td>
<td>100 to 200 mm</td>
</tr>
<tr>
<td>127 M3</td>
<td>200 to 300 mm</td>
</tr>
<tr>
<td>127 M4</td>
<td>300 to 400 mm</td>
</tr>
<tr>
<td>127 M5</td>
<td>400 to 500 mm</td>
</tr>
<tr>
<td>127 M6</td>
<td>500 to 600 mm</td>
</tr>
</tbody>
</table>

Furnished in case without extra charge. Sent without standards unless otherwise ordered.

Packed 1 in a box.

For prices of standards to use with these micrometers, see page 133.

Larger sizes can be made to order when so desired. Prices quoted on application.
Inside Micrometer Calipers

No. 700
Range .200" to 1" by Thousandths

Designed to provide a tool to read as a micrometer, with vernier caliper styled jaws, to measuring small internal dimensions. Contact surfaces are hardened and ground. Packed 1 in a box.

No. 700 .................................. Price, With case .................. Price.

Micrometer Caliper Gages No. 126

Designed for close internal measurements, indicating thousandths where a definite distance in inches is not essential. The body of the tool is a steel tube, provided at one end with a binding chuck in which are fastened the plain rods, and it can quickly be adjusted to any approximate size, giving a reading in thousandths, and has 1/100th movement of screw. A small binding screw locks rods when set. Rods are marked in 1/100th divisions and set to a similar line on a projection of the barrel.

Set A measures from 1 inch to 6 inches, has 1/100th movement of screw and requires four extension rods. The rods are provided with a hardened steel adjustable orifice, which permits adjusting for wear. A small binding screw locks rods when set. This is a very strong and serviceable tool as well as an accurate one. We can furnish rods of extra length for these tools when desired.

When so ordered an auxiliary handle similar to the one furnished with No.124 accompanies Sets A, B and D, which is used by removing the end opposite the lock nut and screwing the handle in place of same, thereby enabling one to take measurements in holes and other places where the micrometer could not otherwise be used.

No. 126 M—Metric Capacity, 2.5 cm. to 10 cm. Price same as for No. 126. Above numbers sent without case unless otherwise ordered.

No. 120 M

The same as No.120, except that it is graduated to read in hundredths of a millimeter.

Set A To measure from 50 mm. to 200 mm. Price, With case..........
Set B To measure from 200 mm. to 760 mm. Price, With case..........
Set C Comprising Sets A and C .............................................. Price, With case..........

Handle, extra.................. Price.

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.
Inside Micrometer Calipers
No. 124

An Inside Micrometer Caliper is an adjustable end measuring gage. It is designed for internal linear measurements such as cylinders, rings, and also in setting calipers, comparing gages, etc., as well as measuring parallel surfaces. The measurement is taken over its extreme ends which are hardened and ground as contacts. The distance between the contacts is changed by the rotation of the sleeve on the micrometer head up to the extent of screw length. Greater distances are obtained by use of extension rods and suitable collars or gages which are provided with each tool to cover its range.

The rods are marked with the range that the tool will take over the measuring points when that particular rod is used. To illustrate the use of inside micrometers, the 124A set, as illustrated on page 137, shows the micrometer head with the 2 to 3 inch extension rod assembled with the shoulder on the rod in contact with the shoule of the micrometer head and the micrometer screw rotated to read .125 inch. The measurement over the contacts is .125 inch. Since the range of the micrometer screw in the head of the A and B sets is .500 inch, measurements between 2.500 and 3 inches are taken by placing the .125 inch spacing collar or gage on the rod before inserting the rod in the head. The rod length will become 2.500, which added to the reading of the micrometer, gives the distance between the contacts. The same use of the .125 inch collar applies to the other sizes of extension rods. In setting these rods see that the zero marks on the collars and micrometer head coincide. (Provisions is made for adjustment to compensate for wear built between the contacts.)

The 124C set has a movement of 1 inch in the screw of the micrometer head and is provided with spacing collars or gages that are used in same manner as those in the A set.

The auxiliary handle as shown in cut for use with sets A, B and D, is designed to go on the side opposite the lock screw which may be distinguished by its small groove. To insert the handle it may be found necessary to use a clamp or pliers on the knurled stud, after which the stud may be easily removed.

See page 137 for additional information and prices.
Inside Micrometer Calipers
No. 121

When linear measurements are beyond the capacity of the ordinary micrometer, it is frequently necessary to have a more accurate instrument than the rule or steel tape. The inside calipers shown here were designed for and are now used by the Government in navy yards and arsenals for measurement. The tubes are telescoping extensions combined with a six-inch screw micrometer for movement. The tubes are accurately graduated and figured in inches and set to the inch marks showing the length wanted, and are firmly held by a knurled locking nut. The ends of the rods have hardened steel anvils. Combinations are possible which give a range from 32 to 107 inches and with micrometer accuracy over the whole range. These inside micrometer calipers are nickel plated. A case is furnished with each set.

Set A Stock with one rod, 32 to 67 inches
Set B Stock with two rods, 32 to 82 inches
Set C Stock with three rods, 32 to 107 inches

No. 121 M
Metric
The same as above, except that it is graduated to read in hundredths of a millimeter.

Set A Stock with one rod, 800 mm. to 1400 mm
Set B Stock with two rods, 800 mm. to 2070 mm
Set C Stock with three rods, 800 mm. to 2700 mm

Height Gage Attachment
No. 447

This cut shows a steel base for holding our Inside Micrometer No. 124 set A and B (page 137), for use as a height gage, serving in many cases where the purchase of a more expensive tool would otherwise be required. The anvil end is even with the bottom of the base and the micrometer is held perpendicularly, as shown in cut, making a reliable gage. A slight turn of the knurled screw instantly clamps it to or releases it from the base.

No. 447 Attachment only

Inspectors’ Micrometer Caliper Gage No. 175
For Testing Boilers, Flues, Tubing, Drawn Die Work, Etc.
Used by U. S. Government Inspectors

This gage was designed particularly for measuring the walls of cylindrical forms through a drilled hole in a line or plane where it would not be otherwise possible to secure accurate measurements. This gage is made to be read by thousands of an inch and its simple construction makes it possible to obtain as exact readings as upon flat material. It is furnished with two anvils which are interchangeable, whereby measurements may be taken, from 0 to 4 inches. The anvils have a positive stop and are held fast to the base, containing a keyway, by the large nut. The smaller nut is used to turn the anvil when released from its seat. The small end shows the anvil turned out of position. They are furnished with lock nut and ratchet step. A 1-inch standard plug is also furnished to test the gage when using the anvil for measurements from 1 to 2 inches.

No. 175 With case

Inspectors’ Gage No. 30

This gage was designed at the suggestion of a government inspector to fill the need of a tool for measuring the thickness of ship plates, boiler plates, etc., where measurement has to be taken through a bolt hole or hole drilled for the purpose.

The contact point is carried in beyond any burrs formed by drilling, ensuring correct measurement.

The slide measuring rod is graduated on two opposite sides, one side reading 31nds, the other 64ths. Reading from the top of the knurled friction slide, which, after the contact end of the gage is brought together against the object being measured, is slipped down against the top, the graduations above show the exact measurement. Then the measuring rod may be instantly withdrawn, the hook part removed and all taken to the light and the correct measurement indicated above the friction slide, easily read.

The knurled nut over the split bush serves to contract same to fit close on the slide or to lock out, making a solid gage, convenient for any mechanic.

The gage weighs about 1 ounce and is adapted for the vest pocket. Length, 1 inch. Capacity, 1/64 inches.

No. 30

No. 30 M—Metric Capacity, 47 mm. Red graduated one side in mm., the other in 1/64 mm.

Inspectors’ Gage No. 31

This gage is similar to our No. 30, except that it is made narrower for use in smaller holes. Width, 1/4 inch. Capacity, 1/32 inches. Graduated one side in 31nds, the other in 64ths.

No. 31

No. 31 M—Metric Capacity, 47 mm. Graduated in mm. and 1/32 mm.

Above numbers packed 1 in a box.
Small Hole Gages
No. 829

At last, an inexpensive, practical set of small gages that reach into small holes and recesses, and get the measurement from 1/4 inch to 1/2 inch. A real companion set to our No. 229 Telescoping Gages which have a minimum capacity of 1/4 inch. See page 141.

Balance, sensitivity of contact and adjustment, together with ball radius, hardness and amplitude, make this set of gages of inestimable value. Simply expand to get the “feel” and measure ball and with a micrometer.

Telescoping Gages
No. 229

These are instruments from which the exact size of holes or slots can be taken by an outside caliper or micrometer, so that shrink, close or loose file, varying in thousandths, or less, can be made and measured. The plunger is locked by a slight turn of the knurled screw in the end of the handle. Made in five sizes. The smallest (size A) will enter a 1/16-inch hole—the largest (size E) will expand to 6 inches.

<table>
<thead>
<tr>
<th>Size</th>
<th>Range</th>
<th>Price, each</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1/16 inch to 1/16 inch</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1/8 inch to 1/8 inch</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1/4 inch to 1/4 inch</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>1/2 inch to 1/2 inch</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>3/8 inch to 6 inches</td>
<td></td>
</tr>
</tbody>
</table>

Set of Four in red leatherette case: Price, per set, Case only.
Starrett
"Universal Junior" Indicator
No. 564
Patented

An unusually sensitive and flexible indicator that will hit about every conceivable application. Consider first, the rotating friction sleeve which carries the ball contact point with it. This feature alone permits the thousandths and the graduated plate, with a range of .012, to be maintained in the preferred position, thus eliminating physical and eye strain, double graduated scale or model. Consider with this rotating sleeve: indicator used on the side of the shank at one end, on the top of the shank at the other end; and the moveable, frictionally held, ball contact.

Case-hardened steel and die-cast parts. Shank size, approximately 1/4 x 1/16 x 8 inches. Indicator case thickness about 1/32 inch, tapering from 1/16 to 1/32 inch ball diameter, 2/32 inches the length.

Note: Special diameter contacts quoted upon application.

No. 564 ................................. Price.
Cone, extra ............................. Price.

Sent without case unless otherwise ordered.

Packed 1 in a box.

142

Starrett
"Last Word" Indicators
The Popular Line with the Mechanic

No. 711 F
MODEL "F"
Patented

Reversible Action
Swiveling Tubular Body
Detachable Machinist Joint
Contact Point
Universal Shank

Price Complete — 
Case Included

The various models of "LAST WORD" Indicators, shown on this and the following pages, provide an excellent variety from which the mechanic may choose.

A brief analysis of this cut readily conveys the marvelous flexibility of this complete LAST WORD Dial Indicator. The combination involves No. 711 F with the Universal Shank.

On this No. 711 F, instead of sideplate, remove inspection hole screw on left side of body and be sure that reversing switch lever is in its lower position at its outer end. Do not remove dial plate unless you have machinists' tools and a machinists' touch or you may damage the huluspring.

The No. 711 F has reversible action by means of the switch lever on right side of body underneath the dial.

The switch lever should be at its extreme limit of motion in either direction to get the best action. It also regulates the tension which normally requires 1/2 to 1 ounce (15 to 20 grams) pressure on the contact point to set the hand in motion. If the switch is not at its extreme limit of motion, the indicator will be more sensitive and, if left midway between stops, the indicator will not function because the operating spring is then in a neutral position.

The ratchet joint contact point can be moved to any desired position without twisting the spring clip, which should be swung aside only when changing contact points. The teeth are fine and, if exposed to grit, would be likely to catch dirt and then not come into proper location.

Keep free from oil, dust, acid and moisture.

Note: When some small alteration or unlisted attachment is desired, we will welcome any opportunity to cooperate.

ROSE TOOLS INC.
Starrett

"Last Word" Indicators

The Popular Line with the Mechanic

No. 711 B MODEL "B"
Patented

Friction Joint Contact Point
Range .025 inch Adjustable Dial
With Gooseneck Shank Price
With Universal Shank Price
Without Shank Price

Sent with Gooseneck Shank and Case unless otherwise ordered.

No. 711 C MODEL "C"
Patented

Friction Joint Contact Point
Range .025 inch Adjustable Dial
With Gooseneck Shank Price
With Universal Shank Price
Without Shank Price

Sent with Gooseneck Shank and Case unless otherwise ordered.

No. 711 D MODEL "D"

Fixed Contact Point
Range .025 inch Adjustable Dial
With Gooseneck Shank Price
With Universal Shank Price
Without Shank Price

Sent with Gooseneck Shank and Case unless otherwise ordered.

No. 711 D-10 MODEL "D-10"

Fixed Contact Point
Range .025 inch Adjustable Dial
With Gooseneck Shank Price
With Universal Shank Price
Without Shank Price

Sent with Gooseneck Shank and Case unless otherwise ordered.

No. 711 F MODEL "F"

Ratchet Joint Contact Point
Reversible Action
Range .025 inch Adjustable Dial
With Universal Shank Price
With Gooseneck Shank Price
Without Shank Price

Sent with Universal Shank and Case unless otherwise ordered.

This model can also be furnished in Metric reading, 1/1000 mm, at same price.

General Information on "Last Word" Indicators

All changes and repairs must be reported immediately to receive consideration. You save time and expense by sending repairs direct to factory by insured parcel post.

We can't undertake to remodel or alter one type into another. All working parts are hardened and every indicator is inspected before shipment. We will not be responsible for damage done, or adjustments disturbed, after the indicator leaves our factory. On all "LAST WORD" Indicators the base are forced on and can be removed by inserting a knife blade between base and body of indicator and prying it partly off. Revolve dial a quarter turn and continue to pry until base comes off. To replace base use a pair of jeweler's and cutting pliers with the cutting edges flamed with an alcohol so they will not injure the base. With one jaw resting on the base just above the knurled part and the other jaw against the underside of the dial plate, the base can be forced on a little at a time until the crystal is tight. If indicator shows backlash, or does not come back to zero with a snap, move the base, then move the side plate and with a small pointed wood stick lift lever out of spiral groove, letting spiral assume its own position, then let lever go down, push spiral toward the left until lever snaps into groove, and replace side plate.
Starrett
"Last Word" Indicators
The Popular Line with the Mechanic
Showing Constructural Detail and Parts Numbers
LAST WORD Indicators
When ordering parts, specify Model with which they are to be used

List of Parts
For No. 711 Indicators

1. Dial plate...
   Price...
2. Indicator head...
   Price...
3. Outer housing...
   Price...
4. Outer spring...
   Price...
5. Inner head...
   Price...
6. Pointer body...
   Price...
7. Pointer with stem and index...
   Price...
8. Spring...
   Price...
9. Pin...
   Price...
10. Contact point...
    Price...
11. Screw...
    Price...
12. Spring...
    Price...
13. Center spring...
    Price...
14. Dial plate screws...
    Price...
15. Indicator head screws...
    Price...
16. Spring...
    Price...
17. Spring...
    Price...
18. Complete set...
    Price...
19. First screw...
    Price...
20. Second screw...
    Price...
21. Third screw...
    Price...
22. Fourth screw...
    Price...
23. Fifth screw...
    Price...
24. Sixth screw...
    Price...
25. Seventh screw...
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26. Eighth screw...
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27. Ninth screw...
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28. Tenth screw...
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29. Eleventh screw...
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30. Twelfth screw...
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31. Thirteenth screw...
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32. Fourteenth screw...
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45. Twenty-seventh screw...
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46. Twenty-eighth screw...
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47. Twenty-ninth screw...
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FOR PRODUCTION INSPECTION

STARRETT
DIAL INDICATORS
Dial Indicators

The L. S. Starrett Company wishes to call to your attention its complete line of Indicators, commonly referred to as Dial Gages. No expense or effort has been spared to construct these gages with the durability and accuracy present-day practices and conditions demand. Such Indicators are indispensable in the tool and machine industry, being attachable to tool spindles, machinery, production jigs and fixtures. Essential in inspection work and for mountings where measurements are involved too numerous to estimate. Together with our well-known No. 196 Dial Indicator, the LAST WORD Indicator, and the models illustrated in our complete Dial Indicator Catalog, the buyer is offered an outstanding selection.

Indicator numbers 25, 81, 655 and 656 are rust-proof through the use of stainless steel and chromium-plated parts. All gears, the rack, dowels, screws, stem bushings, etc., are stainless steel, the case and bezel special die castings, chromium-plated. The back cover is also a die casting with black crackle finish.

Particular attention has been given to reflection and legibility, sturdiness and accuracy, and interchangeability of parts.

Diamond, Norbide* or Tungsten Carbide Tips, materially adding to the life of the contact points, will be quoted upon request.

*Trade name of Norton Company for Boron Carbide.

Write for complete Starrett Dial Indicator Catalog and Price List.
Starrett

Dial Test Indicator No. 665

A sturdily built combination for the general work of inspectors, machinists and toolmakers. The indicator has a spindle travel of 1/32 inch and reads in thousandths from 0-25-0. (Other type of dial indicators for this tool furnished upon request.) By means of the swivel post snug D, the horizontal arm C is adjustable to any position or is easily removed for use in the tool post of a lathe. The right angle arm C-I provides further adjustment. The base stop E and F clamp T-slot, square edge, work plates, etc. The tool-post holder H is designed for the use of other parts such as the horizontal gage holding rod O, offset arm C-1, etc., in connection with the dial post snug D reducing the hole size to 9/32 inch to facilitate clamping to surface gage spindle, etc.

No. 665 Dial Test Indicator, with all attachments, as shown, including finished wood case price...

No. 665 A Base price...

No. 665 B Upright Base Post, including clamping mechanism price...

No. 665 C Horizontal Gage Holding Rod, including clamping mechanism price...

No. 665 D Swivel Post Snug, complete price...

No. 665 E Base Stop, Square price...

No. 665 F Angular Base Stop or Keyway Guide price...

No. 665 G Offset Arm price...

No. 665 H Tool-Post Holder price...

No. 665 I Reducing Bushing for Post Snug (5/8-inch hole) price...

Packed 1 in a box.

No. 665 M Metric

Same as above, except the dial indicator reads in hundredths of a millimeter (0-50-0) and the spindle travel is 2 mm.

No. 665 M—Metric Including finished wood case. Prices same as for No. 665.

Packed 1 in a box.

Starrett

Indicator Attachments

CLAMP No. 665-G

Made to use with our No. 665 Combination Dial Test Indicator. Increases its utility in the inspection of parts and fixtures, lining up parts, work on centers, machine platens, etc. Clamp capacity, about 3 inches. The swivel base above the screw prevents injury to a finished surface.

No. 665-G Packed 1 in a box.

UNIVERSAL ATTACHMENT No. 671

Also clamps on the dial gage stem, the lever working against the spindle. Contacts work that the standard spindle cannot reach. Note the two interchangeable arms by means of tapered stud and held in position by a spring tension.

No. 671 Packed 1 in a box.

HOLE ATTACHMENT No. 670

Clamps on dial gage stem. Provides added utility around internal and external work.

No. 670 Packed 1 in a box.
**Starrett**

**Inspectors’ Dial Bench Gage No. 654**

With Sliding Head and Table

An excellent gage for measuring rubbers, textile goods, paper, metal parts, leather, varnish, mica, celluloid, cardboard, fabric, etc. The dial is graduated to read by thousandths of an inch. See our Dial Gage Catalog for details.

Has both lever and top controls. The lever is pressed downward to lift the spindle and when released allows the spindle to make contact with the work and under a uniform tension regulated by a spring in the dial gage. The lever is positioned at the left but can be furnished at the right if desired.

The dial can be adjusted relative to 0; the range, 9/16 inch. Read clamp not standard but furnished on request. The table, (1/8-inch diameter) is adjustable, as is also the dial gage. Range, 0 to 3 inches. Base diameter, 9/16 inch. Height, 8 inches. Weight, approximately 5 pounds.

No. 654 In substantial wood case, fitted with our No.26B Dial Gage (as shown). Price...

No. 654M—Metric Same as above, except dial gage is graduated to read by hundredths of a millimeter. Price same as for No. 654.

**Note:** Special sizes and shapes of contact points and tables can be furnished upon request.

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**Starrett**

**Dial Bench Gage No. 458**

This gage was designed for bench work and has many adjustments, a wide range of usefulness, grades, thicknesses, etc., of duplicate parts of practically any shaped piece of metal, varnish, celluloid, paper, cardboard and various kinds of fabrics show quickly and directly on the dial. The dial is graduated to read by thousandths of an inch but variations of half thousandths are easily perceptible. With black figure against a white background it is easy to read.

To use: Place the piece to be duplicated or standard gage between the plates and adjustable contact point and turn the dial with the knurled rim so the hand is at 0. The work will, when turning it, show the number of thousandths it is over or under size. The plates and contact points are hardened, ground and tempered. The plate has about 1 inch adjustment; its complete head about 3 inches. There is also a bar adjustment of the head of about 1/4 inch. With these adjustments and the movement of the dial contact point of easily 1/16 inch, any reading by thousandths of an inch within its capacity, 1/4 inches, can be obtained.

Iron parts have black enamel finish, other parts bright.

The base is 9 inches diameter. The height of the base for maximum capacity is about 9 inches. Weight of gage, 6 pounds. With 3 contact points. Sent in substantial wood case...

No. 458 Graduated to read by thousandths of an inch........... Price...

No. 458M—Metric Same as No. 458, except that it reads in 0.01 mm........... Price...

**Dial Sheet Gage No. 170**

This gage is easily held with one finger through the ring and the thumb on the thumb-pad above. The gage was primarily designed to determine quickly and accurately the thickness of paper, and is also adapted to measure the thicknesses of steel, fiber, cloth, cardboard, celluloid, leather, etc.

Its operation is simple in the extreme. The movable contact point is raised by pressing the thumb down on the thumb-pad and inserting the piece to be measured, removes the thumb and the pressure of the spring holds the piece parallel with the contact points, registering on the dial the thickness in thousandths of an inch. By turning the knurled ring, the dial may be instantly moved to bring the hand to 0. The dial is figured 0, 0.01, 0.02, etc., one revolution being 100 thousandths of an inch. The gage is about 1 3/8 inches high, 1 3/4 inches in diameter and 3 inches long. Weight, 4 1/2 ounces.

No. 170 Graduated to read by thousandths of an inch........... Price...

No. 170M—Metric Same as No. 170, except that it reads in 0.01 mm........... Price...

Case for either No. 170 or No. 170M, extra........... Price...

Sent in a case unless otherwise ordered.
Starrett

Universal Dial Test Indicator
No. 196

Simple, reliable, easily read and very sensitive, it may be adjusted to any angle. The slightest pressure upon contact point produces a movement of the hand on the dial. Circumference of the dial divided into 100 equal spaces, each representing a movement of 1 thousandth of an inch. One revolution of the hand therefore indicates one-twentieth of an inch, the capacity of the instrument being approximately two-twentieths.

With the contact points D and E, any exterior surface may be tested as in cutters, racks, etc., whereas the contact point C with its smaller radius and diameter should be used only on plain surfaces. By bringing the contact point against the work with just enough pressure to give the hand one full turn, then setting it at 0, an opportunity is given for one full revolution of the hand to both right and left at 0, showing a rise or drop in the work and the amount of variation. A most valuable feature is the adjustable dial. By turning the knurled rim the dial may be instantly moved to bring the 0 mark to any point desired in relation to the hand. Each indicator is fitted with three hardened contact points for different classes of work. The special tool holder and sleeve are useful in lathe work. For general work the indicator with sleeve K is adapted for use with our 6-inch or 12-inch surface plates. The clamp Q permits attaching the indicator to large lathe and planer tables, milling spindles, etc. The attachment I more than doubles the value of the indicator, adapting it for use inside of holes, to reach over blackings on face plates, etc.

No. 196 A Indicator, with all attachments, as shown
No. 196 B Indicator only, with 3 contact points, C, D and E
No. 196 C Clamp, 1\frac{1}{2}-inch capacity, flat or round
No. 196 D Tool Post Holder, \(\frac{1}{2}\) x \(\frac{1}{4}\) x 6 inches, with upright spindle
No. 196 E Sleeves complete, with \(\frac{1}{2}\)-inch hole for 9-inch spindle
No. 196 F Sleeves complete, with \(\frac{3}{4}\)-inch hole for 12-inch spindle

Not included with No. 196 A
Extra contact points, each

No. 196 A Indicator complete, sent unless otherwise ordered.

No. 196 M Metric
The same as No. 196, except that it reads in \(\frac{1}{100}\) mm. Prices same as for No. 196.
Vibrometer No. 192
For Testing Amplitude of Vibration

This is a simple instrument for measuring the amplitude of vibration of steam or water turbine
units or other similar machinery operating at high speed and where vibration may hamper efficiency.
The amplitude readings obtained at or near the bearings of a rotating machine are a significant
indication of the existing dynamic balance of its rotor.

The dial indicator is set in a heavy metal retaining ring on the bottom of which are fastened
three soft rubber shoes held in dove-tail grooves and easily replaced. Such a contact provides
friction so when testing on an incline or contour the position of the vibrometer is retained. All
parts are chromium and nickel plated to prevent rust.

The dial gauge is removable to permit its use in numerous other ways independent of the measuring.
Note also by turning the knurled rim how the hand is positioned in relation to 0.

No. 192 With case. .................. Price.

Write for complete descriptive circular covering this instrument.

No. 192 M

Metric

No. 192 M — Metric  Same as No. 192, except that it reads in 1/100 mm.  Price same as for No. 192.

Crank Shaft Distortion Dial Gage
or Strain Gage
No. 696
For Checking the Distortion of Engine Shafts and Frames

Dial registers by thousandths of an inch
Range from 2 to 18 inches

An inside measuring gage where the dial registers by thousandths of an inch, which is
used for checking the distortion of the webs of crank shafts. This distortion bears a direct
relation to any existing misalignment or excessive wear of the bearings. The use of
this gage makes it possible to check the bearing alignment or undue deflection of the shaft
without having to dismantle the engine or remove its parts. This gage may be applied as a strain gage on engine frames, while
engine is in operation.

No. 696 With sharp points and with leather case ................................... Price.
No. 696 M—Metric The same as No. 696, except that it reads in 1/100 mm.
Range, 38 mm. to 458 mm. .................................. Price.

Inside Dial Gage
No. 697
A Practical Gage for Inside Measurements

An inside measuring gage where the dial registers by thousandths of an inch. This is
an excellent gage to use between two walls to closely ascertain parallelism; also very useful
in making comparative measurements of internal diameters. The measuring contacts are
made with convex ends.

The movement of the dial indicator is about 1/12 inch and with the zero, the Bunch extensometer, etc., provides a range from 2 to 18 inches.

There are ten rods and one extension. The rods are marked to designate the
approximate overall length of the gage. Indicator is provided with base or ring to adjust dial in
relation to the hand and has a non-breakable crystal. The dial is graduated with wide divisions
of thousandths of an inch and reads from 0 to 0.250 to 0, one turn equaling .040.

Rods of different lengths will be furnished upon request.

No. 697 With round points and with leather case .................................. Price.
No. 697 M—Metric The same as No. 697, except that it reads in 1/100 mm.
Range, 38 mm. to 458 mm. .................................. Price.

Write for complete descriptive circular covering these instruments.
Starrett Cylinder Gages No. 452

Mechanics in motor service, re-grind and re-build shops pronounce this the ideal gage for determining tapered, out-of-round or scored cylinders. No more difficulty in convincing a car owner the necessity of truing up cylinders. Use the gage before him; it shows him instantly the condition of the cylinders to a one thousandth part of an inch. After the variation of the hole has been determined, note the reading on the dial and transfer to an outside micrometer to find the diameter. This gage is of rugged construction and has a non-breakable crystal over the dial. The dial is mounted on a block which moves at right angles to the rod. The dial has two-line contact points which are at all times in alignment with the walls of the cylinder. Two center points (hardened) which independently cause the hand to travel over the dial reading in .001 and with a unique double spring action make the gage self-centering and absolutely non-collapsible. Provisions for diameters varying from 1/8 inches to 6 inches are made by use of adjustable rods. These may be carried in the hollow handle of the gage. The dial is graduated to show plus or minus, one turn of the hand being .001. By turning the knurled rim the dial may be instantly moved to bring the 0 mark to any point desired in relation to the hand. Nickel plated.

No. 452 A With rigid handle. Capacity, 2 1/2 inches to 6 inches. Price...
No. 452 M A Metric Same as No. 452 A, except that it reads in 0.01 mm. Capacity, 53 mm. to 150 mm. Price...
No. 452 B Similar to No. 452 A, with the following new features: Combination of Rigid or Toggle Handle, Locking Mechanism and Hardened and Ground Steel Rod. Capacity, 2 1/2 inches to 6 inches. Price...
No. 452 M B Metric Same as No. 452 A, except that it reads in 0.1 mm. Capacity, 63 mm. to 150 mm. Price...
No. 452 E Similar to No. 452 B, but with capacity from 2 1/8 inches to 6 inches, permitting its use in smaller cylinders. Price...
No. 452 M E Metric Same as No. 452 A, except that it reads in 0.01 mm. Capacity, 56 mm. to 153 mm. Price...
No. 452 AA Junior size, similar to No. 452 B, but with capacity from 1 5/8 inches to 3 inches. Price...
No. 452 M AA Metric Same as No. 452 AA, except that it reads in 0.001 mm. Capacity, 48 mm. to 52 mm. Price...

Handy Automotive Service Sets In Finished Wood Cases

Set No. 914

- Car Set...
- Price...

Set No. 915

- Car Set...
- Price...

Set No. 916

- Car Set...
- Price...

Set No. 917

- Car Set...
- Price...

Write for complete descriptive circular describing these gages.
Starrett

Universal Test Indicators No. 64

This indicator may be used to test inside, outside or surface work. It can be instantly attached to the spindle or the cutter of any surface gage, and used to show the slightest variation in thousandths. It may be clamped to a flat or round support, up to 4 inch flat or round. A holder, as shown in cut, is designed to go in the tool-post of a lathe, adapting it for use to show the accuracy of all sorts of lathe work turning, chucking, or locating and centering work on face plate. It is particularly adapted to lining up toolmakers' buttons, as it can be moved with the carriage of a lathe testing the button its full length. The head of the needle has three working points, equally distant from its fulcrum, so that the needle will vibrate, reading in thousandths, when work is in contact with either point—in front, above or below. When in front, the spring operating the needle below the work. This may be instantly done by a slight turn of the knurled disc to which the v-bring the contact point against the work so that the needle will point to 0, when any variation either way will show. The scale is graduated to read .005 inches on each side of 0.

No. 64A Indicator only, with Tool-Post Holder and Arm complete Price.
No. 64B Indicator only, with upright spindle Price.
No. 64C Tool-Post Holder, 14 x 1 x 6 inches, with upright spindle and arm Price.

No. 64A sent unless otherwise ordered.

No. 64M Metric

The same as above, except that it is graduated to show variations of 1/10 of a millimeter. Prices same as for No. 64.

Above numbers packed 1 in a box.

Starrett

Center Tester No. 65

This instrument was designed to be used in adjusting and locating centrally any point or hole in a piece of work operated upon in a lathe chuck or on a faceplate, also to test the truth of lathe centers or of a shaft between the centers, the instrument being held in the tool post. This tester is of improved design and well-finished.

The indicating needle is 12½ inches long, when jointed together, measuring 6 inches in length. The needle detects the deviation of a point from the center of a shaft or a center hole. The needle is adjustable and may be set to the exact diameter of the work to be located. The needle is graduated to read .005 inches.

No. 65 Five Graduations Price.
Packed 1 in a box.

"Wiggler" or Center Finder No. 828

For jig and tool work: locating working points in milling and vertical machines, drill presses, etc. Pointer is tensioned against spring so when guided to true concentricity, work is brought to perfection with machine spindle. Screw in back of shank exerts tension on ball of pointer. Pointer is protected by telescoping in body when not in use. Pointer length when closed, 5½ inches; when open, 4½ inches; shank diameter, 14 inch.

No. 828 Price, each.
Packed 1 in a box.
Screw Pitch Gages

Starrett

If not known, the pitch of a thread may be readily determined by comparison with the standard gage of pitch in our imperial screw pitch gages. On the edge of the thin leaves there are teeth corresponding to the standard thread sections and by placing leaves successively over the thread, you may compare one leaf with the thread, when the pitch can be read from the stamping on the leaf.

The thin end of the leaf is made narrow, permitting it to be inserted in a small nut so that outside or inside threads may be compared.

Our screw pitch gages are stamped on each leaf with decimals to show the depth of the thread, which, of course, equals the depth of threads on the two sides of a tap having the same pitch. Thus enables the workman to determine what size of drill must be used to leave a tap V thread for a tap having the same pitch. To do this, caliper with a micrometer over the threads of the tap and from its size in thousandths above, deduct those decimals given on the pitch gage leaf which agree with the pitch of the tap. The result will show in thousandths the size of drill needed for a full thread. Allowance to be made for the amount the thread is to be flattened.

Formulas

For depth of thread for V thread:

\[ d - D = \frac{1.753}{N} \]

For U. S. Standard:

\[ d = D = \frac{1.289}{N} \]

D = Outside diameter of tap.  d = Bottom diameter of tap.  N = Number of threads per inch.

No. 40

22 Pitches, 9 to 40, V Thread

With 11 1/2 and 27 Pipe Thread Pitches

The gage has 22 pitches, viz.: 9, 10, 11, 111/2, 12, 12 1/2, 14, 15, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40.

No. 40

Price...

No. 4

24 Pitches, 4 to 30, V Thread

Has the following pitches: 4, 6, 8, 10, 11, 11 1/2, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 28, 30. The teeth are sharp and clean cut. Like No. 45, it can be used inside a nut as well as on the outside of a screw or bolt. It is also a convenient and reliable tool to use as a 60-degree center gage and gage to test the grinding of either an inside or outside threading tool.

No. 4...

Price...

No. 5

26 Pitches, 32 to 82, V Thread

Of the same form as our No. 40 Screw Pitch Gage, for inside and outside work. Has the following pitches: 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74.

No. 5...

Price...

For Positive Stop Threading Gages, see page 168.
Starrett

Metric Screw Pitch Gage No. 156
28 Pitches, .25 to 2.50

This gage is similar in design to our No. 40, with V thread.

The base of this system is one millimeter, and the blades are stamped with the pitch, or the distance from the center of one tooth to the center of the next, expressed in millimeters or fractional parts thereof.

It has the following pitches: .25, .30, .35, .40, .45, .50, .55, .60, .65, .70, .75, .80, .85, .90, 1.00, 1.05, 1.10, 1.15, 1.20, 1.25, 1.30, 1.35, 1.40, 1.45, 1.50, 1.55, 1.60, 1.65, 1.70, 1.75, 1.80, 1.85, 1.90, 2, 2.50, that is, from 1/4 millimeter up to 2 millimeters.

No. 156                                                  Price.

International Standard Screw Pitch Gage No. 158
17 Pitches, 0.5 to 7

It is made after the French system adopted by the Society for Encouragement of National Industries.

The teeth are stamped to show, on the same leaf, in millimeters, both the pitch and the diameter of the bolts.

The gage contains the following pitches: 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.3, and 7 millimeters. This gage also contains a center gage with coarse and fine notches, for use in grinding thread tools.

No. 158                                                  Price.

Metric Screw Pitch Gage No. 159
22 Pitches, 1 to 11.5

This gage is somewhat similar to our No. 158. The angle is the same, viz., 60°; but it has more pitch than the No. 158. The diameter of screw or bolt is stamped on the leaves as well as the pitch in millimeters.

The gage contains the following pitches: 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5.

No. 159                                                  Price.

Above numbers packed 1 in a box; 6 boxes in a carton.

For Positive Stop Thread Gages, see page 160.

Positive Stop Screw Pitch Gages
No. 473
30 Pitches, 6 to 60, V Thread

This gage has a positive stop which holds the leaves at a fixed and convenient position for use.

It has 30 pitches from 6 to 60 inclusive, as follows:

6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60 in the other.

The number of the pitch is stamped on the right side of each leaf.

No. 473                                                  Price.

No. 475
26 Pitches, V Thread

This gage is similar in design to the No. 473 but larger and has coarse pitches containing 26 leaves with pitches as follows:

6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60 in the other.

No. 475                                                  Price.

No. 476
30 Pitches, 3/4 to 60, Whitworth Standard

This gage is put up in the same size case as the No. 473 and contains 30 leaves with pitches as follows:

3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 35, 40, 44, 48, 50, 56, 60 in the other.

No. 476                                                  Price.

Above numbers packed 1 in a box; 6 boxes in a carton.
Starrett

Fillet or Radius Gage No. 178

This gage may also be described as a concave and convex gage, and is especially adapted for use in laying out special forming tools, dies, etc., as well as for measuring fillets. The illustrations show a few of the ways in which the gage can be used. We recommend it for the use of machinists, toolmakers, and screw machine operators, as well as pattern makers.

Size A has 30 leaves stamped to indicate radii by 64ths, from 1/16 to 1 inch (1/2 inch diametrical size). Diameters are from 1/16 to 1/4 inch, varying by 32nds. Size B is made with 32 leaves stamped to indicate radii by 64ths, from 1/32 to 1/4 inch. Diameters are from 1/32 to 1/4 inch, varying by 32nds. The style of case for size B is the same as that of No. 155 Screw Pitch Gage, page 93.

No. 178 A  Price, each.
No. 178 B  Price, each.

No. 178 M  Metric.

Size A has 34 leaves: 1.1, 1.25, 1.5, 1.75, 2, 2.25, 2.5, 2.75, 3, 3.25, 3.5, 3.75, 4, 4.25, 4.5, 4.75, 5 mm.
Size B has 32 leaves: 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15 mm.

No. 178 M A  Price, each.
No. 178 M B  Price, each.

Fillet or Radius Gage No. 272

This gage is similar in design to our No. 178 and affords means of obtaining the radii of fillets, rounds, etc., as shown by the illustrations. Each blade is stamped with the radius in 64ths, the external being on one side and the internal on the other. It can be used in any position or at any angle, the formation allowing it to be used up to a shoulder, and for duplicating sample pieces. The stud holding blades in place are eccentric with the round end of case. This is of advantage as when the case is opened the edge of case stands well away from the edge of the leaves.

Size A has 16 leaves, with radii from 1/64 to 1/4 inch, inclusive, by 64ths.
Size B has 16 leaves, with radii from 1/64 to 1/4 inch, inclusive, by 64ths.

No. 272 A  Price, each.
No. 272 B  Price, each.

No. 272 M  Metric.

Size A has 18 leaves: 1.75, 2, 2.25, 2.5, 2.75, 3, 3.25, 3.5, 4, 4.25, 4.5, 4.75, 5 mm.
Size B has 18 leaves: 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15 mm.

No. 272 M A  Price, each.
No. 272 M B  Price, each.

Above numbers packed 1 in a box; 6 boxes in a carton.

Starrett

Fillet or Radius Gage No. 279

This cut shows a radius gage similar in design to our No. 272, except that it has leaves only with radii from .020 to .200 inch inclusive. Nine leaves have concave and convex radii from .020 to .100 inclusive by .010 inch, four leaves with concave and convex radii from .125 to .200 inclusive by .025 inch, one leaf with concave and convex radii from .250 inch, three leaves with concave radii only from .300 to .400 inclusive by .050 inch and three leaves with convex radii only from .300 to .400 inclusive by .050 inch.

No. 279  Price, each.

Packed 1 in a box; 6 boxes in a carton.

Ball or Radius Gage No. 710

Specially for Die Sinkers

A compact gage readily applicable to checking, roughing or finished cutters used by die sinkers. Includes diameters in steps of 32nds from 1/8 inch to 1 inch; this range covering, in the main, a die sinker's requirements. Herefore mechanics needing a full diameter were compelled to make special gauges as they were needed. The gage while not hardnerved is made of a specially tough steel. Has bright finish with diameter sizes legibly marked. Approximate dimensions, 1/8 inch thick, 1/4 inches wide and 1 1/2 inches long.

No. 710  Price, each.

Packed 1 in a package.

Angle Gage No. 466

Patented

This gage contains eighteen leaves, the radii being ground on an angle to degrees. The leaves are of spring tempered steel and their two sides, as well as the edge, are ground. A convenient tool and time saver and, in many instances, takes the place of a protractor. Useful in inspecting, toolmakers and die sinkers, when drop-forged dies are made. Embodies a combination of angles most frequently used, including 45° and 1/4 the Acme Standard (22° included angle). The gage is about 6 inch thick, 1/4 inch wide and 6 inches long. Angles are as follows: 1°, 2°, 3°, 4°, 6°, 7°, 8°, 9°, 10°, 12°, 14°, 15°, 18°, 20°, 25°, 30°, 35°, 45°.

No. 466  Price, each.

Packed 1 in a box.
Starrett

Thickness Gage No. 78
The Popular Priced Gage for the Automotive Trade

Has six leaves: 0.015, 0.02, 0.03, 0.04, 0.06, and 0.015 inch thick. With one leaf or in combination with any other the range by thousands is 0.015 to 0.031. Screw and stud simplifies substitution of new leaves for a worn one. Case to protect all leaves from being damaged. Eyepiece to carry on ring.

No. 78

Price, each.
Packed 12 in a box; 6 boxes in a carton.
Also supplied on display card—12 gages on card.

Thickness Gage No. 71

The thickness or feeler gages illustrated contain the following leaves: 0.015, 0.02, 0.03, 0.04, 0.06, and 0.015 inch thick. This combination of leaves permits the adjustment of tappets on motors and the setting of idle from 0.015 to 0.031. The leaves fold neatly in a metal case, thereby protecting the leaves from breakage, and any leaf may be easily replaced by removing the screw stud acting as a pivot. At the opposite end of the case is an eyepiece whereby this gage may be carried on a ring or hung from a hook.

No. 71

Price, each.
Packed 12 in a box.

Ignition Spacing Gage No. 571
For Ignition Spacing and Distributor Work

The leaves are easily replaced by removing the screw stud from the end.

No. 571

Price, each.
Packed 1 in an envelope; 6 in a box.

Starrett

Thickness Gages No. 172

This gage is particularly popular with machinists and toolmakers in gauging narrow slots, as well as with the motor mechanic in adjusting the air gap for the valves on motors.

Size A has nine leaves, viz.: 0.015, 0.02, 0.03, 0.04, 0.05, 0.06, 0.015, 0.012 and 0.018.

Sizes B and C have eight leaves the same as A with the omission of 0.015.

The leaves are tempered and have the thickness marked upon them.

Size A is made with either straight leaves as shown here or with tapering leaves as shown in No. 172 M. Sent with straight leaves unless otherwise ordered.

Sizes B and C are made with tapering leaves only, as shown in No. 172 M.

Sizes D and E have eight straight leaves, viz.: 0.02, 0.03, 0.04, 0.05, 0.06, 0.08, 0.015 and 0.018.

As with all our thickness gages, when any lead becomes impaired it can easily be replaced.

Sizes A, B and C—Packed in a box; 6 boxes in a carton.
Sizes D—Packed 1 in a box. Size E—Packed 3 in a box.

No. 172 M Metric

These gages have nine tapered leaves, tempered, and marked in 100ths of a millimeter as follows:

Size A: 0.04, 0.06, 0.07, 0.08, 0.10, 0.15 and 0.20.

Sizes B and M—Case, 8 cm. long x 8 mm. wide; leaves, 5 cm long, x 8 mm wide.

Sizes M—Case, 8 cm. long x 8 mm. wide; leaves, 5 cm. long, x 8 mm. wide.

Size A—Sent unless otherwise ordered.

Packed 1 in a box; 6 boxes in a carton.
Starrett

Thickness Gage No. 72

This gage has 22 leaves, varying in thickness by thousandths, ranging from .004 to .025 inch. The thickness of each leaf is designated by the number upon it. Each leaf may be used singly or in combination with others and any thickness in thousandths within their limits may be quickly obtained. The leaves are ½ inch wide by 2¼ inches long and held in the case, which is 2¼ inches long, a convenient size to carry in the pocket.

No. 72 M Metric

Same as No. 72, except that the leaves are 3 inches long.

No. 72

22 Leaves, .004 to .025

Price.

Starrett

Thickness Gages No. 467

This gage contains thirteen leaves as follows: .0015, .002, .003, .004, .006, .008, .010, .015, .020, .025, .040, .070, .100 and .200. Each leaf is about ½ inch long, ½ inch wide, and clearly marked to show thickness. Many combinations by thousandths of an inch are possible. A handy gage for measuring space within its capacity, where standard gages and other types of tools for such work are not available.

No. 467

Price.

Starrett

Thickness Gage Holders

For Automobile Mechanics

No. 806

Patented

Holds simple leaves and strips of any thickness from .0015 to .025 inch. A “feeler” defective from use, can be snapped off and withdrawn until entirely used up.

No. 806 D

Holder only. Clamps stock at both ends

Price.

No. 806

Holder only. Clamps stock at one end

Price.
Starrett

Feeler Stock No. 667
12-inch Lengths

Consists of a box (12 pieces) of nine different popular sizes packed in attractive display cases. Twelve pieces of a size in a box, each piece in individual envelope. Extra box for odd pieces. Sizes as follows:

<table>
<thead>
<tr>
<th>Size</th>
<th>Price per Foot</th>
<th>Size</th>
<th>Price per Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>.005</td>
<td></td>
<td>.008</td>
<td></td>
</tr>
<tr>
<td>.002</td>
<td></td>
<td>.010</td>
<td></td>
</tr>
<tr>
<td>.004</td>
<td></td>
<td>.012</td>
<td></td>
</tr>
<tr>
<td>.006</td>
<td></td>
<td>.018</td>
<td></td>
</tr>
</tbody>
</table>

Complete Display Assortment of above sizes.

Starrett Feeler Stock has become a necessity in the automotive field. Equally as important to the manufacturers as to the service stations where accurate fit means so much to insure quiet running motors. For setting valve tappets, ignition points, ring groove clearance, gear play, fitted pistons, adjusting spark gap, etc., Starrett Feeler Stock is recognized as the standard by accuracy. Even in the shop it is commonly used in experimental work by toolmakers and machinists.

Made in Popular Thicknesses as follows: *

Thickness: .001 .002 .003 .004 .005 .006 .007 .008 .009 .010 .012 .013 .015
Price, per foot:...

Packed: 12 pieces of a size in a box, each piece in individual envelope.

* Many other thicknesses not shown here can be supplied if desired. Prices on application.

Furnished in convenient 12-inch pieces, each piece marked with its thickness, both ends nicely rounded with no capped edges. To prevent stain and rust spots from handling, each piece is contained in an individual envelope. Each envelope is correctly marked to show thickness of pieces enclosed. The Specially Designed Boxes are particularly convenient for the dealer.
Starrett

Engineers' Taper, Wire and Thickness
Gage No. 245

This gage is especially designed for the use of marine engineers, machinists and others desiring a set of gages in compact form.

The taper gage shows the thickness in 64ths to \( \frac{1}{16} \) of an inch on one side, and on the reverse side is graduated as a rule 3 inches of its length, reading in 8ths and 16ths of an inch.

The wire gage, English Standard, shows on one side sizes numbered from 19 to 30, with two extra slots one \( \frac{1}{32} \) on the other \( \frac{1}{32} \) of an inch, and on the reverse side shows the decimal equivalents expressed in thousandths. This gage has also \( \frac{3}{64} \) thickness to inches gage, approximately 4\( \frac{1}{4} \) inches long, of the following thicknesses: .002, .003, .004, .006, .008, .010, .012, .015, and \( \frac{1}{16} \) of an inch all folded within the case, which is \( \frac{1}{4} \) inches long, convenient to handle or to carry in pocket.

No. 245 M Metric

The same as our No. 245, except that it reads in Metric measurement. Prices same as for No. 245

Above numbers packed 1 in a box.

Taper Gage No. 270

This steel taper gage is primarily valuable on bearing work and gauging slots. It is made of tool steel \( \frac{1}{16} \) inch wide and \( \frac{1}{32} \) inch long. One side is graduated to read from \( \frac{1}{16} \) inch to 3\( \frac{1}{8} \) inch by thousandths of an inch while the reverse side is graduated to read from \( \frac{1}{16} \) mm. to 4 mm. by \( \frac{1}{16} \) mm.

No. 270

Packed 1 in a box. Price... 

Starrett

Taper Gages

No. 267

Specially Adapted for Tubing Gage

The thin leaves of this gage are tapering, the width varying by \( \frac{1}{4} \) inch to every \( \frac{1}{4} \) inch of their length. They are graduated in \( \frac{1}{4} \) inches and figured to read in fractions of an inch from \( \frac{1}{4} \) inch up to \( \frac{1}{4} \) inch. The gage is designed for brass and steel tube manufacturers for inside measurements, and it is also very convenient for mechanics' use to measure the width of slots and size of holes in nuts drilled for tapping.

It is also useful for setting calipers to sizes within its capacity.

No. 267

Price...

No. 267 M Metric

The same as our No. 267, except that it is graduated in millimeters to read from 1.5 millimeters to 2\( \frac{1}{2} \) millimeters by \( \frac{1}{4} \) millimeters. Price same as our No. 267.

Taper Gages

No. 269

Reading in Thousandths of an Inch

These gauges are recommended by mechanics for their wide scope and general utility. They are useful in determining the size of holes in items, etc. They are made from spring-tempered stock .012 inch thick.

No. 269 A is \( \frac{1}{4} \) inches long, and is graduated to read from \( \frac{1}{16} \) inch to \( \frac{1}{4} \) inch in thousandths of an inch.

No. 269 B is \( \frac{1}{4} \) inches long, and is graduated to read from \( \frac{1}{16} \) to 1 inch in thousandths of an inch.

No. 269 A With 8 leaves Price...

No. 269 B With 10 leaves Price...

Above numbers packed 1 in a box.
Hardened and Ground Tool Steel Parallels No. 384

If you are doing much checking or layout work you will find that a set of Starrett Parallels will come in mighty handy.

On machine platens and face plate setups, for milling, grinding, and shaper vice—indeed, for any applications around the shop, they are indispensable.

Ground and finished in pairs of six-inch lengths. They are supplied in individual pairs or in standard sets of four pairs each, which will give you a wide variety of practical working combinations.

For equipment in tool rooms and machine shops or for the individual mechanic, one or more pairs of parallels are of great value.

We do not aim to list the many sizes necessary to meet the various opinions among mechanics as to what dimensions are best, but we have standardized eight pairs of parallels, any one of which we believe a good addition to the mechanic's tool box. The sets as listed below make possible many combinations. These are many sizes where one set or the other can be used to good advantage.

These parallels are made from a special grade of tool steel hardened and nicely ground on the four sides.

They should be purchased only in pairs.

As shown by the notes, they are numbered on the ends in pairs and their relative accuracy is held to extremely close limits. Made in 8-inch lengths only.

They are not made to be used as squares.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Thickness</th>
<th>Width.</th>
<th>Price, per Pair</th>
<th>Catalog No.</th>
<th>Thickness</th>
<th>Width.</th>
<th>Price, per Pair</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 384 A</td>
<td>1/8</td>
<td>1</td>
<td>1</td>
<td>No. 384 A</td>
<td>1/8</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No. 384 B</td>
<td>2/32</td>
<td>1 1/4</td>
<td>1</td>
<td>No. 384 B</td>
<td>2/32</td>
<td>1 1/4</td>
<td>1</td>
</tr>
<tr>
<td>No. 384 C</td>
<td>1/16</td>
<td>1 1/4</td>
<td>1</td>
<td>No. 384 C</td>
<td>1/16</td>
<td>1 1/4</td>
<td>1</td>
</tr>
<tr>
<td>No. 384 D</td>
<td>5/64</td>
<td>1 1/4</td>
<td>1</td>
<td>No. 384 D</td>
<td>5/64</td>
<td>1 1/4</td>
<td>1</td>
</tr>
</tbody>
</table>

Set No. 1—4 pairs, consisting of sizes A, B, E, and G.
Set No. 2—4 pairs, consisting of sizes D, F, and H.

Packed, each size, 1 pair in a box; also 1 set in a box.

Note: Prices for sizes other than listed quoted on application.

Adjustable Parallels No. 154

These parallels will be found very convenient for use in connection with milling, planer, and shaper vises, taking the place of the large number usually required, also for leveling up work on a planer, drill press, etc. They will be found valuable as a support for grinding or milling of square or hexagonal stock on centers, as they may be adjusted and locked to micrometer measurements from 1/4 to 3/4 inches.

<table>
<thead>
<tr>
<th>Length</th>
<th>Thickness</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 154 A</td>
<td>1 1/2 inches</td>
<td>1 1/2 inch to 3/4 inch</td>
</tr>
<tr>
<td>No. 154 B</td>
<td>2 1/2 inches</td>
<td>1 1/2 inch to 3/4 inch</td>
</tr>
<tr>
<td>No. 154 C</td>
<td>2 1/2 inches</td>
<td>1 1/2 inch to 3/4 inch</td>
</tr>
<tr>
<td>No. 154 D</td>
<td>2 1/2 inches</td>
<td>1 1/2 inch to 3/4 inch</td>
</tr>
<tr>
<td>No. 154 E</td>
<td>2 1/2 inches</td>
<td>1 1/2 inch to 3/4 inch</td>
</tr>
<tr>
<td>No. 154 F</td>
<td>2 1/2 inches</td>
<td>1 1/2 inch to 3/4 inch</td>
</tr>
</tbody>
</table>

Packed 1 in a box.

Hold Downs No. 54

Hold downs are used to hold work down flat as on a machine plate or in a vise where a small amount is removed from a surface, etc., and where other methods of clamping are inconvenient. Work can be securely held without distortion. The contact edges are slightly tapered so as to force the base of the work to the bed of the machine. These hold downs are made of tool steel, hardened and ground.

<table>
<thead>
<tr>
<th>Length</th>
<th>Price, per pair</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 54 A</td>
<td>4 inches long by 1/8 inch wide</td>
</tr>
<tr>
<td>No. 54 B</td>
<td>5 inches long by 1/8 inch wide</td>
</tr>
<tr>
<td>No. 54 C</td>
<td>6 inches long by 1/8 inch wide</td>
</tr>
</tbody>
</table>

Packed 1 pair in a box.

Toolmakers' Steel Clamps No. 160

These clamps are made from drop-forgings, finely finished, case-hardened, and have take-up blocks to slip on and off end of screw, and are held in place in a novel manner, allowing slight motion to the adjustable jaw thereby conforming to shape of the piece to be drilled, holding it secure. They will hold work square and parallel.

Laying out on surface plates, finishing or drilling, a ground piece may be rigidly held in two of the clamps and drilled central and parallel. Put up and sold in pairs. With the small block in use, the capacity of the smaller clamp is a little over 1 inch, and that of the larger clamp two inches. Has hole in block to insert screw, so that the block may be fastened to the bench, and used as a small vise.

<table>
<thead>
<tr>
<th>Length</th>
<th>Price, per pair</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 160 A</td>
<td>1-inch, 2 clamps</td>
</tr>
<tr>
<td>No. 160 B</td>
<td>2-inch, 2 clamps</td>
</tr>
</tbody>
</table>

Packed 1 pair in a box.
ROSE TOOLS, INC.

Starrett

Toolmakers' Parallel Clamps No. 161

These clamps are made of steel, case-hardened, and are very useful for holding small work together in tapping, drilling, etc. When ordering jaws only, state length desired. Specify the jaw with tapped hole as No. 1 jaw, and the plain jaw as No. 2 jaw. When ordering screws only, specify the full threaded screw as "F" screw, and screw with smooth end as "C" screw, as shown in cut. To "loose" jaw is held tightly by a spring attachment, thereby preventing a riding while opening or closing the clamp.

<table>
<thead>
<tr>
<th>No. 161 AA</th>
<th>No. 161 A</th>
<th>No. 161 B</th>
<th>No. 161 C</th>
<th>No. 161 D</th>
<th>No. 161 E</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4 inches</td>
<td>1/2 inches</td>
<td>3/4 inches</td>
<td>1/2 inches</td>
<td>1 1/2 inches</td>
<td>2 inches</td>
</tr>
<tr>
<td>Opening</td>
<td>Opening</td>
<td>Opening</td>
<td>Opening</td>
<td>Opening</td>
<td>Opening</td>
</tr>
<tr>
<td>1/4 inch</td>
<td>3/8 inch</td>
<td>1/4 inch</td>
<td>3/8 inch</td>
<td>1 inch</td>
<td>3/8 inch</td>
</tr>
<tr>
<td>Price per Pair</td>
<td>Price per Pair</td>
<td>Price per Pair</td>
<td>Price per Pair</td>
<td>Price per Pair</td>
<td>Price per Pair</td>
</tr>
<tr>
<td>$2.00</td>
<td>$2.25</td>
<td>$2.50</td>
<td>$2.75</td>
<td>$3.00</td>
<td>$3.25</td>
</tr>
</tbody>
</table>

Sent 1 pair (2 clamps) unless otherwise ordered. Packed 1 pair in a box.

Scratch Gage No. 29

For striking lines parallel to a given surface the scratch gage is used if the distance is not too great and if the line is to be struck on a surface nearly at right angles with a given surface. The gage is made of steel with a hardened end steel head. A split knurling in the head grips the beam securely when the set screw is tightened. The head is graduated 1/16th of an inch. The marker is a square piece of thin steel properly tempered and firmly held against the edge of the beam permitting four marking points. Fine adjustments may be made by a slight rotating movement of the head on the beam.

No. 29 5-inch beam, 1/16-inch diameter 6-inch beam, 1/16-inch diameter 6-inch—Graduated—sent unless otherwise ordered.

For either the No. 190 or No. 191.

Little Giant Jack Screws Nos. 190 and 191

These are designed for tool-room use, for leveling up work on a planer-bed or under an upright drill, setting up machinery, etc. All parts are case-hardened.

No. 190 The Jack (A) is 1/4 inches diameter at the base and has a range from 2 1/2 to 3 1/2 inches. It will raise 1,000 pounds or more. Two extension bases (B and C) are made to fit the base of the main part (A) and are 2 inches and 1 inch high respectively. With these two extensions used singly or together a reach from 2 1/4 to 6 1/4 inches may be obtained.

An auxiliary pointed screw (D) is supplied to be used in place of the screw with swivel cap in certain places where it may be preferable. Very often at the point where the jack screw must be placed base (B) cannot be used. For use in such instances the base (E) is provided. The extension V base (F) is for use against a cylindrical form and is often used to straighten motorcycle frames.

No. 191 A smaller size is made with the same number of parts but 1 inch diameter. Part A, 1 inch high; B, 1 inch, and C, 1/2 inch. With this size, adjustments from 1 1/4 to 3 1/4 inches are obtainable.

For either the No. 190 or No. 191.

Jack (A) .......................... Price
Extension Base (B) .............. Price
Extension Base (C) .............. Price
Extension Base (D) .............. Price
Extension V Base (F) ............ Price
Jack, with all Attachments ... Price

Sent complete unless otherwise ordered.
Planer and Shaper Gage No. 599
Universal Height and Cap Gage
Hardened and Ground

Brought forward to meet the demands of mechanics who recognized the utility of our original patented Planer and Shaper Gage (see page 181), but who wanted a little greater accuracy for gage work. A natural request, as the trend is invariably to attempt accuracy not often recommended with certain machine tools. This gage has the same diversity as our own original No. 246, the level being maintained. Alignment and parallelism of ends, sides and work contacts are held to much closer limits. Lateral play of slide or incline of base is eliminated through the angular ways as illustrated. No projections to interfere as gage might be used on work plate or machine table.

As cut shows, one knurled extension is provided, giving a range of 1 1/16 inch to 9 inches. Without extension, the range is 1 1/16 inch to approximately 6 3/16 inches. Base and slide are made from steel forgings, hardened. Base dimensions, 3 1/16 inch wide, 5 3/4 inches long. The extension is 1 1/4-inch diameter, 3 inches long. Weight, approximately 25 ounces.

No. 599 Without case ........................................ Price, each.
No. 599 With wood case ..................................... Price, each.
Sent without case unless otherwise ordered.
Packed 1 in a box.

No. 246

The time taken by a planer or shaper-hand in adjusting the depth of the first cut, or in setting the tools for any required cut has been found to be so great by ordinary methods that we have designed this special gage, which greatly facilitates these operations. By setting this gage to a micrometer, surface gage, or caliper and bringing the planer tool in contact with it, the first cut may be absolutely relied upon. This reduces to a minimum the cut and try method which is common in shops not having this gage. The level in the base of the gage is an appreciable feature in itself. The base and slides are steel forgings and are heat-treated. All measuring surfaces are nicely ground. With the gage lying flat or in an upright position, all sorts of dimensions are readily set through the combination of parts shown in the illustration.

Ranges, 1 1/2 to 8 1/4 inches. Base dimensions, 1 inch thick, 5 inches long.

No. 246 .................................................. Price.
Packed 1 in a box.
Starrett

Combination Hand Vise
No. 86
Painted

This hand vise furnished with a clamp, permitting its use as a small bench vise, is a tool, the utility of which will readily be recognized by mechanics as well as those working around the home. By removing the handle and substituting the clamp, the tool may be fastened to benches, shelves, etc., having an approximate thickness of ½ to ¾ inches. The vise can be adjusted to different positions to meet the convenience of the user. When used as a hand vise the leverage obtainable with the ball-end handle will be appreciated in comparison with a wing nut so commonly employed for this purpose. The jaws are made from forgings and are properly tempered. Width of jaws 1½ inches. Capacity, about ½ inches. Length, about 7 inches.

No. 86 A Hand Vise with clamp as shown
No. 86 B Hand Vise only

Price.

Price.

No. 86 A sent unless otherwise ordered.
Packed 1 in a box.

Starrett

V Blocks and Clamp No. 268

These drill blocks and clamps are of cast-iron material, sufficiently strong to stand any work they may be subjected to. The blocks are ½ inches square and 2 inches long, and are furnished in pairs.
The clamp will hold a round piece up to ¾-inch diameter firmly in the groove of the block, for prick punching, drilling or laying out a series of holes before and while being drilled.

No. 268 A Two Drill Blocks
No. 268 B Clamp
No. 268 C Set complete

Price.

Price.

Price.

No. 268 C sent unless otherwise ordered.

Steel V Blocks and Clamp No. 271
Case-Hardened

These blocks are designed to be used singly or in pairs in connection with drill presses and for laying out work, prick punching, etc. The blocks may be used close together or separated, and are kept in line by a spindle 8 inches long passing through friction bushes. They will be found convenient when holding pieces with shoulders, which may rest between the blocks. The blocks are ½ inches square and will hold round pieces up to ¾-inch diameter. The two grooves in each side take up the length and hold the clamp for small or large work. The clamp, sometimes called the yoke, is a steel forging finished all over and case-hardened. The V's, as in most V blocks, are 90°, measuring about ½ inch and ¾ inch, respectively, across the mouth of the V.

No. 271 A Two Drill Blocks
No. 271 B Clamp
No. 271 C Set complete

Price.

Price.

Price.

No. 271 C sent unless otherwise ordered.
Starrett

V Blocks and Clamp No. 278
Hardened and Ground

The drill blocks shown on this page are designed to meet the demands for an accurate set of V blocks to be used in connection with the surface plate, angle iron, etc. Milling or grinding work clamped in the V's of this tool will be held fast and true.

The blocks are made of tool steel and are hardened and ground throughout. The V's are ground central, parallel and square with the ends and sides. The blocks are numbered in pairs so that the V's in each block are always in alignment. Each block is about $1/4$ inches square, $1/4$ inches long, and has a clamping capacity of 1 inch in diameter.

No. 278 Comprising two Drill Blocks and two Clamps. Price.
Sold only in pairs. Packed 1 set in a box.

No. 567
Patented
Something Distinctly New in a V Block

Rests on its side without interference from the clamp, which is a forging, and is provided with an adjustable support to prevent tilting when drilling. Made of steel, it is hardened and ground. The sides are ground parallel; the V groove being ground central and parallel to the sides and the base.

The groove at the stopped end, at a right angle to the base, holds shouldered studs, round pins, etc. for light milling, drilling and grinding. Hole clearance for drilling and removing dowel pins is provided; as also four $1/4$ inch x $1/8$ tapped holes, two in the base and one in each side, thereby increasing its utility on face plates and angle irons. The block dimensions are approximately $1/4$ inches square, the base length about 9 inches long. Capacity, about $1/4$ inches.

No. 567 Complete, one Block with Clamp. Price.
Packed 1 in a box.

Starrett

Adjustable Jaw Cut-Nippers
No. 1

The majority of wire cutters or nippers once dull or broken are useless. The jaws of these nippers are detachable, so that they can be removed, regrind and adjusted when they have become worn. Each jaw can be ground away to the extent of $1/4$ inch, remaining as good as new for practical use and when used up, if ever, new jaws can be procured.

A screw through the jaw engages with a spline in the frame and draws the jaw firmly down to the toothed seat, holding it securely.

The adjustable screw and stud inside the handles permit setting the jaws so that the cutting edges will not be forced unnecessarily together. The construction of these cut-nippers affords an abundant leverage.

Another improved feature in this cut-nipper is the flat spring below the cutting edges and above the joint, forming a yield joint for the end of the wire to press against while being cut. This eliminates the danger of breaking the jaws, as often happens with other styles of cut-nippers, which allow the wire to be inserted against a solid surface, thereby creating a pushing-out strain on the jaws when they are forced.

The head and handles are of drop-forged steel, finely finished. All the parts are case-hardened, except the jaws. These are made from a high grade of steel, nitrided tempered. Those warranted for music wire have their cutting edges ground to a short, steep bevel, while those for common wire have their cutting edges ground more acute, work easier, and are preferable for cutting softer wire for general use. We particularly recommend this wire cutter to pianists, violinists, telephone men, and airplane workers, or in wire miles where constant cutting of wire is demanded. It also make jaws especially shaped for cutting wire in bicycle rims.

The 5-inch size is made with jaws held in place by one screw, whereas the 7-inch size is with the two screws.

No. 1, M (for music wire) Price
No. 1, C (for common use) Price
No. 1, B (for bicycle use) Price
No. 1, either M, C or B Price

Jaw, either M, C, or B, which should be designated as above, per pair Price

Cut-Nippers with M jaws sent unless otherwise ordered.
Packed 1 in a box.
Starrett

Tile Cut-Nippers No. 235
For Cutting Tile

These nippers are the same as our No. 1 except that the blades are of a finer grade of steel, tempered and nicely finished. The knurled stock is of sufficient size to be easily held without cramping or cutting in the fingers. The long, bent point will be found a valuable auxiliary for reaching through holes, etc. Length, with short, bent point, 9 inches; with long point, 12 inches. All parts are interchangable. The knurled stock is nickel plated.

Complete, as shown...Price.
Without long point...Price.
Extra, Straight Point...Price.
Extra, Short Bent Point...Price.
Extra, Long Bent Point...Price.

Cut-Nippers No. 437
For Bicycle Spokes, Etc.

These nippers combine great power with rigidity. Wire can be cut at extreme end of jaws. Cutting jaws conform to inside of bicycle rim and will cut off spokes at close as required. In case one jaw breaks it may be replaced.

Nippers open 3/4 inch.
Length of nippers overall, 9 1/2 inches.

No. 437 - Nippers Price.
Jaws, per pair...Price.

Packed 1 in a box.

Sole Gage No. 273
This gauge is especially adapted to the needs of shoemakers. It is made of steel, nicely finished, graduated to show the thickness of soles and taps in 1/64ths of an inch. It is figured to show "inch" and "half-inch" points from 2 to 12 inclusive. It is used to determine the thickness or weight of soles, taps, etc.

No. 273...Price.

Packed 1 in a box.

Pocket Scribers No. 70

Made from steel tubing, knurled and nickel plated. The scriber is made from the best quality of steel, nicely tempered, and is held by a knurled chuck. The scriber is reversible, telescoping into the stock, and is held by a slight turn of the chuck so that it is always as safe to start a letter as placed.

No. 70 A Handle, 3/4 inch diam; blade, 2 3/4 inch long; weight, 1 oz...Price, each.
No. 70 B Handle, 3/4 inch diam; blade, 3 1/2 inch long; weight, 1 1/2 oz...Price, each.

Packed 6 in a box.

Starrett

Improved Scriber No. 67

This scriber is made for mechanics who have a better one than of ordinary wire. These points are made of a fine grade of steel, hardened and nicely finished. The knurled stock is of sufficient size to be easily held without cramping or cutting in the fingers. The long, bent point will be found a valuable auxiliary for reaching through holes, etc. Length, with short, bent point, 9 inches; with long point, 12 inches. All parts are interchangable. The knurled stock is nickel plated.

Complete, as shown...Price.
Without long point...Price.
Extra, Straight Point...Price.
Extra, Short Bent Point...Price.
Extra, Long Bent Point...Price.

Adjustable Sleeve Scriber No. 68

The knurled sleeve has a hole clear through and a clamping device at one end, adapting it for holding and or off different tools, securely holding them near to or away from the working point. The knurled stock is nickel plated.

This scriber is made in two lengths, 6 inches and 12 inches. Toolmakers will find the small size more desirable for general use, and the larger one for heavier work. For pattern makers a wide scriber, made of a fine grade of steel, is supplied as an auxiliary.

Either size, without knife point...Price.
Knife Point, extra...Price.
Knife Point, extra...Price.

The 6-inch being the more popular size, will be sent (without knife point) unless otherwise ordered.

Above numbers packed 8 in a box.

Pin Vises No. 162

These vises have hardened jaws with checks so made that they will hold firmly anything inserted in them. The jaws extend through full length of the handle. The handle is reduced in size, so that it may be more rapidly twisted between thumb and forefinger when using small work. They are convenient handles for holding scissors, small files, pins and extensions for holding small tools. Nickel plated.

No. 162 A Capacity, 0 to .040 inch...Price.
No. 162 B Capacity, .050 inch to .062 inch...Price.
No. 162 C Capacity, .070 inch to .125 inch...Price.
No. 162 D Capacity, .135 inch to .187 inch...Price.

Complete (one of each size)...Price.

Pin Vises No. 166

With Rubber Handle. Octagon Shape

These pin vises are the same as our No. 162, described above, except that they are made with a hard rubber handle which is octagon in shape, thereby making them less apt to roll when laid down.

No. 166 A Capacity, 0 to .040 inch...Price.
No. 166 B Capacity, .050 inch to .062 inch...Price.
No. 166 C Capacity, .070 inch to .125 inch...Price.
No. 166 D Capacity, .135 inch to .187 inch...Price.

Complete (one of each size)...Price.

Each size of Nos. 162 and 166 packed 8 in a box.
Ratchet Wrench No. 443

For Engineers, Machinists and Auto Mechanics

In places difficult of access or in cramped quarters where a wrench through a long arc is impossible, the ordinary monkey or S wrench is out of the question. Some other means of turning nuts and bolts is required. To meet these conditions we have invented and perfected the Starrett Ratchet Wrench.

It consists of a ratchet with reversible pawl and a long wrench handle. With these wrench we furnish an extension to reach into otherwise inaccessible places; also a universal joint for turning nuts or bolts where it is impossible to get the wrench at right angles to the ends of the bolt; a spark plug socket for use on automobile and airplane engines; a drilling attachment which takes standard square Shank drills from 16 inch to 1 inch diameter, and screw driver with removable end; together with several adjustments to go with the drilling attachment.

This ratchet wrench is of particular value to engineers and mechanics who have to work about machinery crowded into small space or around hot engines. The sockets for the wrench will turn any standard hexagon nut or bolt. With this wrench finished surfaces and corners of such need not be marred by taking it off and replacing at every fraction of a turn.


Send complete unless otherwise ordered.

Parts of Ratchet Wrench

The 27 small engravings around the outside represent the hexagon steel sockets, varying in size by 2nds, from 1/4 to 1 inch, also 1/4, 3/8, 1/2, and 5/8 inch. The set are hot two square steel sockets, one each 1/4 and 5/8 inch.

C Ratchet wrench, with reversible pawl Price.

D Extension to fit part C. The large end takes all standard sockets Price.

E Spark plug socket Price.

F Universal joint. May be used in connection with wrench, and sockets, or with extension, screw driver, etc., thus giving several combinations. Very useful for getting at nuts or screws in otherwise inaccessible places. Price.

G Screw driver. Used with extension if long blade is required, or in square part of any socket for cramped places. May be used with ratchet, or long socket alone, thus obtaining a good size handle Price.

H Drilling attachment holds standard square Shank drills from 1/4 to 1 inch. Price.

I Holder or friction wrench for drilling attachment Price.

J Thrust plug for use on all sockets and extension, protecting the hand when forcing down on the ends Price.

K Thrust pin. Price.

L Drift pin for driving attachment Price.

M Thrust plate. Sockets, all sizes except spark plug Price.
Starrett

Toolmakers' Surface Gage No. 56

This gage is admirably adapted for light work. The base is a steel, nicely finished and case-hardened, with depressions in the sides for the thumb and finger. The top side is slotted, and the rocking bracket for guide adjustments is pivoted in same. There is a stiff spring under one end of the bracket and a knurled adjusting screw in the other; the spindle is jointed to this so that the gage may be set and held in any position from vertical to horizontal, and the scriber placed in position to be used below its base for depth gage or (with back and down) a scribbling gage. A V-shaped groove in the end and base adapts it for use on cylindrical work in which the scriber may be used in light work, the gage being removed. The gage weighs but ten ounces, and is five inches long and 1/4 inch in diameter of gage base. The 1/4-inch spindle is furnished with a 1/4-inch square in the tool post. An auxiliary guide of the case-hardened, as shown in cut, is furnished to clamp to the base for either a circular or straight edge. See page 189.

No. 56A With 4-inch spindle and auxiliary guide .................................................. Price.
No. 56B Without auxiliary guide .............................................................................. Price.
A 7-inch spindle is furnished when ordered at an extra cost of

Sent with guide unless otherwise ordered.

Universal Surface Gage No. 57

This gage has our latest improvements, which make it all that can be desired, possessing the following points of merit:

Heavy base, grooved through the bottom and end, adapting it for use on or against circular work as well as flat surfaces.

The spindle passes through a rotating head, jointed to a rocking bracket, pivoted in base. The bracket being adjusted by a knurled screw in one and against a stiff spring in the other, the spindle may be set up without or at any angle, or turned so as to work under the base and be sensitively adjusted to any position. The spindle carrying the scriber is so made that when the head carrying the scriber is loosened all may be freely moved to any position and, by friction springs, retained in place until a slight turn of the clamp nut holds them firm.

For small work the spindle may be removed and the scriber inserted in hole provided for it, where it can be sensitively adjusted and used to advantage on bench work.

For small work the spindle may be removed and the scriber inserted in hole provided for it, where it can be sensitively adjusted and used to advantage on bench work.

Length given for spindles includes height of spindle and base; except the 12-inch spindle with 287B and the 18-inch with 287D, the depth of the base not being included in the length of these spindles.

No. 287A Base, approximately 3 inches long, with 8-inch spindle . . . . . . . . . Price.
No. 287B Base, approximately 3 inches long, with 9 and 12-inch spindles . . . . Price.
No. 287C Base, approximately 3 inches long, with 12-inch spindles . . . . . . . Price.
No. 287D Base, approximately 3 inches long, with 12 and 18-inch spindles . . . . Price.

Universal Surface Gage No. 257

With Case-Hardened Steel Base

This gage has our latest improvements, which make it all that can be desired, possessing the following points of merit:

It has a heavy base, grooved through the bottom and end, adapting it for use on or against circular work as well as flat surfaces.

The spindle passes through a rotating head, jointed to a rocking bracket, pivoted in base, the bracket being adjusted by a knurled screw in one and against a stiff spring in the other. The spindle may be set upright or at any angle, or turned so as to work under the base, and be sensitively adjusted to any position. The clamp and head carrying the scriber are so made that when the clamp nut is loosened all may be freely moved to any position, and by friction springs, retained in place until a slight turn of the clamp nut holds them firmly.

In the base are four gage pins, frictionally held, which may be pushed back against the edge of a surface plate or held in the slot of a planer bed for linear work.

For small work the spindle may be removed and the scriber inserted in hole provided for it, where it can be sensitively adjusted and used to advantage on bench work.

For small work the spindle may be removed and the scriber inserted in hole provided for it, where it can be sensitively adjusted and used to advantage on bench work.

Special attention is called to the four gage pins in the corners of the base, which adapt it for use as a locomotive guide and make it more convenient than other gages for many uses.

Length given for spindles includes height of spindle and base; except the 12-inch spindle with 287B and the 18-inch with 287D, the depth of the base not being included in the length of these spindles.

No. 287A Base, approximately 3 inches long, with 8-inch spindle . . . . . . . . . Price.
No. 287B Base, approximately 3 inches long, with 9 and 12-inch spindles . . . . Price.
No. 287C Base, approximately 3 inches long, with 12-inch spindles . . . . . . . Price.
No. 287D Base, approximately 3 inches long, with 12 and 18-inch spindles . . . . Price.

Rule Holder No. 62

For Pattern Makers and Machinists

Designed primarily for the pattern maker and machinist to hold rules in an upright position for use in connection with surface gages, also for use as a depth gage, in capacity (1/4 inch to 1/16 inches wide) permits the use of rules in general use, whether shank, standard or combination square blades. A suitable nut of the right diameter prevents firm retention of the rule.

The base is cast iron, proper consideration having been given to the important factor, weight, which is about 1 1/2 pounds. Grooves are cut on two sides for convenience in handling. Has combination of black enamel and bright finish.

No. 62 ....................................................................................................................... Price.

Pack 1 in a box.
Starrett

Speed Indicators

In every factory in which machinery is used, the speed of the shafting and the machine themselves should be accurately determined in order to get from them the maximum service. To know the speed of this speed is also of great assistance in figuring the pulley sizes, etc. Enginemen frequently have to compute the horse power which an engine or motor is giving out and that cannot be done without an accurate knowledge of the relative speed. In order to determine these speeds with the greatest economy, an instrument should be used which will serve equally well for low or high speeds without heating on the high speeds and with perfect accuracy on the low. Our Speed Indicators are made in three different types for general purposes and for registering speeds. Each instrument is provided with three styles of tips, a pointed steel tip hardened and polished, which forms the end of the spindle, and two rubber tips, which may be slipped over the pointed metal tip, so that no matter what the shape of the point of contact, be it pointed, centered or otherwise, the revolutions per minute will be accurately recorded. These rubber tips not only remove the jet and run smoothly but produce a stronger frictional contact.

High Speed Indicator No. 104

May be run at high speed without heating, and this is at no expense, and the dial plate has two rows of figures, reading right or left, as the shaft may run. An improvement in this indicator is the rotating disc, which, being carried by friction, may be lowered to the starting point where the knob passes under the thumb lightly pressed against it, thus releasing the pressure disc is liberated for counting the revolutions of the shaft when working the eye which has only to look on the watch to note the time. This tool is nickel plated.

No. 104

Price

Sent without case unless otherwise ordered. Packed 1 in a box.

Improved Speed Indicator No. 106

Like our No. 104, this instrument is nickel plated, but has a rubber handle, making a safe insulator when used on electrical machinery.

No. 106

Price

Sent without case unless otherwise ordered.

Packed 1 in a box.

Registering Speed Indicator No. 107

This instrument was devised to automatically register hundreds as well as units and tenths, and thus remove the mind from keeping tally; also to furnish a better registering indicator of a more reasonable cost than has ever been on the market heretofore. The instrument will register 5,000 revolutions. The large dial is graduated into one hundred lines, each one representing a revolution of the spindle. The small dial has divisions cut upon its face, each representing one hundred revolutions of the spindle (or one complete turn of the large dial). A spring finger trip attached to the case engages with one of the lines in the small dial and holds it from revolving until the large dial makes one complete turn, when the trip pin passing under the spring trips it, and the dial is frictionally carried along by the large plate one line, thus showing that the one hundred revolutions of the spindle have been made. This instrument is nickel plated, has a hard rubber handle, making a safe insulator when used on electrical machinery.

No. 107

Price

Sent without case unless otherwise ordered. Packed 1 in a box.

Surface Speed Attachment for Speed Indicators No. 109

This attachment applied to any one of our speed indicators is designed to show the number of linear feet per minute the periphery of the surface of a shaft or pulley is spinning and thus enable a workman to know if the speed is too fast or too slow to get the most work from the tool. For instance, the speed of a cone pulley being turned needs to be checked at every step. Hence it has been all the question as to how many feet per minute the periphery of the work is traveling. It may be so fast as to heat and spoil the tool and cause expansion, bursting the centers in lathes and milling machine tools, or so slow that the work is not the right speed for the purpose intended, as suggested above.

No. 109

Price

Packed 1 in a box.

ROSE TOOLS, INC.
Toolmakers' Calipers and Dividers

With Round Legs

Starrett

While nearly everyone is acquainted with the use of calipers and dividers, it may be stated briefly that, in general, calipers are used for measuring distances between or over surfaces, or for comparing distances or sizes with standards, such as those on graduated rules. Dividers are for measuring distances between points, for transferring distances taken direct from a scale, and for scribing circles or arcs.

To those who are not familiar with the use of calipers, a word of caution may not be out of place. Calipers should never be used on work while it is revolving in a lathe or in any other machine, because if one contact of the caliper is placed against the work the other is likely to be drawn out of a caliper so that measurements taken from moving pieces are never accurate—frequently they are very misleading.

The cuts on this page represent a line of Calipers and Dividers made from round stock with legs drawn down, making them tough and rigid. The fulcrum stud is hardened, bow is cut strong, screw and nut nicely fitted, all highly finished and are the best tools in their line.

No. 277, 275 and 274
Made with solid nut only.

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-inch</td>
<td></td>
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<td>3-inch</td>
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<tr>
<td>4-inch</td>
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<td>6-inch</td>
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Packed 2 in a box.

Duplicate Parts of Toolmakers' Calipers and Dividers

<table>
<thead>
<tr>
<th>Part</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw and Ball</td>
<td></td>
</tr>
<tr>
<td>Thumb Attachment (No. 277 only)</td>
<td></td>
</tr>
<tr>
<td>Nut</td>
<td></td>
</tr>
<tr>
<td>Leg (right)</td>
<td></td>
</tr>
</tbody>
</table>

Spring Calipers and Dividers

Fay Pattern

The illustrations above represent our Spring Calipers and Dividers with our quick-adjusting automatic closing spring nut, a critical examination of which will at once show its superiority over all others on the market. The thread engages the screw at the slightest pressure when the leg comes in contact with the nut; when pressure is withdrawn it releases itself immediately, sliding freely on the screw. Its use will save much valuable time in opening and closing spring-type calipers and dividers.

They are also made with solid nut.

Dividers No. 77

<table>
<thead>
<tr>
<th>Size</th>
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<tr>
<td>6-inch</td>
<td></td>
</tr>
</tbody>
</table>

Sent with spring nut unless otherwise ordered. Packed 2 in a box.

Duplicate Parts of Fay Calipers and Dividers

<table>
<thead>
<tr>
<th>Part</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw and Ball</td>
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<tr>
<td>Nut</td>
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<tr>
<td>Leg (right)</td>
<td></td>
</tr>
<tr>
<td>Leg (left)</td>
<td></td>
</tr>
</tbody>
</table>

Rose Tools, Inc.
Starrett

Spring Calipers and Dividers

Yankee Pattern

The Yankee Calipers and Dividers are similar to the Fay pattern, are not quite so heavy as the Fay, and cost less. They are much liked, and on account of price are preferred by many to the higher cost tools. All sizes are supplied with either solid or quick adjusting nut.

No. 73 represents our Yankee Inside Transfer Caliper with either spring or solid nut. The bow is stiff, making the caliper reliable. After calipering inside of chambered cavity by springing in the legs they may be withdrawn, and as they spring back will show exact size calipered.

The Spring Nut grips the screw firmly yet releases easily. Quick adjustments for large and small measurements are thus provided.

Dividers No. 83

<table>
<thead>
<tr>
<th>Size</th>
<th>Solid Nut</th>
<th>Spring Nut</th>
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</thead>
<tbody>
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<td>Price</td>
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<tr>
<td>12-inch</td>
<td>Price</td>
<td>Price</td>
</tr>
</tbody>
</table>

Sent with solid nut unless otherwise ordered.
Packed 3 in a box.

Calipers Nos. 79 and 73

<table>
<thead>
<tr>
<th>Size</th>
<th>Solid Nut</th>
<th>Spring Nut</th>
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</thead>
<tbody>
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<td>10-inch</td>
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<td>Price</td>
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<tr>
<td>12-inch</td>
<td>Price</td>
<td>Price</td>
</tr>
</tbody>
</table>

Sent with solid nut unless otherwise ordered.
Packed 3 in a box.

Thread Calipers Nos. 179 and 184

These calipers are designed for inside and outside measurements of threads. Suitsably shaped points to work in threads.

PRICES

<table>
<thead>
<tr>
<th>Size</th>
<th>Solid Nut</th>
<th>Spring Nut</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Price</td>
</tr>
<tr>
<td>5-inch</td>
<td>Price</td>
<td>Price</td>
</tr>
<tr>
<td>6-inch</td>
<td>Price</td>
<td>Price</td>
</tr>
</tbody>
</table>

Sent with solid nut unless otherwise ordered.
Packed 3 in a box.

Yankee Thread Calipers No. 82

No. 82

PRICES

<table>
<thead>
<tr>
<th>Size</th>
<th>Solid Nut</th>
<th>Spring Nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-inch</td>
<td>Price</td>
<td>Price</td>
</tr>
</tbody>
</table>

Packed 3 in a box.

Keyhole Calipers No. 80

No. 80

PRICES

<table>
<thead>
<tr>
<th>Size</th>
<th>Solid Nut</th>
<th>Spring Nut</th>
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</thead>
<tbody>
<tr>
<td>8-inch</td>
<td>Price</td>
<td>Price</td>
</tr>
</tbody>
</table>

Packed 3 in a box.

Fay Thread Calipers No. 76

No. 76

PRICES

<table>
<thead>
<tr>
<th>Size</th>
<th>Solid Nut</th>
<th>Spring Nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-inch</td>
<td>Price</td>
<td>Price</td>
</tr>
<tr>
<td>4-inch</td>
<td>Price</td>
<td>Price</td>
</tr>
<tr>
<td>5-inch</td>
<td>Price</td>
<td>Price</td>
</tr>
</tbody>
</table>

Sent with spring nut unless otherwise ordered.
Packed 3 in a box.

Duplicate Parts of Yankee Calipers and Dividers

Screw and Ball ...................................... Price.
Thumb Attachment (No. 83 only) Price.
Solid Nut ............................................. Price.
Spring Nut .......................................... Price.
Leg (right) ......................................... Price.

Spring ............................................... Price.
Jam Washer ........................................ Price.
Palmer Stud ......................................... Price.
Leg (left) with screw attached .................. Price.

196

ROSE TOOLS, INC.
Starrett

Improved Firm-Joint Calipers
Nos. 26 and 27

3-inch ................................................... Price.
4-inch ................................................... Price.
5-inch ................................................... Price.
6-inch ................................................... Price.
8-inch ................................................... Price.
10-inch ................................................... Price.
12-inch ................................................... Price.
16-inch ................................................... Price.
18-inch ................................................... Price.
24-inch ................................................... Price.
30-inch ................................................... Price.
36-inch, No. 26 only ..................................... Price.

The above sizes refer to the length of the calipers.

Note: The No. 27 Inside Calipers are not made larger than 24 inches.

Their capacity is about one-third greater than the sizes given; for example, the 30-inch size will caliper 38 inches, and the 36-inch size will caliper 46 inches diameter.

The improvement in these calipers consists in the construction of the joint, which is so made as to be drawn together by means of a screw. The main stud is squared and fitted to one leg, thus preventing the stud from turning when loosening and tightening, and insuring a smooth and uniform friction of more or less tension to suit the user.

The quality of these calipers is incomparably superior to that of any old style riveted-joint caliper on the market.

Sizes 3 to 12 inches packed 3 in a box.
Sizes 14 to 24 inches packed 2 in a box.
Sizes 30 and 36 inches packed 1 in a package.

Hardened Firm-Joint Calipers
Nos. 26 H and 27 H

These calipers are same as our Nos. 26 and 27, except that they are hardened.

3-inch ................................................... Price.
4-inch ................................................... Price.
5-inch ................................................... Price.
6-inch ................................................... Price.
8-inch ................................................... Price.
10-inch ................................................... Price.
12-inch ................................................... Price.
16-inch ................................................... Price.
18-inch ................................................... Price.
24-inch ................................................... Price.

Above numbers packed 3 in a box.

Starrett

Perfected Firm-Joint Screw-Adjusting Calipers Nos. 34 and 35

The screw adjustment for fine measurements, the improved joint which may be set to any desired degree of uniform tension, the shape and stiffness of the legs, quickness and wide scope of adjustment—all go to make this caliper a leader in its line.

4-inch ................................................... Price.
6-inch ................................................... Price.
8-inch ................................................... Price.
10-inch ................................................... Price.
12-inch ................................................... Price.
14-inch ................................................... Price.
16-inch ................................................... Price.
18-inch ................................................... Price.
20-inch ................................................... Price.
24-inch ................................................... Price.
30-inch, No. 34 only ..................................... Price.
36-inch, No. 34 only ..................................... Price.

The No. 35 Inside Calipers are not made larger than 24 inches.

Sizes 4 to 12 inch packed 3 in a box.
Sizes 14 to 24 inch packed 2 in a box.
Sizes 30 and 36 inch packed 1 in a package.

Lock-Joint Calipers Nos. 38 and 39

These calipers represent a line of reliable lock-joint calipers of wide scope, for both inside and outside work, that can be instantly adjusted to their full extent, and as quickly locked firm in the joint, and yet provided with a sensitive adjustment. The improvement consists in a socket joint made tapering and locked or released by a partial turn of the knurled disc. A spring washer under the disc maintains an easy friction in the joint when unlocked.

To further describe, in the underside of the short arm is a slot containing a small spring. Riveted into the middle leg and projecting through an opening in the arm is a threaded stud on which is a knurled nut having a beveled hub,—this bears against a cone in the arm,—the action of the spring holding them together turns the nut, forces them apart and adjusts the leg when the joint is locked. The spring takes up all backlash, and keeps the legs firm.

Sizes 4 to 12 inch packed 3 in a box.
Sizes 14 to 24 inch packed 2 in a box.
Lock-Joint Transfer Calipers
Nos. 36 and 37

These calipers not only have all the excellent features of Nos. 38 and 39, as described on another page, but in addition to common use may be used inside of chambers, cavities, over flanges, etc., removed and replaced without losing the size calipered. This is done by loosening the nut binding one arm to the auxiliary leaf and swinging it out or in, (while the joint is locked) to clear the obstruction, then moving it back against a stop where it will show the exact size measured.

The sizes given refer to the length of the calipers, but the outside ones will caliper a cylinder 20 per cent greater than their length, and the inside calipers will open nearly twice their length. This applies also to Nos. 38 and 39, page 198; to Nos. 34 and 38, page 196; and to Nos. 38 and 39, page 195.

Sizes 4 to 12 inch packed 3 in a box.
Sizes 14 to 24 inch packed 2 in a box.

4-inch ............ Price.
6-inch ............ Price.
8-inch ............ Price.
10-inch ... Price.
12-inch ............ Price.
14-inch ............ Price.
16-inch ............ Price.
18-inch ............ Price.
20-inch ... Price.
24-inch ... Price.

Illustrations showing our Nos. 36 and 37 Lock-Joint Calipers

Foundry and Forging Caliper No. 173

This caliper is well made, with firm joints and a long handle to caliper with comfort hot pieces—the long arm to be used for the greater and the short one for the smaller or finished sizes. The difference in the length of arms prevents using the wrong caliper when there is but slight variation in the work measured. The caliper is 22 inches in length over all and has a 6-inch caliper on one side and a 13-inch caliper on the other side.

Packed 2 in a box.

Price.

Double Calipers
No. 44

These instruments, as will be seen from the drawings, combine dividers, inside and outside work. They have our improved firm friction joints and sensitive screw adjustment.

Packed 3 in a box.

Calipers
No. 444

These calipers may be used for inside or outside work. They have our improved firm friction joints and sensitive screw adjustment.

Packed 3 in a box.
ROSE TOOLS, INC.

Starrett

Hermaphrodite Calipers

Firm-Joint

No. 41

These calipers have our adjustable point, as well as the improved firm-joint, which has made our No. 28 Outside and No. 27 Inside Calipers deservedly popular among mechanics. This joint, with its smooth and uniform friction, is incomparably superior to the old-style riveted joint.


Lock-Joint

No. 42

With our adjustable point, lock-joint and sensitive adjustment. Reverse cut shows our adjustable point, while the front cut shows our subjoint and sensitive adjustment. The sensitive adjustment is obtained by the smaller knurled nut at lower end of arm.


Firm-Joint

No. 241

The same as No. 41 except that both points are solid, neither being adjustable.


Lock-Joint

No. 242

The same as No. 42 except that both points are solid, neither being adjustable.


Dividers

Firm-Joint

No. 139

These dividers with our improved firm-joint are made in 3, 6, and 12 inch lengths. They are rigid and the points are hardened and nicely finished.

5-inch Price, 6-inch Price, 10-inch Price, Packed 3 in a box.

Lock-Joint

No. 43

With our improved lock-joint attachment and sensitive adjustment. It is light and rigid with large capacity, instantly opened, closed, and locked. The points are nicely tempered.


Firm-Joint

No. 243

This caliper is similar to our Nos. 41 and 43, except it is made with a round adjustable point in the straight leg.

4-inch Price, 6-inch Price, Packed 3 in a box.

Firm-Joint

No. 563

4-inch Price, 6-inch Price, Packed 3 in a box.

For laying off centers and lines from an edge.

Reverse Front

Reverse Front

Reverse Front

Reverse Front

Reverse Front

Reverse Front
Universal Divider and Beam Compass

No. 89
For Engineers, Architects and Draftsmen

The adjustable scriber holder is reversible and carries either a fine tempered steel point or a pencil lead, held in a split socket by a knurled nut. With the holder turned outward it is possible to work close to shoulders, something that cannot be done by a similar tool of any other manufacturer, turned inward, points may be brought close together to scribe the smallest circle. With 4-inch beam a 9-by-1-inch circle and under may be scribed. An auxiliary beam 13 inches long is furnished with which a 25-inch circle may be drawn. The center may be substituted for the scriber point, adapting the tool for scratching around a drilled hole. We also furnish a pen attachment.

No. 89 A
Tool, with 4-inch beam and cone center, as shown above...Price.

No. 89 S
As above, No. 89 A, without cone center and with 89 D in place of bent arm, also with 89 B in place of O...Price.

List of Attachments

No. 89 B Needle Points, each...Price.
No. 89 C Pen Attachment...Price.
No. 89 D Extra Straight Point and Socket...Price.
No. 89 E Extra 13-inch Beam to fit 25-inch circle...Price.
No. 89 F Coupling...Price.
No. 89 G Extra Steel Points, each...Price.
No. 89 H Tool and all attachments...Price.
Case for No. 89 A or S, extra...Price.
Case for No. 89 H, extra...Price.

No. 89 A, without case, sent unless otherwise ordered. Packed 1 in a box.

Note: The No. 89 D is supplied inexpensively with hole diameter .066, but may also be furnished when so desired with hole diameter .076 at the same price.

Note: The following numbers supplied nickel plated at list shown below:

No. 89 A Nickel Plated...Price.
No. 89 S Nickel Plated...Price.
No. 89 H Nickel Plated...Price.

Pencil Divider No. 596
For Draftsmen, Toolmakers, Machinists, Students

An excellent tool for lay-out work on metal, and for pencil drawings. It is not designed to do the small work of the bow pencils and bow dividers. Approximate capacity of opening of points 1/4 to 3 inches. It is made with round legs and two small cheeks, .036 hole diameter, for holding the steel points and pencil lead. The leg in which the pencil lead is held is provided with cut-out to readily remove broken or lodged leads. Finished with a bright nickel plate. Distance from fulcrum to scriber points about 3 inches. No leads are furnished. Extra steel points, 18 cents each.

Made in this one size only.

No. 596...Price, each.
Packed 2 in a box.

Note: May also be supplied when so desired with hole diameter .076 at the same price.

Divider No. 92
This cut shows a divider with features which make it the best divider in its line yet produced. Both points are crucible forged steel, nicely tempered. The quadrant passes through the leg and the clamp screw frictionally locks it firm. After fine adjustments are made, our style of lock nut, between the arms, locks the spring in the leg firm, overcoming the defect in the old-style dividers of the points dodging out and in with the grain of the wood. The adjustable point may be instantly removed and a common pencil inserted in its place, or the ball points shown below may be used. The dividers are light, yet rigid and easy to handle, and are worth twice the price of the cheap malleable dividers on the market. The adjustable point is eccentric and may be loosened and deflected to make fine adjustments.

No. 92 6-inch...Price.
No. 92 7-inch...Price.
No. 92 8-inch...Price.
No. 92 9-inch...Price.

Packed 2 in a box.
**Improved Extension Divider No. 85**

This is a well-constructed divider, with auxiliary caliper legs. The head and socket legs are made from drawn (not cast) bronze metal, and are hardened, tough, strong, finely finished and nickel plated.

The joint is large and firm. Our locking nut between the arms, against which a spiral spring acts, is a valuable feature. After the fine adjustment is made, the nut may be turned back, locking spring and arm firmly, the remainder of the weak point which remains the common wing divider only as stiff as the adjusting spring. A ball-threaded nut on the arm, through which the quadrant passes, is a more durable feature than two or three threads tapped in the arm to hold the wing of an old style. The head and socket of this tool are made from the best malleable iron, the rest of steel. The points are hardened 19 inches, and will write a 22-inch circle; will caliper 11 inches outside and 13 inches inside. The second size is 9 inches; by adjustment of points it becomes 12 inches, and will write and caliper 14 inches outside and 16 inches inside. The third size is 6 inches; by adjustment of points it becomes 11 inches, and will write 16-inch circle and caliper 17 inches outside and 19 inches inside.

The points are eccentric and may be loosened and rotated to make fine adjustments. For Ball Points which may be used with this tool, see page 207.

- **No. 85 A** 7-inch, with divider legs only: $Price.
- **No. 85 B** 8-inch, with divider legs only: $Price.
- **No. 85 C** 9-inch, complete: $Price.
- **No. 85 D** 9-inch, complete: $Price.
- **No. 85 E** 10-inch, with divider legs only: $Price.
- **No. 85 F** 14-inch, complete: $Price.
- **No. 85 G** sent unless otherwise ordered.

**Improved Trammel Points No. 50**

Nickel Plated

A trammel is a tool used to measure the distance between points too great to be reached with ordinary dividers.

These trammels are made from bronze metal, with forged steel points, hardened.

Either point can be removed, and the sleeve socket accompanying each pair put in its place.

Adjustable like spring dividers. Light and durable.

The bar, shown in cut, holding pencil socket in center, with frames at each end, is similar to what would be used as a beam in using this tool, but is only long enough to permit easy packing in the tool chest, as well as in shipping.

- **No. 50 A** With 3-inch points, adjustable: $Price.
- **No. 50 B** With 5-inch points, not adjustable: $Price.
- **No. 50 C** Extra long points for above, 8-inch: $Price.

**Note:** When ordering No. 50C alone state whether they are to be used with No. 50A or No. 50B.

Packed 1 set in a box.

---

**Improved Extension Divider No. 85**

This is a well-constructed divider, with auxiliary caliper legs. The head and socket legs are made from drawn (not cast) bronze metal, and are hardened, tough, strong, finely finished and nickel plated.

The joint is large and firm. Our locking nut between the arms, against which a spiral spring acts, is a valuable feature. After the fine adjustment is made, the nut may be turned back, locking spring and arm firmly, the remainder of the weak point which remains the common wing divider only as stiff as the adjusting spring. A ball-threaded nut on the arm, through which the quadrant passes, is a more durable feature than two or three threads tapped in the arm to hold the wing of an old style. The head and socket of this tool are made from the best malleable iron, the rest of steel. The points are hardened 19 inches, and will write a 22-inch circle; will caliper 11 inches outside and 13 inches inside. The second size is 9 inches; by adjustment of points it becomes 12 inches, and will write and caliper 14 inches outside and 16 inches inside. The third size is 6 inches; by adjustment of points it becomes 11 inches, and will write 16-inch circle and caliper 17 inches outside and 19 inches inside.

The points are eccentric and may be loosened and rotated to make fine adjustments. For Ball Points which may be used with this tool, see page 207.

- **No. 85 A** 7-inch, with divider legs only: $Price.
- **No. 85 B** 8-inch, with divider legs only: $Price.
- **No. 85 C** 9-inch, complete: $Price.
- **No. 85 D** 9-inch, complete: $Price.
- **No. 85 E** 10-inch, with divider legs only: $Price.
- **No. 85 F** 14-inch, complete: $Price.
- **No. 85 G** sent unless otherwise ordered.

**Improved Trammel Points No. 50**

Nickel Plated

A trammel is a tool used to measure the distance between points too great to be reached with ordinary dividers.

These trammels are made from bronze metal, with forged steel points, hardened.

Either point can be removed, and the sleeve socket accompanying each pair put in its place.

Adjustable like spring dividers. Light and durable.

The bar, shown in cut, holding pencil socket in center, with frames at each end, is similar to what would be used as a beam in using this tool, but is only long enough to permit easy packing in the tool chest, as well as in shipping.

- **No. 50 A** With 3-inch points, adjustable: $Price.
- **No. 50 B** With 5-inch points, not adjustable: $Price.
- **No. 50 C** Extra long points for above, 8-inch: $Price.

**Note:** When ordering No. 50C alone state whether they are to be used with No. 50A or No. 50B.

Packed 1 set in a box.
ROSE TOOLS, INC.

Starrett

Trammels No. 59

This cut shows the trammels fastened to a wooden beam, which may be any size from 1/8 to 1/2 inches wide, and of any thickness desired (requiring no fitting), giving stiffness according to its length and adapting it for small or large work.

The auxiliaries designed to go with the trammel heads are as shown above, viz., inside and outside caliper legs, a set of four ball points with holder, which enable one to scribe a circle from the center of any line up to 2½ inches and under. A lead pencil may be used in place of either of the steel points. Points are eccentric for close settings. Our clamped device is adapted to take in either a small or common sized pencil. The trammels are furnished with or without auxiliaries.

The small engraving in the margin gives a more detailed representation of one of the heads. Due to the various lengths of beams required at different times and in being a simple matter for the mechanic to arrange, we do not furnish a beam.

No. 59 A Trammel Heads (with one pair of points) Price.
No. 59 B Balls and Holder Price, per set.
No. 59 C Small Caliper Legs Price, per pair.
No. 59 D Large Caliper Legs Price, per pair.
No. 59 E Large Dividing Points Price, per pair.
No. 59 F Set complete Price.

No. 59 A sent unless otherwise ordered.
Packed 1 in a box.

208

Starrett

Extension Beam Trammels No. 51

Nickel Plated

This illustration represents a pair of trammel heads, with an opening through the underside to accommodate the extension, giving width and stiffness in proportion to the length required for large work, while it is equally well-adapted to receive a narrow beam for light work.

The points are eccentric, and may be loosened and rotated in their sockets to make fine adjustments. Either point may be removed and a common pencil inserted.

One of the caliper legs is provided with a joint, worked by an eccentric fourth piece for fine adjustments.

This illustration merely shows a section of a beam, these trammel heads would be used with. As it is much more convenient for a mechanic to fit the beam, we do not furnish same.

No. 51 A Complete Price.
No. 51 B Without caliper legs Price.

For Ball Points which may be used with this tool, see page 207.
Packed 1 in a box.

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Starrett

Extension Steel Beam Trammels No. 58

The beam of this tool is 1/4 inch round, with one side flattened, so constant clamping will not injure the sliding surface as well as keeping the points in alignment. It is made in one, two or three sections, of 1-inch length each, and coupled together by means of our improved socket coupling shown in cut, rigidly holding them for long reaches. A special wrench for the coupling screw is furnished with each tool. With one 1-inch section only, it weighs but 8 ounces. The slides carrying the points grip both beam and points by a partial turn of the knurled nut. Fine adjustments are made by a slight rotation of one of the other eccentric points, which by a friction spring retains them when the nut is loosened.

No. 58 A With one section, 14-inch Price.
No. 58 B With two sections, 28-inch Price.
No. 58 C With three sections, 42-inch Price, Extra Sections, with coupling Price.
Caliper Points, as shown in cut Price, per pair.

Sent plain unless otherwise ordered.

For Ball Points which may be used with this tool, see page 207.
When Ball Points are to be used with No. 58 the fact should be mentioned in the order.
Packed 1 in a box.

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Starrett

Steel Beam Trammels No. 251
For Draftsmen, Engineers and Metal-Workers

A rigid well-designed trammel for laying out, scribing and measuring. The beam is fastened on the top so when the arms are clamped in position they cannot turn from pressure on the points. The arms are held in place by a spring friction once the nuts are loosened for setting. As will be observed from the cut, one arm has an adjusting screw for fine adjustment of the points. At the top of each arm the knurled grips are in the form of a roller, the advantage being a swivel handle, which is far better than fixed handles. The points are adjustable in the spring clamps and can be replaced by pencils, caliper legs or ball points. The ball points permit working from holes up to ⅛ inches in diameter.

No. 251 A With 10¼-inch beam, to scribe circles 18 inches in diameter ................. Price.
No. 251 B With 14¼-inch beam, to scribe circles 25 inches in diameter ................. Price.
No. 251 C With 20¼-inch beam, to scribe circles 30 inches in diameter ................. Price.
Pair Caliper Points included with above sizes.
No. 251 D Coupling, with extra 20-inch beam, to scribe circles 72 inches in diam. Price.
No. 251 E Ball Points and Holder. ........................................................................ Price, per pair.

Set A sent unless otherwise ordered.

Additional Attachments for No. 251

Made so that a pen point and chuck (opening .078) to hold pencil leads, etc., may be used with our No. 251 Trammel for draftsmen and engineers. As depicted, the shanks of the attachments are clamped in the larger chucks of the trammel.

No. 251 H Steel Point and Socket (holds leads also) Price, each.
No. 251 J Needle Point ................................................. Price, each.
No. 251 K Pen Attachment ................................................. Price, each.

Starrett

T-Handle Tap Wrenches No. 93

This cut represents a tool valuable to toolmakers, machinists and motor mechanics. It is used for holding taps to be turned with the hand, and is also useful for holding drills, reamers and other small tools. The body is centering, enabling the workman to use it on lathe centers, or in an upright drilling machine to start the tap straight. Its unique construction permits the jaws to conform to the piece to be held, making it rigid and less apt to become loose. The jaws and the knurled clamping nuts are heat-treated to withstand any ordinary use. No. 93C is made with sliding handle.

The D. C. and F. listing are identical in construction to A. B. and C., except the body from knurled chuck out to T-handle is proportionately larger. For machine, automobile service and airplane repair shops eliminating the expense of having on hand an endless lot of special long taps to work at depths where space does not permit of turning the handle.

No. 93 A Length, 1 ¼ inches; capacity, ⅛ to ⅜ inch square ............................................ Price.
No. 93 B Length, 2 inches; capacity, ⅛ to ¼ inch square ............................................ Price.
No. 93 C Length, 3 inches; capacity, ⅛ to ⅜ inch square ............................................ Price.
No. 93 D Length, 4 inches; capacity, ⅛ to ¼ inch square ............................................ Price.
No. 93 E Length, 5 inches; capacity, ⅛ to ⅜ inch square ............................................ Price.
No. 93 F Length, 6 inches; capacity, ⅛ to ⅜ inch square ............................................ Price.

Packed 1 in a box.

Tap Wrench No. 174

This wrench of nicely finished steel, with the gripping surfaces tempered, will hold taps, reamers, drills, etc., or any tool ⅜ inch in diameter or under. It will grip round, square or oval shanks. It being but 3 inches in length and light in weight makes it particularly valuable in using taps of small diameters.

No. 174 ........................................................................ Price.

Packed 6 in a box.

Tap Wrenches No. 91

Of new design, with gripping surfaces tempered—strong, neat and efficient. It will hold firmly a tap with square or round shank. Inside the knurled adjusting screw a spring connected with the plunger holds it back and causes instant movement with the screw.

<table>
<thead>
<tr>
<th>Length</th>
<th>Hold Tape</th>
<th>Pile Square</th>
<th>Approximate Weight</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 91 A</td>
<td>6 ¼ inches</td>
<td>⅛ to ⅜ inch</td>
<td>⅛ to ¼ inch</td>
<td>21/2 ounces</td>
</tr>
<tr>
<td>No. 91 B</td>
<td>2 ⅛ inches</td>
<td>¼ to ⅜ inch</td>
<td>⅛ to ¼ inch</td>
<td>9 ounces</td>
</tr>
<tr>
<td>No. 91 C</td>
<td>2 ⅛ inches</td>
<td>½ to ⅜ inch</td>
<td>⅛ to ¼ inch</td>
<td>1 pound</td>
</tr>
<tr>
<td>No. 91 D</td>
<td>2 ⅛ inches</td>
<td>½ to ¼ inch</td>
<td>⅛ to ¼ inch</td>
<td>2 pounds</td>
</tr>
</tbody>
</table>

No. 91A packed 3 in a box
No. 91 B-C-D packed 1 in a box.

ROSE TOOLS INC.
Starrett

Automatic Adjustable-Stroke Center Punch No. 18

The ordinary hammer and center punch are not sufficiently accurate when laying out fine work. They require the use of both hands and the accuracy of the blow depends upon the skill of the mechanic.

This center punch contains a mechanism which automatically strikes a blow of any required force when the punch is in the exact position desired by the operator. It is provided with a knurled adjustable screw cap, which, working in connection with a spring, regulates the stroke. For work requiring a heavy blow, turn cap down; for work requiring a light blow, turn up. To use it, no hammer is needed. The punch being placed in an upright position over the working line, a downward pressure releases the striking block and makes the impression without danger of slipping, as is liable when a hammer is used. When adjusted for either light or more accurate and quicker work may be done as required on delicate work in toolmaking. The working parts are hardened, durable and accessible for such repairs as may be needed. The adjustable cap fits the hand, so there is no stroke of off-centering and easily replaced. The AA size is 2 inches long when adjusted for medium stroke, 1 inch in diameter and weighs 1 ounce. The A size is 5 inches long when adjusted for a medium stroke, 1/2 inch in diameter and weighs 3 ounces. The B size is 6 inches long when adjusted for a medium stroke, 1/2 inch in diameter and weighs 6 ounces. It differs from the other sizes in being larger and capable of striking a much heavier blow.

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
</tbody>
</table>

Extra Points...Price, each.

No. 18 AA...Price, each.
No. 18 A...Price, each.
No. 18 B...Price, each.
No. 18 A...sent unless otherwise ordered.
Packed 1 in a box.

Starrett

Center Punches No. 264

Square With Knurled Grip Will Not Roll

This illustration shows our new distinctive line of center punches, square, with knurled grip. They will not roll when laid down. They are made in seven sizes, ranging in length from 2 1/4 to 8 inches. The A, B and C sizes are especially adapted to light toolmakers' work. Each punch is tempered to its full length.

<table>
<thead>
<tr>
<th>Size</th>
<th>Price, each.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

Showing Attachment applied to Center Punch

Starrett

Center Punches No. 117

Made to supply the demand for a better article than is ordinarily required. Made of fine steel, neatly shaped, knurled for finger grip, hardened and polished, and points nicely ground.

Length of size AA, 3/4 inches. Length of sizes A, B, C and D, 4 inches. Diameter at top of tapered point: AA, 1/4 inch; A, 1/8 inch; B, 1/8 inch; C, 1/16 inch; D, 1/16 inch.

A larger size, E, is made for heavy work: length, 5 inches; diameter, 1/4 inch; diameter of knurled part, 1/8 inch.

<table>
<thead>
<tr>
<th>Size</th>
<th>Price, each.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td></td>
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<tr>
<td>A</td>
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<td>B</td>
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<td>C</td>
<td></td>
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<tr>
<td>D</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>

No. 117 Sizes AA, A, B, C and D...Price, each.
No. 117 Size E...Price, each.
No. 117 Assorted Sizes A, B, C and D, in plain box...Price, per dozen.
No. 117 Assorted Sizes A, B and C, in round wooden box, as shown on page 218...Price, per dozen.

All sizes packed 12 in a box, except E size, 6 in a box.
Sent assorted in plain box unless otherwise ordered.

Starrett

Spacing Attachment for Automatic Center Punch No. 188

This attachment is entirely self-contained and can be instantly applied in place of the regular points. It will be found an indispensable tool for the rapid and accurate spacing of any number of centers at once. The locating point is on the principle of a spring plunger, held in its lowest position by a light spiral spring. It is frictionally held and easily replaced.

The attachment is made in two sizes: Size A has a capacity from 1 to 1 1/4 inch and fits either Center Punch No. 188 AA or 188 B. Size B has a capacity from 1 1/4 to 2 inches and fits Center Punch No. 188.

<table>
<thead>
<tr>
<th>Size</th>
<th>Price, each.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
</tbody>
</table>

Packed 2 in a box.
Starrett

Spacing Center Punch
No. 118

This Combination Prick Punch and Spacing Tool is just the thing for laying off work quickly and accurately, for drilling, cutting out dies, etc. The prick punch is solidly made from best tool steel, properly tempered. The guide point is set in a socket with a spiral spring to force it down. When the punch is struck, the guide passes back into the socket, permitting the punch to be held straight over its work and insuring accurate results. The screw with pin plunger against spring retainer of adjustable point sets and holds the spacing right in laying out for small or large drills, and has a variation from 1/64 inch to approximately 1/32 inch.

Packed 3 in a box.

---

Starrett

Drive Pin Punches No. 565

Made of good quality steel, neatly shaped, hardened and polished, with knurled centers.

Length of each size, 4 inches. Diameter of points: A, 1/64 inch; B, 1/32 inch; C, 1/16 inch; D, 1/32 inch; E, 1/16 inch; F, 1/8 inch; G, 3/32 inch; H, 1/4 inch.

PRICES

Set of Eight (one of each size) on round wooden box, as shown in cut.

Per dozen, in plain box.

Each.

Packed 12 of a size, except H, or 12 assorted sizes, in plain box. Size H packed 5 in plain box.

Sent assorted unless otherwise ordered.

---

Starrett

Prick Punches
No. 816

Made with a long tapered point. Hardened and polished and the points nicely ground. Length of each size, 4 inches.

No. 816 Sizes A, B, C and D.................................................. Price, each.

No. 816 Sizes A, B, C and D.................................................. Price, per dozen.

No. 816 Assorted Sizes 3A, 3B, 30 and 30A............................ Price, per dozen.

Packed 12 in a box.

Sent assorted unless otherwise ordered.

---

Starrett

Bench Block No. 129

Patented

This block, like many other tools, was designed to meet the demand for something better than an ordinary piece of metal with a hole in it to drive pins in round or flat work. It is made from a forging and is hardened and ground. The knurled shown in the cut, while adding to its appearance, makes it easy to handle. The recess in the base, as shown in the semi-sectional view, decreases its weight. But it is strong enough to withstand much hard use. The V in the center is a feature needed no explanation. The holes vary in size from 1/16 to 5/32 inch. The block being about 1/2 inch high and 3 inches in diameter, appeals to mechanism particularly in preserving a finished piece of work where the fitting of dowel pins is necessary.

Packed 1 in a box.

---

Starrett

Drive Pin Punches No. 248

Extra Long

For Motor Service and Machine Shop Work

These drive pin punches are 8 inches long and have a knurled grip of 4 inches. The pin drive part is 3 1/2 inches long, diameters of same being slightly smaller: A, 1/8 inch; B, 5/32 inch; C, 9/32 inch; D, 1/4 inch, and E, 1/2 inch. The diameter of the knurled grips is 1/8 inch on the A size, 1/16 inch on the B, C, and D sizes, and 5/32 inch on the E size.

They are designed to stand much hard use and to provide a more satisfactory punch for motor service and machine shop work. Just the punch to follow long center pins and the like into a hole without hindrance. Made of good quality steel and are hardened and polished.

No. 248 Sizes A, B, C, D and E.................................................. Price, each.

No. 248 Assorted Sizes A, B, C, D and E.................................................. Price, per dozen.

Set of Five in plain box.......................................................... Price.

Packed 6 in a box; assorted sizes 12 in a box.

Sent assorted unless otherwise ordered.
Starrett

Nail Sets No. 116

Made of fine grade steel, both ends hard- 
ened and polished, points nicely knurled,  
tips concaved, tops oval, and the jaws just  
right.

Length of each size, 4 inches. Diameter 
at tip: A, \(\frac{1}{16}\) inch; B, \(\frac{1}{8}\) inch; C, \(\frac{1}{4}\) inch; D,  
\(\frac{3}{32}\) inch.

PRICES

No. 116 In plain box Per dozen, 
No. 116 Each, 
No. 116 Assorted Sizes, A, B, and C,  
in round wooden box as shown  
Sent assorted in plain box unless otherwise  
ordered, 
Packed 12 in a box.

Extra Heavy Nail Sets No. 176

No. 176 A 5 inches long, \(\frac{1}{16}\) inch diameter, \(\frac{1}{16}\) inch at point Each, 
No. 176 B 5 inches long, \(\frac{1}{16}\) inch diameter, \(\frac{1}{16}\) inch at point Each, 
Packed 6 in a box.

Square Head Nail Sets No. 800

With Large Square Head and Round Grip

A \(\frac{1}{16}\) For the carpenter who likes a round  
grip and large striking surface. The square  
head prevents rolling and enables the user  
to readily pick it out from tools, nails, etc.  
in the pocket.

B \(\frac{1}{8}\)

C \(\frac{3}{32}\)

D \(\frac{5}{32}\)

E \(\frac{1}{4}\)

These nail sets are machined from \(\frac{1}{8}\)  
inch square bar stock, cut 4 inches long,  
have deep knurling and the heads and  
points are polished. Size of point is  
stamped on each set.

Made in 5 point sizes: \(\frac{1}{16}\), \(\frac{1}{32}\), \(\frac{1}{8}\), \(\frac{3}{32}\) and  
\(\frac{1}{4}\) inch.

PRICES

No. 800 Sizes A, B, C, D and E Each, Per dozen, 
No. 800 Assorted Sizes, A, B, C, D and E Each, Per dozen,  
Sent assorted unless otherwise ordered.  
Packed 12 in a box.

Starrett

Nail Sets No. 265

Square—With Knurled Grip—Will Not Roll

A \(\frac{1}{4}\)

B \(\frac{1}{8}\)

C \(\frac{3}{32}\)

D \(\frac{5}{32}\)

E \(\frac{1}{4}\)

The above cut shows our new distinctive line of nail sets, square with knurled grip. They will  
not roll when laid down. They are made in seven sizes, the length of the five smaller sizes being  
4 inches, the two larger sizes 5 inches. Each set is tempered in full length and the points are nicely  
knurled and beveled. The A size is specially adapted for a brad set.

No. 265 Sizes A, B, C, D and E Each, Price each, Per dozen, 
No. 265 Sizes F and G Each, Price each, Per dozen,  
No. 265 Assorted Sizes, A, B, C, D and E Each, Per dozen,  
Sizes A, B, C, D and E packed 12 in a box.  
Sizes F and G packed 6 in a box.  
Sent assorted unless otherwise ordered.

Measuring Bar Clamps No. 69

These clamps are one inch square  
graduated, and are to be used with two  
wooden bars about 1 by \(\frac{1}{8}\) inch, of any  
desired length. (We do not furnish the  
bars.) The clamps and bars thus  
combined will be found very convenient by  
those who work with adjustable measuring  
rules, as well as for extension beams for our  
No. 50 T-square, as shown on page 208.  
Packed plated.

No. 69 Price, per pair,  
Packed 2 pairs in a box.
Starrett
Universal Scraper No. 194

The edges of the blade are ground square. There are therefore eight sharp cutting edges, and any one of them can almost instantly be brought into use by means of the handle. The blade is approximately 5 1/4 inches wide, 3 3/4 inches long and .065 inch thick, while the handle is about 7 inches long.

To lock or release the blade or place the blade at any angle, it is simply necessary to give the handle a slight turn. The wing nut is used when the blade is removed from the handle. The guard may be instantly slipped on or off either side or end of the blade, and enables one to use the tool with a firm grip, bearing on the handle securely, as may be desired.

No. 194
Blades only, regular size. Price, each.
Blades only, 2 inches wide. Price, each.
Guards for blades. Price, each.
Packed 1 in a box.

Floor, Bench and Cabinet Scraper
No. 181

The head of this scraper is made of sheet steel with the stroke up to make it rigid and has a bow formed for a rest to bear upon, which is nickel plated, to a dull finish. It is supported on the shoe to be placed in the angle, enabling the user to get into corners firmly. Both ball and handle are made to suit the particular purpose of the scraper, and may be quickly placed for action and firmly clamped, so that the head is about 4 inches long. In design, workmanship, material and finish this tool is satisfactorily Starrett quality.

No. 181
Extra Blades. Price, each.
Extra Handle. Price, each.
Packed 1 in a box.

Note: For Burnisher to be used with this Scraper, see our No. 810 listed on page 219.

Starrett
Burnisher No. 810
For Turning Scraper Cutting Edge

Although differing from the set standards for burnishers, many uses of scrapers like this oval shape with the knurled steel handle. This shape is not only practical, but it allows the user to have a better grip and does away with the annoying looseness of a wood handle. This burnisher is about 7 inches long, the approximate length of the oval section being 4 inches. The surface is hard and smooth polished.

No. 810
Price, each.
Packed 6 in a box.

Double-Lip Countersink No. 195

This is the only double-lip, self-centering wood countersink that has been made, and the one made on the true principle for a woodworking tool. It will clear itself of its shavings in any kind of wood and will cut a smooth, round hole with surprising rapidity and ease. It is made from the best of steel, forged, twisted, and tempered. It can be sharpened from the inside with a file, and has a Shank so that it may be held in bit braces or wood-working chucks.

No. 195 A 1/8-inch.
Price, each.
No. 195 B 1/4-inch.
Price, each.
Packed 6 in a box.

Stair Gage Fixtures
No. 111

These fixtures can be readily clamped to a carpenter's steel square to form a gage for various uses, as in stairs, valley cuts, hip and rafter work. Sketch A shows the gage as applied for laying out a stair stringer: sketch B, laying off hexagonal angles; sketch C, as used as a center gage or in quartering a circle. Fixtures are light, neat and efficient.

No. 111
Price, per pair.
Packed 3 pairs in a box.

Stair Gage Fixtures
No. 470

A small set of 1/4-inch hexagonal fixtures for the carpenter's steel square. Can be quickly clamped in place on the blades, to lay out angles for stair stringers, masonry, etc. The finish is white nickel. Set screws are faced with natural finish.

No. 470
Price, per pair.
Packed 12 pairs in a box.
Starrett

Screw Driver No. 570
For Toolmakers and Machinists

An especially adaptable screw driver for toolmakers and machinists, but appealing to other tradesmen as well, there being three blades which will fit nearly all screw heads. The blade is clamped and is as rigidly held as the solid type by a knurled nut. The cut shows that the nut merely holds the blade in position, the tang being so constructed as to withstand the greatest leverage. The hexagonal hard wood handle makes it the best feeling screw driver on the market. It is a well finished tool throughout and with the blade inserted is about 10 inches in length. Size of bits, approximately 1/16, 1/32 and 1/4 inch.

No. 570 With three blades... Price, Extra Blades... Price each. Packed 1 in a box.

Magazine Screw Driver No. 557

This is the best tool yet offered for a set of pocket screw drivers. It has four blades of different widths, any of which may quickly be taken from the telescopic handle and inserted in the end, where it is set in the socket indicated on the handle. Any or all of the blades are carried in the handle where they are held from rattling when carried in the pocket or from being lost when the cap is off. While the cap may be readily pulled off, it is rigidly held from turning and fractionally held from coming off, with no screws to bind or hinder.

The smaller blades may be used to make holes in wood, to start screws as well as to drive them home. This tool will be found valuable in every household as well as to the mechanic. The widths of the blades are 1/16, 1/32 and 1/4 inch.

No. 557 Complete.Price, Extra Blades... Price each. Packed 1 in a box.

Electricians' Pocket Screw Driver No. 560

This screw driver is the same as our No. 557, except that the handle is covered with hard rubber for insulation from electrical current, and is nicely rubbered so as to insure a firm grip when using the tool.

No. 560 Complete... Price, Extra Blades... Price each. Packed 1 in a box.

Starrett

Jewelers' Screw Drivers No. 555

They are nicely and substantially made from steel tubing, knurled and nickel plated. Six constitute a set, with blades varying from .025 to .100 inch in width. The blades are held from rattling when carried in the pocket or from being lost when the cap is off. While the cap may be readily pulled off, it is rigidly held from turning and fractionally held from coming off, with no screws to bind or hinder.

No. 555 AA Handle, 1/8-inch diameter; approx. width of blade, .025 inch... Price, No. 555 B Handle, 1/16-inch diameter; approx. width of blade, .035 inch... Price, No. 555 C Handle, 1/32-inch diameter; approx. width of blade, .040 inch... Price, No. 555 D Handle, 1/32-inch diameter; approx. width of blade, .055 inch... Price, No. 555 E Handle, 1/32-inch diameter; approx. width of blade, .065 inch... Price.

Set of Six Extra Blades... Each one packed 6 in a box.

Starrett

Opticians' Screw Driver and Holder No. 552

This screw driver is designed for those using small screws, especially opticians, watch and clock makers. When the screw holder is not needed, it may be slipped back on the blade, out of the way.

No. 552 A Screw Driver, complete, with two blades and screw holder... Price, No. 552 B Screw Driver, with two blades, without screw holder... Price, No. 552 C Screw Holder, only... Price. Extra Blades, either size... Price each.

No. 552 A sent unless otherwise ordered. Packed 6 in a box.
Starrett

Pocket Screw Driver No. 553

This tool is made from steel tubing, knurled and nickel plated. The shank of the blade fits solid lock in the tube, preventing it from burning, and is held from coming out by a slight turn of the chuck. To carry in pocket, reverse the blade, inserting it in the handle, giving a slight turn of the chuck to keep it there. It takes no more room in the pocket than a pencil knife. The blades are properly tempered.

No. 553 A Handle, 16-inch diameter; blade, 11/2 inches long; weight, 1/2 ounce...Price...
No. 553 B Handle, 3-inch diameter; blade, 3 inches long; weight, 1 1/4 ounces...Price...
Extra Blade...Price....

Pocket Screw Driver No. 559

With Wood Handle

This screw driver is very similar to our No. 553 listed above, except that it is made with a good feeling wood handle. There are many small and inexpensive screw drivers on the market but this was designed for those who prefer a little better quality and strength throughout.

Steel parts are nickel plated. Blade reversible, telescoping in handle. Length with blade, 6-1/2 inches; 5-6 inches.

No. 559 A Handle, 1/2-inch diameter; blade, 1 3/4 inches long; weight, 1/2 ounce...Price...
No. 559 B Handle, 1-inch diameter; blade, 3 inches long; weight, 1 1/4 ounces...Price...
Extra Blade...Price....

Eyeglass Screw Driver No. 554

This screw driver is made with a chuck to hold the blades firmly in a split socket when in use. To carry in the pocket, on key-clip or watch chain, the chuck may be reversed by slightly inserting the chuck, then reversed and telescoped through the socket nearly full length, and held safely by tightening the chuck. Nickel plated.

No. 554...Price...
Extra Blade...Price....

Eyeglass Screw Driver No. 556

Made in two pieces and screwed together, telescoping the blade when not in use. It is neat and safe to carry in the pocket, on key-clip or attached to a watch chain. Nickel plated.

No. 556...Price...

Starrett

Drill Point Gage

No. 22

Patented

This tool meets the demand for a gage designed for the specific purpose of assisting in grinding drill points accurately. The method followed for sharpening the cutting edges is to do one at a time. For satisfactory results, each lip must not only be the same length, but must also have the same angle in relation to the axis of the drill.

The No. 22 C offers a very complete tool which may be used as a Drill Point Gage, Hook Rule, Plain Rule, Depth Gage, Try Square and Slide Caliper. The head only, No. 22 D, will fit our spring-tempered rules of same width and thickness, viz: our Nos. 300, 303, 600 and 603, in the 6-inch lengths.

No. 22 A Gage with 15/32-inch blade (like our combination square blade), complete...Price...
No. 22 B Sliding Graduated Head only for (No. 22 A size)...Price...
 Recommended for large size drills.
No. 22 C Gage with 6-inch hook rule, complete...Price...
No. 22 D Sliding Graduated Head only for (No. 22 C size)...Price...
 Recommended for small size drills.

Above numbers packed 1 in a box.

Blades for both sizes are graduated in 6ths, 10ths, 32nds, and 64ths.
PROPER CUTTER CLEARANCE! Is there any phrase heard more in tool and machine shops the world over? There is no more important single factor in the successful operation of a milling cutter than CORRECT CLEARANCE of the cutting edge.

Correct design, good steel, proper hardening, are factors established by the manufacturer and not subject to alteration after a cutter has been purchased. The one variable factor is CLEARANCE. Correct clearance generally varies from 2 degrees to 15 degrees, the basic rule being, "Give the cutting edge the maximum backing without letting the heel of the tooth drop." Previous to the introduction of the Starrett Cutter Clearance Gage the matter of determining correct clearance has been largely indefinite. The use of a protractor laid on the face of the cutter, or indicating same on cutters with a dial indicator, translating thousands of readings into degrees, etc., has been the slow and expensive way since one method or the other required removal of the cutter from its arbor in the milling machine, or removal from the arbor of the grinding machine. We claim, with this gage, in any department where cutter grinding takes place it will save many dollars by cutting the grinding expense, more work between grinds, less "out time" of machines, less wear on machines and, finally, more and better production. It is the type of gage that grows with one as it is used. The illustrations on the opposite page tell at a glance a few of its many applications. Helps check clearances from 1/4 to 2 inches in diameter and accurately checks clearance on cutters from 2 to 30 inches or more in diameter on end, side, spiral, helical and inserted teeth milling cutters.

The main sections of the gage are made of tool steel, hardened to withstand wear at contact points. The sliding bar, reversible on the beam, increases its scope. The flat foot of the sliding bar is on the line with the foot of the frame, thus making the measurement of side clearance on large diameter cutters an extremely simple one. Graduated to read by degrees from 0 to 30. The upright blade is both perpendicularly and angularly adjustable and each changing action thereof is independent of the other.

No. 459 ................................................................. Price.

With case ............................................................. Price.

Sent with case unless otherwise ordered.

Packed 1 in a box.

Checking Peripheral Clearance on a 6 x 15 Inch Inserted Cutter at Different Positions

Gage Used on Spiral Angular Cutter

Check Side Clearances of 4 x 1/4 Inch Alternate Tooth Mill

Gage Used on Diameter of 4-Inch Helical Mill

Gage Used on Side Tooth of 12 x 3/8 Inch Saw

Gage Used on Diameter of 20-Inch Diameter Inserted Tooth Mill
Starrett

Tap and Drill Gage

Tap and Drill Data on This Gage Conforms to the National Coarse and National Fine Thread Series

No. 185
Hardened

Trade Mark
Time Saver

This gage is approximately \(\frac{1}{4}\) inch thick, \(\frac{3}{16}\) inches wide, and \(\frac{11}{32}\) inches long. It is hardened, ground and rubbed to a bright finish and is thoroughly tested after hardening.

By the use of this gage one is enabled to select at once the right sized drill to suit machine screw taps most commonly used, leaving just stock enough for the tap to cut as near a full thread as is practicable for one tap without breaking it, thus saving much time and uncertainty of result attending the former crude ways of making a selection.

Explaining the chart, the first row of figures, for an example, read thus, 2-56-50. The number 2 (in the first row of figures) means the number or size of tap; 56, the pitch or size of thread; 50, the size of drill to use which will leave the right stock for proper thread; and the number 44, in last column, is the size of drill to use to let the tap, screw, or bolt through freely.

The figures—1, etc., up to 60—designate the number of drill (size agreeing with the holes). Other figures, 228, 221, etc., designate the size of hole in thousandths of an inch.

No. 185
Packed 3 in a box......Price

Drill and Steel Wire Gage No. 286

This gage gives the number and decimal equivalents of standard sizes from 61 to 80 inclusive. It is adapted to gage small twist drills and fine drill rods. Each gage is hardened, ground and rubbed to a bright finish and thoroughly tested after hardening. Size of gage—\(\frac{1}{4}\) inch thick, \(\frac{1}{16}\) inch wide, and \(\frac{1}{8}\) inches long.

No. 286
Packed 3 in a box......Price

Drill and Steel Wire Gage No. 186

This gage gives the number of drill to fit each hole, and the size of the hole in thousandths of an inch. This gage is about \(\frac{1}{4}\) inch thick, \(\frac{1}{16}\) inches wide, and \(\frac{11}{32}\) inches long. It is hardened, ground and rubbed to a bright finish and is thoroughly tested after hardening.

No. 186
Hardened

No. 187
Hardened

Drill and Steel Wire Gage No. 187

This gage shows sizes from \(\frac{1}{4}\) to \(\frac{1}{8}\) inch, varying by \(\frac{1}{64}\)ths, and is about \(\frac{1}{4}\) inch thick, \(\frac{1}{8}\) inches wide and \(\frac{1}{16}\) inches long. It is hardened, ground and rubbed to a bright finish and thoroughly tested after hardening.

No. 187
Hardened
**English Standard Wire Gages**

*Nos. 188 and 189*

**Hardened**

*Birmingham or Stubs’*

Commonly used for gauging iron wire, also for hot and cold rolled steel, and in some instances for gauging sheet iron.

These gages have black finish and the decimal equivalents of each number are stamped on the reverse side. Each gage carefully tested after hardening.

**Sizes and Numbers of English Standard Wire Gage**

<table>
<thead>
<tr>
<th>No. of Wire Gage</th>
<th>Size of Each No. in Decimal Parts of an Inch</th>
<th>No. of Wire Gage</th>
<th>Size of Each No. in Decimal Parts of an Inch</th>
</tr>
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<td>10</td>
<td>.102</td>
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<td>29</td>
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</tr>
</tbody>
</table>

Packed 2 in a box.

See page 255 for comparison of wire gage standards.

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**American Standard Wire Gages**

The Generally Accepted Standard for Non-Ferrous Metals

Adopted by the Brass Manufacturers, January, 1898

**No. 281**

**Hardened**

**No. 282**

**Hardened**

**United States Standard Gage**

**No. 283**

**Hardened**

The gage numbers are United States Standard, adopted by Congress March 3, 1893. The precision commercial standard in the United States for uncoated sheet and plate iron and steel, and is based on weights in ounces per square foot. Gage is black finished with decimal equivalents of each number stamped on reverse side. Carefully tested after hardening.

**No. 283** Numbers 0 to 36

Packed 2 in a box.

See page 255 for comparison of wire gage standards.

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*These gages are particularly useful for gauging sheet, plate and wire of non-ferrous metal such as copper, brass, aluminum, etc., also for electricians’ use. Each gage has black finish, and is carefully tested after hardening. The decimal equivalents (approx.) are stamped on the reverse side.*

**No. 281** Numbers 0 to 36

**No. 282** Numbers 5 to 36

Packed 2 in a box.

See page 255 for comparison of wire gage standards.
Starrett

Wire Gage No. 287
Hardened
Washburn & Moon Standard
"U.S. Steel Wire Gage"

For gauging steel wire and drill rod.

This gage is taken in sizes from 0 to 36. The gage numbers are those of the Washburn & Moon Standard. Decimal equivalents on the back.

Each gage has the black finish and is carefully tested after hardening.

No. 287 Numbers 0 to 36

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Starrett

Music Wire Gage No. 295
Hardened
American S. & W. Co. Standard

For measuring and checking steel music wire.

This gage has black finish and has the decimal equivalents of each number stamped on the back. Each gage carefully tested after hardening.

No. 295 Numbers 6-0 to 33

---

Starrett

Steel Music Wire Gage No. 280
Hardened
Washburn & Moon Standard

Sizes and Numbers of Steel Music Wire Gage

Each gage has a bright finish and is carefully tested after hardening.

No. 280 Numbers 12 to 20

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See page 255 for comparison of wire gage standards.
Starrett

Imperial Standard Wire Gages
Nos. 441 and 442

The decimal equivalents of each number are stamped on the back. Each gage is carefully tested after hardening. No. 441 with friction spring retains any position at which it may be set, and is made with bright finish.

No. 441 made in two sections, which fold together. Diameter, approximately 2/3 inches. No. 442 made in one piece with black finish. Diameter, approximately 3/16 inches.

No. 441 Numbers 1 to 36 Price
No. 442 Numbers 1 to 36 Price

Packed 2 in a box.

See page 265 for comparison of wire gages standards.

Wire Gage Guide No. 288

A timesaver and mistake eliminator for all workmen using wire gage on duplicated work. The gage is held on the central stud, and may be securely locked in any position, so that all the required number will be covered, thus making mistakes impossible, and saving the time formerly used in hunting for the size.

Size A made to be used with English Standard Wire Gage No. 189 and American Standard Wire Gage No. 282.

Size B made to be used with English Standard Wire Gage No. 189 and American Standard Gage No. 283 and Washburn & Moen Standard Wire Gage No. 287; also Imperial Standard Gage No. 442. Specify No. 288 A or No. 288 B when ordering.

No. 288 A

No. 288 B

Price

Rolling Mill Gages

Hardened

These gages are especially adapted to the hard use they are likely to receive in rolling mills and in places where constant measurements are to be taken quickly. The decimal equivalents of each number are stamped on the back with extra large figures. They are hardened and tempered and each gage is carefully tested. They are approximately 1 inch thick, 3/4 inches wide and 3/16 inches long, and have black finish.

No. 477 English or Birmingham Standard, Numbers 000 to 25

No. 478 English or Birmingham Standard, Numbers 1 to 22

No. 479 U.S. Standard, Numbers 000 to 25

(The recognized commercial standard in the United States for wrought sheet and plate iron and steel, and is based on weights in ounces per square foot)

Packed 3 in a box.

Starrett

Caliper and Wire Gage No. 293

Harden

Specially for Use in Steel Mills

This gage is made only in the English or Birmingham Standard and the United States Standard for sheet and plate iron and steel. As gages in rolling mills are preferred as compact as possible, yet strong enough to withstand hard usage, the moveable jaw and graduated slide are made in one piece. It is hardened and finished bright. Graduations first inch are 32nds, remainder 16ths. Opening of caliper, 4 inches. Depth of jaws, 1/2 inches. Width, 1 1/4 inches.

No. 293 A Sizes 1 to 30, English or Birmingham Standard

No. 293 B Sizes 1 to 30, United States Standard

Packed 1 in a box.

Screw and Wire Gage No. 227

The gage is made of spring-tempered steel and is easily carried in the pocket by those often handling screws and wire in hardware stores, stock rooms, etc. As shown by the cuts, this is an angular gage marked to show the right of the opening (front view) all sizes of the American Standard Screw Gages from 0 to 30 and is equally adapted to measuring wire, as well as machine and wood screws. The gage can also be used to measure A.S.M.E. Standard Screws. Although there is a difference of one or two thousandths for the same number, it is not enough to affect the reading of the gage. At the left of the opening it is marked to read fractions of an inch from 1/32 to 1/16 inch. The shorter intermediate lines make possible readings by 32nds of an inch.

The 3/32-inch scale, 3/64 inches graduated by 16ths and 1 inch by 32nds, is ordinarily sufficient to take length measurements of screws, etc. One end of the scale is cut out for a countersunk head screw, while the other end is made square to measure from a sharp right angle. The reverse side of the gage is graduated to read by the old standard or English Wire Gages from 0 to 0000 and by the new standard or American Wire Gages from 18 to 0000.

A screw or wire is measured by placing it in the opening until its weight brings up against both jaws; the division at contact point indicates the number of the gage.

Packed 3 in a box.
Master Precision Level
No. 199

For Erecting and Testing Machinery, Etc.

With 10-Second Level Vial

A new addition to our extensive line of iron levels. Designed only after much thought and experimentation to give the set-up men and manufacturers of all kinds of machinery a real precision and sensitive level. Too many machines are erroneously condemned when the whole fault is improper leveling. Present-day production and accuracy, to a large degree, depends on the levelness of the set-up. With this level, the operator can read and readily figure the exact variation from level and make the necessary adjustments.

Attention is called to the following phases of construction:
- Main ground and graduated vial of 10-second accuracy, one division equaling ½ thousandth (0.0005) of an inch per foot.
- An auxiliary level to aid setting true horizontal, showing position laterally.
- Level vials set so breakage is reduced to a minimum.
- Fool-proof adjustment to avoid tampering, once set.
- Special alloy iron employed to obtain freedom from thermal effects.
- Castings thoroughly seasoned, machined and scraped.
- Non-machined surfaces have a black crinkle finish.
- Insulation from handling through the top plate of non-conductive material.

The length is 15 inches; height, 3 inches; width, 1½ inches, and the weight about 5½ pounds.

No. 199 Including finished wood case .......................... Price,

Packed 1 in a box.

Adjustable Bench Levels

With plain or ground and graduated vials—accurate and very sensitive.

Notes: A ground vial is ground slightly convex on the inside, removing any small particles on the surface, giving a more sensitive bubble.

These levels are so constructed that they can be accurately adjusted, and when so adjusted are not liable to get out of true, the vials being set in tubes having solid ends which are firmly clamped to the base. The tubes are nickel plated and the bases are japanned. The outer tube being conveniently turned with its friction fit may be turned so as to protect the glass when not in use. These levels have the longitudinal groove mentioned on page 226.

4-inch, with plain vial ........................................ Price,
6-inch, with plain vial ........................................ Price,
8-inch, with plain vial ........................................ Price,
12-inch, with plain vial ..................................... Price,
16-inch, with plain vial with double plumb .......... Price,

No. 95

4-inch, with ground and graduated main vial .......... Price,
6-inch, with ground and graduated main vial .......... Price,
8-inch, with ground and graduated main vial .......... Price,
12-inch, with ground and graduated main vial with plumb .... Price,
16-inch, with ground and graduated main vial with plumb .... Price,

No. 96

Above numbers packed 1 in a box.

Cross-Test Level and Plumb No. 134

Nickel Plated

This is a well made and reliable tool, and valuable in plumbing, approximate squaring and leveling work. Just the level to use about a place or in setting up machinery. Leveling is done every way without moving the tool.

It weighs 3 ounces. Size, 2 inches by 3 inches by ½ inch thick. Can be easily carried in the pocket.

No. 134 .......................................................... Price,

Packed 1 in a box.
Starrett

Improved Levels
For Testing Shafting, Etc.
With Plain or Ground and Graduated Vials

In addition to the regular parallel vial, the bases have a cross level which enables one to place or hold the base on a shaft level in its cross section, not having assurance for the shape of the level or cross section of the chuck or spot. Hence the base of the level is not only to test the truth of shafting, but to show the true shape of the level base in a cutting position.

The base of this level has one concealed groove running through the length of its base, leaving a flat margin on each side, which prevents its base from sticking to the tool, forming an absolutely flat and true surface when not in use.

No. 97
6 inch, with plain vial. Price.
8 inch, with plain vial. Price.
12 inch, with plain vial with plumb. Price.
18 inch, with plain vial with double plumb. Price.

No. 98
6 inch, with ground and graduated main vial. Price.
8 inch, with ground and graduated main vial. Price.
12 inch, with ground and graduated main vial with plumb. Price.
18 inch, with ground and graduated main vial with double plumb. Price.

Cross-Test Level No. 136

As the cut shows, two levels in one frame, extending at right angles 2½ inches each way. The level weighs 4 ounces. When placed on a bench to be tested in both directions, it will not be necessary to move the tool. It is japanned; with nickel-plated ends.

No. 126 Price.

Packed 1 in a box.

Starrett

Engineers’ and Plumbers’ Levels
No. 133

The above represents an adjustable, incline level, a fixed level, and a plumb. The hinged tube, inside the working faces of the frame, carrying a level glass, is adjustable to the graduated plate, and shows any incline by 24 degrees (or less) to 3 inches from the foot without interfering in the least with the plumb or level. Each 32nd division on graduated plate equals $\frac{1}{4}$ inclination of an inch or foot.

A longitudinal groove in the seat of frame (not shown in cut) adapts it to rest on a cylindrical shaft or pipe as well as on flat surfaces, making it convenient to determine the pitch in laying tile pipe, drain pipe, etc.

These levels are supplied with either ground or plain glasses.

No. 133 A 10 inch, with plain vials Price.
No. 133 B 15 inch, with plain vials Price.
No. 133 C 20 inch, with ground and graduated vials Price.
No. 133 D 25 inch, with ground and graduated vials Price.

No. 133 A sent unless otherwise ordered.

No. 133 M Metric

The same as No. 133, except that the plate has metric graduation, and shows any incline by millimeters or less up to an incline of 4 to 20 centimeters.

No. 133 M A 25 cm., with plain vials Price,
No. 133 M B 30 cm., with plain vials Price,
No. 133 M C 25 cm., with ground and graduated vials Price,
No. 133 M D 30 cm., with ground and graduated vials Price.

No. 133 M A sent unless otherwise ordered.

Above numbers packed 1 in a box.

Iron Level No. 130

Bench Level

No. 130 3½ inch Price.
Starrett

Bench Levels with Double Plumbs No. 132

4-inch, with square ends..............Price, 6-inch, with square ends..............Price, 9-inch, with square ends..............Price, 12-inch, with square ends..............Price, 18-inch, concave ends..............Price, 24-inch, concave ends..............Price.

All Starrett levels contain glass vials with two or more graduated lines, insuring greater accuracy.

Our levels, Nos. 95, 97, 98, 132 and 133, have longitudinal grooves in seat of base, as shown in small cut, adapting them to rest on cylindrical work, piping, shafting, etc., and also improving them for flat work. This concave groove is a section of a 1-inch circle and is true in relation to base. The outer edges of the concave groove only touch the surface of a round piece, unless it be less than 1-inch diameter, and is an improvement over a deep V groove.

Above numbers packed 1 in a box.

Level Sight Attachments No. 131

These attachments are made to slip on and off the top side of our iron levels and are held in place by suitably knurled clamp screws. They have eight holes—one with a cross wire to line the common level for leveling a plot of ground from a fixed point at long range.

These attachments are made to fit 6, 9, 12, 18, and 24 inch No. 133 levels, as well as our No. 133 levels.

Packed 1 pair in a box.

228

Starrett

Nickel-Plated Pocket Levels No. 135

These levels are made from hexagonal stock 1/4 and 1/2 inch respectively. With the convex ends and bright nickel finish they are all that could be desired for the pocket or on small work.

No. 135 3/4-inch..................Price, No. 135 3/4-inch..................Price,

Packed 1 in a box; 6 boxes in a carton.

Hexagon Aluminum Levels No. 805

There are endless occasions where a check on the horizontal is made without regard to extreme accuracy and because the above levels are compact, light and inexpensive, they are gaining in popularity. Made from 1/4-inch hexagonal tubing. Vials filled to show yellow. Two lines to center bubble. Commonly used when installing oil burners, etc.

No. 805 4-inch length; weight, 1/2 ounce..........................Price, each,
No. 805 6-inch length; weight, 1/2 ounce..........................Price, each,

Packed 6 in a box.

Aluminum Line Level No. 108

Weight, only 1/4 ounce

Line levels are used in laying foundations, tile pipe, cement and brick walls, working ditches, determining grades, building roads, trimming hedges, etc. Can also be used as a surface level. Note the reverse position of the side which prevents its dropping off the line when in use. The lightness of this level tends to displace any in the line. Made from 1/4-inch hexagonal stock 3 inches long and weighing but 1/4 ounce it may be conveniently carried in the pocket. A luminous level line with a yellowish fluid which is penetrable in line levels is furnished in this level. This level glass has two graduated lines to check true level, also a metal guard to prevent breakage. The approximate level can be determined with this metal guard.

No. 128..........................Price,

Packed 1 in a box; 6 boxes in a carton.
Starrett

Gas Heaters No. 100
Useful in Various Mechanical Trades, Radio Work, etc.

These Double Tube Gas Heaters are made with nickel-plated burners and japanned bases, and with their attachments, are most convenient and effective heaters.

Their effectiveness lies in their scientific construction, being so made as to cause the gas and air to be thoroughly mixed for perfect combustion while passing through deflectors in base of tubes. The tubes are so formed as to cause the flames to penetrate each other at cross angles, thus producing a clean, intense heat, free from smoke and with no waste of gas.

The heater will be found very useful in the machine shop, as it is convenient for tempering small tools, melting lead, brass, etc., and as a forge for light work it will be found very valuable. Plumbers, electricians, jewelers, dentists, barbers, and others will also find it valuable for laboratory and household use it has no equal. Over it a quart of water will boil in six minutes.

Screw the burner to the base so that the tool holder E (when in use) will be horizontal. If base is not vertical, bend one of the deflectors in or out. They are made for directing the flow of gas to the ducts. Do not get them too close together.

In hardening tools, the burner should be shielded from light and draft. Avoid leakage at joints. Best results are attained with a full head of gas, which will have air injected through the mixing chamber, producing a blast.

Do not turn the blazes below a blue color, as good results cannot be obtained with a white blazed. If a white blaze appears on lighting, turn out and relight. For holding small pieces to be heated, roll up different sized tubes of tin to act as holders.

Soldering irons with short handles can be used with this heater, without fear of heating the handle.

The two and three burner heaters are made with a graduated adjusting tube on the end to supply the gas to one or more burners. For example, if gas is desired in one burner only, adjust the tube so that the figure one will coincide with the index mark on the base; for gas in two burners have the figure two coincide with the index, and so on.

No. 100A Burner only, without base ............... Price
No. 100B One Burner, with base .................... Price
No. 100C Two Burners, with base ................. Price
No. 100D Three Burners, with base ............... Price
No. 100E Tool Holder only .......................... Price
No. 100F Dish Holder ................................. Price
No. 100G Ladle only, 14 inches long, 18 ounces in weight ....... Price
No. 100H One Burner with base (E), with tool holder (F) and dish holder (F) ........ Price

No. 100H sent unless otherwise ordered.

Starrett

Hack Saw Frames
Recognized as leaders by all who use Hack Saw Frames: the same as Starrett Tools are known to every user of tools. The best grade of material is used in these frames, and the working parts are all uniform so that the blade lines up parallel with the back of the frame. Many features and improvements are embodied in STARRETT Frames to withstand the greatest strain and give the longest service.

Particular attention is called to the STARRETT "Fest Grip" and "Eazy Grip" frames. Either of these handles conforms to the shape of the hand, permitting perfect control of the frame at all times. Hand cramp is unknown where this type of handle is used. The various frames as listed, while slightly different in finish or certain refinements, are all made with the same high regard for quality and durability.

No. 150

A narrow frame holding an 8-inch blade is often in demand in many places where the conventional run of hack saw frames cannot be used, and where it is not practical to attempt any cut with the blade only.

A good frame for cutting small pipe, cutting into conduit, B-X, tubing, insulation, etc. Has ample rigidity, our usual 4-way blade adjustment and is nickel plated.

An excellent frame for use with our No. 245 Screw Slotting Blades. (See page 254.) Price.

No. 150 With one blade

Nos. 140 and 145

Depth of Frame, 5/4 inch

Spring plungers overlap the ends of the saw, automatically holding it in position. By slightly pushing them back the saw may be instantly removed, thus furnishing the most convenient way of attaching or detaching the saw ever devised. An improved nut within the handle, turning with it, gives the desired tension to the saw, which may be quickly and conveniently set at any required angle. The adjustable or extension back frames have improved spring plungers which securely hold the frames to receive saws of various lengths. The frames are neither too light nor too heavy—just right—are finely finished and nickel plated. In appearance, workmanship, and utility those tools are not approached by any other hack saw frames made. No. 145 takes 5 to 12 inch saws.

One 8-inch saw blade furnished with each frame.

No. 140 With one blade
No. 145 With one blade

Above numbers packed 1 in a box.
Starrett

Hack Saw Frames
No. 141

This solid steel frame is very rigid, the stock in some being wider than commonly used, and it cannot be cramped by straining the blade. The saws may be set to cut in any one of four directions and tightened by simply turning the handle. It is well made in every way.
Polished and nickel plated.

No. 141 8-inch, with one blade ............................... Price,
No. 141 9-inch, with one blade ............................... Price,
No. 141 10-inch, with one blade ............................. Price,
No. 141 12-inch, with one blade ............................ Price,

No. 146

This is, we believe, a better frame for the price than any other made. The stock is wider and more rigid than commonly used and cannot be cramped when saws are tightened up, and will not buckle when used. It is well made with our improved adjustable back and will take in 8, 9, 10, 11, and 12 inch saws, which may be set to cut in any one of four directions, and tightened by simply turning the handle.
Polished and nickel plated.

No. 146 With one blade ......................................... Price,

No. 143

This solid steel frame is not as highly polished as our other solid frames, No. 141.
Made with dull nickel finish.
The saws may be set to cut in any one of four directions, and tightened by simply turning the handle.

No. 143 8-inch, with one blade ............................... Price,
No. 143 9-inch, with one blade ............................... Price,
No. 143 10-inch, with one blade ............................. Price,
No. 143 12-inch, with one blade ............................ Price,

No. 144

This frame is nickel plated, dull finish. It is well made, with our improved adjustable back, and will take in 8, 9, 10, 11, and 12 inch saws, which may be set to cut in any one of four directions, and tightened by simply turning the handle.

No. 144 With one blade ......................................... Price,

One 8-inch saw blade furnished with each of the above frames.

Above numbers packed 1 in a box.
Starrett

Heavy Hack Saw Frames
No. 142

For cutting girders, steel rails, etc. With hardwood handle. Takes 12-inch saws only. Depth of frame from teeth of saw to inside edge of frame, 3/4 inches. Nickel plated.

No. 142 With one blade .......................................... Price.

Packed 1 in a box.

No. 148

For cutting girders, steel rails, etc. With hardwood handle. Takes 12-inch saws only. Depth of frame from teeth of saw to inside edge of frame, 7/8 inches. Nickel plated.

No. 148 With one blade .......................................... Price.

Packed 1 in a box.

No. 149

For cutting girders, steel rails, etc. With hardwood handle. Takes 12-inch saws only. Depth of frame from teeth of saw to inside edge of frame, 1-1/2 inches. Nickel plated.

No. 149 With one blade .......................................... Price.

Packed 1 in a box.

One 12-inch saw blade furnished with each of the above frames.

A saw for every metal cutting job

STARRETT HACK SAWS

Starrett Hack Saw Blades are made in all standard sizes for hand frames or power machines and in the following types:

TUNGSTEN ALLOY STEEL
HAND BLADES
All Hard
Flexible

POWER BLADES
All Hard

HIGH SPEED STEEL
HAND BLADES
All Hard

POWER BLADES
All Hard

5-M MOLYBDENUM
HAND BLADES
All Hard

POWER BLADES
All Hard

Standardize on STARRETT HACK SAWS

ROSE TOOLS, INC.
Suggestions

How little attention is given to the use of Hack Saw Blades as compared to other tools used in the shop. To use them correctly will greatly increase their efficiency.

Use Hand Hack Saw Blades as follows:

Keep the blade tight enough in the frame to hold it straight and taut. Too much tension is liable to break the blade at the pinholes should the saw be twisted or cramped.

Avoid starting a cut on corners unless a very fine tooth blade is used, then being sure when starting to use a light, steady stroke until the teeth cut through the corner into the thicker stock.

Short cutting strokes should be avoided, whereas a long steady downward stroke will produce a faster and cleaner cut.

When cutting sheet metal use a fine tooth blade so as to engage as many teeth as possible. The blade should be used at an angle. Coarse tooth blades would strand the work and rip the teeth out immediately. To prevent ripping at least two teeth should be cutting at the thinnest section of the material being cut. On material too thin for the finest pitch blades made, start the cut very gently and with very little pressure.

The larger the surface to be cut, the coarser the teeth. When a hand blade is used for cutting larger surfaces of soft material, 14 or 18 tooth blades will be found most suitable. Soft material being easily cut, the coarser tooth blade digs in more, removes larger chips easier from the cutting surface. Finer tooth saws on similar work would clog the teeth with chips and make the cutting more difficult.

A slower cutting stroke should be used when cutting tougher or harder material, also more pressure is required when cutting heavier stock.

Use Power Hack Saw Blades as follows:

Keep all power hack saw machines in good condition.

The selection of the proper type blade for the material to be cut is most essential. Length, width, thickness and correct number of teeth must be considered.

Much depends on the correct insertion of the blade in the machine. When operating a draw cut machine the teeth of the blade should point away from the operator while on a push-cut machine, toward the operator.

Applications for Hand Blades of Tungsten Alloy Steel

14 TEETH at approx. 60 Strokes per min.
Bronze Cast Iron
Brass Rails
Soft Steel Heavy Angles

18 TEETH at approx. 40 Strokes per min.
High Speed Steels Drill Rod

24 TEETH at approx. 60 Strokes per min.
Small Solids Light Angles

Metal Conduit Brass Tubing
Heavy EX Iron Pipe

32 TEETH at approx. 60 Strokes per min.
Light EX Thin Tubing
Steel Metal Flush Pipe

Applications for Power Blades of Tungsten Alloy Steel

Coolant Should Be Used

Light Power Sizes
14 TEETH at approx. 60 Strokes per min.
Copper Iron Pipe
Bronze Wrought Iron

18 TEETH at approx. 60 Strokes per min.
Thin Metals Light Angle Iron
Copper Tubing

Heavy Power Sizes
4 TEETH at approx. 60 Strokes per min.
Large Solid Stock Large Die Blocks

Solid Steel Machine Steel

6 TEETH at approx. 60 Strokes per min.
Soft Steel Machine Steel Solid Stock

10 TEETH at approx. 60 Strokes per min.
Bronze Iron Pipe
Brass

Tool Steel Heavy Angle Iron

14 TEETH at approx. 60 Strokes per min.
Hard Materials Steel Tubing Light Angle Iron

When using S-M Molybdenum or High Speed Steel Saws, the same pitch of teeth may be followed, but the speed can be increased.
Starrett Hack Saws

Made from steels especially selected for each particular type of blade, scientifically set teeth, for fast cutting, particular attention to the milled teeth, insuring uniform cutting. Proper heat treating furnaces for correct hardening, are some of the important features, which, with our many years of manufacturing experience, insure the user Dependable Hack Saws.

Select the saw that suits your job.

When ordering specify stock number and size required.

The illustrations below show sections of a few Starrett Hack Saws.

Note the difference in number of teeth per inch.

This is a heavy 10-tooth power blade for cutting tool steel, cast iron, rails, etc.

This is an 18-tooth hand blade, the all-round saw for general work. Most commonly used for cutting tool steel, high carbon and high speed steel.

This blade has 32 teeth and is recommended for cutting extra fine stock, thin pipe, tubing and sheet metal.

Tungsten Alloy Steel Hack Saws

Hand Blades

"Semi-Flex" recommended for cutting all kinds of soft metals.

<table>
<thead>
<tr>
<th>Size (inches)</th>
<th>14 Teeth</th>
<th>18 Teeth</th>
<th>24 Teeth</th>
<th>32 Teeth</th>
<th>Approximate Weight (per Gross)</th>
<th>Stock Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 x 1/4 x .020</td>
<td>940</td>
<td>941</td>
<td>942</td>
<td>943</td>
<td>34 lbs.</td>
<td>1020B</td>
</tr>
<tr>
<td>6 x 1/2 x .020</td>
<td>940</td>
<td>941</td>
<td>942</td>
<td>943</td>
<td>38 lbs.</td>
<td>1020C</td>
</tr>
</tbody>
</table>

14 and 18 Tooth Saws have Alternate Tooth Set. 24 and 32 Tooth Saws have Wavy Tooth Set.

When cutting pipe, electrical conduit, wire cable, EK cable, tubing and cornicles, without breaks or stripping of teeth, this blade is unequalled. Should not be used on tool steel, drill and other heavy sections.

The saw for "trouble" jobs. Guaranteed to be practically unbreakable as to blade or teeth when in use.

Packed 1/2 gross in a box.

When ordering specify stock number and size required.

Tungsten Alloy Steel Hack Saws

Hand Blades

All Hard. Preferred by skilled mechanics and bench workers where material to be cut is held rigid.

<table>
<thead>
<tr>
<th>STOCK NUMBER</th>
<th>SIZE (INCHES)</th>
<th>14 Teeth</th>
<th>18 Teeth</th>
<th>24 Teeth</th>
<th>32 Teeth</th>
<th>Approximate Weight (per Gross)</th>
<th>Last Price (per Gross)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 x 1/4 x .020</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>34 lbs.</td>
<td>103 A 13</td>
<td>3 lbs.</td>
</tr>
<tr>
<td>10 x 1/4 x .020</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>38 lbs.</td>
<td>103 A 14</td>
<td>4 lbs.</td>
</tr>
<tr>
<td>12 x 1/4 x .020</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>38 lbs.</td>
<td>103 A 24</td>
<td>5 lbs.</td>
</tr>
</tbody>
</table>

The above numbers are all furnished with Alternate Tooth Set.

Hand Blades

Flexible Back

Flexible Back, with hardened teeth only, to eliminate breakage. Preferred by electricians, plumbers, automotive repairmen and for maintenance work in cramped or out-of-the-way places.

<table>
<thead>
<tr>
<th>STOCK NUMBER</th>
<th>SIZE (INCHES)</th>
<th>14 Teeth</th>
<th>18 Teeth</th>
<th>24 Teeth</th>
<th>32 Teeth</th>
<th>Approximate Weight (per Gross)</th>
<th>Last Price (per Gross)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 x 1/4 x .020</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>3 lbs.</td>
<td>250 A 13</td>
<td>3 lbs.</td>
</tr>
<tr>
<td>10 x 1/4 x .020</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>4 lbs.</td>
<td>250 A 14</td>
<td>4 lbs.</td>
</tr>
<tr>
<td>12 x 1/4 x .020</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>4 lbs.</td>
<td>250 A 24</td>
<td>5 lbs.</td>
</tr>
</tbody>
</table>

Flexible Blades all have Alternate Tooth Set except No. 252—10 and 12 inch—which may be had with Wavy Set. Alternate Set shipped unless otherwise specified.

For best results we suggest:

14-Tooth Saws—For cutting soft steel, solid brass, bronze, cast iron, mild and aluminum, etc.

18-Tooth Saws—For cutting tool steel, high carbon and high speed steel, light structural shapes, etc. For general use.

24-Tooth Saws—For cutting iron pipe, brass, medium tubing, copper, drill rod, etc.

32-Tooth Saws—For cutting thin tubing, thin sheet metals, special BZ and electrical conduit, etc.

* No. 103 B, 103 A 13, 250 D and 250 A 14 All 14-Tooth Saws—specially recommended for cutting soft steel.

** + No. 252 Flexible Back The proper saw for the"trouble" jobs.

All Hand Frame Blades measure from center to center of holes. 14, 17 and 18 inch Power Blades measure 13 1/2, 16 1/2 and 17 1/2 inches respectively between centers of holes. All other Power Blades measure from center to center of holes.

When ordering specify stock number and size required.
Tungsten Alloy Steel Hack Saws

Power Blades

All Power Saws have the Clearance or Raker Tooth Set

Starrett

For Light Power Machines

Size Inches

Stock Number

Approximate Weight per Gross

Last Price per Gross

12 x 1/2 .060

112 A

3 lbs.

112 B

3 lbs.

114

3 lbs.

115 B

3 lbs.

Packed $ gross in a box.

14-Tooth Saws—For cutting tool steel, wrought iron, cast iron, brass, steel and rails.

15-Tooth Saws—For cutting iron pipe, heavy tubing, thin wall stock, brass castings, etc.

For Medium Power Machines

Size Inches

Stock Number

Approximate Weight per Gross

Last Price per Gross

12 x 1/2 .060

228 A

2 lbs.

229 B

2 lbs.

235

2 lbs.

Packed $ gross in a box.

10-Tooth Saws—For cutting cold rolled and machinery steel, shafting, etc.

14-Tooth Saws—For cutting tool steel, high speed steel, etc.

For Heavy Power Machines

Size Inches

Stock Number

Approximate Weight per Gross

Last Price per Gross

12 x 1/2 .060

248 A

2 lbs.

254 A

2 lbs.

254 B

2 lbs.

Packed $ gross in a box.

10-Tooth Saws—For cutting cold rolled and machinery steel, shafting, etc.

14-Tooth Saws—For cutting tool steel, high speed steel, etc.

For Extra Heavy Power Machines

Size Inches

Stock Number

Approximate Weight per Gross

Last Price per Gross

14 x 1/2 .060

598 C

1 lb.

598 D

1 lb.

598 E

1 lb.

Packed $ gross in a box.

10-Tooth Saws—For cutting tool steel, cast iron, rails, etc. When ordering specify stock number and size required.

"S-M" Molybdenum Hack Saws

The letters "S-M" identify Starrett Molybdenum Hack Saws. They distinguish Starrett "S-M" Saws from our Tungsten and High Speed Steel Blades. We use these letters to simplify ordering.

Starrett "S-M" Molybdenum Hack Saws are the result of long and careful experimental work. You will find that, like every other Starrett Hack Saw Blade, they are outstanding in their class.

Starrett "S-M" Hack Saws combine the newest developments in heat treating with the hard, long-wearing qualities of Molybdenum. No matter what you cut—mild steel, mason metal or stainless steel, high speed tool steel, cast iron, heavy angle iron, thick wall pipe, cast iron, heavy structural shapes, etc.—you can do the job better and faster and at the same time save real money.

Check these facts in your shop on your own metal cutting problems. A short test will quickly demonstrate the extra efficiency and economy of Starrett "S-M" Molybdenum Hack Saws.

Hand Blades

Supplied in Alternate Tooth Set only

Size Inches

14 Teeth

10 Teeth

24 Teeth

30 Teeth

Weight per Gross

Last Price per Gross

Regular

12 x 1/4 .060

250"S-M"

250"S-M"

250"S-M"

250"S-M"

Heavy

12 x 1/4 .060

250"S-M"

250"S-M"

250"S-M"

250"S-M"

Extra Heavy

12 x 1/4 .060

250"S-M"

250"S-M"

250"S-M"

250"S-M"

14-Tooth Saws—For cutting soft steel, brass, cast iron, heavy angles and rails.

16-Tooth Saws—For cutting drill rod, light angles, light speed steel, small solids.

24-Tooth Saws—For cutting brass tubing, heavy BX Cable, iron pipe, metal conduit.

32-Tooth Saws—For cutting thin tubing, sheet metal, light BX cable, brass pipe, channels.

Packed $ gross in a box.

Power Blades

Recommended for cutting at approximately 100 strokes per minute with a moderate feed.

For extra heavy "S-M" Molybdenum Saws

16 x 1/4 .060

250"S-M"

250"S-M"

250"S-M"

250"S-M"

250"S-M"

Packed 1 dozen in a box.

Specify "S-M" Saws (as shown in listing) when ordering.

When ordering specify stock number and size required.
High Speed Steel Hack Saws

For cutting on a production scale, or for hand-to-cut metals like high alloy steel, stainless steel, phosphor bronze, tool steel, rails, etc., the slightly higher investment in Starrett High Speed Blades will be amply repaid. They are often more convenient for the ordinary run of work because High Speed Blades of one pitch of teeth will cut a wider range of metals.

Starrett High Speed Blades are made from selected High Speed Steel, carefully heat treated and finished to Starrett standards. In most cases they will cut twice as fast and make many times as many clean cuts as regular Tungsten Blades. Use them in hand frames or power machines for greater economy, efficiency, and production.

All Hand Frame Blades measure from center to center of holes. 14, 17 and 18 inch Power Blades measure 13 1/2, 16 1/2 and 17 1/2 inches respectively between centers of holes. All other Power Blades measure from center to center of holes.

Hand Blades

<table>
<thead>
<tr>
<th>Size</th>
<th>14 Teeth per Inch</th>
<th>16 Teeth per Inch</th>
<th>24 Teeth per Inch</th>
<th>32 Teeth per Inch</th>
<th>Approximate Weight per Dozen</th>
<th>List Price per Dozen</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 x 1 x .049</td>
<td>650</td>
<td>650</td>
<td>652</td>
<td>652</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>12 x 1 x .060</td>
<td>650</td>
<td>650</td>
<td>652</td>
<td>652</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>16 x 1 x .049</td>
<td>650</td>
<td>650</td>
<td>652</td>
<td>652</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>16 x 1 x .060</td>
<td>650</td>
<td>650</td>
<td>652</td>
<td>652</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>16 x 1 x .063</td>
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<td>650</td>
<td>652</td>
<td>652</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>16 x 1 x .070</td>
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<td>640 lbs.</td>
<td>94.00</td>
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<tr>
<td>16 x 1 x .080</td>
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<td>652</td>
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<td>640 lbs.</td>
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<tr>
<td>18 x 1 x .090</td>
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<td>652</td>
<td>640 lbs.</td>
<td>94.00</td>
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</table>

Packed 1 dozen in a box.

14 and 18 Tooth Saws have Alternate Tooth Set only.

14, 16, 17, 24 and 32 Tooth Saws have Alternate and Wavy Tooth Set (specify).

Power Machine Blades

<table>
<thead>
<tr>
<th>Size</th>
<th>4 Teeth per Inch</th>
<th>10 Teeth per Inch</th>
<th>14 Teeth per Inch</th>
<th>Approximate Weight</th>
<th>LIST PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 x 1 x .049</td>
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<td>650</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>12 x 1 x .060</td>
<td>650</td>
<td>650</td>
<td>650</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>12 x 1 x .070</td>
<td>650</td>
<td>650</td>
<td>650</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>16 x 1 x .060</td>
<td>650</td>
<td>650</td>
<td>650</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>16 x 1 x .064</td>
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<td>650</td>
<td>650</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>16 x 1 x .070</td>
<td>650</td>
<td>650</td>
<td>650</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>16 x 1 x .080</td>
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<td>650</td>
<td>650</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>18 x 1 x .090</td>
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<td>650</td>
<td>650</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
<tr>
<td>24 x 1 x .125</td>
<td>650</td>
<td>650</td>
<td>650</td>
<td>640 lbs.</td>
<td>94.00</td>
</tr>
</tbody>
</table>

Packed 1 dozen in a box.

4 Tooth Saws—For cutting heavy solid bar of soft stock in extra heavy feed power machines.
6 Tooth Saws—For cutting machining steel, bronze, brass and large sections of other metals in a high speed positive feed machine.
10 Tooth Saws—For cutting tool steel, high speed steel, cast iron, thin wall pipe, milled metal, heavy structural shapes and other metals in a medium speed gravity feed machine.
14 Tooth Saws—For cutting high speed steel, pipe, structural shapes, tool steel, etc. When ordering specify stock number and size required.
Starrett

Starrett Hack Saws
For Any Metal Cutting Job

Screw Slotting Saw Blades
No. 249

These blades are made for cutting slots in screw heads and can be used in any adjustable or 8-inch hack saw frame. They are hardened throughout, and taper in thickness from the teeth to the back, thus providing good clearance, which prevents binding and allows the blades to cut easily and quickly.

All blades are 8 inches long by 1/4 inch wide. They are made in four different thicknesses, covering a wide range of work, and will be found invaluable in any machine shop or garage.

Packaged three dozen of one thickness in a box, also in sets of four, consisting of one blade of each thickness, twelve sets to a carton.

Purchased with either 14 or 24 teeth to the inch. Specify which is wanted when ordering.

14 teeth sent unless otherwise ordered, 24 teeth commonly used for pistons.

Approximate Thickness at Teeth

| No. 249 A | .049 inch |
| No. 249 B | .065 inch |
| No. 249 C | .083 inch |
| No. 249 D | .109 inch |

| Set of four blades, one of each thickness, per set... | ... | .048 inch |

Dimensions of Sizes in Decimal Parts of an Inch

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<tr>
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<td>0.050</td>
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</table>

Different Standards for Wire Gages in use in the United States

Roses Tools, Inc.
## Starrett

### Table of Decimal Equivalents

of

8ths, 16ths, 32nds, and 64ths of an Inch

<table>
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<th>8ths</th>
<th>32nds</th>
<th>64ths</th>
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</tr>
<tr>
<td>( \frac{1}{32} ) = .04875</td>
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### Decimal Equivalent of the Numbers

of Twist Drill and Steel

Wire Gage

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<th>No.</th>
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# Table of Decimal Equivalents

## Starrett

### Millimeters and Fractions of Millimeters

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<th>mm. inches</th>
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<td>11.50 = .00834</td>
<td>19 = .094808</td>
</tr>
<tr>
<td>19/100 = .01497</td>
<td>10.50 = .00816</td>
<td>20 = .010016</td>
</tr>
<tr>
<td>20/100 = .01576</td>
<td>10 = .00798</td>
<td>21 = .010684</td>
</tr>
<tr>
<td>21/100 = .01655</td>
<td>9 = .00781</td>
<td>22 = .011352</td>
</tr>
<tr>
<td>22/100 = .01734</td>
<td>8 = .00763</td>
<td>23 = .012019</td>
</tr>
<tr>
<td>23/100 = .01813</td>
<td>7 = .00745</td>
<td>24 = .012687</td>
</tr>
<tr>
<td>24/100 = .01892</td>
<td>6 = .00727</td>
<td>25 = .013354</td>
</tr>
<tr>
<td>25/100 = .01971</td>
<td>5 = .0071</td>
<td>26 = .014021</td>
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</tbody>
</table>

10 mm. = 1 centimeter = 0.3937 inch
10 cm. = 1 decimeter = 0.3937 inches
10 dm. = 1 meter = 39.37 inches
25.4 mm. = 1 English inch

---

# Starrett

## Allowances for Fits

(Naval Engineering Co.)

From Machinery's Handbook (Fifth Edition).

### Allowances in Standard Holes

<table>
<thead>
<tr>
<th>Class</th>
<th>Nominal Diameter</th>
<th>Up to 1/4 Inch</th>
<th>1/4-1/2 Inch</th>
<th>1/2-3/4 Inch</th>
<th>3/4-1 Inch</th>
<th>1-1 1/4 Inch</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>High Limit</td>
<td>+0.0010</td>
<td>+0.0005</td>
<td>+0.0002</td>
<td>+0.0001</td>
<td>+0.0000</td>
</tr>
<tr>
<td></td>
<td>Low Limit</td>
<td>-0.0010</td>
<td>-0.0005</td>
<td>-0.0002</td>
<td>-0.0001</td>
<td>-0.0000</td>
</tr>
<tr>
<td></td>
<td>Tolerance</td>
<td>0.0005</td>
<td>0.0005</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0000</td>
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### Allowances for Forged Holes

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<th>Up to 1/4 Inch</th>
<th>1/4-1/2 Inch</th>
<th>1/2-3/4 Inch</th>
<th>3/4-1 Inch</th>
<th>1-1 1/4 Inch</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>High Limit</td>
<td>+0.0010</td>
<td>+0.0005</td>
<td>+0.0002</td>
<td>+0.0001</td>
<td>+0.0000</td>
</tr>
<tr>
<td></td>
<td>Low Limit</td>
<td>-0.0010</td>
<td>-0.0005</td>
<td>-0.0002</td>
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<td>-0.0000</td>
</tr>
<tr>
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<td>Tolerance</td>
<td>0.0005</td>
<td>0.0005</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0000</td>
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### Allowances for Driving Fits

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<th>Nominal Diameter</th>
<th>Up to 1/4 Inch</th>
<th>1/4-1/2 Inch</th>
<th>1/2-3/4 Inch</th>
<th>3/4-1 Inch</th>
<th>1-1 1/4 Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>High Limit</td>
<td>+0.0010</td>
<td>+0.0005</td>
<td>+0.0002</td>
<td>+0.0001</td>
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<tr>
<td></td>
<td>Low Limit</td>
<td>-0.0010</td>
<td>-0.0005</td>
<td>-0.0002</td>
<td>-0.0001</td>
<td>-0.0000</td>
</tr>
<tr>
<td></td>
<td>Tolerance</td>
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<td>0.0005</td>
<td>0.0001</td>
<td>0.0001</td>
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### Allowances for Punch Fits

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<thead>
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<th>Up to 1/4 Inch</th>
<th>1/4-1/2 Inch</th>
<th>1/2-3/4 Inch</th>
<th>3/4-1 Inch</th>
<th>1-1 1/4 Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>High Limit</td>
<td>+0.0010</td>
<td>+0.0005</td>
<td>+0.0002</td>
<td>+0.0001</td>
<td>+0.0000</td>
</tr>
<tr>
<td></td>
<td>Low Limit</td>
<td>-0.0010</td>
<td>-0.0005</td>
<td>-0.0002</td>
<td>-0.0001</td>
<td>-0.0000</td>
</tr>
<tr>
<td></td>
<td>Tolerance</td>
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<td>0.0005</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0000</td>
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### Formulas for Determining Allowances

<table>
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<th>High Limit</th>
<th>Low Limit</th>
<th>Class</th>
<th>High Limit</th>
<th>Low Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>+D×0.0008</td>
<td>+D×0.0003</td>
<td>X</td>
<td>+D×0.00125</td>
<td>+D×0.0025</td>
</tr>
<tr>
<td>B</td>
<td>+D×0.0009</td>
<td>+D×0.0004</td>
<td>Y</td>
<td>+D×0.001</td>
<td>+D×0.002</td>
</tr>
<tr>
<td>C</td>
<td>-D×0.0009</td>
<td>-D×0.0005</td>
<td>Z</td>
<td>-D×0.0005</td>
<td>-D×0.001</td>
</tr>
</tbody>
</table>

---

* Tolerances provided for holes, which ordinary standard steels can produce, in two grades, Class A and B, the selection of which is a matter for the user's decision and depends upon the quality of the work required; some firms prefer Class A as working limits and Class B as inspection limits.

** Running fits, which are the most commonly required, are divided into three grades: Class X, for engine and other work where close fits are wanted; Class Y, for high speed and average machine work; Class Z, for fine tool work.
# Starrett

## Tapers and Angles

<table>
<thead>
<tr>
<th>Taper per Foot</th>
<th>Included Angle (°)</th>
<th>With Center Line (°)</th>
<th>Taper per Inch</th>
<th>Taper per Inch from Center Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4</td>
<td>0</td>
<td>17</td>
<td>0.010416</td>
<td>0.008203</td>
</tr>
<tr>
<td>1/8</td>
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<td>35</td>
<td>0.015625</td>
<td>0.007812</td>
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<tr>
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<td>1</td>
<td>35</td>
<td>0.020833</td>
<td>0.010416</td>
</tr>
<tr>
<td>1/32</td>
<td>1</td>
<td>44</td>
<td>0.025042</td>
<td>0.013021</td>
</tr>
<tr>
<td>1/64</td>
<td>1</td>
<td>53</td>
<td>0.030250</td>
<td>0.018625</td>
</tr>
<tr>
<td>1/128</td>
<td>2</td>
<td>62</td>
<td>0.035458</td>
<td>0.024229</td>
</tr>
<tr>
<td>1/256</td>
<td>2</td>
<td>71</td>
<td>0.040667</td>
<td>0.030833</td>
</tr>
<tr>
<td>1/512</td>
<td>2</td>
<td>80</td>
<td>0.045875</td>
<td>0.036438</td>
</tr>
<tr>
<td>1/1024</td>
<td>2</td>
<td>89</td>
<td>0.051083</td>
<td>0.042042</td>
</tr>
<tr>
<td>1/2048</td>
<td>3</td>
<td>108</td>
<td>0.056290</td>
<td>0.047649</td>
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<tr>
<td>1/4096</td>
<td>3</td>
<td>117</td>
<td>0.061497</td>
<td>0.053258</td>
</tr>
<tr>
<td>1/8192</td>
<td>3</td>
<td>126</td>
<td>0.066705</td>
<td>0.058868</td>
</tr>
<tr>
<td>1/16384</td>
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<td>135</td>
<td>0.071913</td>
<td>0.064479</td>
</tr>
<tr>
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<td>3</td>
<td>144</td>
<td>0.077120</td>
<td>0.070090</td>
</tr>
<tr>
<td>1/65536</td>
<td>4</td>
<td>153</td>
<td>0.082328</td>
<td>0.075701</td>
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<td>0.087536</td>
<td>0.081312</td>
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<td>0.086923</td>
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<td>0.114978</td>
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<td>0.126200</td>
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<td>0.131811</td>
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<td>252</td>
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<td>0.137422</td>
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<tr>
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<td>0.143033</td>
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<td>279</td>
<td>0.154340</td>
<td>0.154255</td>
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</tbody>
</table>

## American National Coarse and Fine Thread Dimensions and Tap Drill Sizes

\[
P = \text{pitch} \quad \text{No. threads per in.}
\]
\[
d = \text{depth} = p \times 0.84519
\]
\[
f = \text{flat} = \frac{p}{2}
\]

<table>
<thead>
<tr>
<th>Size</th>
<th>Threads per Inch</th>
<th>Outside Diameter Inches</th>
<th>Pitch Diameter Inches</th>
<th>Root Diameter Inches</th>
<th>Tap Drill Diameter, 1/16</th>
<th>Decimal Equivalent of Tap Drill</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
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<tr>
<td>2</td>
<td>2</td>
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<td>3</td>
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<td>0.0000</td>
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</tr>
<tr>
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<td>4</td>
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</tbody>
</table>

(Continued on page 262)
### American National Coarse and Fine Thread Dimensions and Tap Drill Sizes

(Continued from page 261)

<table>
<thead>
<tr>
<th>Size</th>
<th>Threads per Inch</th>
<th>Outside Diameter Inches</th>
<th>Pitch Diameter Inches</th>
<th>Root Diameter Inches</th>
<th>Tap Drill Approx. 1/16&quot; Full Thread</th>
<th>Decimal Equivalent of Tap Drill</th>
</tr>
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<tbody>
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<td>.5968</td>
<td>.6110</td>
<td>.5789</td>
<td>.1384</td>
</tr>
<tr>
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<td>12</td>
<td>.6110</td>
<td>.6734</td>
<td>.6886</td>
<td>.6578</td>
<td>.1484</td>
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<td>1/8</td>
<td>11</td>
<td>.6886</td>
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<td>.7388</td>
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<td>.1025</td>
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<td>.2384</td>
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<tr>
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<td>1.4365</td>
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<td>.2484</td>
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<td>1.5000</td>
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<td>.2584</td>
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<td>.2684</td>
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<td>1.6610</td>
<td>.1549</td>
<td>.2784</td>
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</table>

### Starrett Letter Sizes of Drills

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<th>Designation of 1 inch</th>
<th>Diameter Inches</th>
<th>Designation of 1 inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1/4</td>
<td>N</td>
<td>1/4</td>
</tr>
<tr>
<td>B</td>
<td>5/32</td>
<td>O</td>
<td>5/32</td>
</tr>
<tr>
<td>C</td>
<td>3/32</td>
<td>P</td>
<td>3/32</td>
</tr>
<tr>
<td>D</td>
<td>7/32</td>
<td>Q</td>
<td>7/32</td>
</tr>
<tr>
<td>E</td>
<td>1/2</td>
<td>R</td>
<td>1/2</td>
</tr>
<tr>
<td>F</td>
<td>5/8</td>
<td>S</td>
<td>5/8</td>
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<td>T</td>
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</tr>
<tr>
<td>H</td>
<td>7/8</td>
<td>U</td>
<td>7/8</td>
</tr>
<tr>
<td>I</td>
<td>1</td>
<td>V</td>
<td>1</td>
</tr>
<tr>
<td>J</td>
<td>13/16</td>
<td>W</td>
<td>13/16</td>
</tr>
<tr>
<td>K</td>
<td>15/16</td>
<td>X</td>
<td>15/16</td>
</tr>
<tr>
<td>L</td>
<td>5/8</td>
<td>Y</td>
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</tr>
<tr>
<td>M</td>
<td>7/8</td>
<td>Z</td>
<td>7/8</td>
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### High Temperatures Judged by Color, and Colors for Tempering

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<tr>
<th>Degree Categories</th>
<th>Degree Fahrenheit</th>
<th>High Temperatures Judged by Color</th>
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</thead>
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<td>400</td>
<td>400</td>
<td>Red heat, visible in the dark</td>
</tr>
<tr>
<td>474</td>
<td>440</td>
<td>Red heat, visible in the twilight</td>
</tr>
<tr>
<td>528</td>
<td>480</td>
<td>Red heat, visible in the daylight</td>
</tr>
<tr>
<td>581</td>
<td>520</td>
<td>Red heat, visible in the sunlight</td>
</tr>
<tr>
<td>600</td>
<td>560</td>
<td>Dark red</td>
</tr>
<tr>
<td>638</td>
<td>600</td>
<td>Dark yellow</td>
</tr>
<tr>
<td>695</td>
<td>650</td>
<td>Cherry-red</td>
</tr>
<tr>
<td>745</td>
<td>700</td>
<td>Yellow-cherry-red</td>
</tr>
<tr>
<td>780</td>
<td>750</td>
<td>White-welding heat</td>
</tr>
<tr>
<td>820</td>
<td>800</td>
<td>Brilliant white</td>
</tr>
<tr>
<td>865</td>
<td>850</td>
<td>Damming white (blue-white)</td>
</tr>
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</table>

### American National Pipe Thread

Briggs Standard

<table>
<thead>
<tr>
<th>Pipe Size Inches</th>
<th>Threads per Inch</th>
<th>Root Diameter Small End of Pipe and Gage</th>
<th>Tap Drill</th>
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<td>18</td>
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<td>.339</td>
</tr>
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<td>1/4</td>
<td>18</td>
<td>.4258</td>
<td>.445</td>
</tr>
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<td>16</td>
<td>.5376</td>
<td>.558</td>
</tr>
<tr>
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<td>16</td>
<td>.6400</td>
<td>.661</td>
</tr>
<tr>
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<td>14</td>
<td>.7428</td>
<td>.763</td>
</tr>
<tr>
<td>1/8</td>
<td>14</td>
<td>.8456</td>
<td>.866</td>
</tr>
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<td>12</td>
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<td>.970</td>
</tr>
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<td>12</td>
<td>1.0519</td>
<td>1.073</td>
</tr>
<tr>
<td>7/32</td>
<td>10</td>
<td>1.1550</td>
<td>1.177</td>
</tr>
<tr>
<td>1/4</td>
<td>9</td>
<td>1.2589</td>
<td>1.280</td>
</tr>
<tr>
<td>5/32</td>
<td>8</td>
<td>1.3625</td>
<td>1.384</td>
</tr>
<tr>
<td>3/32</td>
<td>8</td>
<td>1.4661</td>
<td>1.487</td>
</tr>
<tr>
<td>7/32</td>
<td>6</td>
<td>1.5696</td>
<td>1.590</td>
</tr>
<tr>
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<td>6</td>
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<td>1.694</td>
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### Lubricants for Cutting Tools

<table>
<thead>
<tr>
<th>Material</th>
<th>Turning</th>
<th>Chucking</th>
<th>Drilling</th>
<th>Machining</th>
<th>Tapping</th>
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<tbody>
<tr>
<td>Tool Steel</td>
<td>Day or Oil</td>
<td>Oil or Sod Water</td>
<td>Oil</td>
<td>Land Oil</td>
<td>Oil</td>
</tr>
<tr>
<td>Sintered Iron</td>
<td>Day or Oil</td>
<td>Sod Water</td>
<td>Oil or Sod Water</td>
<td>Land Oil</td>
<td>Oil</td>
</tr>
<tr>
<td>Cast Iron</td>
<td>Day or Oil</td>
<td>Oil</td>
<td>Dry</td>
<td>Dry</td>
<td>Dry</td>
</tr>
<tr>
<td>Brass</td>
<td>Day or Oil</td>
<td>Oil</td>
<td>Dry</td>
<td>Dry</td>
<td>Dry</td>
</tr>
<tr>
<td>Copper</td>
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<td>Oil</td>
<td>Dry</td>
<td>Dry</td>
<td>Dry</td>
</tr>
<tr>
<td>Aluminum</td>
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<td>Oil</td>
<td>Dry</td>
<td>Dry</td>
<td>Dry</td>
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<tr>
<td>Glass</td>
<td>Day or Oil</td>
<td>Oil</td>
<td>Dry</td>
<td>Dry</td>
<td>Dry</td>
</tr>
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</table>

**Note:** The table above summarizes the general guidelines for lubricants used in various industrial applications. The specific lubricant to use may vary depending on the specific material and application. Always consult the manufacturer's recommendations for the most accurate guidance.
### Starrett

#### The Speed of Drills

A feed per revolution of .004 to .007 for drills 1/4 inch and smaller, and from .007 to .015 for larger is about all that should be required.

This feed is based on a peripheral speed of a drill equal to:
- 50 feet per minute for steel
- 35 feet per minute for iron
- 50 feet per minute for bronze

It may also be found advisable to vary the speed somewhat as the material to be drilled is more or less refractory.

We believe that these speeds should not be exceeded under ordinary circumstances.

#### Table of Cutting Speeds

<table>
<thead>
<tr>
<th>Diameter, Inches</th>
<th>Feet per Minute</th>
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<tbody>
<tr>
<td>1/16</td>
<td>317</td>
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<tr>
<td>1/32</td>
<td>512</td>
</tr>
<tr>
<td>1/64</td>
<td>812</td>
</tr>
<tr>
<td>1/80</td>
<td>1216</td>
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</table>

#### Revolutions per Minute

<table>
<thead>
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<th>Diameter, Inches</th>
<th>Revolutions per Minute</th>
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</thead>
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<tr>
<td>1/16</td>
<td>573.7</td>
</tr>
<tr>
<td>1/32</td>
<td>913.0</td>
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<td>1/64</td>
<td>1478.0</td>
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<td>1/80</td>
<td>2430.0</td>
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#### Starrett

#### Double Depth of Threads

<table>
<thead>
<tr>
<th>Threads per Inch</th>
<th>V DD</th>
<th>D D</th>
<th>A. M. Nat. Form D D</th>
<th>Whitworth Standard DD</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>.66699</td>
<td>.66699</td>
<td>.64000</td>
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<tr>
<td>2 1/4</td>
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<td>.77333</td>
<td>.67808</td>
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<tr>
<td>2 1/2</td>
<td>.72950</td>
<td>.72464</td>
<td>.73894</td>
<td>32</td>
</tr>
<tr>
<td>3</td>
<td>.63320</td>
<td>.63320</td>
<td>.71520</td>
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<td>4</td>
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<td>.54945</td>
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<td>.52726</td>
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<td>.51950</td>
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<td>.47733</td>
<td>.48300</td>
<td>.53566</td>
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<td>10</td>
<td>.45303</td>
<td>.45866</td>
<td>.58384</td>
<td>44</td>
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<tr>
<td>12</td>
<td>.43094</td>
<td>.43714</td>
<td>.63771</td>
<td>46</td>
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<td>16</td>
<td>.39394</td>
<td>.39476</td>
<td>.73005</td>
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</table>

<table>
<thead>
<tr>
<th>Threads per Inch</th>
<th>V DD</th>
<th>D D</th>
<th>A. M. Nat. Form D D</th>
<th>Whitworth Standard DD</th>
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</thead>
<tbody>
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<td>2 1/4</td>
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<td>16</td>
<td>.39394</td>
<td>.39476</td>
<td>.73005</td>
<td>48</td>
</tr>
</tbody>
</table>

**For V Thread**

**For American Nat. Form, U. S. Std.**

**For Whitworth Standard**

---

**DD = 1.733**

**DD = 1.289**

**DD = 1.368**

**For V Thread**

**For American Nat. Form, U. S. Std.**

**For Whitworth Standard**
Starrett

Rules Relative to the Circle, etc.

To Find Circumference—
Multiply diameter by 3.1416
Or divide diameter by 0.3183

To Find Diameter—
Multiply circumference by 0.3183
Or divide circumference by 3.1416

To Find Radius—
Multiply circumference by 0.15915
Or divide circumference by 6.28318

To Find Side of an Inscribed Square—
Multiply diameter by 0.7071
Or multiply circumference by 0.2236
Or divide circumference by 4.4428

To Find Side of an Equal Square—
Multiply diameter by 0.8862
Or multiply circumference by 0.2821
Or divide circumference by 3.545

Square—
A side multiplied by 1.4142 equals diameter of its circumscribing circle.
A side multiplied by 4.442 equals circumference of its circumscribing circle.
A side multiplied by 1.128 equals diameter of an equal circle.
A side multiplied by 3.545 equals circumference of an equal circle.
Square inches multiplied by 1.273 equals circle inches of an equal circle.

To Find the Area of a Circle—
Multiply circumference by one-quarter of the diameter.
Or multiply the square of the diameter by 0.7854
Or multiply the square of the circumference by 0.07958
Or multiply the square of the radius by 3.1416

To Find the Surface of a Sphere or Globe—
Multiply the diameter by the circumference.
Or multiply the square of the diameter by 3.1416
Or multiply four times the square of radius by 3.1416

To Find the Weight of Brass and Copper Sheets, Rods and Bars—
Ascertain the number of cubic inches in piece and multiply same by weight per cubic inch.
Brass, 0.2372
Copper, 0.3212
Or multiply the length by the breadth (in feet) and product by weight in pounds per square foot.

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Starrett

Metric Conversion Table

<table>
<thead>
<tr>
<th>Metric</th>
<th>Conversion to</th>
<th>Conversion from</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millimeters</td>
<td>0.03937</td>
<td>Inches</td>
</tr>
<tr>
<td>Millimeters</td>
<td>= 25.400</td>
<td>Inches</td>
</tr>
<tr>
<td>Meters</td>
<td>= 3.2809</td>
<td>Feet</td>
</tr>
<tr>
<td>Meters</td>
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<td>Feet</td>
</tr>
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<td>Kilometers</td>
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<td>Miles</td>
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<tr>
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</tr>
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<tr>
<td>Square centimeters</td>
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<td>Square inches</td>
</tr>
<tr>
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</tr>
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<tr>
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</tr>
<tr>
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</table>

By courtesy of the American Machinist, New York.
### Tables of Decimal Equivalents

<table>
<thead>
<tr>
<th>Of 7ths, 16ths, and 32nds of an Inch</th>
<th>Of 32nds, 64ths, and 128ths of an Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal</td>
<td>7th</td>
</tr>
<tr>
<td>---------</td>
<td>-----</td>
</tr>
<tr>
<td>1</td>
<td>0.039714</td>
</tr>
<tr>
<td>2</td>
<td>0.079514</td>
</tr>
<tr>
<td>3</td>
<td>0.119309</td>
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<tr>
<td>4</td>
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<td>6</td>
<td>0.238705</td>
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<tr>
<td>7</td>
<td>0.278510</td>
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### Tables for Computing Weight of Cast Steel

<table>
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<th>Size in Inches</th>
<th>Round</th>
<th>Octagon</th>
<th>Square</th>
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<tr>
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<td>0.010</td>
<td>0.011</td>
<td>0.013</td>
</tr>
<tr>
<td>1/4</td>
<td>0.041</td>
<td>0.044</td>
<td>0.053</td>
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<tr>
<td>3/16</td>
<td>0.067</td>
<td>0.070</td>
<td>0.085</td>
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<tr>
<td>1/8</td>
<td>0.094</td>
<td>0.099</td>
<td>0.120</td>
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<tr>
<td>5/32</td>
<td>0.145</td>
<td>0.157</td>
<td>0.191</td>
</tr>
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<td>0.262</td>
<td>0.272</td>
<td>0.334</td>
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<td>0.378</td>
<td>0.388</td>
<td>0.481</td>
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<tr>
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<td>0.514</td>
<td>0.542</td>
<td>0.665</td>
</tr>
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<td>0.621</td>
<td>0.656</td>
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<td>0.850</td>
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<td>1.270</td>
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<td>1.870</td>
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<td>2.056</td>
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<td>2.361</td>
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<td>2.686</td>
<td>2.832</td>
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<td>3.339</td>
<td>3.555</td>
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<td>4.197</td>
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<td>5.675</td>
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<td>6.044</td>
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<td>7.093</td>
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### Miscellaneous Measurements

#### Measures of Length

- 1 mile = 1760 yards = 5280 feet.
- 1 yard = 3 feet = 36 inches.
- 1 foot = 12 inches.

The following measures of length are also used occasionally:
- 1 mil = 0.001 inch
- 1 fathom = 2 yards = 6 feet
- 1 rod = 5.5 yards = 16.5 feet
- 1 hand = 4 inches
- 1 span = 9 inches

#### Surveyor's Measure

- 1 mile = 8 furlongs = 80 chains.
- 1 furlong = 10 chains = 220 yards.
- 1 chain = 4 rods = 22 yards = 66 feet = 100 links.
- 1 link = 7.92 inches.

#### Nautical Measure

- 1 league = 3 nautical miles.
- 1 nautical mile (knot) = 6080.26 feet = 1.1516 statute miles.
- 1 knot = 1 nautical mile.

One degree at the equator = 60 nautical miles = 69.156 statute miles.

360 degrees = 21,600 nautical miles = 24,874.5 statute miles = circumference of earth at the equator.

#### Square Measure

- 1 square mile = 640 acres = 6400 square chains.
- 1 acre = 10 square chains = 4840 square yards = 43,560 square feet.
- 1 square chain = 16 square rods = 484 square yards = 4356 square feet.
- 1 square rod = 30.25 square yards = 272.25 square feet = 625 square links.
- 1 square yard = 9 square feet.
- 1 square foot = 144 square inches.

An acre is equal to a square, the side of which is 206.27 feet.
## Tap Drill Sizes

**75% Depth of Thread**

A bolt inserted in an ordinary nut, which has only one-half of a full depth of thread, will break before stripping the thread. Also a full depth of thread, while very difficult to obtain, is only about 5% stronger than a 75% depth.

These tables give the exact size of the hole, expressed in decimals, that will produce a 75% depth of thread, and also the nearest regular stock drill to this size. Holes produced by these drills are considered close enough for any commercial tapping.

Diameter of Tap, Minus No. threads per Inch = Diameter of Holes

### TAP DRILL SIZES—75% Depth Thread

#### Machine Screw Threads

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*American National Form*  

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*U. S. and S. A. E. Standard*  

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The Metric System of Measurement

Measures of Length

1 Millimeter (mm.) = 0.03937079 inch, or about 1/25 inch
10 Millimeters = 1 Centimeter (cm.)
10 Centimeters = 1 Decimeter (dm.) = 0.3937079 inch
10 Decimeters = 1 Meter (m.) = 39.37079 inches, 3.280899 feet, or 1.09361 yards
10 Meters = 1 Decameter (Dm.) = 32.808399 feet
10 Decameters = 1 Hectometer (Hm.) = 98.42528 feet
10 Hectometers = 1 Kilometer (Km.) = 328.08399 feet, or 209.961 yards
1 Kilometer = 0.621371 miles
1 inch = 2.54 cm, 1 foot = 0.3048 m, 1 yard = 0.9144 m, 1 rod = 0.5029 Dm., 1 mile = 1.6093 Km.

Measures of Weight

1 Gramme (g.) = 0.03527397 oz. Troy, or 0.0373242 oz. avoirdupois
1 Grammes = 1 Decigramme (Dg.)
10 Decigrammes = 1 Centigramme (cg.)
1000 Kilogrammes = 1 Tonne (T.)
1 Tonne (T.) = 2204.62262 lbs., or 1.1023 tons of 2000 lbs., or 0.9842 ton of 2240 lbs., or 19.68 cwt.
1 grain = 0.0648 g., 1 oz. avoirdupois = 28.35 g., 1 lb. = 0.4536 Kg., 1 ton (2000 lbs.) = 0.9072 T.
1 ton (2240 lbs.) = 1.016 T., or 1016 Kg.

Measures of Capacity

1 Liter (L.) = 1 cubic decimeter = 0.03531 cu. ft., or 1.0604 liquid quarts, or 0.838499 gal.
10 Liters = 1 Deciliter (DL.) = 2.6417 gal., or 1.136 pk.
10 Deciliters = 1 Liter (L.) = 2.64175 gallons
10 Hectoliters = 1 Kiloliter (KL.) = 1.05714 gallons, or 22.715 bu.
1 cu. ft = 28.317, 1 gallon (American) = 3.785 L., 1 gallon (British) = 4.543 L.
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Starrett

Steel Straight Edges

Where lines are to be scribed straight or when surfaces must be tested for their precision, an accurate standard straight edge is generally used. Straight edges are also necessary on some kinds of work for use in sighting for winding. It is needless to say that such straight edges must be absolutely dependable. We have made a line of straight edges which for accuracy cannot be equalled. The various sizes have been selected as being most convenient. The sizes given are approximate. Made in pairs when two are wanted of the same width, without extra charge. The prices given are for single straight edges.

No. 380
Not Beveled
Not Graduated

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<th>Price</th>
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Packed 1 in a package.

No. 385
Beveled—One Edge Only
Not Graduated

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<tr>
<td>72</td>
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</table>

One edge only is beveled, and this to approximately ¼ inch thick from ½ to ¾ inch back. Packed 1 in a package.

No. 383
Graduated—Not Beveled

Graduated on one side only, one edge in 16ths and the other in 8ths of an inch.

<table>
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Packed 1 in a package.

No. 387
Graduated—Beveled—One Edge Only

Graduated on beveled edge only in 32nds of an inch.

<table>
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<tr>
<td>48</td>
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Packed 1 in a package.

Draftsmen's Steel Straight Edges
Nickel Plated

These straight edges are made especially for draftsmen's use. They are nickel plated with dull finish, and with a hole at one end.

No. 381
Not Beveled

<table>
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Above numbers packed 1 in a package.

No. 386
Beveled
Same as No. 381, except one edge is beveled.

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Draftsmen's Straight Edges
Stainless Steel

Straight edges made especially for draftsmen's use. Stainless steel and furnished with a hole at one end.

No. 1381
Not Beveled

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Above numbers packed 1 in a package.

No. 1386
Beveled—One Edge Only

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Starrett

Inside Micrometer Caliper
No. 823

Minimum of micrometer head 1\(\frac{1}{2}\) inches \((1\frac{1}{2}''\) movement of screw\). Maximum range 8 inches and 12 inches inclusive. All thousandths lines are numbered.

Extensions or rods are made of steel tubing and are centerless ground. Diameter approximately \(\frac{3}{8}\) inch.

By removing anvil ends, extensions or rods may be placed at either end of micrometer head, always to the preference of the user.

Adjustment for sense of "feel" and wear is thru the STARRETT friction sleeve and hardened anvils snugly fitted into the tubular extensions. Handle is compact and rigid. Holds readily and fast and grips on the knurled sections as well as on the smooth sections, providing the desired balance.

**No. 823 A**

Has 8 extensions or rods, micrometer head, spanner wrench and handle. Range 1\(\frac{1}{2}\) inches to 8 inches inclusive.

Complete Set, with finished wood case recessed for all parts—

**Price**

**No. 823 B**

Has 8 extensions or rods, micrometer head, spanner wrench and handle. Range 1\(\frac{1}{2}\) inches to 12 inches, inclusive.

Complete Set, with finished wood case recessed for all parts—

**Price**