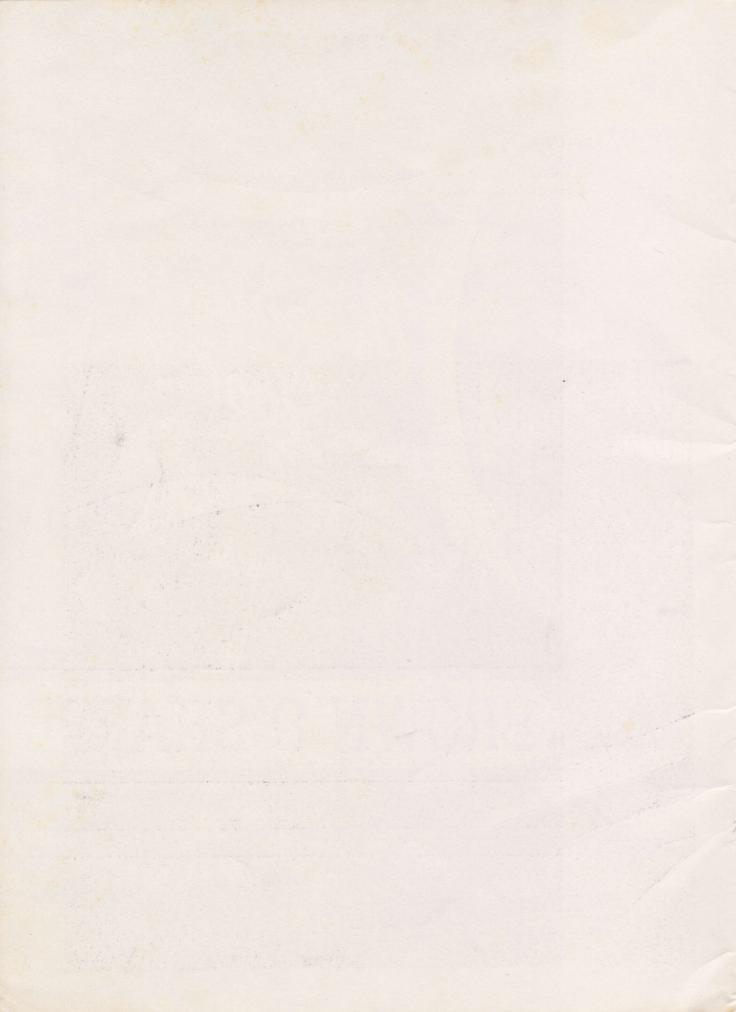
machinists Jools

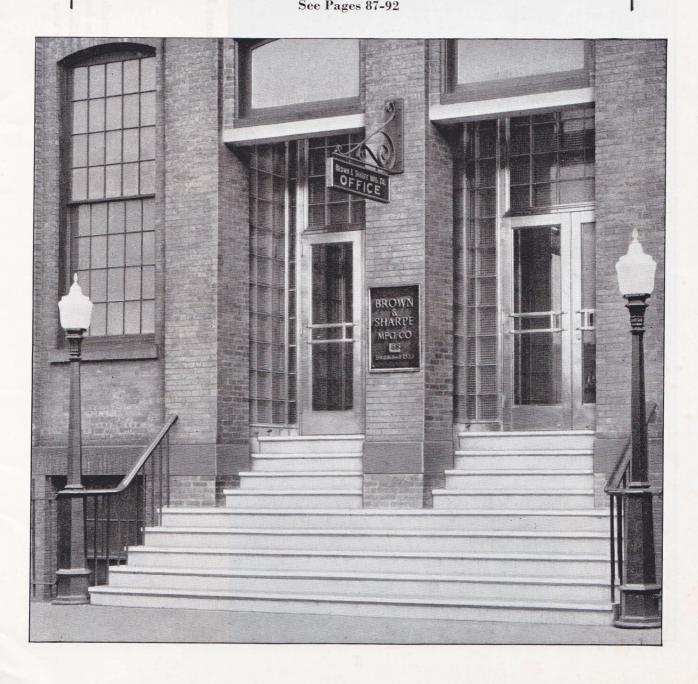
BROWN & SHARPE

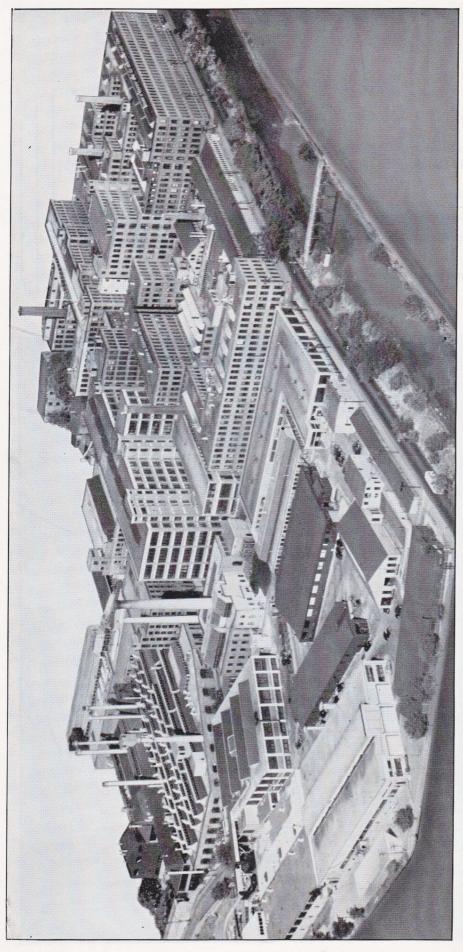
CATALOG Nº 35 M



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Gages (Plug, Ring and Caliper)	Arbors, Adapters and Collets	
Johansson Gage Blocks	Screw Machine Tools	
Electronic Measuring Equip- ment	Pumps	
Milling Cutters and Hobs	Other Useful Equipment	
C D	07.00	





Main Office and Works of the Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



The main manufacturing buildings and offices have a floor space of 1,434,800 sq. ft., the foundry 311,600 sq. ft. and miscellaneous buildings 154,400 sq. ft. In 1853 the floor space occupied was 1,800 sq. ft. Today, the buildings have over 1,900,000 sq. ft. of floor space—approximately 431/2 acres.

BROWN & SHARPE MACHINISTS' TOOLS

CATALOG No. 35M



Trade Mark Reg. U.S. Pat. Off. and Foreign Countries

IMPORTANT

Prices for the items in this catalog are shown in price list. In ordering, always specify the *Ordering Number* which appears in the price list, the name of the item and Catalog No. 35M. This will permit filling your order correctly and save delay and correspondence.

1952

BROWN & SHARPE MFG. CO.

PROVIDENCE 1, R.I., U.S.A.

ESTABLISHED 1833

Also Manufacturers of

Milling Machines • Grinding Machines • Screw Machines
Gages • Johansson Gage Blocks • Electronic Production
Measuring and Inspecting Equipment • Milling Cutters
and Hobs • Arbors, Adapters
and Collets • Screw Machine Tools • Pumps
Other Useful Equipment

BROWN & SHARPE MFG. CO.

Main Office and Works: PROVIDENCE 1, R.I., U.S.A.

SALES OFFICES:

BROWN & SHARPE MFG. CO. West Hartford 7, Conn. 7 South Main St. Philadelphia 3, Pa. Broad St. Station Bldg. BROWN & SHARPE CO. Chicago 6, Ill. 626–630 Washington Blvd. Cleveland 13, Ohio 426 Penton Bldg., West Third & Lakeside Ave. Detroit 2, Mich. 405 Curtis Bldg., 2842 West Grand Blvd. Los Angeles 23, Calif. 3040 East Olympic Blvd.

BROWN & SHARPE OF NEW YORK, INC.

New York 7, N.Y.20 Vesey St.Rochester 14, N.Y.1008 Genesee Valley Trust Bldg.Syracuse 2, N.Y.725 University Bldg., 120 East Washington St.

Stocks of Brown & Sharpe Tools are carried by hardware and supply dealers in the principal cities and towns in the United States and by the leading tool dealers in foreign countries.

Of General Interest

THE business now conducted by the Brown & Sharpe Mfg. Co. was founded in 1833 by David Brown and his son Joseph R. Brown. David Brown retired in 1841 and the business was continued by Joseph R. Brown until 1853, when Lucian Sharpe became his partner, and the firm of J. R. Brown & Sharpe was formed. The Brown & Sharpe Mfg. Co. was incorporated in 1868.

The manufacture of Steel Rules and other tools of precision was begun by Joseph R. Brown in 1850. In 1852 a similar line of work was begun by Samuel Darling and, in 1866, the partnership of Darling, Brown & Sharpe was formed, the business being carried on under that name until the partnership was dissolved by the purchase of Mr. Darling's interest in 1892.

All Brown & Sharpe products are made with the intention that they shall be the best in their respective classes. Careful attention is given constantly to insure workmanship of the best quality. Should any defect become apparent in the workmanship of any of our tools, we request that we be notified promptly.

We are pleased to show our works to those who are interested in our products and machine shop practice.

STANDARDS. We make our own Standards which are checked frequently with those of the United States Bureau of Standards, the only standards we recognize.

PATENTS. Many of the items in this catalog are protected by issued or pending United States patents and/or foreign patents.

IMPORTANT. Please address all business communications to the Company. Cable Address "Sharpe Providence." Codes: Our own and Lieber's.

PURCHASING TOOLS. We urge mechanics and manufacturers to purchase our products from hardware stores and distributors, most of whom carry stocks for the convenience of users of our products. Where tools are not available from dealers they can be purchased directly from our factory.

PRICES. Prices are subject to change without notice. In addition to stated prices, buyer shall pay the seller an amount equal to any sales, use, occupation or excise taxes which the seller may pay in respect to a sale. Prices F.O.B. Providence, R.I.

Discounts: A dealers' discount is allowed to legitimate hardware and supply stores. This discount will be given on application.

We do not pay transportation costs or duties on shipment of goods to dealers.

TERMS OF PAYMENT—UNITED STATES AND CANADA. Mechanics: Where our small tools cannot be obtained from dealers we pay transportation charges from our

factory to any place in the United States and Canada, and will ship upon receipt of remittance in New York funds for the price of tools. We do not pay duty on shipments outside the United States.

Manufacturers and Dealers: Net 30 days to firms of approved credit. We do not pay duty on shipments outside the United States.

ORDERING. Use the price list in ordering. Always specify the ORDERING NUMBER shown in the price list, the name of the item desired and Catalog No. 35G. All verbal instructions should be confirmed in writing.

Orders are subject to delays occasioned by strikes, fires, floods, accidents or by any cause beyond our control, including delivery of material to us.

DELIVERY. F.O.B. Providence, R.I. Title and right of possession will pass to customer upon delivery to carrier at Providence, R.I.

SHIPPING INSTRUCTIONS. State distinctly in giving shipping instructions, whether goods are to be sent by freight, express or mail. When instructed to ship by mail, we assume it is desired to ship by parcel post, insured. If no shipping instructions are given we will ship the way we consider best, taking into account the factors of economy, time of delivery and safety, and in such cases we cannot be held responsible for transportation charges, delays or loss in transit.

CLAIMS. Although goods are considered sold and our responsibility ceases when delivery is made to post office or transportation company, in event of goods being lost in transit, we will make every effort in behalf of customer to have lost goods found or to have the post office or transportation company make proper restitution for loss.

RETURNING GOODS. If for any reason goods are returned, the transportation charges must be paid and we particularly request in such cases that the name and address of the sender be marked plainly on the package. Always send a letter of explanation at the same time.

SPECIAL ORDERS. In ordering special tools, be sure to give full information, sketches and dimensions. While special tools often are required, we wish to impress on customers the advantage of ordering, if possible, goods that are carried in stock instead of goods that vary only slightly from stock articles and have to be made to order.

FOR DEALERS. We have available for the use of dealers regularly selling our products display material, booklets, circulars and other selling aids as well as electrotypes for advertising and catalog purposes. This material furnished upon request.



BROWN & SHARPE MACHINISTS' TOOLS are accurate, reliable and durable. These tools are made by skilled workmen in the largest plant of its kind in the world. Only the finest materials are used and the quality of these materials is maintained carefully.

Many years of research have resulted in a large variety of special equipment which we use in the manufacture and inspection of these tools. The maintenance of experimental and gage laboratories plays an important part in protecting the accuracy for which Brown & Sharpe Machinists' Tools are noted. The experimental laboratory works constantly toward perfecting new designs and developing new methods of manufacture. The gage laboratory operating at a temperature of 68 degrees F., the temperature recommended by the American Standards Association, is

equipped with a set of master standards which are checked periodically with the United States Bureau of Standards. Carefully trained inspectors compare our testing equipment with these master standards at regular intervals so that our working standards have the high degree of accuracy essential for maintaining the accuracy of Brown & Sharpe Tools.

From Brown & Sharpe have come many of the major advancements in precision tools. The first micrometer caliper, ten-thousandths graduation lines on micrometers, the Brown & Sharpe or American System of wire gaging, the first vernier caliper and precision rules accurately graduated by an automatic linear dividing machine of our own design and manufacture—these and other advancements had their origin in the Brown & Sharpe plant.

The First Practical Micrometer—a Brown & Sharpe Tool

We must go back more than one hundred years to find the prototype of the Micrometer of today in a

tool known as "Système Palmer," patented in France in 1848. Messrs. J. R. Brown and Lucian Sharpe saw this tool during their visit to the Paris Exposition in 1867 and were impressed with the fact that it might help to solve a problem which had come to their attention earlier that year.

Before their departure for Europe, the Bridgeport Brass Company, who had had a shipment returned as "out

of gage" and had found that no two of the three standard gages then in use agreed on the brass in question, had sent a model and sketch of a proposed measuring tool to J. R. Brown and Sharpe for experimental work. The tool was not of value commer-

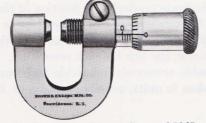
cially, as it could not be read easily, but there was evidently a need for better means of measuring sheet

metal.

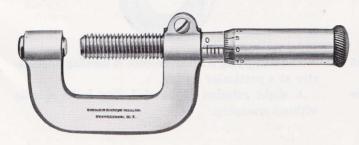
Upon their return from Paris, Messrs. Brown and Sharpe introduced the "Pocket Sheet Metal Gage" (shown at left), adopting a system of graduations similar to that of the Palmer tool and adding means of compensating for wear of measuring surfaces and screw. This was the first practical micrometer.

From this beginning and from ideas worked out in its own shops

and through acquired patents, the Brown & Sharpe Mfg. Co. has increased its line to include about two hundred and fifty different Micrometer Calipers designed to meet all ordinary shop requirements.

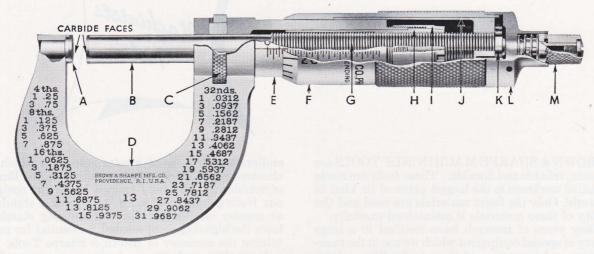


Pocket Sheet Metal Gage of 1867



Improved Micrometer Caliper of 1885

The Principle of the Micrometer Caliper



Sectional View of the Micrometer Caliper

beveled edge of the thimble accurately subdivide each revolution of the screw so

that readings may be taken in units, usually of .001", or .01 mm.

A-Anvil

B-Spindle

C—Clamp Ring

D-Frame

E—Barrel F—Thimble

G-Measuring Screw

H-Fixed Nut

I -Adjusting Nut for

Thread Wear

J —Thimble Sleeve

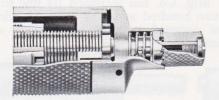
K—Lock Nut for Thimble Sleeve and

Measuring Screw

L —Thimble Cap M—Ratchet Stop

The basis of the Micrometer Caliper is an accurate screw G, which can be revolved in a fixed nut H to vary the opening between the two measuring faces, one at the end of the screw-spindle B and the other on the anvil A. The graduations on the barrel E and thimble F indicate precisely the position of the screw and the amount of the opening between the measuring faces. The thimble rotates with the screw-spindle and travels along the barrel. The graduations on the barrel conform to the pitch of the measuring screw, one line for each revolution. The graduations on the

Ratchet Stop



Uniform and sufficient pressure at measuring point is obtained by use of the ratchet stop.

The knurled end should be turned slowly two "clicks" for each measurement.

Clamp Ring



The clamp ring is a convenience in keeping micrometer at a particular setting.

A slight rotation of knurled ring locks spindle without cramping.

How to Read Micrometers Graduated to Thousandths of an Inch



The customary pitch of the screw in English measure micrometers which measure in inches is 1/40'' or .025''. This is equivalent to 40 threads per inch and means that with one complete and exact revolution of the micrometer screw the contact face at the end of the spindle has either moved away from or towards the face of the anvil exactly .025''.

The lines on the barrel conform to the pitch of the micrometer screw each line indicating .025" and each fourth line being numbered 1, 2, 3, etc. to indicate hundreds of thousandths—.100", .200", .300", etc. The beveled edge of the thimble is

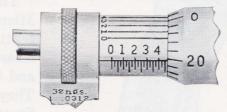
graduated into 25 parts, each line indicating .001"—1/25 of the .025" covered by one complete and exact revolution of the thimble. Every fifth line on the thimble is numbered.

To read a measurement in thousandths of an inch: To the number of hundreds of thousandths of an inch indicated by the highest figure visible on the barrel, add .025" for each line visible between that number and the thimble edge, and to this total add the number of the line on the thimble which coincides with or has passed the long parallel or axial line on the barrel.

Example (See Illustration Above)

Highest figure visible on barrel 2=	= .200''
Lines visible between the number 2 and thimble edge	= .025''
Line on thimble which coincides with or has passed long line on barrel16 =	= .016"
Reading of Measurement	.241"

How to Read Micrometers Graduated to Ten-Thousandths of an Inch



Readings in .0001" are obtained by a Vernier on the barrel of the micrometer, see *illustration above.

The Vernier has 10 divisions which equal the over-all space of 9 divisions on the thimble. Thus one division on the Vernier= $1/10 \times 9/1,000''=9/10,000''$. Graduations on the thimble=1/1,000'' or 10/10,000''.

The difference between a division on the thimble and a division on the barrel = 10/10,000''-9/10,000''=1/10,000''.

Example

There are no ten-thousandths to add as the zero lines on Vernier coincide with lines on thimble.

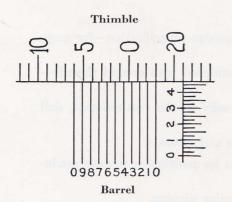
Reading = .4690''

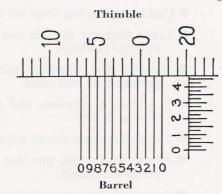
The zero lines on the Vernier and thimble coincide when the reading is exact in thousandths and the differences between lines on thimble and lines on Vernier at 1, 2, 3, etc. = .0001", .0002", .0003", etc. Thus as the 1, 2, 3, etc. Vernier line coincides with a thimble line, the thimble has moved past the exact setting, 1, 2, 3, etc., ten-thousandths of an inch.

To read: First obtain reading in thousandths and add to this the ten-thousandths indicated by the coinciding lines of the Vernier and the thimble.

Example

Reading = $\overline{.4697''}$



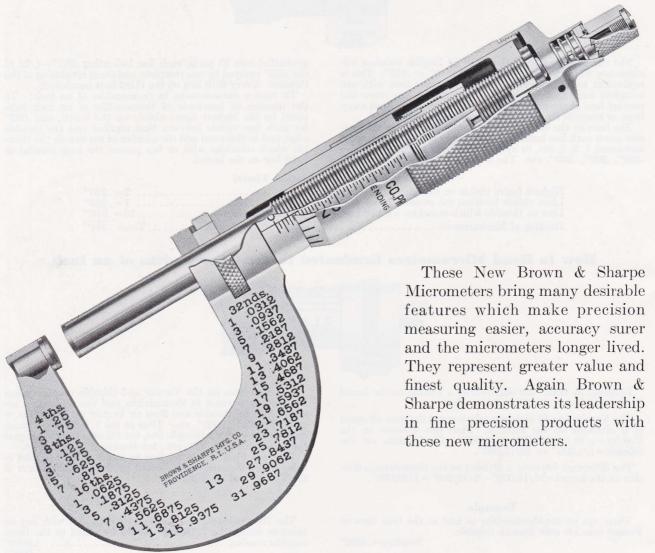


*Micrometer Calipers Nos. 233RS and 245 read ten-thousandths of an inch by methods other than described above.

Distinctive New Features

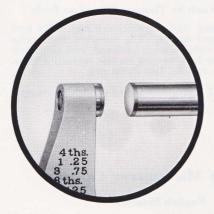
in the Completely New Line of

Brown & Sharpe Micrometers



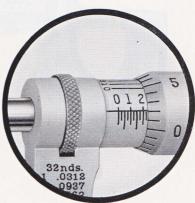
- Carbide measuring faces are long wearing.
- Large diameter thimble has wide divisions—greater magnification—for easy, accurate readings.
- Stainless steel, one-piece spindle and screw, hardened with ground threads—permanently rust proof.
- The black graduations and figures are read easily on the rust resistant, dull chrome finish.
- The sliding taper thread adjustment is sensitive and accurate.
- Adjustable thimble provides simple adjustment for positioning thimble graduations accurately.
- Screw and thimble are locked positively, preventing slipping.
- Thimble is adjustable longitudinally on screw.

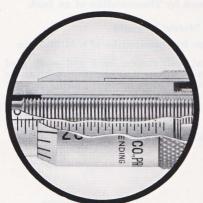
Distinctive Features of the New Micrometers



• Carbide Measuring Faces



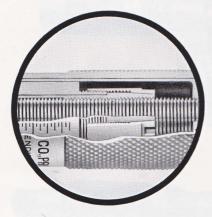




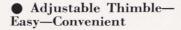
• Stainless Steel One-Piece Spindle and Screw, Hardened and Ground Threads

Rust Resistant
Dull Chrome
Finish, Black
Graduations

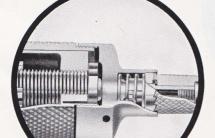




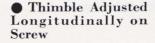
• Sliding Taper Thread Adjustment







• Thimble Locked to Screw







No. 5 Micrometer Caliper

Range 0 to 1/2 Inch by Thousandths of an Inch

Has a rust resistant, dull chrome finish and easily read black graduations and figures. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring.

A table of decimal equivalents including 64ths is stamped on the frame.



No. 5RS Micrometer Caliper

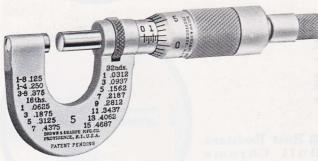
English Measure Range 0 to ½ Inch by Thousandths of an Inch

Metric Measure

Range 0 to 13 Mm. by Hundredths of a Millimeter

Has a rust resistant, dull chrome finish and easily read black graduations and figures. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring and ratchet stop.

A table of decimal equivalents including 64ths is stamped on the frame of English Micrometers.

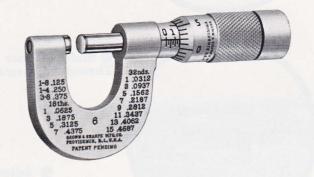


No. 6 Micrometer Caliper

Range 0 to ½ Inch by Ten-Thousandths as well as Thousandths of an Inch

Has a rust resistant, dull chrome finish and easily read black graduations and figures. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Has long wearing carbide measuring faces. Thimble is locked to spindle.

A table of decimal equivalents including 64ths is stamped on the frame.

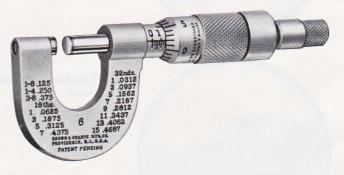


No. 6RS Micrometer Caliper

Range 0 to ½ Inch by Ten-Thousandths as well as Thousandths of an Inch

Has a rust resistant, dull chrome finish and easily read black graduations and figures. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has ratchet stop.

A table of decimal equivalents including 64ths is stamped on the frame.



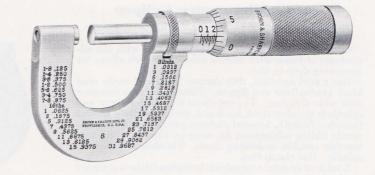
Each of the above packed one in a box. Case can be furnished. See page 25.

No. 8 Micrometer Caliper

Range 0 to 1 Inch by Thousandths of an Inch

Has a rust resistant, dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle. Has clamp ring.

A table of decimal equivalents including 64ths is stamped on the frame.



No. 8RS Micrometer Caliper

English Measure

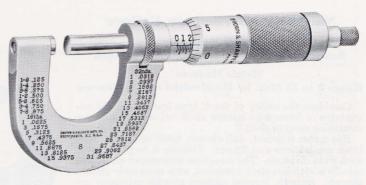
Range 0 to 1 Inch by Thousandths of an Inch

Metric Measure

Range 0 to 25 Mm. by Hundredths of a Millimeter

Has a rust resistant, dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle. Has clamp ring and ratchet stop.

A table of decimal equivalents including 64ths is stamped on the frame of English Micrometers.



No. 11 Micrometer Caliper

Range 0 to 1 Inch by Thousandths of an Inch

Has enameled, I section frame. The anvil projects $\frac{3}{16}$ inch, a convenience in measuring counterbores and slots. Thimble and barrel have rust resistant, dull chrome finish with easily read black graduations and figures and are of large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle.

For similar micrometer with Clamp Ring, see No. 59, pages 24 and 25.



No. 11RS Micrometer Caliper

English Measure Range 0 to 1 Inch by Thousandths of an Inch

Metric Measure

 $Range 0\ to\ 25 Mm.\ by\ Hundredths\ of\ a\ Millimeter$

Has enameled, I section frame. The anvil projects 3½ inch, a convenience in measuring counterbores and slots. Thimble and barrel have rust resistant, dull chrome finish with easily read black graduations and figures and are of large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has ratchet stop.

For similar micrometer with Clamp Ring, see No. 59RS, pages 24 and 25.

Each of the above packed one in a box. Case can be furnished. See page 25.

No. 12 Micrometer Caliper

Range 0 to 1 Inch by Thousandths of an Inch

Combines the utility of the C type frame with the advantages of frame with narrow anvil end which allows for

measuring deep in slots.

Has a rust resistant, dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring.

A table of decimal equivalents including 64ths is stamped

on the frame.

No. 12RS Micrometer Caliper

English Measure Range 0 to 1 Inch by Thousandths of an Inch

Metric Measure Range 0 to 25 Mm. by Hundredths of a Millimeter

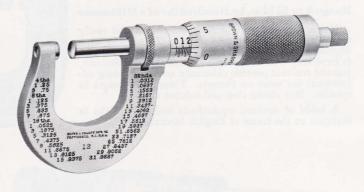
Combines the utility of the C type frame with the advantages of frame with narrow anvil end which allows for

measuring deep in slots. Has a rust resistant, dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring and ratchet stop.

A table of decimal equivalents including 64ths is stamped

on the frame of English Micrometers.





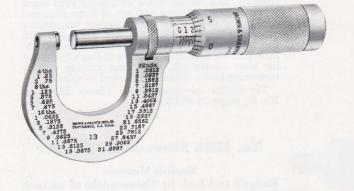
No. 13 Micrometer Caliper

Range 0 to 1 Inch by Ten-Thousandths as well as Thousandths of an Inch

Combines the utility of the C type frame with the advantages of frame with narrow anvil end which allows for measuring deep in slots.

Has a rust resistant, dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring.

A table of decimal equivalents including 64ths is stamped on frame.



0 1 2

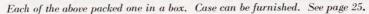
No. 13RS Micrometer Caliper

Range 0 to 1 Inch by Ten-Thousandths as well as Thousandths of an Inch

Combines the utility of the C type frame with the advantages of frame with narrow anvil end which allows for measuring deep in slots.

Has a rust resistant, dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring Thimble is locked to spindle. Has clamp ring and ratchet stop.

A table of decimal equivalents including 64ths is stamped on the frame.



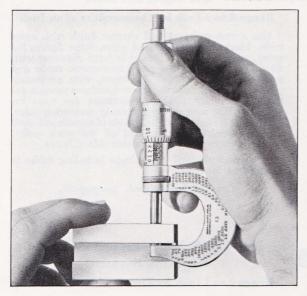


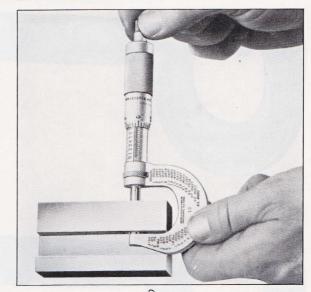
13

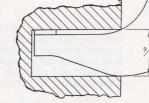
Anvil enters

slot approximately 15/16".

Micrometers with Narrow Anvil End Allow Measurements in Narrow Slots



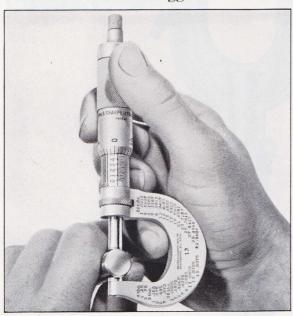


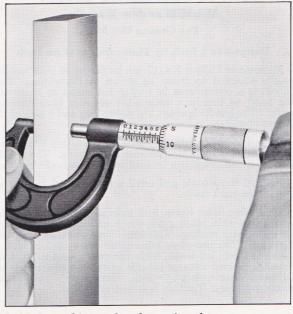


Anvil enters slot approximately 1/4".

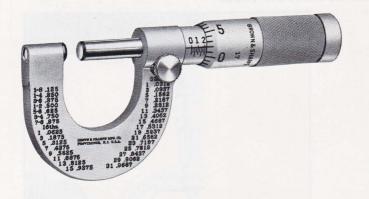
Micrometers with narrow anvil end have definite advantages where it is necessary to take measurements in a narrow slot and in similar places inaccessible to micrometers with regular frames. These advantages are available in Micrometer Calipers Nos. 12, 12RS, 13, 13RS, 47, 47RS, 48 and 48RS. The dimensions of the frames are shown in the line illustrations.

Suggestions for Holding Micrometer Calipers





In using a one inch Micrometer for small work, hold the tool in one hand, turning the thimble with the same hand, as shown. This permits freedom of the other hand for holding the work. In measuring larger or stationary work, the frame should be held securely in one hand while the other hand turns the thimble.



No. 17 Micrometer Caliper

For Gaging Hot Metal

Range 0 to 1 Inch by Thousandths of an Inch

Has a rust resistant dull chrome finish with extra wide, black graduations and extra large figures for quick, easy reading. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Ends of spindle and anvil are chamfered to slide on and off the work easily. Spindle lock can be used on either side of frame.

A table of decimal equivalents including 64ths is stamped on the frame.

Case can be furnished. See page 25.



For Gaging Hot Metal

Range 0 to 1 Inch by Thousandths of an Inch
Has a rust resistant dull chrome finish with extra

wide, black graduations and extra large figures for quick, easy reading. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has ratchet stop. Ends of spindle and anvil are chamfered to slide on and off the work easily. Spindle lock can be used on either side of frame.

A table of decimal equivalents including 64ths is stamped on frame.

Case can be furnished. See page 25.

No. 17 Micrometer Caliper With Wooden Handle

For Gaging Hot Metal

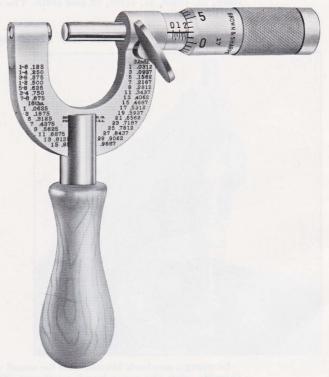
Range 0 to 1 Inch by Thousandths of an Inch

Micrometer Caliper No. 17 can be furnished with wooden handle attached to frame as shown in illustration. This handle is a convenience in gaging hot metal as it permits the hand to remain a reasonable distance from the hot metal. The handle is about $2\frac{1}{2}$ inches long and 1 inch at the largest diameter.

When furnished with the wooden handle, this micrometer has a winged spindle lock for ease in clamping. The spindle lock is reversible and can be used on either side of the frame.

Ends of the spindle and anvil are chamfered to slide on and off the work easily.

This micrometer has a rust resistant dull chrome finish with extra wide black graduations and extra large figures for quick, easy reading. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle.



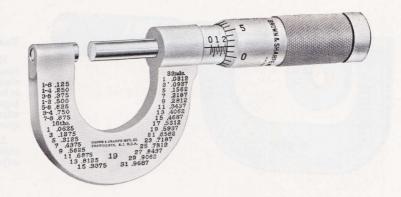
Each of the above packed one in a box.

No. 19 Micrometer Caliper

Range 0 to 1 Inch by Thousandths of an Inch

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle.

A table of decimal equivalents including 64ths is stamped on the frame.

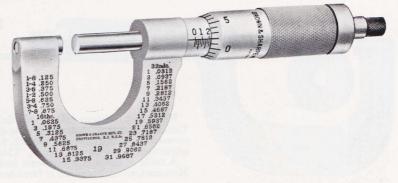


No. 19RS Micrometer Caliper

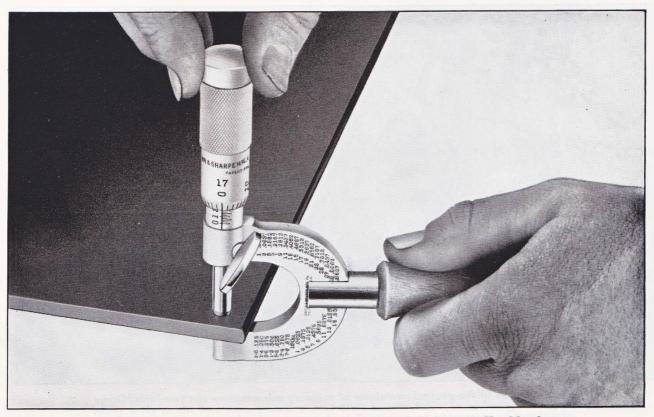
Range 0 to 1 Inch by Thousandths of an Inch

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle. Has ratchet stop.

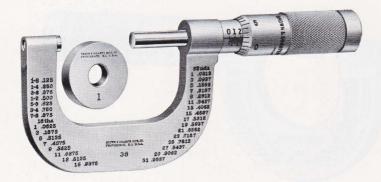
A table of decimal equivalents including 64ths is stamped on frame.



Each of the above packed one in a box. Case can be furnished. See page 25.



No. 17 Micrometer Caliper with Wooden Handle Used in Measuring Hot Metal

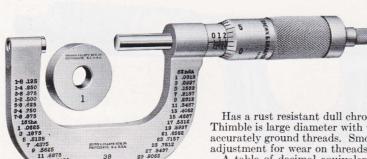


No. 38 Micrometer Caliper

Range 1 to 2 Inches by Thousandths of an Inch

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to

A table of decimal equivalents including 64ths is stamped on the frame. A Standard is furnished for adjusting the Micrometer.



No. 38RS Micrometer Caliper

English Measure Range 1 to 2 Inches by Thousandths of an Inch

Metric Measure Range 25 to 50 Mm. by Hundredths of a Millimeter

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle. Has ratchet stop.

A table of decimal equivalents including 64ths is stamped on the frame of English

Micrometers. A Standard is furnished for adjusting the Micrometer.

Each of the above packed one in a box. Case can be furnished. See page 25.



In addition to the general usefulness of ordinary micrometers the two-inch Micrometer Calipers Nos. 47, 47RS, 48 and 48RS have a narrow anvil end which gives them advantages in measuring in narrow slots, keyways and other places inaccessible to micrometers with frames of the conventional type.

No. 47 Micrometer Caliper

Range 1 to 2 Inches by Thousandths of an Inch

Combines the utility of 1 to 2-inch micrometers with the advantages of frame with narrow anvil end

which allows for measuring deep in slots. Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece mi-crometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to carbide measuring faces. spindle. Has clamp ring.

A table of decimal equivalents including 64ths is stamped on the frame. A Standard is furnished for

adjusting the Micrometer.

No. 47RS Micrometer Caliper

English Measure

Range 1 to 2 Inches by Thousandths of an Inch

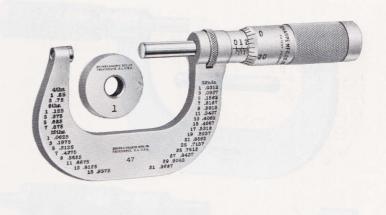
Metric Measure

Range 25 to 50 Mm. by Hundredths of a Millimeter

Combines the utility of 1 to 2-inch micrometers with the advantages of frame with narrow anvil end

which allows for measuring deep in slots. Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring and ratchet stop.

A table of decimal equivalents including 64ths is stamped on the frame of English Micrometers. A Standard is furnished for adjusting the Micrometer.





No. 48 Micrometer Caliper

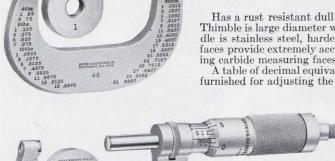
Range 1 to 2 Inches by Ten-Thousandths as well as Thousandths of an Inch

Combines the utility of 1 to 2-inch micrometers with the advantages of frame with narrow anvil end which allows for measuring deep in slots.

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring.

A table of decimal equivalents including 64ths is stamped on the frame. A Standard is

furnished for adjusting the Micrometer.



STATES META CO.

No. 48RS Micrometer Caliper

Range 1 to 2 Inches by Ten-Thousandths as well as Thousandths of an Inch

Combines the utility of 1 to 2-inch micrometers with the advantages of frame with narrow anvil end which allows for measuring deep in slots.

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring and ratchet stop.

A table of decimal equivalents including 64ths is stamped on the frame of English Micrometers. A Standard is furnished for adjusting the Micrometer.

Each of the above packed one in a box. Case can be furnished. See page 25.



No. 50 Micrometer Caliper

Range 2 to 3 Inches by Thousandths of an Inch

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle.

Micrometer furnished with Standard unless other-

wise ordered.

No. 50RS Micrometer Caliper

English Measure
Range 2 to 3 Inches by Thousandths of an Inch

Metric Measure Range 50 to 75 Mm. by Hundredths of a Millimeter

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle. Has ratchet stop.

to spindle. Has ratchet stop.

Micrometer furnished with Standard unless other-

wise ordered.

Each of the above packed one in a box. Case can be furnished. See page 25.



When using a large micrometer, frame should be held securely in one hand at point where weight of tool is supported most conveniently without cramping the measuring surfaces. The finger and thumb of other hand should turn the thimble.

No. 52 Micrometer Caliper

Range 2 to 3 Inches by Thousandths of an Inch

Has a rust resistant dun emotion read black graduations and figures. Thimble is read black graduations and figures. The one-piece Has a rust resistant dull chrome finish and easily micrometer screw and spindle is stainless steel, hard-ened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring.

Micrometer furnished with Standard unless other-

wise ordered.

No. 52RS Micrometer Caliper

English Measure Range 2 to 3 Inches by Thousandths of an Inch

Metric Measure Range 50 to 75 Mm. by Hundredths of a Millimeter

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring and ratchet stop.

Micrometer furnished with Standard unless other-

wise ordered.





No. 53 Micrometer Caliper

Range 2 to 3 Inches by Ten-Thousandths as well as Thousandths of an Inch

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring.

Micrometer furnished with Standard unless other-

wise ordered.



Range 2 to 3 Inches by Ten-Thousandths as well as Thousandths of an Inch

Has a rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Has long wearing carbide measuring faces. Thimble is locked to spindle. Has clamp ring and ratchet stop.

Micrometer furnished with Standard unless other-

wise ordered.



Each of the above packed one in a box. Case can be furnished. See page 25.

Nos. 54 and 54RS Micrometer Calipers

Range 0 to 4 Inches by Thousandths of an Inch Measures Work 4 Inches in Diameter



Illustration shows No. 54RS with Ratchet Stop

Has enameled, I section frame. Thimble and barrel have rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle. No. 54 has clamp ring. No. 54RS has clamp ring and ratchet stop.

Particularly adapted for the shop that does not wish to

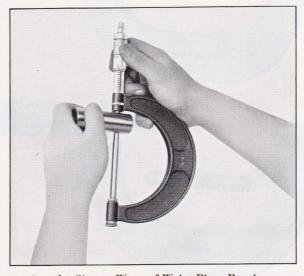
invest in a set of four micrometers. Well suited for automotive shops as it measures accurately most parts that require close fitting, accurately determining the size or wear of wrist pins, bearings, pistons and other automotive parts.

Range of measurement is obtained by interchangeable anvils of different lengths. Each anvil has separate means of adjustment for wear.

A set of three Standards furnished unless otherwise ordered. Furnished in finished wooden case.

Packed one in a box.





Micrometer Calipers Nos. 54 and 54RS Accurately Determine the Size or Wear of Wrist Pins, Bearings, Pistons and other Automotive Parts.

For Prices and Ordering Numbers, See Colored Section

Nos. 55 and 55RS Micrometer Calipers

Range 2 to 6 Inches by Thousandths of an Inch Measures Work 6 Inches in Diameter

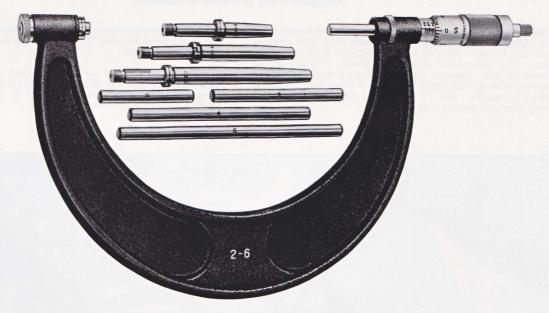


Illustration shows No. 55RS with Ratchet Stop

Has enameled, I section frame. Thimble and barrel have rust resistant dull chrome finish and easily read black graduations and figures. Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle. No. 55 has clamp ring. No. 55RS has clamp ring and ratchet stop.

Particularly adapted for the shop that does not wish to

invest in a set of four micrometers. Well suited for automotive shops as it measures all pistons ordinarily used in motor service work.

Range of measurement is obtained by interchangeable anvils of different lengths. Each anvil has separate means of adjustment for wear.

A set of four Standards is furnished unless otherwise ordered.

Furnished in finished wooden case.

Packed one in a box.





Micrometer Calipers Nos. 55 and 55RS with 2 to 6-Inch Range are Extremely Useful. In Motor Service Work they
Measure all Pistons Ordinarily Used.

Nos. 57 and 57RS Micrometer Calipers

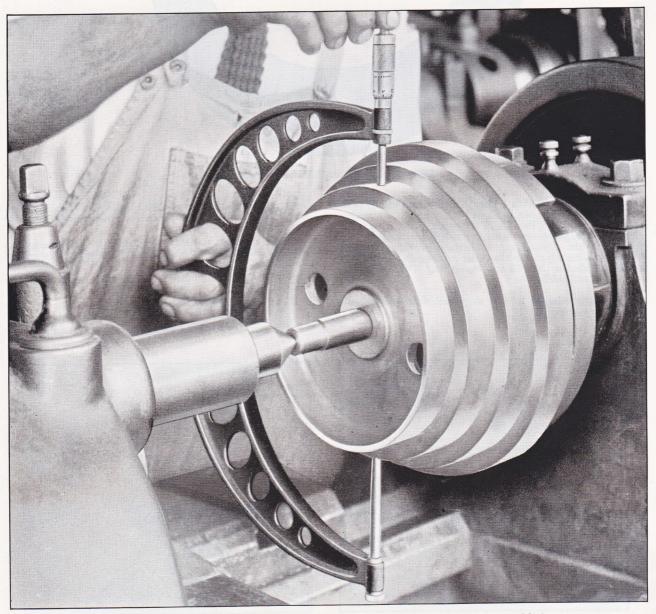
Range 6 to 12 Inches by Thousandths of an Inch

Measures Work 12 Inches in Diameter

Has enameled, I section frame. Thimble and barrel have rust resistant dull chrome finish and easily read black graduations and figures Thimble is large diameter with wide divisions. The micrometer screw is hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle. No. 57 has clamp ring. No. 57RS has clamp ring and ratchet stop.

Range of measurement is obtained by interchangeable anvils of different lengths. Each anvil has separate means of adjustment for wear.

Particularly adapted for the shop that requires accurate measurements from 6 to 12 inches but which does not have sufficient demand to warrant investment in a more expensive set of six separate micrometers.

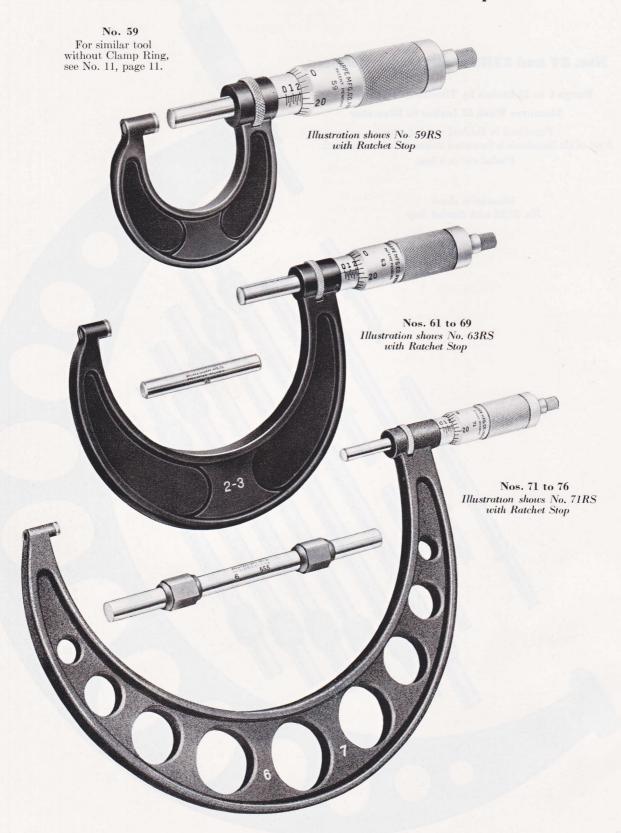


Note how holes in frame of Nos. 57 and 57RS Micrometer Calipers, in addition to making these tools light and convenient to handle, provide a handy finger grip for holding micrometer when making measurements.



For Prices and Ordering Numbers, See Colored Section

Nos. 59 to 76 and 59RS to 76RS Micrometer Calipers



For Prices and Ordering Numbers, See Colored Section

Nos. *59 to *76 and 59RS to 76RS Micrometer Calipers

English Measure

Range 0 to 12 Inches by Thousandths of an Inch

Metric Measure

Range 0 to 300 Mm. by Hundredths of a Millimeter

These micrometers have enameled, I section frames. The anvils project above the frames—a convenience in measuring counterbores and slots. Thimbles and barrels have rust resistant dull chrome finish and easily read black graduations and figures. Thimbles are large diameter with wide divisions.

The one-piece micrometer screws and spindles are stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Long wearing carbide measuring faces. Thimbles are locked to spindles. Nos. 59 to 76 have clamp rings. Nos. 59RS to 76RS have clamp rings and ratchet stops.

In the larger sizes, frames have holes which lighten the tools without sacrificing rigidity and strength. The entire design is the result of scientific research as well as practical experiment to develop a frame which would give rigidity, strength, ease in handling and convenience in measuring.

Nos. 71 to 76 and 71RS to 76RS Micrometer Calipers are furnished in nicely finished wooden cases as shown at right which will be found convenient for shop use and well adapted to protect the tools.

Cases can be furnished for Nos. 59 to 69 and 59RS to 69RS. See below.

Micrometer Caliper Cases

Each of the above packed one in a box.

	RANGE	No.	RANGE	
No.	English Measure, Inches	With Ratchet Stop	English Measure, Inches	Metric Measure, Mm.
†59	0 to 1	†59RS	0 to 1	0 to 2
61	1 to 2	61RS	1 to 2	25 to 5
63	2 to 3	63RS	2 to 3	50 to 7
65	3 to 4	65RS	3 to 4	75 to 10
67	4 to 5	67RS	4 to 5	100 to 12
69	5 to 6	69RS	5 to 6	125 to 15
71	6 to 7	71RS	6 to 7	150 to 17
72	7 to 8	72RS	7 to 8	175 to 20
73	8 to 9	73RS	8 to 9	200 to 22.
74	9 to 10	74RS	9 to 10	225 to 25
75	10 to 11	75RS	10 to 11	250 to 27
76	11 to 12	76RS	11 to 12	275 to 300

Furnished without Standards, unless otherwise ordered. *Nos. 59 to 76 furnished in English Measure only. †For similar tool without clamp ring, see No. 11 or No. 11RS, page 11.



Cases can be furnished for ½, 1, 2, 3, 4, 5 and 6-inch Micrometer Calipers and for Nos. 216, 217, 218, 232, 232RS, 237 and 237RS Micrometer Calipers. These cases add to the convenience of the use of the tools and protect them against damage.

When ordering, give size of caliper with which case is to be used.



Soft Leather Cases

Made to hold Micrometer Calipers of $\frac{1}{2}$, 1 and 2-inch capacity, except Nos. 232, 232RS, 237 and 237RS.

When ordering, give size of caliper with which case is to be used.

Above cases packed one in a box.

Micrometer Caliper Sets

BROWN & SHARPE Micrometer Calipers are obtainable in convenient sets in combinations especially selected for various requirements. A case for each set is available which serves to protect the tools and to provide a convenient place in which to keep them.



Set No. 131RS-0 to 3 Inches or 0 to 75 Mm.

Set No. 132RS similar but has .0001 inch graduations.

Set No. 130RS (English only) has micrometers without cutaway anvil ends, without carbide measuring faces and without clamp rings.



Set No. 135RS-0 to 6 Inches or 0 to 150 Mm.



Set No. 133RS-0 to 3 Inches or 0 to 75 Mm.



Set No. 138RS-0 to 12 Inches or 0 to 300 Mm.

Note separate case in which standards are placed.

Set No. 137RS similar but has ranges 6 Inches to 12 Inches or 150 Mm, to $300~\mathrm{Mm}$.

For Prices and Ordering Numbers, See Colored Section

Nos. 130 to 132 and 130RS to 132RS Micrometer Caliper Sets

Micrometers in Sets Nos. 130 to 132 inclusive and Nos. 130RS to 132RS inclusive have a rust resistant, dull chrome finish and easily read black graduations and figures. Thimbles are large diameter with wide divisions. The micrometer screws in micrometers in Sets Nos. 130 and 130RS are hardened with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads.

The micrometers in Sets Nos. 131, 131RS, 132 and 132RS have one-piece micrometer screws and spindles with accurately grounds threads and long wearing carbide measuring faces. 1" and 2" micrometers in these sets have cut away frames. Thimbles are locked to spindles.

Nos. 130 and 130RS Micrometer Caliper Sets

3 Micrometers

Range 0 to 3 Inches by Thousandths of an Inch

Sets consist of Micrometer Calipers Nos. 19, 38 and 50 or 19RS, 38RS and 50RS.

Micrometers in Set No. 130RS have ratchet stops.

Furnished in case with Standards, unless otherwise ordered.

Nos. *131 and 131RS Micrometer Caliper Sets

3 Micrometers

English Measure

Range 0 to 3 Inches by Thousandths of an Inch

Metric Measure

Range 0 to 75 Mm. by Hundredths of a Millimeter

Sets consist of Micrometer Calipers Nos. 12, 47 and 52 or 12RS, 47RS and 52RS. Micrometers in Set No. 131 have clamp rings. Micrometers in Set No. 131RS have clamp rings and ratchet stops. Furnished in case with Standards, unless otherwise ordered.

*Set No. 131 furnished in English Measure only.

Nos. 132 and 132RS Micrometer Caliper Sets

3 Micrometers

Range 0 to 3 Inches

by Ten-Thousandths as well as Thousandths of an Inch

Sets consist of Micrometer Calipers Nos. 13, 48 and 53 or 13RS, 48RS and 53RS. Micrometers in Set No. 132 have clamp rings. Micrometers in Set No. 132RS have clamp rings and ratchet stops. Furnished in case with Standards, unless otherwise ordered.

Nos. 133 to 138 and 133RS to 138RS Micrometer Caliper Sets

Micrometers in Sets Nos. 133 to 138 inclusive and Nos. 133RS to 138RS inclusive have black enameled, I section frames. Thimbles and barrels have rust resistant, dull chrome finish and are large diameter with wide divisions. The one-piece micrometer screws and spindles are stainless steel, hardened, with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Micrometers have long wearing carbide measuring faces. Thimbles are locked to spindles.

Nos. *133 and 133RS Micrometer Caliper Sets

3 Micrometers

English Measure

Range 0 to 3 Inches by Thousandths of an Inch

Metric Measure

Range 0 to 75 Mm. by Hundredths of a Millimeter

Sets consist of Micrometer Calipers Nos. 59, 61 and 63 or 59RS, 61RS and 63RS. Micrometers in Set No. 133 have clamp rings. Micrometers in Set No. 133RS have clamp rings and ratchet stops. Furnished in case with Standards unless otherwise ordered.

*Set No. 133 furnished in English Measure only.

Nos. *137 and 137RS Micrometer Caliper Sets

6 Micrometers

English Measure

Range 6 to 12 Inches by Thousandths of an Inch

Metric Measure

Range 150 to 300 Mm. by Hundredths of a Millimeter

Sets consist of Micrometer Calipers Nos. 71, 72, 73, 74, 75 and 76 or 71RS, 72RS, 73RS, 74RS, 75RS and 76RS. Micrometers in Set No. 137 have clamp rings. Micrometers in Set No. 137RS have clamp rings and ratchet stops. Furnished in a finished wooden case. Furnished with Standards unless otherwise ordered.

*Set No. 137 furnished in English Measure only.

Nos. *135 and 135RS Micrometer Caliper Sets

6 Micrometers

English Measure

Range 0 to 6 Inches by Thousandths of an Inch

Metric Measure

Range 0 to 150 Mm. by Hundredths of a Millimeter

Sets consist of Micrometer Calipers Nos. 59, 61, 63, 65, 67 and 69 or 59RS, 61RS, 63RS, 65RS, 67RS and 69RS. Furnished in case with Standards, unless otherwise ordered. Set No. 135 has clamp rings. Set No. 135RS has clamp rings and

*Set No. 135 furnished in English Measure only.

Nos. *138 and 138RS Micrometer Caliper Sets 12 Micrometers

English Measure

Range 0 to 12 Inches by Thousandths of an Inch

Metric Measure

Range 0 to 300 Mm. by Hundredths of a Millimeter

Sets consist of Micrometer Calipers Nos. 59, 61, 63, 65, 67, 69, 71, 72, 73, 74, 75 and 76 or 59RS, 61RS, 63RS, 65RS, 67RS, 69RS, 71RS, 72RS, 73RS, 74RS, 75RS and 76RS.

Micrometers in Set No. 138 have clamp rings. Micrometers in Set No. 138RS have clamp rings and ratchet stops. Furnished in a finished wooden case. Furnished with Standards unless otherwise ordered.

*Set No. 138 furnished in English Measure only.

Each of the above packed one set in a box.

Nos. 152 to 155 and 152RS to 155RS Screw Thread Micrometer Calipers

Range, Pitch Diameters, 0 to 1 Inch by Thousandths of an Inch



No.	With Ratchet Stop	Capacity Inches	Per Inch
*152	*152RS	1	8 to 13
153	153RS	1	14 to 20
154	154RS	1	22 to 30
155	155RS	1	32 to 40

End of spindle is pointed. V in anvil is accurately ground and anvil is free to rotate. End of point and bottom of V have allowance for clearance so they will not rest on bottom or top of thread to be measured. Anvil is so made that pitch diameters of very short screws with fine pitches can be measured. When set at zero, pitch lines of spindle and anvil coincide as AB. When caliper is opened, reading represents the distance between the two pitch lines or the pitch diameter. As thread itself is measured, actual outside diameter of piece does not enter into consideration. Table of decimal equivalents including 64ths is stamped on the frame. Has rust resistant, dull chrome finish and easily read black graduations and figures. Thimbles are large diameter with wide divisions. The micrometer screws are hardened with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimbles are locked to spindles. Micrometers Nos. 152RS to 155RS have ratchet stops.

*Whitworth Standard, range 8 to 12 threads per inch only.

Tools are furnished for (1) V and American National or United States Standard and (2) Whitworth Standard Threads. When ordering, specify thread form to be measured. Special Screw Thread Micrometer Calipers can be furnished.

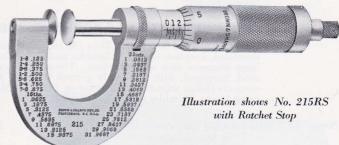
*Case can be furnished. See page 25.

Nos. 215 and 215RS Micrometer Calipers

Disk Type Measuring Surfaces—For Measuring Forming Tools Range 0 to 1 Inch by Thousandths of an Inch

For measuring the thickness of forms and in other places inaccessible to regular micrometers. Disks are $\frac{1}{2}$ " in diameter, $\frac{1}{2}$ " thick in center and .015" thick at edge. Forms up to $\frac{1}{2}$ " deep, with grooves over .015" in width can be measured. Rust resistant, dull chrome finish and easily read black graduations and figures. Thimbles are large diameter with wide divisions. The micrometer screws are hardened with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimbles are locked to spindles. No. 215 has clamp ring. No. 215RS has clamp ring and ratchet stop.

Case can be furnished. See page 25.



Nos. 216 to 218 Micrometer Calipers

Blade Type Measuring Surfaces—For Measuring Forming Tools Range 1 to 3½ Inches by Thousandths of an Inch



For measuring depths of narrow grooves and diameters of forming tools. Blade on spindle end does not rotate. Blades are .030" thick and permit measurements in slots having a depth up to 7_{52} ".

No.	Range by Thousandths of an Inch
216	1 to 2
217	$\frac{1\frac{1}{2} \text{ to } 2\frac{1}{2}}{2\frac{1}{2} \text{ to } 3\frac{1}{2}}$
218	$2\frac{1}{2}$ to $3\frac{1}{2}$

Cases can be furnished. See page 25.

Each of the above packed one in a box.

Nos. 225 and 225RS Micrometer Calipers

For Measuring the Thickness of Tubing
Range 0 to ½ Inch by Thousandths of an Inch

Anvil is rounded. Back of frame at anvil is cut away so that anvil enters tubing as small as ½" or 8 mm. inside diameter. Table of decimal equivalents of English Standard Gage, Nos. 1 to 30, are stamped on frame. Has a rust resistant, dull chrome finish and easily read black graduations and figures. The micrometer screw is hardened with accurately ground threads. Thimble is locked to spindle. Micrometer No. 225RS has ratchet stop.

Packed one in a box. Case can be furnished. See page 25.



No. 226 Ball Attachment



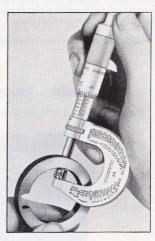
Snaps on Anvil or Spindle End in an Instant.

Greatly increases the usefulness of a micrometer caliper. Hardened steel ball fits loosely in attachment and always bears against anvil or spindle end. Attachment snaps instantly either on the anvil or spindle end of micrometer calipers having spindle .250" in diameter. As hardened steel ball measures .250" in diameter, it is necessary to subtract this dimension from the actual caliper reading in making a measurement. For all Brown & Sharpe Micrometer Calipers with conventional anvils and spindles except ½" sizes.

Packed twelve in a box.



With attachment on spindle, micrometer measures wall thickness of the curved section at any point, no matter how long the piece.



Micrometer caliper with attachment on anvil, measuring thickness of arbor collar.

No. 228 Micrometer Caliper

For Measuring the Thickness of Tubing Range 0 to 1 Inch by Thousandths of an Inch

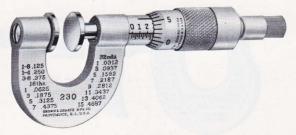


Anvil is rounded. Back of frame at anvil is cut away so that anvil enters tubing as small as ${}^{1}/_{22}$ " inside diameter. Has black enameled, I section frame. Thimble and barrel have rust resistant, dull chrome finish with easily read black graduations. Thimble is large diameter with wide divisions. The micrometer screw is hardened with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. Thimble is locked to spindle.

Packed one in a box. Case can be furnished. See page 25.

No. 230RS Paper Gage Micrometer Caliper

Range 0 to 3/8 Inch by Thousandths of an Inch



Has disks approximately ½" in diameter on anvil and spindle for gaging paper, rubber and other soft materials. Disk on anvil floats, adjusting itself to surface being measured. Edges of disks are rounded to slide over work easily. Table of decimal equivalents including 64ths is stamped on the frame. Has a rust resistant, dull chrome finish and easily read black graduations and figures. The micrometer screw is hardened with accurately ground threads. Thimble is locked to spindle. Has ratchet stop.

Packed one in a box. Case can be furnished. See page 25.

No. 233RS Micrometer Caliper

Range 0 to 1/2 Inch by Ten-Thousandths of an Inch



It is found of service to wire drawers, watchmakers and others who desire fine measurements, and where the work is of such a class that a micrometer can be used when placed on a bench.

It differs from our regular micrometers in that the measuring screw has 50 threads per inch and the thimble has 200 graduations which read direct by ten-thousandths of an inch

Micrometer thimble has a rust resistant dull chrome finish with easily read black graduations and figures. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground threads. Has long wearing carbide measuring faces. Has ratchet stop.

Furnished in finished wooden case.

Nos. 232 and 232RS Paper Gage Micrometer Calipers

Range 0 to 3/8 Inch by Thousandths of an Inch



No. 232RS with Ratchet Stop

Has disks approximately $\frac{1}{2}$ " in diameter on anvil and spindle for gaging paper, rubber and other soft materials. Disk on anvil floats, adjusting itself to surface being measured. Edges of disks are rounded to slide over work easily. Deep opening in black enameled frame permits measurements to be taken 2" from edge of material beinggaged. Thimble has rust resistant, dull chrome finish with easily read black graduations and figures. The microm-eter screw is hardened with accurately ground threads. Thimble is locked

to spindle. Micrometer No. 232RS has ratchet stop.

Case can be furnished. See page 25.

Nos. 237 and 237RS Micrometer Calipers

Rolling Mill Gage
Range 0 to 1 Inch by Thousandths of an Inch



No. 237RS with Ratchet Stop

Especially designed for gaging sheet metal but has a wide range of uses where a caliper with a frame of unusual depth is required.

With this caliper it is possible to take measurements 3" in from the edge of the work.

Has black enameled, I section frame. Thimble and barrel have rust resistant, dull chrome finish with easily read black graduations and figures. Thimble is large diameter with wide divisions. The one-piece micrometer screw and spindle is stainless steel, hard-

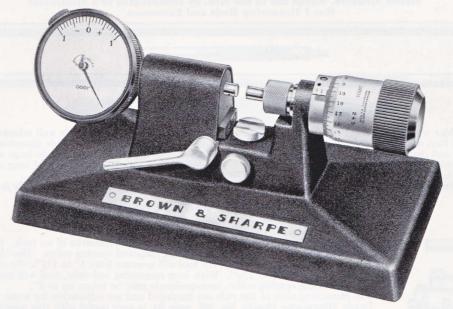
ened with accurately ground threads. Smooth, tapered surfaces provide extremely accurate sliding adjustment for wear on threads. The micrometer has long wearing carbide measuring faces. Thimble is locked to spindle. Micrometer No. 237RS has ratchet stop.

Case can be furnished. See page 25.

Each of the above packed one in a box.

No. 245 Indicating Bench Micrometer

Range 0 to 1/2 Inch by Ten-Thousandths of an Inch



Ideal for maintaining close limits on small work and for use in statistical quality control. It provides a new ease and convenience for fine small parts measurements, including pinion staffs, instrument parts, wire and other slender elements found in electronic manufacture.

strument parts, wire and other slender elements found in electronic manufacture.

It measures by .0001" directly from micrometer thimble. It measures by .0001" directly from dial gage with micrometer set at nearest .001" of the measurement. It also serves as a comparator and is set without additional standards. Retractor lever withdraws anvil instantly for rapid repeat measurements.

Indicating Bench Micrometer No. 245 has adjustable measuring pressure from 8 ozs. to 2 lbs. that remains constant when set. This feature meets the needs of wire manufacturers and others who require standardized measurements at predetermined pressures.

Thimble has a rust resistant dull chrome finish with easily read black graduations and figures. The one-piece micrometer screw and spindle is stainless steel, hardened, with accurately ground

threads. Has long wearing carbide measuring faces. Furnished in finished wooden case.

No. 250 Inside English Measure, Range .200 Metric Measure, Range 5 to 2

No. 250 Inside Micrometer Caliper

English Measure, Range .200 to 1 Inch by Thousandths of an Inch Metric Measure, Range 5 to 25 Mm. by Hundredths of a Millimeter

For small internal measurements. Measuring surfaces are hardened and ground on a radius to provide accurate measurements and prevent cramping. Has clamp screw.

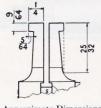
Case can be furnished.



Approximate Dimensions of Measuring Jaws

No. 252 Inside Micrometer Caliper

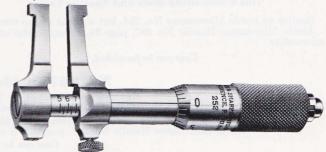
English Measure, Range $\frac{1}{2}$ to $\frac{1}{2}$ Inches by Thousandths of an Inch Metric Measure, Range 12 to 37 Mm. by Hundredths of a Millimeter



Approximate Dimensions of Measuring Jaws

The nibs are hardened and ground on a radius to provide accurate measurement of small holes. The shape of the jaws, also, enables measurements to be taken over a flange or shoulder. Has clamp screw.

Case can be furnished.



Each of the above packed one in a box.

No. 262 Inside Micrometer

English Measure, Range 8 to 36 Inches by Thousandths of an Inch Metric Measure, Range 200 to 900 Mm. by Hundredths of a Millimeter Has 7 Measuring Rods and Extension



Consists of a holder with a micrometer screw and thimble and extension rods that are graduated by a series of angular grooves of a form and depth that allow clamping fingers to spring in and adjustments to be made quickly and positively. Micrometer screw has 1" movement. For convenience in attaching rods knurled finger grips are provided.

This style of micrometer is well adapted for use wherever it is desired to measure the inside diameters of rings, cylinders and similar work of comparatively large size. It is especially useful where an extensive range of long measurements is re-

Finished wooden case can be furnished.

No. 263 Inside Micrometer

Range 1 to 2 Inches by Thousandths of an Inch

Has 2 Measuring Rods and Spacing Collar
Takes internal measurements from 1" to 2" by thousandths of an inch. Consists of a holder

with a ½" micrometer screw, two measuring rods and spacing collar. Has clamp screw.

With short measuring rod only, the tool will measure from 1" to 1½". By adding spacing collar this range is increased to 1½". With long measuring rod only, tool will measure from 1½" to 1¾". By adding spacing collar, measurements may be taken up to 2".

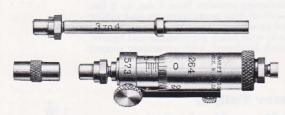
134". By adding spacing collar, measurements may be taken ap.

The measuring ends of the rods are hardened and are adjustable for wear. Inside Micrometer Handle No. 287, page 34, is very useful with this micrometer.

Case can be furnished.



Range 2 to 8 Inches by Thousandths of an Inch Has 6 Measuring Rods and Spacing Collar



Consists of holder with 1/2" micrometer screw and measuring rods. When rod is in position with shoulder against head, first half of inch can be measured (example, 3'' to $3\frac{1}{2}''$). When spacing collar is in place, last half of inch can be measured (example, $3\frac{1}{2}''$ to 4''). Ends of rods are hardened and adjustable for wear.

Adjustable measuring point of thimble permits adjustment of over-all length of micrometer head, which should be exactly 1.573" with micrometer set at 0. This is a desirable feature as this one point receives appreciably more wear than individual rods and it eliminates necessity of making separate adjustments on each of the rods. Has clamp screw.

Inside Micrometer Handle No. 287, page 34, is very useful with this micrometer. Case can be furnished.

No. 265 Inside Micrometer

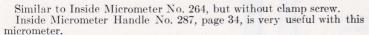
Range 2 to 12 Inches by Thousandths of an Inch Has 10 Measuring Rods and Spacing Collar

Similar to Inside Micrometer No. 264 except that the 10 measuring rods furnished increase its range. Has clamp screw.

Inside Micrometer Handle No. 287, page 34, is very useful with this micrometer. Case can be furnished.

No. 266 Inside Micrometer

Range 2 to 8 Inches by Thousandths of an Inch Has 6 Measuring Rods and Spacing Collar



Case can be furnished.

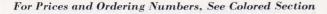
No. 267 Inside Micrometer

Range 2 to 12 Inches by Thousandths of an Inch Has 10 Measuring Rods and Spacing Collar

Similar to Inside Micrometer No. 266 except that the ten measuring rods furnished increase its range. Inside Micrometer Handle No. 287, page 34, is very useful with this micrometer.

Case can be furnished.

Each of the above packed one in a box.



No. 268 Telescoping Inside Micrometer

Range 2 to 6 Inches by Thousandths of an Inch Has 8 Measuring Rods



This Telescoping Inside Micrometer combines the advantages of a telescoping gage and an inside micrometer. When inserted in a hole or recess, the measuring point adjusts itself to the work and is locked in position by turning knurled knob at end of handle. The tool is withdrawn and the micrometer thimble is turned until it contacts the shoulder on the rod and micrometer reading is taken.

An important feature is the location of the handle near the fixed end in a most sensitive position for accurate measurement. The handle is $3\frac{3}{4}$ " long

The micrometer screw has a ½" movement and the measuring rods, which are interchangeable in a holder that telescopes in the micrometer barrel, measure from 2" to 6" by thousandths. Provision is made for adjustment for wear of measuring points.

> Case can be furnished. Packed one in a box.

No. 273 Tubular Inside Micrometer Set

7 Micrometers

English Measure Range 2 to 6 Inches by Thousandths of an Inch Metric Measure Range 50 to 150 Mm. by Hundredths of a Millimeter



Consists of Tubular Inside Micrometers Nos. 270 or 272. Furnished in finished wooden case.

Packed one set in a box.

Nos. 270 and 272 Tubular Inside Micrometers

No. 270

English Measure Range 2 to 12 Inches by Thousandths of an Inch No. 272

Metric Measure Range 50 to 300 Mm. by Hundredths of a Millimeter



Tubular Inside Micrometers are very light and convenient to handle.

They are designed for measuring by thousandths of an inch or hundredths of a millimeter inside diameters of rings and cylinders, setting calipers, comparing gages and work of a similar nature. They are fitted with micrometer heads having ½" or 1" movements (Metric, 13 mm. or 25 mm.). Measuring points are hardened and faces are ground on a radius, adapting them for measuring parallel or curved surfaces.

Fibre grips guard against inaccuracies due to heat of hand. Small sizes have one grip while larger sizes have two.

Each tool, with exception of size 2'' to $2\frac{1}{2}''$ or 50 mm. to 63 mm., is provided with clamp screw which clamps spindle and preserves setting.

	No. 270	
Range, Inches	Range, Inches	Range, Inches
*2 to 2½	$4\frac{1}{2}$ to 5	9 to 10
$2\frac{1}{2}$ to 3	5 to 6	10 to 11
3 to $3\frac{1}{2}$	6 to 7	11 to 12
$3\frac{1}{2}$ to 4	7 to 8	
4 to $4\frac{1}{2}$	8 to 9	•••••
	No. 272	
Range, Millimeters	Range, Millimeters	Range, Millimeters
*50 to 63	113 to 125	225 to 250
63 to 75	125 to 150	250 to 275
75 to 88	150 to 175	275 to 300
88 to 100	175 to 200	
100 to 113	200 to 225	

*Differs from cut. No Clamp Screw is furnished.

Inside Micrometer Handle No. 287 is very useful with the smaller sizes of these micrometers.

Packed as follows:-The two larger sizes, one in a tubular container; all others, one in a box.

No. 274 Tubular Inside Micrometer Set

13 Micrometers

English Measure

Range 2 to 12 Inches by Thousandths of an Inch

Metric Measure

Range 50 to 300 Mm. by Hundredths of a Millimeter

Consists of Tubular Inside Micrometers Nos. 270 or 272. Furnished in finished wooden case.

Packed one set in a box.

For Prices and Ordering Numbers, See Colored Section

No. 276 Tubular Inside Micrometers

Range 12 to 42 Inches by Thousandths of an Inch

3 Sizes:

12 to 22 Inches,

22 to 32 Inches,

32 to 42 Inches





Made for long inside measurements by thousandths of an inch. Due to their tubular construction, they are light and easy to handle. Measuring points are hardened and faces are ground on a radius, adapting them for measuring parallel or curved surfaces. Each tool has a clamp screw for locking spindle and preserving setting.

Range of measurements is obtained by 10 interchangeable

rods of different lengths. Each rod has means of adjustment for wear. Shoulders of rods fit against shoulder of micrometer head providing accurate measurements. Rods are held by clamp screw fitting into a V groove.

Each tool is furnished in finished wooden case with set of

Packed one set in a box.

No. 287 Inside Micrometer Handle

For Micrometers Nos. 263, 264, 265, 266, 267, 270 (2 to 5 Inches) and 272 (50 to 125 Mm.)



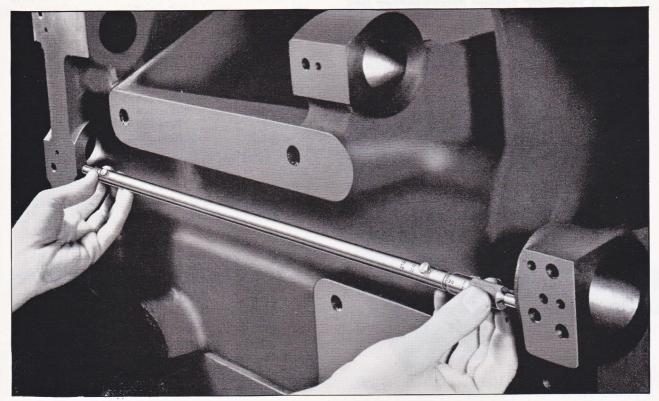
With this handle Inside Micrometers can be inserted in small holes for a greater distance than by the hand alone.

The hooked end of handle fits around body of micrometer

and the brass plug clamps handle tightly without marring the tool.

Handle is approximately $5\frac{3}{8}$ " long.

Packed one in a box.



Tubular inside Micrometer No. 276 provides for the accurate inside measurement of long distances on large work.

For Prices and Ordering Numbers, See Colored Section

Micrometer Heads

Brown & Sharpe Micrometer Heads are made with the same care and accuracy and of the same materials as other Brown & Sharpe Micrometers.

These Micrometer Heads are useful in making accurate set-

tings and close adjustments of cutting tools and other machine parts. They are designed to be attached readily to special gages, fixtures and attachments or installed as integral parts of machines.



Micrometer Heads serving as integral parts of machines accurately determine table or carriage movements as well as tool settings.

Nos. *290 and 290RS 1/2-Inch Micrometer Heads

English Measure—Measure by Thousandths of an Inch Metric Measure—Measure by Hundredths of a Millimeter



Illustration shows No. 290RS with Ratchet Stop

Length of shank $\frac{3}{8}$ inch or 9 mm. Diameter of shank $\frac{3}{8}$ inch or 9 mm. Spindle projects $\frac{9}{16}$ inch or 14.3 mm with micrometer set at zero. Head No. 290RS has ratchet stop.

*No. 290 furnished in English Measure only.

Nos. 291 and 291RS 1/2-Inch Micrometer Heads

Measure by Ten-Thousandths as well as Thousandths of an Inch

Length of shank $\frac{3}{8}$ inch. Diameter of shank $\frac{3}{8}$ inch. Spindle projects $\frac{9}{16}$ inch with micrometer set at zero. Head No. 291RS has ratchet stop.



Illustration shows No. 291RS with Ratchet Stop

Nos. *294 and 294RS 1-Inch Micrometer Heads

English Measure—Measure by Thousandths of an Inch Metric Measure—Measure by Hundredths of a Millimeter



Illustration shows No. 294RS with Ratchet Stop

Length of shank $\frac{3}{4}$ inch or 21 mm. Diameter of shank $\frac{3}{8}$ inch or 9 mm. Spindle projects $1\frac{1}{16}$ inches or 27 mm. with micrometer set at zero. Head No. 294RS has ratchet stop.

*No. 294 furnished in English Measure only

Nos. 295 and 295RS 1-Inch Micrometer Heads

Measure by Ten-Thousandths as well as Thousandths of an Inch

Length of shank ¾ inch. Diameter of shank ¾ inch. Spindle projects 1¼ inch with micrometer set at zero. Head No. 295RS has ratchet stop.



Illustration shows No. 295RS with Ratchet Stop

No. 296RS 1-Inch Heavy Micrometer Head

Measures by Thousandths of an Inch



Particularly suited for use with heavy machines and fixtures. Length of shank 1% inch. Diameter of shank 1% inch. Spindle projects 1% inches with micrometer set at zero. Has ratchet stop.

Each of the above packed one in a box.

Standards of Lengths

The Standards of Lengths which are in common use today are not units deliberately developed but an Anglo Saxon heritage adopted many years ago to eliminate the confusion caused by the employment of many different measurements and the absence of a uniform system.

The British yard is of ancient origin. In modern times a standard yard bar was legalized in 1824 by Parliament, but was destroyed by fire in 1834. The British Imperial Yard "Bronze No. 1" was then prepared and legalized in 1855. Forty copies were made and one of these "Bronze No. 11" was presented to the United States by the British Government. At the same time another copy, known as "Low Moor Iron No. 57" was sent to this country. Since 1893 the United States yard has been defined in terms of the meter.

The use of the metric system was legalized in this country in 1866. The International Prototype Meter and its copies, the National Prototype Meters, were completed in 1889 and two of these latter were sent to Washington. One of them, No. 27, was designated the U.S. Prototype Meter, and since 1893 it has been the Standard of Length in this country not only for the metric units of length, but also for the length units of the U.S. Customary System, the U.S. yard being defined as 3600/3937 part of a meter.

An important secondary standard of length is the wave length of red cadmium light which is .000000644 meter long. Wave lengths of many other useful radiations including the

important radiation of Mercury Isotope 198 have been compared with that of the red cadmium.

Standards were prepared for use in our own shops, the mean errors of which were found to be for the yard, .00002", and for the meter, .000005M., both being too long. These Standards have been subdivided with great care and accuracy, and our Rules and Vernier Tools are as nearly exact copies as expert mechanical skill, aided by machines especially designed for the purpose, can make them.

Our Master Line Standards and Master Gage Blocks are periodically checked at the Bureau of Standards and our measuring equipment and graduating machines are calibrated frequently and adjusted to these Masters.

The extreme care used in safeguarding the accuracy of our Standards is reflected in the corresponding accuracy and precision of all Brown & Sharpe Tools including Steel Rules, which must be uniformly dependable to provide reliable meas-

Brown & Sharpe Rules are made of the highest quality steel and are machine graduated. The Brown & Sharpe Mfg. Co. was among the first to manufacture such rules in America and our complete line includes many styles and sizes demanded by the mechanic. Brown & Sharpe Rules are exceptionally easy to read accurately because of the uniform width and depth of the graduation lines.

Graduations

Rules are divided into parts of an inch as follows:

Graduation	No. 4	No. 8	No. 9	No. 10	No. 11	No. 12
1st edge 2nd edge 3rd edge 4th edge	8ths 16ths 32nds 64ths	32nds 64ths 10ths 100ths	16ths 32nds 64ths	32nds 64ths	64ths 100ths	50ths 100ths

Metric Rules read by half-millimeters, millimeters or both.

End Graduations

Rules Nos. 300 and 315, 2" to 12" in length, and No. 320, 4" to 12" in length, with No. 4 Graduation have End Gradua-



tions reading to 32nds on two ends of one side. This feature is advantageous in measuring the depth and width of grooves, countersinks and recesses.

No. 300 Tempered Steel Rules

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	2	BROWNS CHURPE MEG CLUS. A 3	TEMPERED 4	800 5	91
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These rules are about 1/20th of an inch thick excepting the 48" which is about 1/10th of an inch thick.

No.	Length,	Approx.	*Number of
	Inches	Width, In.	Graduation
300	6 12 24 36 †48	$ \begin{array}{c c} & 1 \\ & 1 \\ & 31/32 \\ & 1 \\ & 1 \frac{1}{2} \end{array} $	4 4 4 4 4

†Not tempered. *No. 4, 8ths, 16ths, 32nds and

No. 301 Tempered Steel Rules

Metric Measure

These rules are about 1½ mm. thick. First edge graduated in ½ mm. and remaining three edges in mm.

No.	Length, Centimeters	Approximate Width, mm.
301	15 30	17 25

No. 303 Narrow Tempered Steel Rules

No.	Length, Inches	*Number of Graduation
202	4	10 10 or 11
303	12	10 01 11

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These rules are a	bout 1/20th of an	inch thick and	about 7/32nds of an

*No. 10, 32nds and 64ths; No. 11, 64ths and 100ths.

No. 304 Narrow Tempered Steel Rules

Metric Measure

These rules are about 11/2 mm. thick and about 51/2 mm. wide. Graduated on one edge of each side only.

No.	Length, Centimeters	Graduations
304	15 30	1st edge: $\frac{1}{2}$ mm. 2nd edge: mm.

Each of the above packed six in a box, except 24" to 48" which are packed one in a package.

No. 306 Flexible Steel Rules

No.	Length,	Approx.	*Number of
	Inches	Width, In.	Graduation
306	6	1/2	10, 11 or 12
	12	1/2	10

*No. 10, 32nds and 64ths; No. 11, 64ths and 100ths; No. 12, 50ths and 100ths.

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These rules are tempered and are are about 1/64" thick. Graduated on both edges of one side only.

Leather Case can be furnished for 6" Rule.

No. 306A Flexible Steel Rule

This rule is tempered. 6" length only, with No. 10 graduation, 32nds and 64ths. Has figured graduations. The 32nds are numbered every 4th graduation and the 64ths every 8th graduation as shown at right. Rule is approximately ½ wide and ½ thick.

Leather Case can be furnished.

98 et 0+ 28 +3 97 8 95 et 0+ 28 +8 97 Tempered 5 306A 4 8 12 15 20 84 88 4 8 18 16 60 84 No 10 4

No. 306C Flexible Steel Rule

This rule is tempered. Made in 6" length only. Has No. 9 Graduation, 16ths and 32nds on one side, and 64ths on one edge of the other side as shown at right. Rule can be turned over quickly from one graduation to the other without turning end for end. Has figured graduations. The 32nds are numbered every 4th graduation and the 64ths every 8th graduation. Rule is approximately ½ wide and ½ thick.

Leather Case can be furnished.

64 1 B.&S.Nig Co. 2 Prov. R.I. U.S.A. 3 4 Tempered 5 306 C 3 16 24 32 40 48 56 8 18 24 32 40 48 56 8 18 24 32 40 48 58 8 18 24 32 40 48 56 8 18 24 32 40 48 56 8 18 24 32 40 48 56 8 18 24 32 40 48 56 8 18 24 32 40 48 56

No. 307 Flexible Steel Rules

No.	Length, Centimeters	Graduations
307	15 30	$\begin{array}{c} \text{1st edge: } \frac{1}{2} \text{ mm.} \\ \text{2nd edge: mm.} \end{array}$

Metric Measure

These rules are about ½ mm. thick and 13 mm. wide and are tempered. Graduated on both edges of one side only.

Leather Case can be furnished for 15 cm. rule.

No. 311 Flexible Steel Rule

This rule is tempered. Made in 6" length only with No. 8 graduation—32nds and 64ths on one side and 10ths and 100ths on the other. Has figured graduations. 32nds are numbered every 4th graduation, 64ths every 8th graduation, the 10ths every graduation and the 100ths every 10 graduations.

This permits measurements to be taken in fractions of parts of an inch up to 6" on one side of the rule and in decimals on the other.
Rule is approximately ½" wide and ¼4" thick.

Leather Case can be furnished.



4 8 12 16 20 24 28	4 8 12 15 70 24 28 4 8 12 16 20 24 28 4 8 12 5 20 24 28 4 8 12 16 20 24 28 4 8 12 16 20 24 28
	2 3 4 5
947HS 9 16 24 ³² 40 48 56 Helstelebelskelskelskelskelskelskelskelskelskelsk	B IR 24 32 40 48 58 B 18 24 32 40 48 58 B 16 24 32 40 48 58 B 16 24 34 40 48 55 B 18 24 34 48 55 B 18 24 34 48 35 B 18 24 34 34 34 34 34 34 34 34 34 34 34 34 34

No. 315 Tempered Steel Rules

No.	Length, Inches	Approx. Width, In.	*Number of Graduation
	2 3	35/64 35/64	4 4
315	4 6	19/32 11/16	4 4
	12 24	1	4

*No. 4, 8ths, 16ths, 32nds & 64ths.

64 1	2 months	Secretary 3	TEMPERED 4	315 5	8 16 24 32 40 48
9 16 24 32 40 49 56	8 16 24 32 40 48 56 B 16 2	24 32 40 48 56 8	16 24 32 40 48 56	8 16 24 32 40 48 56	

Have figured graduations. The 64ths are numbered every 8th graduation, as 8, 16, 24, etc. These rules are about 1/20th of an inch thick.

Each of the above packed six in a box, except 24" which is packed one in a package.

No. 320 Tempered Hook Rules



No.	Length,	Approx.	*Number of
	Inches	Width, Inches	Graduation
320	6 12	11/16	4 4

*No. 4, 8ths, 16ths, 32nds and 64ths.

Furnished in Metric Measure in 15 cm. and 30 cm. sizes when specified. Packed six in a box.

These tempered rules have a sliding hook which makes possible accurate measurements from shallow shoulders. They are also very convenient in taking measurements of flanges or circular pieces or through the hubs of pulleys or gears. Handy for setting calipers and dividers and taking measurements from points where the user cannot see if the rule is even with the measuring

Rules are furnished with figured graduations and with end graduations. The thickness of these

rules is about 1/20th of an inch.

No. 325 Narrow Tempered Hook Rules



These narrow rules enable user to take measurements through holes as small as 3/8" in diameter. They are about 1/20th of an inch thick.

No.	Length,	Approx.	*Number of
	Inches	Width, In.	Graduation
325	6	7/32	10
	12	7/32	10

*No. 10, 32nds and 64ths. Furnished with metric graduations when ordered. Packed six in a box.

No. 335 Steel Rules with Holder











Rules for No. 335

Length,	No. of
Inches	Graduation
1/4	10
3/8	10
1/2	10 or 12
3/4	10
1	10 or 12

Rules and Holder also may be furnished as separate items.

5 Rules Interchangeable in One Holder

Lengths 1/4", 3/8", 1/2", 3/4" and 1"

Convenient where ordinary rule cannot be used as in measuring a recess or keyway and for general tool and die work.

Rules are held in a split chuck adjusted by knurled nut at the top of holder and can be set at various angles.

The rules are of tempered steel, graduated on both sides. Graduations No. 10—32nds and 64ths; No. 12—50ths and 100ths. Rules furnished in sets all have No. 10 Graduation. Furnished in leatherette case.

Packed, complete, one set in a box.

Nos. 340, 341, 342, 343, 344 and 345 Tempered Steel Shrink Rules

1		Y	2	B SWINS	7	3 8	0.1	11
11	10	8.	** ***	request of	2024			
	1,0	8	1	В	5	4,	2 3	1,
di		11 11111	a data			0.11.11.11.11		

No.	Shrink per Foot, Inches	Length, Inches	Width, Inches	*Number of Graduation
340	1/10 1/10	$12^{1/_{10}}$ $24^{1/_{5}}$	1 1	4 4
341	1/8 1/8	12½ 24¼	1 1	4 4
342	3/16 3/16	$\begin{array}{c} 12\frac{3}{16} \\ 24\frac{3}{8} \end{array}$	1 1	4 4
343	1/4 1/4	$ \begin{array}{c c} 12\frac{1}{4} \\ 24\frac{1}{2} \end{array} $	1 1	4 4
344	5/16 5/16	$\begin{array}{c c} & 12\frac{5}{16} \\ & 24\frac{5}{8} \end{array}$	1	4 4
345	5/32 5/32	$\begin{array}{c} 12^{5} \\ 24^{5} \\ 16 \end{array}$	1	4

*No. 4, 8ths, 16ths, 32nds and 64ths.

12" inch Rules packed six in a box; 24" Rules, one in a package.

Shrink rules are graduated to give shrinkage allowances directly.

The allowance necessary for shrinkage varies for different metals and the different conditions under which they are cast. For castings where the thickness runs fairly uniform, cast under ordinary conditions, the following allowances can be made:

For Cast Iron. per ft. Brass, " " Steel. Malleable Iron, Zinc, " " Tin, 66 Aluminum, Britannia,

The above table gives the standard shrinkage of different metals, but some consideration must be given to the size and shape of the casting. Thick castings will shrink less, under the same conditions, and thinner ones more than the standard. The quality of the material and the manner of molding and cooling also will make a difference in shrinkages.

No. 350 Stainless Steel Rules

No.	Length, Inches	Approx. Width, Inches	*Number of Graduation
250	6	11/16	4
350	12	1	4

*No. 4, 8ths, 16ths, 32nds and 64ths.

These tempered rules are made of Stainless Steel, a protection against rusting and staining.

1	STAINLESS 2	BY THE THE PARTY AND THE PARTY IN SA 3	NEAPERED 4	350 5	91

Packed six in a box

No. 356 Flexible Stainless Steel Rule

This tempered rule is made of Stainless Steel, a protection against rusting and staining. Mechanics find in this rule all the fine qualities they desire in a pocket rule. Stainless Steel does not have the lively spring temper of regular Carbon Steel and will not withstand sharp bends, but this rule is sufficiently flexible for all reasonable requirements. Leather Case can be furnished.

32 1 B	ESMRO 2 ProvRIUSA 3	Tempered No.10 4 Stainless	356 5
No.	Length, Inches	Approx. Width, Inches	*Number of Graduation
356	6	1/2	10

*No. 10, 32nds and 64ths.

Packed six in a box.

No. 377 Key Seat Clamps



For laying out keyways and scribing parallel lines on circular pieces. Easily put on and taken off of steel rules. Can be used also on combination square blades and straight edges (except Beveled Steel Straight Edges).

Packed one pair in a box, 6 boxes in a carton.

No. 385 Slide Caliper Rule



For measuring small rods, tubing and sheet stock, this tool is very desirable as the slide enables the user to get quick measurements.

Rules are 4%'' long, 1%'' wide and about 1%'' thick, graduated on both edges in 32nds of an inch. The jaws are about 3%'' deep.

Packed six in a box.

No. 388 Pocket Slide Caliper Rule

English Measure or Metric Measure



English Measure. Rules are 3" long, $\frac{11}{16}$ " wide and about $\frac{1}{8}$ " thick. One edge is graduated in 32nds and the slide in 64ths for $2\frac{1}{2}$ ". The jaws are $\frac{5}{8}$ " long and, when open, measure up to 2".

Metric Measure. Rules are 75 mm. long, 17 mm. wide and about 3 mm. thick. One edge is graduated in mm. and the slide in $\frac{1}{2}$ mm. The jaws are about 15 mm. long and meas-



ure up to 50 mm.

These rules accurately measure inside and outside diameters. The nibs of the jaws can be inserted in holes as small as $\frac{1}{8}$ " or 3 mm. in diameter.

The clamp nut locks the slide and holds it set for any particular measurement. The button on the slide aids in opening and closing the jaws.

Packed six in a box.

No. 391 Steel Caliper Rules

No.	Length	Gradus	ations
391	3" 4"	1st edge 2nd edge 3rd edge 4th edge slide	$\begin{array}{c} 8\\ 16\\ 32\\ 64\\ 32 & 64 \end{array}$

Furnished to order chromium plated.

Packed six in a box.



Convenient for use in the stock room, in selecting sheet or bar stock, wire and tubing.

The slide of the 3" rule can be drawn out to measure $2\frac{1}{4}$ ", and the slide of the 4" to measure $3\frac{1}{4}$ ".

Nos. 400 to 460

Combination Squares, Combination Sets and Protractors

BROWN & SHARPE Combination Squares and Sets are well made and adaptable to a great many uses. The unhardened heads are of cast iron. The hardened heads are drop forged and are light, durable and convenient. The revolving turrets in the protractors are fitted nicely and graduated to 90 degrees either side of zero. They can be set at any angle and clamped rigidly by a thumb nut.

The reversible bolt is an exclusive and very convenient Brown & Sharpe feature. It permits either side of the blade to be used as desired. The knurled tip on the bolt permits the bolt to be reversed without removing it from the head.

The round clamping groove allows the blades to be inserted quickly in the heads. The bolt forces the blade against the bottom of the slot, square with the face of the head, and the blade

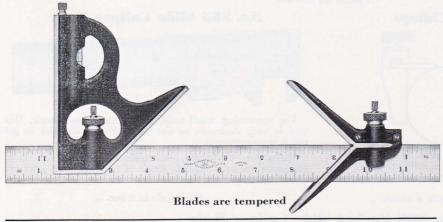
groove presents no sharp corners to collect dirt and interfere with the accuracy of the tool.

Levels are furnished on square heads and protractors.

Hardened steel scribers are furnished also for use with square heads. Scribers are inserted in holes in heads when not in use.

The square heads have wide surfaces and, together with the blade, make excellent try squares. With the blade, the square heads can be used as depth or height gages, and the 45 degree angle finds frequent use. The ends of the center heads are ground and can be used on work of large diameter.

The blades are tempered and graduated with the same care and accuracy as our steel rules. All parts of the same size are interchangeable.

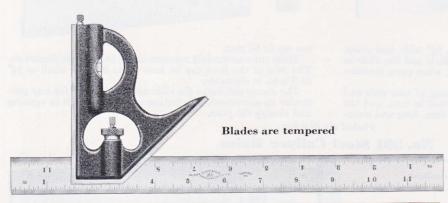


Nos. 400 and 402 Combination Squares

With Head	s Hardened	With Heads r	ot Hardened
No.	Size	No.	Size
400 English	6 inch 12 '' 24 ''	402 English	6 inch 9 " 12 " 24 "

GRADUATION

Nos. 400 and 402	No. 4
1st edge	8
2nd edge	16
3rd edge	32
4th edge	64



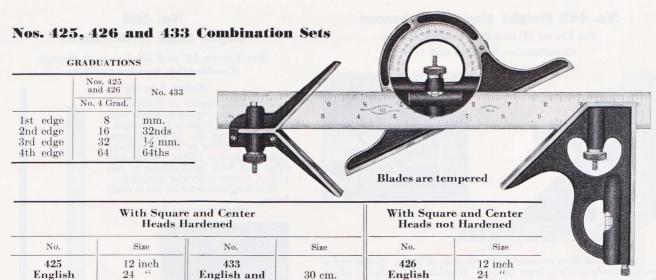
Nos. 401 and 403 Combination Squares

With Heads not Hardened With Heads Hardened Size No. Size 403 6 inch 401 6 inch 12 English 12 English " " 24 24

Each of the above packed one in a box.

GRADUATION

Nos. 401 and 403	No. 4
1st edge	8
2nd edge	16
3rd edge	32
4th edge	64



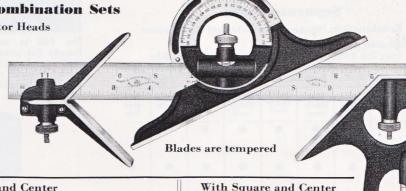
English 24 " English and Metric 30 cm. English

Nos. 438, 439 and 446 Combination Sets

With Reversible Protractor Heads

GRADUATIONS

m.
nds
mm.



		re and Center Hardened		With Square Heads not	
No.	Size	No.	Size	No.	Size
438 English	12 inch 24 "'	446 English and Metric	30 cm.	439 English	12 inch 24 "

Nos. 450 and 454 Protractors

No.	Size	No.	Size
450 English	12 inch 24 "	454 English and Metric	30 cm.



Nos. 456 and 460 Protractors

With Reversible Protractor Heads Blades are tempered

No.	Size	No.	Size
456 English	12 inch 24 "	460 English and Metric	30 cm.

Illustration shows No. 450 (12")

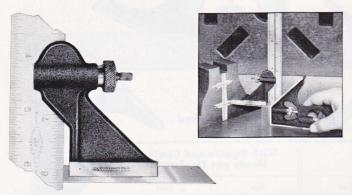
GRADUATIONS

	Nos. 450 and 456 No. 4 Grad.	Nos. 454 and 460
1st edge	8	mm.
2nd edge	16	$32 \mathrm{nds}$
3rd edge	32	$\frac{1}{2}$ mm.
4th edge	64	64ths

Each of the above packed one in a box.

No. 465 Height Gage Attachment

For Use on 12" and 24" Brown & Sharpe Combination Squares and Sets



Can be used from extreme top to bottom of blade. Inside end of pointer blade projects from body of Attachment to edge of blade, facilitating accurate reading of height of pointer. Frame is drop forged. Pointer is high quality steel, hardened, tempered and ground.

Packed one in a box.

Separate Parts

For Combination Squares and Sets and Protractors

Parts indicated are sold separately.

Blades have No. 4 Graduation, 8ths, 16ths, 32nds and 64ths.

	Blades	Square	Heads	Center	Heads	Protra	actors
Size	Tem- pered	Not Hard- ened	Hard- ened	Not Hard- ened	Hard- ened	Plain	Re- vers- ible
6"	•	•	•	•	•		
9"					oun esi	anilli .	
12" or 30 cm. *12" (Fig.	•	•	•	•	•	•	•
Grad.) 24"	A SECTION		Carry de	min/2	ISTW -		

Scribers and Level Glasses can be furnished.

*Blade has No. 4 Graduation with 32nds numbered every 4th graduation, as 4, 8, 12, etc., and the 64ths every 8th graduation, as 8, 16, 24, etc. In ordering, specify 12" Blade with Figured Graduations.

No. 468 Depth Gage Attachment

For Use on 12" and 24" Brown & Sharpe Combination Squares and Sets

Range, 0 to 41/2"

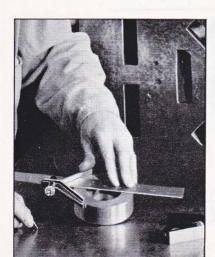
These attachments are particularly useful in measuring the depths of wide recesses. The frame is drop forged.

6" blade has No. 10 Graduation, 32nds and 64ths or No. 11 Graduation, 64ths and 100ths. Blade with 32nd and 64th graduations is furnished, unless otherwise specified.

Rod is \%4" diameter for use in small holes.

Packed one in a box.





Finding center line of round work is one use for Combination Squares.



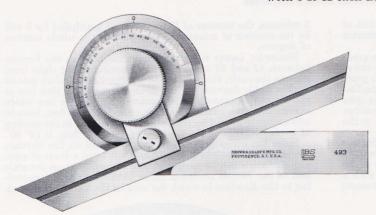
A Combination Square makes a very convenient depth gage.



Angles are determined quickly and accurately with a Protractor.

No. 493 Bevel Protractor

With 6 or 12-inch Blade



Adapted for all classes of work where angles are to be laid out or established which do not require such a fine degree of accuracy as is possible with a Protractor having a Vernier.

One side of the tool is flat, thus permitting it to be laid flat upon the paper or work.

The dial is graduated accurately in degrees over an arc of 180° reading 0 to 90° from each extremity of the arc. It turns on a large central stud, which is hardened and ground. After setting has been made, dial is clamped easily and rigidly in position by large diameter thumb nut.

The blade is about $\frac{1}{16}$ " thick, can be moved back and forth its entire length and clamped independently of the dial.

Extra blades can be furnished. Case can be furnished.

No. 495 Universal Bevel Protractor

With 6 or 12-inch Blade

Protractor No. 495 is well adapted for all classes of work where angles are to be laid out or established. One side of the tool is flat, thus permitting it to be

laid flat upon the paper or work.

The dial is graduated accurately in degrees through a complete circle. The swivel turns on a large central stud which is hardened and ground. After setting has been made dial is clamped easily and rigidly in position by large diameter thumb nut.

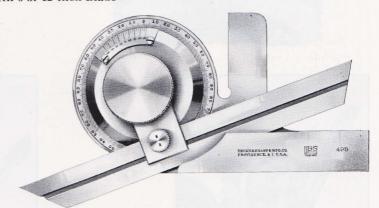
The graduations are below the surface, protecting

them from wear.

The Vernier adds materially to the use of the protractor in obtaining fine measurements. It reads to 5 minutes or $\frac{1}{12}$ of a degree.

The blade is about 1/6" thick, can be moved back and forth its entire length and clamped independent-

ly of the dial.

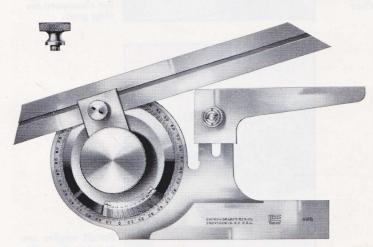


Extra blades can be furnished. Case can be furnished.

No. 496 Universal Bevel Protractor

With Acute Angle Attachment

With 6 or 12-inch Blade



The Universal Bevel Protractor with Acute Angle Attachment is designed for all classes of work where angles are to be laid out and, with the attachment, extremely small angles can be established easily and quickly. Alignments are correct and workmanship throughout the best.

One side of the tool is flat, thus permitting its being laid flat upon the paper or work. The dial is graduated accurately in degrees through a complete circle. The graduations are below the surface protecting them

from wear.

A Vernier, which reads to 5 minutes or one twelfth of a degree, adds materially to the fineness to which angles can be laid out. A small thumb pinion is furnished for securing extremely fine adjustments. It is inserted in the back of the protractor and engages with a gear which swings the dial in either direction. After setting has been made dial is clamped easily and rigidly in position by large diameter thumb nut.

The blade is about ½" thick, can be moved back and forth its entire length and clamped independently of the

dial.

Extra blades can be furnished. Case can be furnished.

Each of the above packed one in a box.

For Prices and Ordering Numbers, See Colored Section

Reading the Vernier

On Universal Bevel Protractor

The Vernier indicates every 5 minutes (5') or one twelfth of a degree. Each space upon the Vernier is 5 minutes shorter than two spaces on the scale.

When the zero on the Vernier exactly coincides with a graduation on the scale, the reading is in exact degrees, as in cut at lower left in which the reading is 17° 0′. When the zero graduation of the Vernier does not exactly coincide with a graduation on the scale, the graduation on the Vernier that does coincide with a graduation on the scale indicates the number of 12ths of a degree or units of 5 minutes to be added to the whole degree reading.

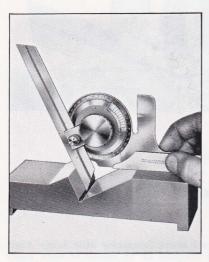
Read off directly from the scale the number of whole degrees between 0 on the scale and 0 on the Vernier. Then count, in the same direction, the number of divisions from the 0 of the Vernier to the first line on the Vernier that coincides with a line on the scale. As each division on the Vernier represents 5 minutes, the number of these divisions multiplied by 5 will be the number of minutes to be added to the whole number of degrees.

Example: Lower right cut shows the zero on the Vernier between 12 and 13 on the scale. Counting to the right from zero on the scale, the zero on the Vernier has therefore moved twelve whole degrees. In the same direction the 10th line of the Vernier, representing 50 minutes (50'), is the line which exactly coincides with a line on the scale. We, therefore, have 50 minutes as indicated by the Vernier, to be added to the reading of twelve degrees on the scale. The reading, then, is 12° 50'.

of twelve degrees on the scale. The reading, then, is 12° 50°. Since the divisions, both on the scale and on the Vernier, are numbered both to the right and left from a basis of zero, any size angle can be measured, and the readings on the scale and on the Vernier are taken either to the right or left, according to the direction in which the zero on the Vernier is moved.



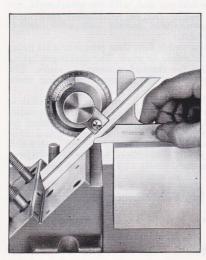




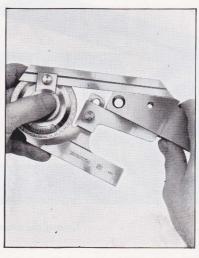
Bevel Protractor measures angle and determines its relationship to other surfaces.



Bevel Protractor measuring angular clearance on ring gear.



Bevel Protractor used with a test block to measure fixture angle.



Small angles are measured easily with the acute angle attachment furnished with No. 496.



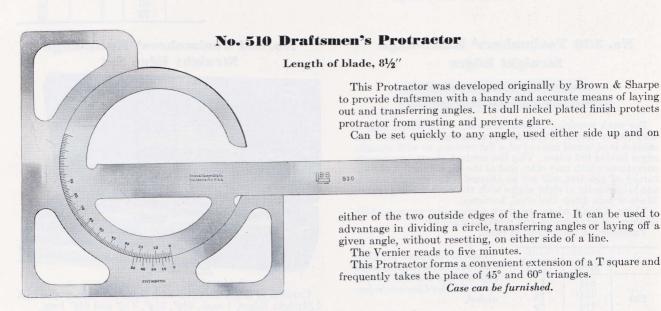


Case of this bevel is $3^{\prime\prime}$ long. Both the case and the tongue are $1^{\prime\prime}_{32}^{\prime\prime}$ wide. The long slot in the case and the special off-set tongue are advantageous for certain settings.



With this tool it is possible to transfer any angle from one surface to another. It can be used, also, for laying out angles as the back of the tool is smooth and can be laid flat on the work.

The body of the tool is 4" long. The slotted blade swings on a stud to any angle and is clamped in position on body by a knurled nut. The auxiliary blade can be attached quickly to the slotted blade and, also, clamped in position by knurled nut. One end of the body is square and the other end is beveled to 45°. The auxiliary blade is beveled on one end to 60° and on the other end to 30°.



Each of the above packed one in a box.

Straight Edges

Brown & Sharpe Straight Edges are unexcelled for use in accurately drawing straight lines and for checking surfaces for straightness. They are made carefully on specialized equipment and each straight edge is checked for conformity to a master. Only the highest grade of tool steel is used.

Larger sizes are marked at two balancing points with arrows. Straight Edges so marked should be suspended at these points to preserve their accuracy and counteract any tendencies toward deflection caused by their length and weight.

In the manufacture of Straight Edges, exact conformance to the figures specified in the tables showing their general characteristics is not required by the usage of the Straight Edges. Accordingly some slight variation can be expected from the dimensions in the tables included in their listings.

No. 526 Beveled Steel Straight Edges



Made straight on beveled edge. Thickness of each size proportioned for rigidity. One edge only beveled. Beveled edge ½" in thickness. Thirty-six inch and larger sizes have balancing points. Not hardened.

Packed one in a package.

No.	Length, Inches	Width (Approx.), Inches	Thickness (Approx.), Inches
526	12 24 36 48 60 72	1 3/8 1 15/6 2 15/6 2 15/6 3 3	3/16 7/32 9/32 9/32 9/32 5/16

No. 527 Hardened Steel Straight Edges



Hardened on edges. Will not bruise or wear easily. Especially useful for hard and continuous service. 39" size has balancing points. Packed one in a package.

No.	Length, Inches	Width (Approx.), Inches	Thickness (Approx.), Inches
527	37/8 7 133/4 20 27 39	15/6 13/8 21/6 27/8 3	1/16 5/64 5/64 7/64 7/64

No. 528 Standard Steel Straight Edges



For machinists' and shop use. Not hardened. Sizes 36" and larger have balancing points.

Packed one in a package.

No.	Length, Inches	Width (Approx.), Inches	Thickness (Approx.), Inches
528	6	1	564
	12	1 ¹ / ₄	564
	18	1 ³ / ₄	564
	24	1 ³ / ₄	564
	36	2	332
	48	2 ¹ / ₂	332
	60	3	764
	72	3	764

No. 530 Toolmakers' Knife-Edge Straight Edges



For work requiring extreme accuracy. The testing edge is very narrow and is of semicircular cross section so that a line contact is obtained instead of a flat contact, as with straight edges having flat edges. This line contact shows any minute curvatures which may exist, and as the edge is curved, the accuracy of the test will not be affected if the straight edge is not held exactly at right angles with the surface being tested. Made of high grade tool steel, hardened.

These straight edges are given a seasoning process which removes internal strains and prevents warping.

Furnished in cloth-covered cases.

No.	Length (Approx.), Inches	Width (Approx.), Inches
530	2½ 3½ 4½	13/16 13/16 13/16

Case for complete set, Cloth Covered Case for single straight edge or Glass Test Bar in Imitation Leather Case can be furnished

Packed one in a box.

No. 531 Toolmakers' Knife-Edge Straight Edge Set



Set furnished complete in case.

Consists of Glass Test Bar with imitation leather case and 4 Straight Edges, 1 each, $2\frac{1}{4}''$, $3\frac{1}{4}''$, $4\frac{1}{2}''$ and $6\frac{1}{4}''$ long.

Packed one set in a box.

Squares

Brown & Sharpe Squares are fine precision tools and are true right angles, both inside and outside. Their manufacture entails the use of many special machines, fixtures and processes. Beams and edges of blades are ground accurately for straightness and parallelism. Only the highest grade tool steel is used in their manufacture. Before the squares are assembled the blades are seasoned in order to remove internal strains and prevent inaccuracies from developing in the finished tool. Special equipment is used when inspecting the squares.

As the sides of the blades are not working surfaces they are

not held precisely at right angles with the bottom of the beams and, in using a square, blade should be held flat against work so that the face and not a corner of blade contacts the work. This eliminates the possibility of error which might be caused by any slight lateral deviation of blade.

In the manufacture of Squares, exact conformity to specified sizes for the length of blade and beam and width of blade as given in the tables listing these tools is not required and as a consequence slight deviations from figures given can be expected. This in no way effects the usefulness of the Square.

No. 540 Hardened Steel Squares

	Beams and edges of blades are hardened. The length of blade, as given, is from the inner edge of beam to end of blade.
	Substantial wooden case can be furnished.
•	

No.	Length of Blade (Approx.), Inches	Length of Beam (Approx.), Inches
	3 41/2	27/6 39/6
540	6 12	$\frac{4\frac{3}{8}}{7\frac{1}{8}}$
	18	$10\frac{1}{4}$

No. 541 Hardened Steel Squares

541 BROWNE SWAPE MECO.

PROVIDENCE, N. I., U.S.A.

BS

The construction of these squares is very rigid. Beams and edges of blades are hardened. Length of blade, as given, is from the inner edge of beam to end of blade

Furnished in substantial wooden case unless otherwise ordered.

No.	Length of Blade (Approx.), Inches	Length of Beam (Approx.), Inches
541	24 36	13½ 19½

Each of the above packed one in box.

No. 542 Hardened Steel Squares with Beveled Edges



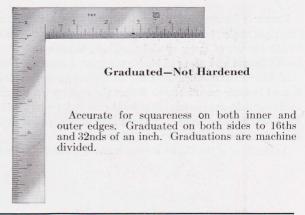
For all classes of work where the requirements are most exacting. The blades are beveled on both edges of each side, furnishing practically a line contact with the work. The beams and edges of the blade are hardened. Length of blade, as given, is from inner edge of beam to end of blade.

Substantial wooden case can be furnished.

No.	Length of Blade (Approx.), Inches	Length of Beam (Approx.), Inches
542	3 4½ 6	27/16 39/16 43/8

Packed one in a box.

No. 547 Thin Steel Square



No.	Length of Blade (Approx.), Inches	Width of Blade (Approx.), Inches
547	6	1

Packed six in a box.

No. 550 Steel Square for Millwrights

Not Hardened

Designed to meet the wants of those desiring a more accurate tool than the ordinary carpenters' square.

> Long blade, 24" long, 2" wide (approx.) Short blade, 18'' long, $1\frac{1}{2}''$ wide (approx.)

Inner and outer 90° angles are accurate. Graduations are machine divided

and are made heavy for easy reading.

Both blades are $\frac{1}{8}$ " thick at the corner where they unite, and taper down to $\frac{1}{6}$ " at their ends. They have similar graduations on both sides, one inside and outside edge being graduated in 8ths and the other inside and outside edge graduated in 16ths. One inside and outside edge of each side has the last inch graduated in 64ths and the preceding inch in 32nds.

Packed one in a package.

No. 552 Die Makers' Square

Die clearances are measured easily with this tool. It is also very useful to the patternmaker for determining drafts on patterns.

Blade is locked in position by small clamp screw and can be set for any angle up to 8° either side of zero. The graduations show the setting in degrees.

Clamp screw on back of square locks setting.
Straight blade is 2½" long, graduated for one inch on each end, in 32nds of an inch on one side and in 64ths on the other Blade is 1/32" wide except for $\frac{5}{8}$ " on one end where it is narrowed to $\frac{7}{64}$ " for use in small holes and narrow dies.

Offset blade is used where it would be impossible to sight the straight blade. The offset end is ½8" wide, and beveled on both sides of each edge. The remainder of the blade, ½2" wide, fits into the body of the square.

The body of the square, approximately $2\frac{1}{4}$ " x 5/8" x 3/8", is hardened and ground.

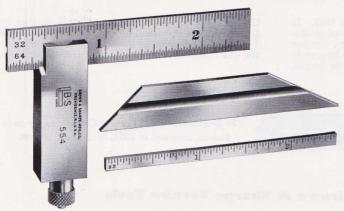
Packed one in a box.



Offset blade gives unobstructed view.



No. 554 Adjustable Square

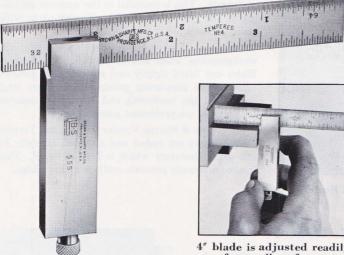




Adjustable feature adapts square for a wide variety of uses.

Useful to toolmakers on small work. Blades may be adjusted to any point within their length and used where it would be impossible to use a fixed blade. Blades are held accurately in body and are reversed readily.
Wide blade, 2½" long, is graduated on one side, one edge

in 32nds and the other in 64ths. Blade with beveled ends is extremely useful for establishing 60° and 45° angles, and for checking angles or thread tools. Narrow blade, 1/8′ wide, is graduated on one side in 32nds. All blades are tempered. Beam is hardened and ground.



PROPINE SHARFE MINGCO.

4" blade is adjusted readily for small surfaces.

No. 555 Adjustable Square

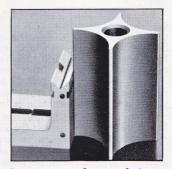
No. 555 Adjustable Square is particularly useful to toolmakers and to others requiring a reliable square with a 4" adjustable blade. The blade may be adjusted to any point within its length and used where it would be impossible to use a square with a fixed blade. The blade is held firmly in the body in accurate alignment and is reversed readily. Furnished with the one square blade as shown.

Blade has No. 4 graduation, 8ths, 16ths, 32nds and 64ths and is tempered The beam is $2\frac{7}{16}$ long and is hardened and ground.

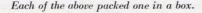


The design of this surface plate square gives it many advantages. It is substantial and strong and of a form most convenient for use on a surface plate Its one piece construction is not subject to changes from handling and from small variations in temperature. The weight and shape are such that it is not upset easily.

This square is made of hardened steel 4" high and is approximately 215/16" between opposite edges. Both ends are square with all four edges.



Square can be used in a number of positions for a variety of uses, with either end resting on the surface plate.



Principle of the Vernier

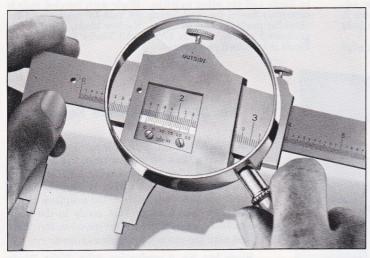
The Vernier was invented by Pierre Vernier in 1631. It consists of a small scale having a certain number of graduations which equals, in combined length, a different number of graduations, usually one more or one less, on the long scale of the tool. It is evident that if, in the same extreme length,

the Vernier has divisions greater or less in number by one than the scale, there is a small difference between a division on the Vernier and a division on the scale. The readings depend upon the difference between the Vernier and the scale divisions.



The first and original Vernier Caliper, so far as is known, invented in 1851, by Jos. R. Brown.

Features of Brown & Sharpe Vernier Tools



Fine, Clean Cut Lines mean Accurate Settings and Readings

Brown & Sharpe Vernier Tools of all styles have machine-divided graduations which are extremely accurate in their spacing. The lines are cut evenly, not etched, and are narrow and of uniform width and depth. This is essential to the accurate matching of the graduations on the Vernier plate with those on the scale.

Great care is taken in the selection of materials, workmanship, finish and inspection. The Vernier Slides are fitted tightly and smoothly to prevent error at the measuring points. Figures are read easily and the hardening and lapping of measuring surfaces are performed painstakingly.

All Brown & Sharpe Vernier Calipers and Vernier Height Gages are tested and adjusted carefully in our gage laboratory which is kept at 68° F. This insures uniformly accurate settings and readings.

Reading the Vernier-English Measure

Cuts show the Vernier used with a scale which is graduated into 40ths or .025ths of an inch. The Vernier has 25 divisions which are numbered every 5th division and which equal, in extreme length, 24 divisions on the scale, or $24 \times 1/40'' = 24 \times .025'' = .600''$. Thus, one division on the Vernier equals 1/25 of .600'' = .024''. Therefore, the difference between a division on the Vernier and a division on the scale = .025'' - .024'' = .001''.

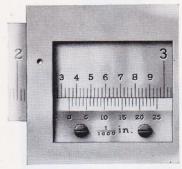
When the reading is exact, with respect to the number of fortieths of an inch, the zero on the Vernier coincides with a graduation on the scale—either inch, tenth or fortieth, as the case may be. This leaves a space between lines on the scale and the 1, 2, 3, 4, 5, 6, etc. lines on the Vernier of .001", .002", .003", .004", .005", .006", etc., respectively, the difference increasing .01" at each Vernier division in numerical order until, at the 25th graduation, the lines again coincide (see upper cut).

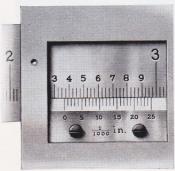
Thus, when the 1st, 2nd or 3rd, etc. line on the Vernier coincides with a line on the scale, the zero on the Vernier has moved 1, 2 or 3, etc. thousandths of an inch past the previous fortieth graduation to bring these lines together.

To read—Note the inches, tenths and fortieths of an inch that the zero on the Vernier has moved from the zero on the scale and to this reading add the number of thousandths indicated by the line on the Vernier that coincides with a line on the scale.

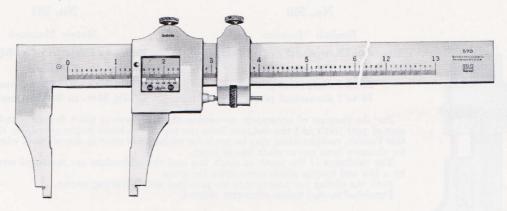
Example:—The upper cut shows the zero graduation on the Vernier coinciding with a fortieth graduation on the scale (the second fortieth beyond an even tenth graduation). This indicates that the reading is exact with respect to the fortieths of an inch. The reading therefore equals $2.000^{\prime\prime}+.300^{\prime\prime}+.050^{\prime\prime}=2.350^{\prime\prime}$. The lower cut, however, shows the 18th Vernier graduation coinciding with a line on the scale. This indicates that .018" should be added to the scale reading. The reading, then, equals $2.000^{\prime\prime}+.300^{\prime\prime}+.050^{\prime\prime}+.018^{\prime\prime}=2.368^{\prime\prime}$.

Verniers with 25 divisions are used, for English Measure, on all Brown & Sharpe Verniers with the exception of Gear Tooth Verniers No. 580, 20 to 2 diametral pitch, on which Verniers with 20 divisions are used.





Nos. 570 and 572 Vernier Calipers



Vernier Calipers No. 570 take inside as well as outside measurements direct. They are graduated to read on one side for outside, and on the other side for inside measurements and the Vernier plate for inside measurements is set to compensate for thickness of the measuring points. This feature enables the user to read either inside or outside measurements direct from the caliper without calculation.

The jaws are hardened and ground. Points are placed on the bars and slides so that dividers can be set to transfer distances, except in 36" and 48" sizes.

No. 570 Vernier Calipers English Measure

Graduated on both front and back to read, by means of a Vernier, to thousandths of an inch.

No.	Size. Inches	Length of Jaws, Inches	Approximate Width of Jaws Closed, Inches
570	6 12 24 36 48	$ \begin{array}{c} 1\frac{1}{4} \\ 2\frac{1}{4} \\ 2\frac{1}{4} \\ 2\frac{1}{4} \\ 2\frac{3}{4} \\ 3\frac{1}{2} \end{array} $	$\frac{1}{4}$ $\frac{3}{10}$ $\frac{3}{10}$ $\frac{1}{2}$ $\frac{3}{4}$

With the No. 572 English and Metric Caliper it is necessary to add the following thicknesses of the measuring points to the caliper reading for inside measurements.

Size

6"	or	150	mm.	Add	.250"	English	Measure;	6.35	mm.	Metric	Measure
12"	"	300	"	"	.300"	"	" ;	7.62	"	"	"
24"	"	600	"	"	.300"	"	"	7.62	"	"	u
36"	"	900		"	.500"	"	"	12.70	"	"	"

A $\frac{1}{4}$ " Cylindrical Plug Gage is furnished when desired, for testing the accuracy of the adjustment of the Caliper. Class Z is suitable.

No. 572 Vernier Calipers English and Metric Measure

This Caliper reads in both English and Metric Measure. Graduated to read in thousandths of an inch on one side and 50ths of a millimeter on the other.

No.	Siz	e	Leng Ja		Width Clo	
572	6 12 24 36	150 300 600 900	$ \begin{array}{r} $	Mm, 31 57 57 69	.250 .300 .300 .300	Mm. 6.35 7.62 7.62 12.70

Furnished in case, unless otherwise ordered.

Larger sizes furnished on order.

Each of the above packed one in a box.

No. 573 Center and Small Hole Attachment Set

For Use with Brown & Sharpe 6" and 150 Mm. Vernier Calipers Nos. 570 and 572



Center Points quickly convert a 6" or 150 mm. vernier caliper into a direct reading precision divider. With them the distance between two points or between a point and some locating part is determined precisely.

The small hole points make possible measurements between holes and recesses too small to receive the jaws of the vernier caliper. Points have two sizes of measuring surfaces with semi-circular cross sections. Small size has .025" (.64 mm.) radius—larger size .050" (1.27 mm.) radius. Furnished in case.

Packed one set in a box.

Nos. 580 and 581 Gear Tooth Verniers

No. 580

English Measure

Reads to Thousandths of an Inch 2 Ranges

> 20 to 2 diametral pitch 10 to 1 diametral pitch

No. 581

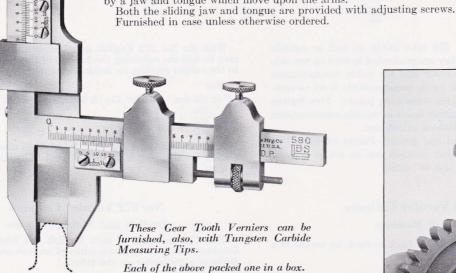
Metric Measure

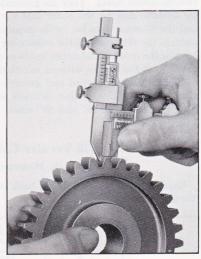
Reads to Fiftieths of a Millimeter 2 Ranges

11/4 Mm. to 12 Mm. module 2½ Mm. to 25 Mm. module

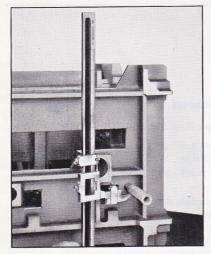
For the purpose of accurately measuring the thickness at pitch line or chordal thickness of gear teeth and the distance from the top of the tooth to the chord. By the use of this Vernier, compensation may be made for variation or error in size of blank when setting for distance from top to pitch line of tooth.

The thickness of the tooth at pitch line and the addendum are measured respectively by a jaw and tongue which move upon the arms.



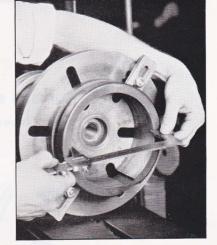


Gear teeth are measured accurately with Gear Tooth Vernier



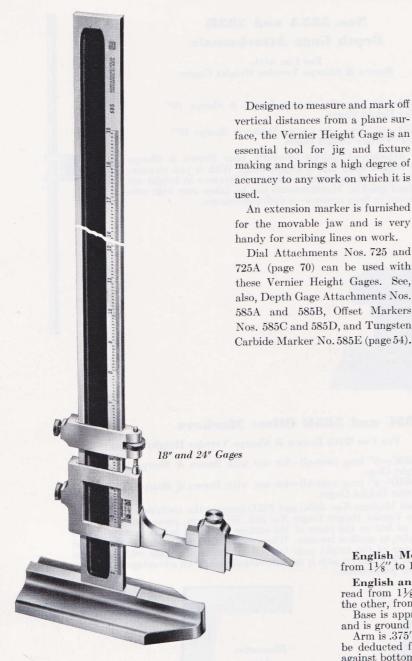
Vernier Height Gages maintain the highest standards for toolroom work.





Reliable outside and inside measurements up to 48" are taken in thousandths of an inch with a Vernier Caliper.

No. 585 Vernier Height Gages



18" Gage

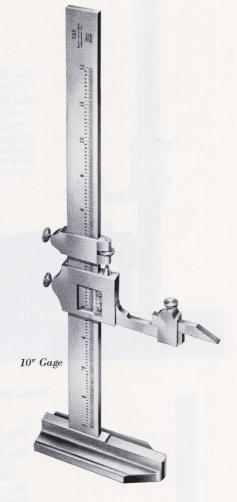
English Measure. Graduated on one side only to read from $1\frac{1}{2}$ " to 18" by thousandths of an inch.

English and Metric Measure. Graduated to read on one side from $1\frac{1}{2}$ " to 18" by thousandths of an inch, and, on the other, from 40 mm. to 46 cm. by 50ths of a millimeter. Base is approximately 53%" long, 214" wide and 78" high

and is ground and lapped on the bottom.

Arm is .594" (15.088 mm.) high and this measurement should be deducted from reading if marker is placed upside down against bottom of arm.

Furnished in Case unless otherwise ordered.



10" Gage

English Measure. Graduated on one side only to read from 11%" to 10" by thousandths of an inch.

English and Metric Measure. Graduated on one side to read from 1½" to 10" by thousandths of an inch, and on the other, from 28 mm. to 25 cm. by 50ths of a millimeter.

Base is approximately 3¾" long, 1½" wide and ¾" high and is ground and lapped on the bottom.

Arm is .375" (9.525 mm.) high and this measurement should

be deducted from reading if marker is placed upside down

against bottom of arm. Furnished in Case unless otherwise ordered.

24" Gage

English Measure. Graduated on one side only to read from 17%" to 24" by thousandths of an inch.

Base is approximately 634" long, 3" wide and 11%" high

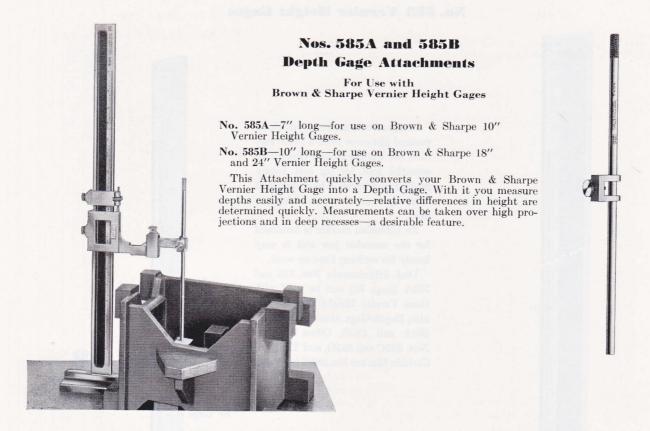
and is ground and lapped on the bottom.

Arm is .594" high and this measurement should be deducted from reading if marker is placed upside down against bottom of arm.

Furnished in Case unless otherwise ordered.

Larger sizes furnished on order. Each of the above packed one in a box.

For Prices and Ordering Numbers, See Colored Section



Nos. 585C and 585D Offset Markers

For Use With Brown & Sharpe Vernier Height Gages

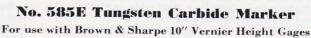
No. 585C-3" long over-all—for use with Brown & Sharpe 10" Vernier Height Gage.

No. 585D—4" long over-all—for use with Brown & Sharpe 18" and 24"

Vernier Height Gages.

Offset Markers Nos. 585C and 585D increase the usefulness of Brown & Sharpe Vernier Height Gages No. 585. With them, measurements can be taken as low as the plane of the surface on which height gage is placed and, also, in shallow recesses. When used in inverted position they extend the range of the height gage beyond the range of a gage with a straight marker. The marker arm is made unusually long—an advantage in measuring over projections.





Tungsten Carbide Markers mark layout lines on glass, hardened steel or other hard material. The point of the marker is Tungsten Carbide, an extremely hard, wear-resisting alloy. This practically wearproof marker greatly increases the usefulness of a vernier height gage and is interchangeable with regular marker.

Each of above packed one in a box.



No. 590 Telescoping Gages



No. 590—Complete Set, Range, ½" to 6" (including 3¾" Handle)

(including 3¾" Handle)
No. 590A—Handle, 3¾" long (approx.)
No. 590B—Range, ½" to ¾" (without handle)
No. 590C—Range, ¾" to 1¼" (without handle)
No. 590D—Range, 1¼" to 2½8" (without handle)
No. 590E—Range, 2½" to 3½" (without handle)
No. 590F—Range, 3½" to 6" (without handle)
No. 590H—Handle, 9" long

Unless otherwise ordered, complete set will be furnished.

These gages are compact, simple and durable, and are intended for use with a micrometer caliper to determine quickly internal measurements which are otherwise hard to obtain. The Brown & Sharpe design incorporates two important features. 1. Only the small leg telescopes. This brings handle near to point of contact in the most sensitive position for accurate measurement, see illustration below at left. 2. When handle is removed, heads will not fly apart and become lost. Ends of each head are hardened and faces are ground on radius of smallest hole gage will enter, thus adapting tool especially for accurate use on curved surfaces. The five heads are interchangeable. Handle furnished with set is $3\frac{3}{4}$ " long (approx.). A longer handle 9" in length is available, also, for use in reaching many places which cannot be reached by a gage with a 3¾" handle.

In use, head expands to exact size of hole and is then locked by turn of knurled screw in end of handle. Gage is withdrawn and measured with micrometer.



No. 598 **Height Gage Attachment**

For Use with Inside Micrometers Nos. 260 and 261



In conjunction with an inside micrometer, this attachment makes a useful, accurate and economical combination. The end of the micrometer measuring rod is first lined up with the base of the attachment, the clamp screw is tightened, and the tool is ready for use. The V groove adapts it for use on cylindrical work. It is convenient not only as a height gage but for many other measurements as well.

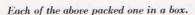


No. 599 Depth Gage

Range, 0 to 2" Has Four Measuring Rods

This is a handy all around tool used in conjunction with an outside micrometer caliper, for checking depths from 0 to 2". Readings are obtained by measuring over-all length of body and exposed portion of rod and subtracting one inch, the length of the body. Useful for measuring distances between shoulders and flanges. In such uses, the over-all length of the tool, $1^{\prime\prime}$ to $3^{\prime\prime}$ is used.

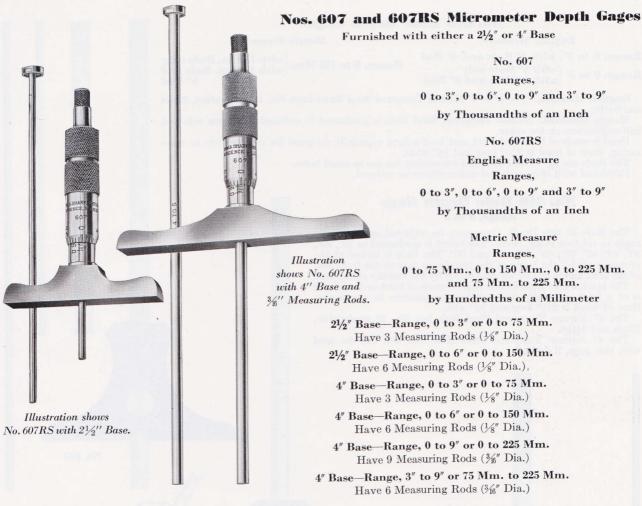
Body is hardened and ground, and rods are polished.





No. 600 Vernier Depth Gages English, or English and Metric Measure With 6-inch or with 6 and 12-inch Blades English Measure. Graduated on the front to read, by means of a Vernier, in thousandths of an inch. English and Metric Measure. Graduated on the front to read, by means of Verniers, in thousandths of an inch on one edge, and in 50ths of a millimeter on the other. For obtaining the depths of holes, recesses in dies or distances from a plane surface to a projection. The bottom surface of the base is $2\frac{5}{8}$ " x $\frac{3}{10}$ ". The blades are $\frac{1}{4}$ " or 7 mm. wide. The sixinch blade allows measurements to be made $3\frac{1}{2}$ " or 88 mm. deep and the 12'' blade $9\frac{1}{2}''$ or 238 mm. deep. Furnished in case unless otherwise ordered. No. 605 **Micrometer Depth Gage** Range, 0 to 21/2" by Thousandths of an Inch Furnished with either a 2" Base or a 4" Base The micrometer screw in these gages has a one half inch movement. The adjustable rod is graduated each half inch and the graduations are of such a form and depth that the clamping fingers, at the end of the gage, spring in, and allow the $\frac{1}{2}$ " adjustment of the rod to be made quickly and positively. Illustration The bottom surfaces of the bases are about 7/6" wide and, shows No. 605 with 2" Base. together with the ends of the rods, are hardened. Rods are 605 .100" in diameter. Cases can be furnished. Illustration shows No. 605 with 4" Base.

Each of the above packed one in a box.



The micrometer screws have a movement of 1" and the various ranges are obtained by the use of the measuring rods furnished. Rods of gages measuring 0 to 3" and 0 to 6" are $\frac{1}{8}$ " in diameter, those measuring 0 to 9" and 3" to 9" are 36" in diameter to give added rigidity for the longer measurements. Extra measuring rods for increasing the ranges of these gages can be furnished as listed below. Ends of all rods are hardened. By removing thimble cap, the desired rod is inserted easily and quickly in the gage through a hole in the micrometer screw. When replaced, thimble holds rod firmly in position against positive seat. Bottom surfaces of the bases are about %" wide and are hardened.

No. 607RS has ratchet stop.

Each of the above packed one in a box. Cases can be furnished.

†Extra Measuring Rods

For Nos. 607 and 607RS Micrometer Depth Gages

For Depth Gages with 1/8" Diameter Measuring Rods Extend Range from 3" to 6" or 75 Mm. to 150 Mm.

For Depth Gages with 3/6" Diameter Measuring Rods Extend Range from 0 to 3" or 0 to 75 Mm.

Range

3" to 4" or 75 mm. to 100 mm. 4" to 5" or 100 mm. to 125 mm.

 $5^{\prime\prime}$ to $6^{\prime\prime}$ or 125 mm. to 150 mm.

Range

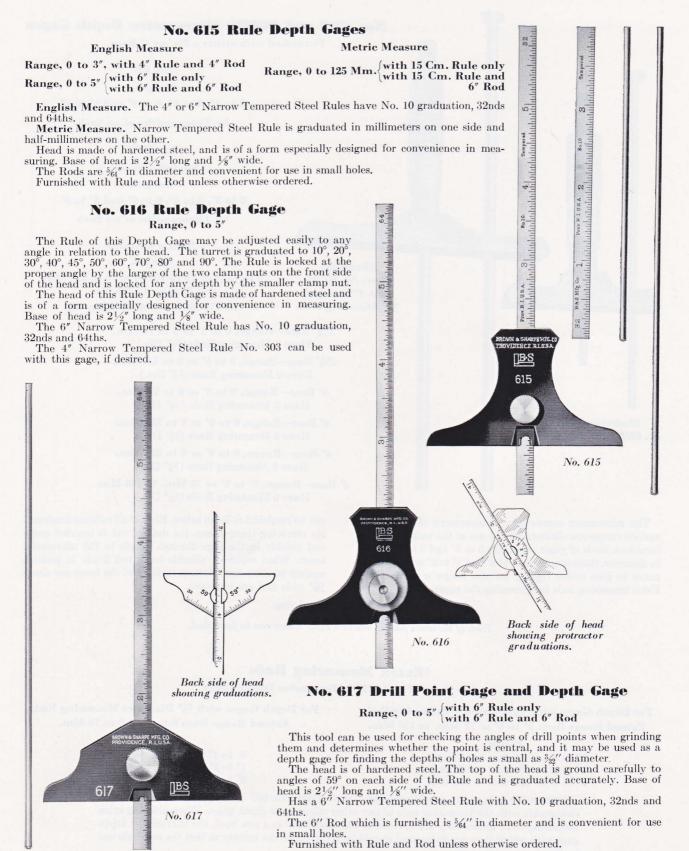
0 to 1" or 0 to 25 mm.

1" to 2" or 25 mm. to 50 mm.

2" to 3" or 50 mm. to 75 mm.

†Measuring rods of any one Micrometer Depth Gage No. 607 or No. 607RS are not interchangeable with the measuring rods of any other micrometer depth gage. When ordering extra measuring rods, unless they are ordered at the same time as a new tool, the micrometer depth gage with which they are to be used should be returned to the factory so that the new rods can be fitted accurately to it.

Packaged in envelopes.



Each of the above packed one in a box.

Nos. 620, 621 and 622 Universal Surface Gages

Brown & Sharpe Surface Gages are designed so that a wide range of adjustments can be made readily. The spindle can be adjusted quickly in swivel bolt and set at any angle above or below the base and locked in approximate position by the large knurled adjusting screw. The fine adjustment is then made by the small knurled screw on top of base. A distinct advantage of the Brown & Sharpe design is the location of the fine adjustment which permits the gage to be held and adjusted with one hand. (See illustration below.)

Base is of a form most convenient to handle and a V groove in the bottom adapts it for cylindrical work. Two gage pins in the rear end of base can be pushed down and used against the edge of a surface plate or the side of a T slot. Scriber may be used below the base as a depth gage and, for small work, it may be inserted and adjusted in the swivel bolt in place of the spindle.

Nos. 621 and 622, when used with Dial Attachment No. 725, make useful dial indicators and can be used in many places inaccessible to large dial gages. (See illustration below and page 70.)

No. 621 Surface Gage and Universal Dial Indicator Set No. 740 make a very useful combination as swivel of No. 740 fits spindle of No. 621.

No. 620 Universal Surface Gages

No.

620A With 4" Spindle, Base Not Hardened.

620B With 4" Spindle, Base Hardened.

Size of Base, approximately $2\frac{1}{4}$ " x $1\frac{1}{2}$ "

No. 621 Universal Surface Gages

No. 621A With 9" Spindle, Base Not Hardened.

621B With 9" and 12" Spindles, Base Not Hardened.

621C With 9" Spindle, Base Hardened.

621D With 9" and 12" Spindles, Base Hardened.

Size of Base, approximately $3\frac{1}{8}$ " x $2\frac{1}{2}$ "

No. 622 Universal Surface Gages

No. Heavy Base

622A With 12" Spindle, Base Not Hardened.

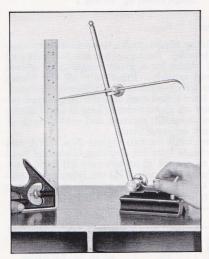
622B With 12" and 18" Spindles, Base Not Hardened.

622C With 12" Spindle, Base Hardened.

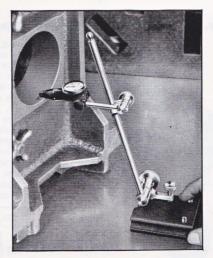
622D With 12" and 18" Spindles, Base Hardened.

Size of Base, approximately $4'' \ge 3 \frac{3}{8} i''$

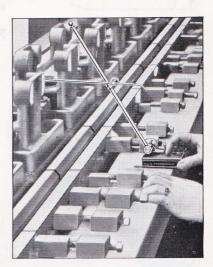
Each of the above packed one in a box.



Surface Gage is held conveniently and adjusted with one hand other hand is free to hold work.



With Dial Attachment No. 725, a surface gage makes tests in places inaccessible to large dial gages.



With gage pins used against table edge, surface gage lines up work on machine table.

No. 625 Planer and Shaper Gage

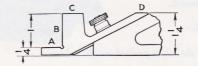


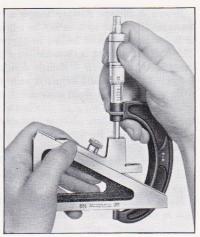
With this gage, time spent by the planer hand in adjusting the cutting tool is reduced to a minimum. By setting gage to a micrometer, surface gage or caliper and bringing the planer tool in contact with it, the first cut may be relied upon to give the desired dimension. This gage may be used on its side as diameter of adjusting nut is less than thickness of base.

The slide is so designed that with one extension it is possible to get a tool setting from ½" to 8½". Desirable features of this slide are the surfaces C and D (see line drawing below) being in the same plane and 1.000" from the plane of surface A, a combination that simplifies many settings, particularly for small measurements; also, the extension which screws into either of the three surfaces A, B or C of the slide being 2.500" long, further simplifying the making of accurate settings, particularly in the higher ranges.

The base is a steel forging and is hardened as are the steel slide and extension. Working surfaces are ground. The open or cutaway design of the base makes the tool light in weight without sacrificing its strength and rigidity.

Packed one in a box.

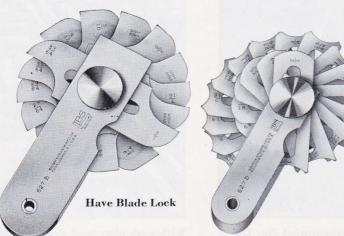






No. 625 is set accurately to micrometer and permits a range of settings from $\frac{1}{4}$ " to $\frac{81}{2}$ ".

No. 627 Fillet and Radius Gages



Long, sliding blades make these tools very easy to use and handle. Each gage has but half the usual number of blades for a given range. The desired size is found quickly. Practically all the blades can be extended at one time—a further convenience. Blades are hard rolled steel and can be clamped securely. They are about twice as long as usual blades and are double-ended; concave and convex radii of same size are on same blade.

Gages are made in two styles: Nos. 627A and 627B have blade form for checking fillets and radii in corners or against shoulders—see left-hand illustration. Nos. 627C and 627D are especially useful for laying out forming tools as well as for gaging fillets and radii—see right-hand illustration.

No.	No. of Blades	Radii, Size, Inches
$627 \left\{ \begin{matrix} \mathbf{A} \\ \mathbf{B} \\ \mathbf{C} \\ \mathbf{D} \end{matrix} \right.$	8 8 15 16	½2 to ½4, by 64ths ½2 to ¾4, by 64ths ½2 to ¼4, by 64ths ¼4 to ½2, by 64ths

Each of the above packed one in a box; six boxes in a carton.

Screw Pitch Gages

The blades of Brown & Sharpe Screw Pitch Gages, except those for Metric and Whitworth Threads, are cut deeply, with the tops of teeth flatted so that one blade suffices for gaging V and American National or United States Standard Threads.

This is an original Brown & Sharpe feature—a desirable advantage as only one gage is needed for the three threads. The illustrations at right show the application of this form of gage to both American National and V Threads.

The shape of the blades adapts them for the threads of nuts as well as of screws. The arrangement of the blades, hinged in the case, enables the desired blade to be selected and used easily. The number of threads per inch is stamped on each blade.

Each gage has a Blade Lock by which any blade, or blades, can be locked in

position for use.

Formula for V Thread:

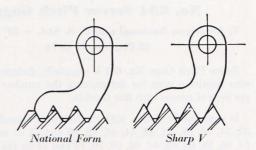
 $d=D-\frac{1.732''}{N}$

D = Outside diameter of tap

d = Bottom diameter of tap

N = Number of threads per inch

 $d = D - \frac{1.299''}{N}$



Formula for American National and U.S. Standard

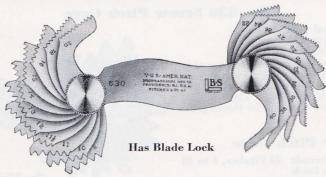
Thread:

D = Outside diameter of tapd = Bottom diameter of tap

N = Number of threads per inch

No. 630 Screw Pitch Gage

V, American National and U. S. Std. - 60° Threads. 22 Pitches, 9 to 40



Gage No. 630 contains 22 blades for following threads per inch: 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18 and 20 on one end and 22, 24, 26, 27, 28, 30, 32, 34, 36, 38 and 40 on other.

Blades with 11½ and 27 threads per inch are for checking pipe threads and the 16 pitch blades can be used, also, for determining 8 pitch.

No. 631 Screw Pitch Gage

V, American National and U. S. Std. - 60° Threads. 24 Pitches, 4 to 30 Has Blade Lock

Similar in design to Screw Pitch Gage No. 630. It contains 24 blades with the following threads per inch: 4, $4\frac{1}{2}$, 5, $5\frac{1}{2}$, 6, 7, 8, 9, 10, 11, $11\frac{1}{2}$ and 12 on one end and 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28 and 30 on the other. Blades with 11½ and 27 threads per inch are for checking pipe threads.

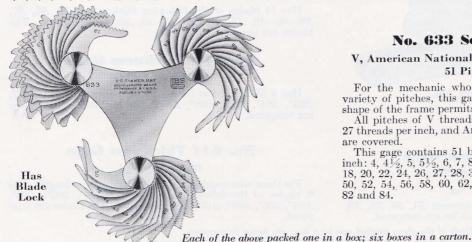
No. 632 Screw Pitch Gage

V, American National and U. S. Std. - 60° Threads. 30 Pitches, 4 to 42 Has Blade Lock

82 and 84.

Similar in design to Screw Pitch Gage No. 630. It contains 30 blades with the following threads per inch: 4, $4\frac{1}{2}$, 5, $5\frac{1}{2}$, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14 and 15 on one end and 16,

18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40 and 42 on the other. Blades with 11½ and 27 threads per inch are for checking pipe threads.



No. 633 Screw Pitch Gage

V, American National and U.S. Std. - 60° Threads 51 Pitches, 4 to 84

For the mechanic who has use for a gage with a great variety of pitches, this gage is just the tool. The triangular

shape of the frame permits the compact housing of 51 blades. All pitches of V threads including pipe threads, 11½ and 27 threads per inch, and American National and U.S. Threads are covered.

This gage contains 51 blades for the following threads per inch: 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80,

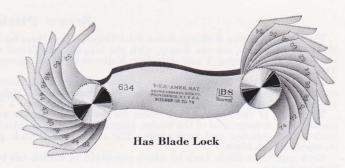
For Prices and Ordering Numbers, See Colored Section

No. 634 Screw Pitch Gage

V, American National and U.S. Std. - 60° Threads 22 Pitches, 32 to 74

Screw Pitch Gage No. 634 is especially designed for those who require a gage for determining the number of threads per inch of screws with fine threads.

It contains 22 blades, with the following threads per inch: 32, 34, 36, 38, 40, 42, 44, 46, 48, 50 and 52 on one end and 54, 56, 58, 60, 62, 64, 66, 68, 70, 72 and 74 on the other.



No. 635 Screw Pitch Gage

V, American National and U. S. Std. - 60° Threads Has Gage for Grinding Thread Tools

25 Pitches, 21/4 to 20

Has Blade Lock

This gage is similar in design to No. 634. It contains 26 blades, with the following threads per inch: $2\frac{1}{4}$, $2\frac{3}{8}$, $2\frac{1}{2}$, $2\frac{5}{8}$, $2\frac{9}{4}$, $2\frac{7}{8}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, 4, $4\frac{1}{2}$ and 5 and thread gage on one end and 5½, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18 and 20 on the other.

No. 636 Screw Pitch Gage

Système International — 60° Threads 17 Pitches, 1/2 to 7 Mm. Has Gage for Grinding Thread Tools

For determining the pitch of screws, nuts and bolts, and is made after the French system of the Société d'Encouragement pour l'Industrie Nationale. The gage contains 17 blades for the following pitches: $\frac{1}{2}$, $\frac{3}{4}$, 1, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{4}$, 2, $\frac{2}{2}$, 3, $\frac{3}{2}$, 4, $\frac{4}{2}$, 5, $\frac{5}{2}$, 6, $\frac{6}{2}$ and 7 millimeters and blade for thread gage.

No. 637 Screw Pitch Gage

Whitworth Standard — 55° Threads 24 Pitches, 4 to 48 Has Blade Lock

Similar in design to No. 634 shown above. Contains 24 blades, with the following threads per inch: 4, 4½, 5, 6, 7, 8, 9, 10, 11, 12, 14 and 16 on one end; 18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 40 and 48 on the other.

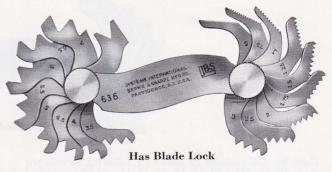


No. 643 Thickness Gage **Metric Measure**

Illustration shows No. 640.

Blades, 25/16" x 7/16"

Has 9 blades of the following thicknesses: .04, .05, .08, .10, .15, .20, .25, .30 and .35 mm. The blades are tempered.



No. 640 Thickness Gage

Blades, 25/16" x 7/16"

Has 22 blades varying in thickness from .004" to .025" inclusive, by thousandths of an inch. The blades are tempered. Eyelet in case is handy feature.

No. 641 Thickness Gage **Metric Measure**

Blades, 25/16" x 7/16"

Has 14 blades of the following thicknesses: .05, .06, .07, .08, .09, .10, .15, .20, .25, .30, .40, .50, .75 and 1 mm. The blades are tempered.

No. 642 Thickness Gage

Blades, 25/16" x 7/16"

Has 9 blades of the following thicknesses: .0015", .002", .003", .004", .006", .008", .010", .012" and .015". The blades are tempered.

No. 644 Thickness Gage

Blades, 3" x 1/2"

For those who require blades of a little greater length. Has 9 blades of the following thicknesses: .0015", .002", .003", .004", .006", .008", .010", .012" and .015". The blades are tempered.

Each of the above packed one in a box; six boxes in a carton.

No. 645 Thickness Gage

Blades, 3" long

Has Blade Lock

The tapered blades, convenient for gaging in narrow places, have sizes marked in large, easily read figures. The eyelet in case is another useful feature. Blades are ½" wide at heel, " wide at tip, and tempered.

14" wide at tip, and tempered. No. 645 has 9 blades of following thicknesses: .0015", .002", .003", .004", .006", .008", .010", .012" and .015".

Packed one in a box; six boxes in a carton.

No. 647 Thickness Gage

Blades, 3" long

Has Blade Lock

No. 647, similar to No. 645, has 26 blades as follows: .0015" to .0025" inclusive by half-thousandths, and .003" to .025" by thousandths.

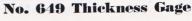
Packed one in a box; six boxes in a carton.



No. 648 Thickness Gage Blades, 41/2" Long Contains 8 blades of following thicknesses: .002", .003", .004", .006", .008", .010", .012" and .015".

1/2" wide at heel and taper 23/4" to tip which is 1/4" wide. Blades are tempored

Packed one in a box; six boxes in a carton.



Blades, 6" Long

Similar to No. 648 except blades are 6" long, $\frac{1}{2}$ " wide at heel and taper $2\frac{3}{4}$ " to tip which is 1/4" wide. Length is useful for finding clearance between pistons and cylinder walls.

Contains 8 blades of following thicknesses: .002", .003", .004", .006", .008", .010", .012" and .015". Blades are tempered.

Packed one in a box; six boxes in a carton.

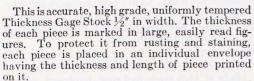


Illustration shows No. 648.

Thickness Gage Stock

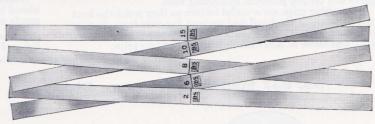
12" Lengths

15 Different Thicknesses



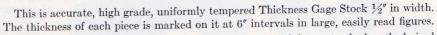
Furnished in the following thicknesses: .0015" and .002" to and including .015" by thousandths.

Packed one piece in an envelope; twelve pieces of a size in a box.



Thickness Gage Stock

10 Different Thicknesses 25 Ft. Rolls



The reel is a very desirable feature. Stock can be withdrawn to the length desired easily and without binding. Furnished in the following thicknesses: .0015", .002", .003", .004", .005", .006", .007", .008", .010" and .015".

Packed one reel containing 25 ft. of stock in a box.



Nos. 650, 651 and 652 Center Gages

Tempered

No. 650, American National or U. S. Std.

No. 651, Whitworth or English Standard, 55°

No. 652, Metric, 60°



The angles used on these gages are 60° for the American National or U. S. Std. and Metric Gages, and 55° for the Whitworth or English Standard. The four graduations, 14, 20, 24 and 32 parts to the inch, are useful in measuring the number of American National and Whitworth Threads to the

The Metric Gage is graduated to read in millimeters and half-millimeters.

The table on the American National or U. S. Std. Gage is used for determining the size of tap drills for these threads, and shows in thousandths of an inch the double depth of thread of tap and screw of the pitches most commonly used.

The table for determining the size of tap drills is omitted on the Whitworth and Metric Gages.

Packed twelve in a box.

No. 654 Center Gage Attachment

The attachment holds the center gage firmly against the lathe spindle or face plate, aiding in setting the cutting tool to the proper angle.

The base of the attachment has a V groove and in the top there is a slot, containing a flat spring which holds the center gage. It can be used for setting both internal and external screw cutting tools.

Packed three in a box.

Nos. 655 and 656 Standard End Measuring Rods

No. 655 **English Measure** Lengths from 3" to 23"

No. 656 Metric Measure Lengths from 75 Mm. to 575 Mm.



These rods are made of high grade steel, hardened on the ends and ground accurately so that the ends are sections of true spheres. They are especially useful for measuring parallel surfaces, rings and cylinders or setting calipers, comparing gages and testing precision measuring tools.

The rubber grips are a useful feature as they resist the heat and moisture of the hand and prevent the rods from slipping or rolling. The 3" and 4" rods are furnished with one rubber grip, and those 5" and over in length have two grips.

Standard End Measuring Rods No. 655, English, are furnished in lengths from 3'' to 23'' inclusive in increments of one inch. Diameter of rods is 3/8 of an inch.

Standard End Measuring Rods No. 656, Metric, are furnished in lengths from 75 mm. to 575 mm. inclusive in increments of 25 mm. Diameter of rods is 9.53 mm.

Intermediate sizes and sizes larger than listed above, both English and Metric, can be furnished to order.

Each of the above packed one in a tubular container.

No. 657 Standard Reference Disks



Individual disks packed one in a package; the set one in a box.

Made of high grade tool steel, hardened, ground and accurately lapped to size. Furnished to Class XX tolerances. Handles which make them convenient for internal testing can be furnished. Recommended for use as reference gages and not for working gages.

Standard Reference Disks No. 657 are furnished in sizes $\cancel{1}''$ to 3'' inclusive in increments of sixteenths of an inch to the 1'' size, eighths of an inch from 1'' to 2'' size and from 2'' to 3'' in increments

of one quarter of an inch.

The ½" and ½" sizes are furnished with handles.

Metric sizes and special sizes made to order. The 1" size, used as a standard for micrometers and other testing purposes, can also be furnished in Metric size of

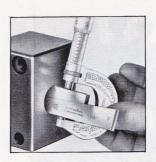
No. 658 Standard Reference Disk Set

English Gages in sets in sizes as listed above from 1/4" to 3", including handles, furnished in substantial wooden case.

For Prices and Ordering Numbers, See Colored Section

No. 672 Taper Parallel Gage Set





To shops lacking full sets of plug gages, this Taper Parallel Gage Set offers an economical and convenient means of checking holes of any size from ¼" to 1". It also can be used instead of plugs when it is desired to check distances between holes. To measure hole sizes as shown in illustration, two gaging

To measure hole sizes as shown in illustration, two gaging pieces are inserted in the hole and expanded along the tapered surfaces. The diameter of the hole then can be obtained by measuring the Taper Parallel Gage pieces externally. The set consists of 10 gages made of high grade tool steel hardened and ground to very close limits. The small A and B gages are spring tempered to prevent breaking. The measuring surfaces are ground on a radius according to the size of the holes in which they are to be used.

Gages are packed in a neat wooden case, and a plate in the cover gives the ranges obtainable with different combina-

tions of gages.

16 17 18 19 20 21 22 23 24 25

Packed one set in a box.

No. 684 Rolling Mill Gage

English or Birmingham Standard

Numbers 000 to 25-Hardened

Especially adapted to withstand the rough usage a gage is likely to receive in rolling mills or for use in other places where measurements are to be taken quickly. Gage is hardened steel, about ½" thick.

Gage numbers are the English Standard Wire Gage,

Gage numbers are the English Standard Wire Gage, or Stubs' Iron Wire or Birmingham Gage (designates the Stubs' Soft Wire Sizes) and are used for gaging iron wire and for hot and cold rolled sheet steel. Also, in some cases, for gaging sheet iron. For different gage sizes, see page 67.



ENGLISH STANDARD

Packed six in a box.

No. 685 Rolling Mill Gage

U. S. Standard

Adopted by Congress, March 3, 1893-For Sheet and Plate Iron and Steel

Numbers 000 to 25—Hardened

Especially adapted to withstand the rough usage which a gage receives in rolling mills or for use in other places where measurements are to be taken quickly. Gage is hardened steel about ½8" thick.

Gage numbers are United States Standard, used

Gage numbers are United States Standard, used for determining duties and taxes levied by the United States. This is a recognized commercial standard in the United States for uncoated sheet and plate iron and steel, and is based on weights in ounces per square foot. For different gage sizes, see page 67.

Packed six in a box.

No. 688 Brown & Sharpe (American Standard) Wire Gage

The generally accepted Standard for Non-Ferrous Metals Adopted by the Brass Manufacturers, January, 1858

Numbers 0 to 36-Hardened

This gage is particularly useful to electricians and others for gaging sheets, plates and wire of non-ferrous metal such as copper, brass and aluminum. Screw Slotting Cutters are also made to this gage.

Decimal equivalents (approx.) are stamped on the reverse side.

For different gage sizes, see page 67.





No. 690 English Standard Wire Gage

Same as Stubs' Iron Wire or Birmingham Gage Numbers 0 to 36—Hardened

The Stubs' Iron Wire Gage is the one commonly known as the English Standard or Birmingham Gage (and designates the Stubs' Soft Wire Sizes).

It is used for gaging iron wire, hot and cold rolled sheet steel and in some cases sheet iron.

Decimal equivalents are stamped on reverse side.

For different gage sizes, see page 67.

No. 692* Steel Wire Gage

American Steel & Wire Co.'s (Washburn & Moen) Standard Numbers 0 to 36—Hardened

For gaging steel wire and drill rod.

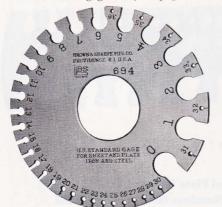
*Extract from a letter written by the Director, United States Bureau of Standards,

July 7, 1911:

"Upon the recommendation of the Bureau of Standards at Washington, a number of the principal wire manufacturers and important consumers have agreed it would be well to designate this gage as the 'Steel Wire Gage'; . . . to distinguish it from the British Standard Wire Gage it may be called the 'United States Steel Wire Gage.' The name thus adopted has official sanction, although without legal

For different gage sizes, see page 67.





No. 694 U.S. Standard Gage

Adopted by Congress, March 3, 1893, For Sheet and Plate Iron and Steel Numbers 0 to 36—Hardened

Gage numbers are United States Standard, used for determining duties and taxes levied by United States. This is a recognized commercial standard in the United States for uncoated sheet and plate iron and steel and is based on weights in ounces per square foot.

Decimal equivalents (approx.) stamped on reverse side.

For different gage sizes, see page 67.

No. 696 Steel Music Wire Gage

American Steel and Wire Co.'s Standard Numbers 000000 to 33-Hardened

This gage carries all sizes for measuring and checking steel music wire. Decimal equivalents stamped on reverse side. For different gage sizes, see page 67.



Each of the above packed six in a box.

Different Standards for Wire Gages

Dimensions of Sizes in Decimal Parts of an Inch

No. of Wire	Brown & Sharpe (American) for Non-Ferrous Metals	*Birm- ingham, or Stubs' Iron Wire	American S. & W. Co.'s (Washburn & Moen) Std. Steel Wire	American S. & W. Co.'s Music Wire	Imperial Wire	*Stubs' Steel Wire	U. S. Std. Gage for Sheet & Plate Iron & Steel	No. of Wire
7–0's	. 651354	reads or Ob	. 4900	c benedition le	. 500	1	. 500	7–0's
6-0's	. 580049	mater manage	.4615	.004	.464		.46875	6-0's
5-0's	.516549	. 500	. 4305	.005	. 432		. 4375	5-0's
4-0's	.460	. 454	.3938	.006	. 400		. 40625	4-0's
000	.40964	. 425	.3625	.007	.372		.375	000
00	.3648	.380	.3310	.008	.348		.34375	00
0	.32486	.340	.3065	.009	.324		.3125	0
1	.2893	.300	.2830	.010	.300	.227	.28125	1
2	.25763	.284	.2625	.011	.276	.219	. 265625	2
3	.22942	.259	.2437	.012	.252	.212	.250	3
4	.20431	.238	.2253	.013	.232	.207	.234375	4
5	.18194	.220	.2070	.014	.212	.204	.21875	5
6	.16202	. 203	.1920	.016	.192	.201	.203125	6
7	.14428	.180	.1770	.018	.176	.199	.1875	7
8	.12849	. 165	.1620	.020	.160	.197	.171875	8
9	.11443	.148	.1483	.022	.144	.194	.15625	9
10	.10189	.134	.1350	.024	.128	.191	.140625	10
11	.090742	.120	.1205	.024	.116	.188	.125	11
12	.080808	.120		.020	.104	.185	.109375	12
13		. 109	.1055		.092	.182	.09375	13
	.071961	.083	.0915	.031		.182	.078125	14
14	.064084	.083	.0800	.033	.080	.178	.0703125	15
15	.057068	.065	.0720	.035	.064	.175	.0625	16
16	.05082		.0625	.037				17
17	.045257	.058	.0540	.039	.056	.172	.05625	18
18	.040303	.049	.0475	.041	.048	.168	.050	
19	.03589	.042	.0410	.043	.040	.164	.04375	19
20	.031961	.035	.0348	.045	.036	.161	.0375	20
21	.028462	.032	.0317	.047	.032	.157	.034375	21
22	.025347	.028	.0286	.049	.028	. 155	.03125	22
23	.022571	.025	.0258	.051	.024	. 153	.028125	23
24	.0201	.022	.0230	.055	.022	. 151	.025	24
25	.0179	.020	.0204	.059	.020	.148	.021875	25
26	.01594	.018	.0181	.063	.018	. 146	.01875	26
27	.014195	.016	.0173	.067	.0164	.143	.0171875	27
28	.012641	.014	.0162	.071	.0149	. 139	.015625	28
29	.011257	.013	.0150	.075	.0136	.134	.0140625	29
30	.010025	.012	.0140	.080	.0124	.127	.0125	30
31	.008928	.010	.0132	.085	.0116	.120	.0109375	31
32	.00795	.009	.0128	.090	.0108	.115	.01015625	32
33	.00708	.008	.0118	.095	.0100	.112	.009375	33
34	.006304	.007	.0104		.0092	.110	.00859375	34
35	.005614	.005	.0095	and it and	.0084	.108	.0078125	35
36	.005	.004	.0090	dulfi ja	.0076	.106	.00703125	36
37	.004453	Buttingen	.0085	. 7	.0068	.103	.00664063	37
38	.003965		.0080		.0060	. 101	.00625	38
39	.003531	M . M SV	.0075		.0052	.099	Market and	39
40	.003144	Ministre	.0070		.0048	.097		40

^{*}The difference between the Stubs' Iron Wire Gage and the Stubs' Steel Wire Gage should be borne constantly in mind, the first, commonly being known as the English Standard

Wire or Birmingham Gage which designates the Stubs' soft wire sizes, and the second, being used in measuring drawn steel wire or drill rods of Stubs' make.





No. 700 Pocket Screw and Wire Gage

Made of a good quality steel and carefully finished to size. Graduated on front and back.

Front side is graduated for all sizes of American Standard Screws, old style, from 0 to 30, and to measure diameters of wire or screws from $\frac{1}{16}$ " to $\frac{1}{16}$ ".

Back side is graduated to measure the Birmingham, or Stubs' Iron Wire, or old English Wire Gage, from 17 to 0000, and to measure the Brown & Sharpe (American) Wire Gage from 15 to 0000.

This gage can be used, also, to show the numbered sizes of American National numbered screws from 0 to 30 as these sizes vary only slightly from the respective gage sizes of the American Standard screws, old style.

One edge is graduated in $\frac{1}{2}$ " for measuring screws. Angular and 90° slots permit the heads of flat or round headed screws to be placed against positive stops when being measured for their lengths.

Gage is approximately 4" long, 113/2" wide and 3/4" thick.

No. 701 American National Standard Screw Gage

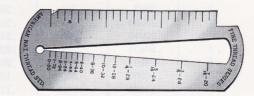
Made of a good quality steel and carefully finished to size. Graduated on front and back.

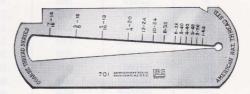
Front side graduated for fine thread series, and back side for coarse thread series, American National Standard.

American National Standard Wood Screws are the same size as American National Machine Screws and so can be sized equally well on this gage.

One edge is graduated in $\frac{1}{2}$ " for measuring screws. Angular and 90° slots permit the heads of flat or round headed screws to be placed against positive stops when being measured for their lengths.

Gage is approximately 4" long, 113/2" wide and 3/4" thick.







Large-Hardened-Nos. 1 to 60

61 62 63 64 65 66 67 68 69 70

705 Brown & Sharpe Mig. Co.
Providence. R.L. U.S.A.

71 72 73 74 75 76 77 78 79 80

Small-Hardened-Nos. 61 to 80

No. 705 Twist Drill Gage

For use in determining the correct size of Twist Drills. Can be used also for High Speed Steel drill rod. Great care is taken to insure the accuracy of the gage numbers. All sizes are tested carefully after hardening.

The larger Gage is about $\frac{1}{6}$ " thick, $\frac{15}{8}$ " wide, $\frac{51}{4}$ " long and contains gage numbers from 1 to 60, inclusive, with decimal equivalents of the various sizes stamped conveniently on the front side. The smaller Gage is about $\frac{1}{6}$ " thick, $\frac{3}{4}$ " wide, $\frac{2}{4}$ " long and contains gage numbers from 61 to 80, inclusive.

For Decimal Equivalents of the Numbers of Twist Drill Gage see below.

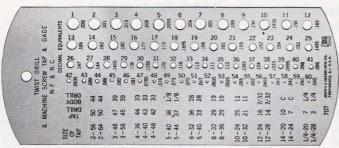
Each of the above packed six in a box.

Decimal Equivalents of the Numbers of Twist Drill Gage

For measuring the sizes of twist drills and High Speed Steel drill rod. Used almost universally in the United States for drill sizes. Rod sizes by this gage should not be confused with

Stubs' Steel Wire Gage Sizes. There is a slight difference between the sizes of corresponding numbers in the two gages for most of the sizes.

No.	Size of No. in Decimals														
1	.2280	11	.1910	21	.1590	31	.1200	41	.0960	51	.0670	61	.0390	71	. 0260
2	.2210	12	.1890	22	.1570	32	.1160	42	.0935	52	.0635	62	.0380	72	.0250
3	.2130	13	.1850	23	.1540	33	.1130	43	.0890	53	.0595	63	.0370	73	.0240
4	.2090	14	.1820	24	.1520	34	.1110	44	.0860	54	.0550	64	.0360	74	. 0225
5	.2055	15	.1800	25	.1495	35	.1100	45	.0820	55	. 0520	65	.0350	75	.0210
6	. 2040	16	.1770	26	.1470	36	. 1065	46	.0810	56	.0465	66	.0330	76	.0200
7	.2010	17	.1730	27	.1440	37	.1040	47	.0785	57	. 0430	67	.0320	77	.0180
8	.1990	18	.1695	28	. 1405	38	.1015	48	.0760	58	.0420	68	.0310	78	.0160
9	.1960	19	.1660	29	. 1360	39	.0995	49	.0730	59	.0410	69	. 02925	79	.0145
10	. 1935	20	.1610	30	.1285	40	.0980	50	.0700	60	.0400	70	.0280	80	.0135



Hardened-Nos. 1 to 60

No. 707 Twist Drill and Machine Screw Tap Gage

Tells at a glance correct drill for any common size machine screw tap. Carefully tested after hardening.

Gage is about ½6" thick, 25%" wide, 6½" long and is polished. Table gives size of tap, pitch of thread, size of drill required and size of drill for making hole through which outside diameter of tap will pass.

For Decimal Equivalents of the Numbers of Twist Drill Gage, see page 68.

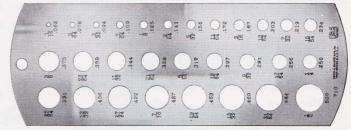
Packed six in a box.

No. 710 Jobbers' Drill Gage

For Gaging Twist Drills

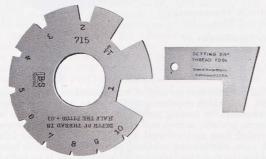
Gage is about $\frac{1}{16}$ " thick, $2\frac{3}{8}$ " wide, $6\frac{1}{4}$ " long and is polished. The hole sizes are tested carefully for accuracy after hardening. Decimal equivalents of hole sizes are stamped on the front side.

Packed six in a box.



Hardened-Range, 1/16" to 1/2" by 64ths

No. 715 29° Screw Thread Tool Gage Acme Standard—Hardened



This gage furnishes a correct standard to which thread tools can be ground to cut threads of a uniform angle to take the place of square threads and to standardize the threads of various angles and depths now in use. The Acme thread has the same depth as the square thread, but is stronger.

The sides are at an inclination of 14½°, with a 29° included angle, which is the angle now generally adopted in cutting worms. (See below).

A tool setting gage is furnished with each gage.

Packed six in a box.

No. 716 29° Screw Thread Tool Gage

Acme Standard Hardened 29°SCHEW THREAD W
TOOL GAGE

NUMBERS EQUAL
THREADS PER INCH

HALF THE FITCH + 01

HOLE THREAD IS UI
HALF THE FITCH + 01

TO COMMENT OF THREAD IS UI
HALF THE FITCH + 01

TO COMMENT OF THREAD IS UI
HALF THE FITCH + 01

This gage furnishes a correct standard to which thread tools can be ground for cutting threads of a uniform angle to take the place of square threads.

The Acme thread has the same depth as the square thread, but as the sides are at an inclination of $14\frac{1}{2}^{\circ}$ (29° included angle) this form of thread is stronger. (See below).

Packed twelve in a box.

Thread Dimensions 29° Screw Thread—Acme Standard

The various parts of the 29° Screw Thread, Acme Standard, are obtained as follows:

Width of Point of Tool for Screw or Tap Thread=

 $\frac{.3707}{\text{Threads per inch}} - .0052$

Width of Screw or Nut Thread = $\frac{.3707}{\text{Threads per inch}}$

Diameter of Tap=Diameter of Screw+.020

Diameter of Tap or Screw at Root=

Diameter of Screw $-\left(\frac{1}{\text{Threads per inch}} + .020\right)$

Depth of Thread = $\frac{1}{2 \times \text{Threads per inch}} + .010$

Threads per Inch	Depth of Thread, Inches	Thickness at Top of Thread, Inches	Width Space at Bottom of Thread, Inches	Space at Top of Thread, Inches	Thickness at Root of Thread Inches
1	.5100	.3707	.3655	. 6293	. 6345
1 1-3	.3850	.2780	.2728	.4720	.4772
2	. 2600	. 1853	.1801	.3147	.3199
3	.1767	.1235	.1183	. 2098	.2150
4	. 1350	.0927	.0875	.1573	.1625
5	.1100	.0741	.0689	. 1259	. 1311
6	.0933	.0618	.0566	. 1049	.1101
7	.0814	.0529	.0478	.0899	.0951
8	.0725	. 0463	.0411	.0787	.0839
9	.0655	.0413	. 0361	.0699	.0751
10	.0600	.0371	.0319	.0629	.0681





No. 720 Worm Thread Tool Gage

Hardened

Furnishes the correct form for tools used in turning the threads of worms when the worm wheels are cut with involute cutters. The figures on the gage correspond to the number of threads per inch of the worm.

A tool setting gage is furnished with each gage.

Packed six in a box.

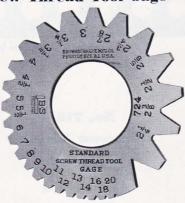
No. 724 American National and U. S. Standard Screw Thread Tool Gage

Hardened

This gage is used as a standard for grinding tools to cut threads according to the American National and United States Standard.

The angles are 60°, and the flat surfaces at top and bottom of threads are equal to one eighth of the pitch.

Packed six in a box.



No. 725 Dial Attachment

For Use With Vernier Height Gages No. 585 and Surface Gages Nos. 621 and 622 Range, .030" by thousandths of an inch



Small, compact, light, easy to read and use. Low friction, jeweled bearings make this tool exceptionally sensitive. Indicator unit is approximately $2\frac{3}{4}''$ long over-all. Dial is $1\frac{1}{8}''$ in diameter and can be turned to bring zero to any desired position. Lever on side of case reverses direction of movement of contact point which can be set at practically any angle. Swivel is adjustable along dovetail on bottom and end of case. This permits swivel to be clamped near contact point if desired, a convenient feature for sensitive measurements. Rod adapts tool for use with Surface Gages Nos. 621 and 622. Bar adapts tool for use with No. 585 Vernier Height Gages. Two sizes of bars are available—one for use with 10'' Height Gage and the other for use with 18'' and 24'' Height Gages.

Furnished complete* with one Bar and Rod in wooden case. Extra Bar* or Rod can be furnished.

*When ordering either complete Attachment or Bar, specify size of Height Gage with which it is to be used.

Packed one in a box.

No. 725A Dial Attachment

For Use With Vernier Height Gages No. 585 Has Jeweled Bearings

Range, .008" by ten-thousandths of an inch

Similar to No. 725 except that dial is graduated to .0001". Rod for use with Surface Gages is not regularly furnished, as this tool is intended for use with a more rigid support.

Furnished complete* with one Bar in wooden case. Extra Bar* can be furnished.

*When ordering either complete Attachment or Bar, specify size of Height Gage with which it is to be used.

Packed one in a box.

No. 726 Dial Gage

For Dial Test Indicators

*English Measure

Spindle Movement .300"

by half-thousandths of an inch

or

*Metric Measure

Spindle Movement 7 Mm.

by hundreths of a millimeter



Can be attached to any of our indicators, with exception of No. 740, which requires a smaller gage. Also used on special attachments for testing purposes on machine or bench work.

Gears, pinions, screws and racks are made of stainless steel, providing long and unusual durability. Stem is cast integral with case, eliminating soldered joints. Great care is taken in hobbing the gears and pinions. The movement is an individual unit as in watches, simplifying cleaning and making indicator shock proof. Exposed parts are chromium plated or enamelled.

White enamel dial face and bezel can be turned to bring zero under hand. Bezel clamp permits clamping dial in any desired position. Graduations are spaced widely and fractional parts of half-thousandths or hundredths of a millimeter are estimated readily. Gages have lug on back with 3/6" hole. Point of gage can be removed and points of different forms and lengths used. Dial is 27/32" in diameter and stem is .275" in diameter.

in diameter.

*Can be furnished to order with .500" or 12½ mm. spindle movements.

Packed one in a box.

No. 726A Dial Gage

For Dial Test Indicators

Has Jeweled Bearings; Spindle movement .020" by ten-thousandths as well as thousandths of an inch

For use where inspection and testing are held to very close limits. Jeweled bearings insure smooth, even action and long life. This gage is recommended for use with Brown & Sharpe Dial Indicators Nos. 730, 731, 731A, 733, 744, 744A and other indicators of the more rigid type. The point of the gage is removable and points of different forms and lengths can be used.

Dial face may be turned to bring zero under index pointer. Bezel clamp permits dial to be locked in position desired. Gages are furnished regularly with lug on back with $\frac{3}{6}$ hole. Dial is $\frac{2}{6}$ in diameter and stem is .275 in diameter.

Packed one in a box.

No. 728A Wheel Defect, Worn Coupler Limit, Worn Journal Collar and Journal Fillet Gage



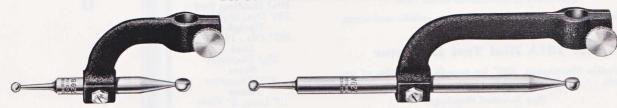
(A. A. R. Standard)—Hardened

Determines extent of defects and wear in car wheels, journal collars and couplers. Hardened steel, dull chromium plated. Measuring surfaces are ground and finished accurately.

Packed six in a box.

Nos. 729A, 729B, 729C and 729D Hole Attachments

For Use with Dial Test Indicators



Nos. 729B and 729D

These attachments increase the usefulness of Dial Test Indicators, adapting the indicators for testing internal and other surfaces which cannot be reached with the spindles of dial gages. They are attached easily and quickly and held firmly in position by their knurled clamp screws.

The designs of the attachments make them rigid and sensitive. An added feature is the adjustable fulcrum screw by which any looseness or play in the finger can be eliminated. They are made for use with dial gages having either .275" diameter stems or .375" diameter stems, see listing at right.

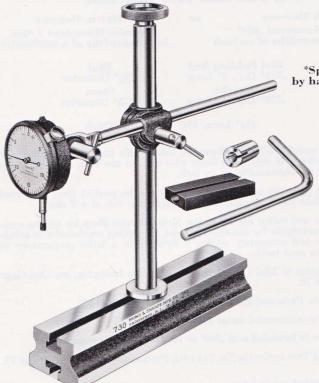
Nos. 729A and 729C are suited particularly for use in deep holes. Nos. 729B and 729D are suited particularly for use in

Nos. 729A and 729C

short, shallow holes or for rough grinding and boring operations, as with short fingers, the tendency to chatter is reduced. The fingers are hardened.

No.	For Use with Dial Gages having Stems Diam., Inches	Diam. of Finger, Inches	Will Enter Hole to Depth, Inches
729A	.275	7/32	111/16
729 B	.275	7/32	13/16
729C	.375	7_{32}	111/16
729D	.375	7/32	13/16

Packed one in a box.



No. 730 Dial Test Indicator

*Spindle Movement .300"

*Spindle Movement .300"

by half-thousandths of an inch

*Spindle Movement 7 Mm.
by hundreths of a millimeter

Has Tubular Upright and Lever Style Clamps

Dial Holding Rod .375" Dia., 9" Long Upright .738" Dia., 8¾" Long Dial 2½" Diameter Stem .275" Diameter Base 8½" Long, 2½" Wide

Especially serviceable to set-up men, erectors or inspectors of machines for determining accuracy of a surface, spindle or arbor, and to toolmakers for obtaining comparative measurements on close work.

Upright is large diameter, tubular and very rigid. Knurled nut at top of upright conveniently clamps it to base. Horizontal arm is adjustable to any angle; can be removed and used independently as in lathe tool post. Lever style clamps permit quick, positive adjustments. Tool Post Clamp, Tool Post Clamp Rod and Adapter Bushing are included with indicator. For description of Dial Gage furnished with this Indicator, see Dial Gage No. 726, page 70.

For Separate Parts, Extra Contact Points and Base Stops, see page 73.

See, also, Dial Test Indicator No. 744 with Permanent Magnet Base, page 75.

Furnished in substantial Metal Case.

*Can be furnished with .500" or 12½ mm. spindle movements.

Packed one in a box.

For Prices and Ordering Numbers, See Colored Section

No. 731 Dial Test Indicator

English Measure or Metric Measure

*Spindle Movement .300"

*Spindle Movement 7 Mm.
by half-thousandths of an inch
by hundredths of a millimeter

Has Tubular Construction and Separate Clamp for each adjustment.

This super rigid indicator has a separate clamp for each movement. Individual adjustments can be made without disturbing the other settings. Lever style clamps permit easy, secure clamping. Upright and dial holding rods are large diameter and tubular—strong and light—indicator is easy to handle. For description of Dial Gage furnished, see No. 726, Page 70. For Separate Parts, Extra Contact Points and Base Stops, see page 73.

Furnished in substantial metal case.

*Can be furnished with .500" or 121/2 mm. spindle movements.

No. 731A Dial Test Indicator

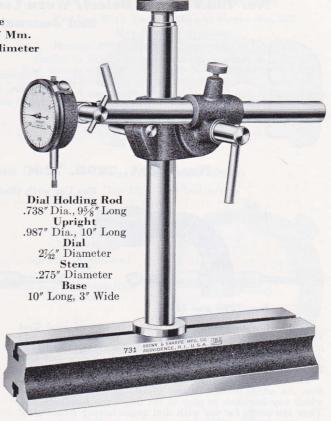
Spindle Movement .020" by ten-thousandths of an inch.

Has Jeweled Bearings.

Similar to No. 731, except that dial gage is graduated to .0001". (See No. 726A, page 70.) For work where extreme accuracy is required.

Furnished in substantial metal case.

See, also, Dial Test Indicator No. 744 with Permanent Magnet Base, page 75.



No. 733 Dial Test Indicator

English Measure *Spindle Movement .300" by half-thousandths of an inch

Metric Measure
*Spindle Movement 7 Mm.
by hundredths of a millimeter

Dial Holding Rod .375" Dia., 9" Long Upright .738" Dia., 8" Long Dial 2½″ Diameter Stem .275″ Diameter

Base $4\frac{1}{4}$ " Long, $3\frac{1}{4}$ " Wide, $1\frac{1}{8}$ " Thick

The solid upright, .738" in diameter, makes this indicator exceptionally rigid and particularly suited for those who wish to use with it a Dial Gage graduated to ten-thousandths of an inch.

Base has a gage pin at each corner. Pins can be pushed down and used against a surface plate, straight edge or against the side of a T slot.

Indicator is well suited for use in the Motor Service Shop for testing camshafts and crankshafts for out-of-roundness, for setting crankshafts in grinding machines and accurately setting a flywheel in a lathe preparatory to turning off the gear teeth.

For description of Dial Gage furnished with this Indicator, see Dial Gage No. 726, page 70.

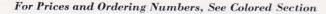
For Separate Parts and Extra Contact Points, see page 73.

Furnished in substantial metal case.

*Can be furnished with .500" or 121/2 mm. spindle movements.

See, also, Dial Test Indicator No. 744 with Permanent Magnet Base, page 75.

Each of the above packed one in a box.



M

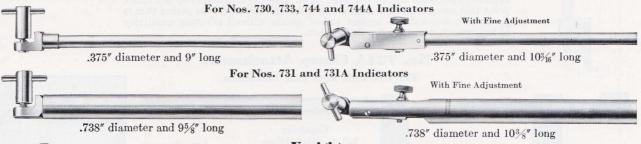
Separate Parts for Dial Test Indicators

These Dial Test Indicator parts are readily adaptable and useful for many types and combinations of special tools and fixtures. Other parts for Dial Test Indicators, not listed, shown in separate folder sent on request.

Dial Holding Rods

For Dial Holding Rods with fine adjustment, set dial gage in approximate position and turn fine adjustment screw until gage point contacts the work and pointer swings to the desired position on dial. This locates the zero at the top of the dial or wherever desired.

Packed one in a box.



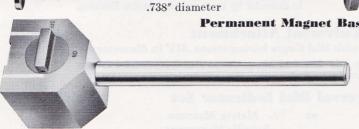
Uprights .375" diameter

Upright .375" diameter, complete for No. 730, old style Upright .738" diameter, complete for No. 730, new

style. Can be used with No. 730 bases formerly equipped with .375" diameter Uprights. Upright .987" diameter (not shown), complete for

Nos. 731 and 731A. Interchangeable with .375" diameter Uprights in old No. 732 Indicators.

Packed one in a box.



Permanent Magnet Base and Upright

For use with Brown & Sharpe Dial Test Indicators Nos. 730, 733, 744 and 744A. Upright is .738" diameter and 713/6" long. Permanent Magnet Base allows positioning in upside down and other positions on small iron or steel surface for indicator settings impossible with other indicators.

Permanent Magnet Base and Upright for sale only in the United States of America and its Territories.

Packed one in a box.



Sliding Swivel, complete with two .375" holes for Nos. 730 and 733 old style having uprights .375" in diameter.

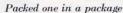
Sliding Swivel complete with one .375" and one .738" hole for Nos. 730 and 733 new style having uprights .738" in diameter, and Nos. 744

Sliding Swivel, complete with one .738" and one .987" hole for Nos. 731 and 731A.

Packed one in a package.

Adapter Bushing

Adapts sliding swivels with .738" holes for use with Clamp Attachment No. 734A, Dial Holding Rods, Uprights and Tool Post Clamp Rods .375" in diameter.





.375"

Holes

.375 & .738"

Holes



.738" & .987"

Holes

For Dial Test Indicators Nos. 730, 731 and 731A. Permit indicators to be located from dovetail or angular surface. Ends of legs are rounded. In ordering, specify number of indicator with which Stop is to be used.

Packed one in a package

Contact Points

For use on Brown & Sharpe Dial Gages and Dial Test Indicators. Points are steel, hardened, ground and have a blackened finish. Regular point is 1/4" long. Mushroom point is 3/8" dia. and 1/8" thick with a curved bottom of 1/4" radius. Narrow point is 1/16" long.

In ordering, specify style wanted.

Packed one in a package.



Mushroom



Plain **Base Stops**

For use with Dial Test Indicators Nos. 730, 731 and 731A. Permit indicators to be located from T slots and square edges. In ordering, specify number of indicator with which Stop is to be used.

Packed one in a package.

For Prices and Ordering Numbers, See Colored Section



No. 734 Universal Attachment

For Use on Dial Test Indicators with Dial Gages having stems .275" in diameter

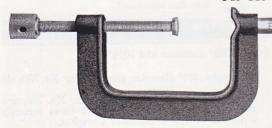
For testing internal and other surfaces that cannot be reached con-

veniently with regular straight spindle of dial gage.

Consists of a small cylinder that clamps over end of dial gage stem. Inside cylinder, a rod rests against dial gage point. This rod is actuated by bell crank point that extends at right angles to regular spindle. Rod is so placed that it produces a direct thrust against end of spindle without affecting sensitivity of instrument. See, also, No. 734B below.

No. 734A Clamp Attachment

For Use with Dial Test Indicators



Capacity %" to 23/4" Diam. Rod .375" Dia., 5% Long

Attachment holds dial gage firmly from machine arbor.



For use in holding dial indicator swivel and arm to arbor, spindle or similar machine member while checking runout of parts or alignment of fixtures. Brass shoe on end of bolt swivels to prevent injury to a finished surface.

Used with indicators having swivels for uprights and dial holding rods .375" in diameter. Used, also, with Dial Test Indicators Nos. 730, 733, 744 and 744A having uprights .738" in diameter by means of an Adapter Bushing.

No. 734B Universal Attachment

For use on Dial Test Indicators with Dial Gages having stems .375" in diameter

Similar to Universal Attachment No. 734 described above except that it is intended for use with dial gages having stems .375" in diameter.

No. 740 Universal Dial Indicator Set

English Measure Spindle Movement .100" by thousandths of an inch

Metric Measure Spindle Movement 2.5 Mm. by .025 of a millimeter

Complete set includes Dial Gage with Hole Attachment No. 729A, Bar with Upright, Clamp, Sliding Swivel, Dial Holding Rod and three Contact Points. Hole Attachment No. 729B can be used also, if desired.

Can be adjusted to almost any position and used in places inaccessible to ordinary indicators. Hole Attachment has hardened arm, $\frac{7}{32}$ diam., which will enter holes to a depth of $1\frac{11}{16}$. Clamp has brass swivel to prevent marring work. Bar is case hardened steel, 5 \(^{15}\)₁₆" long, \(^{3}\)₈" thick and \(^{7}\)₈" wide. Swivel, also, fits Surface Gages No. 621.

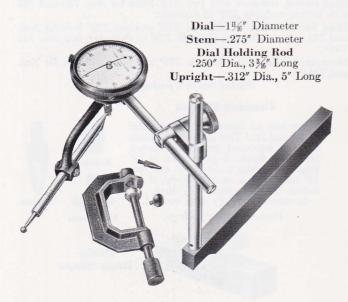
Dial Gage is extremely durable and has simple adjustment for wear. Measures by thousandths of an inch. By bringing contact point against work with enough pressure to give hand one-half revolution, readings may be taken .050" either side of zero. Knurled rim turns to bring zero under hand.

Finished Wooden Case can be furnished.

Separate Parts for No. 740 Universal Dial Indicator Set can be furnished as follows:

Dial gage only with 3 Contact Points, Hole Attachment, Clamp, Bar with Upright, Dial Holding Rod, Sliding Swivel, and Contact Points.





Each of the above packed one in a box.



A swing of lever on permanent magnet base holds indicator firmly to iron or steel part.

Fine adjustment is located conveniently.



No. 743 Dial Test Indicator

With Fine Adjustment and Permanent Magnet Base

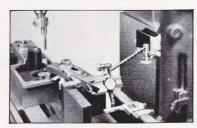
Base— $2\frac{7}{6}$ " wide, $3\frac{1}{8}$ " long, $1\frac{5}{16}$ " high (approx.)

Dial Holding Rod— $2\frac{5}{8}$ " long, $\frac{7}{32}$ " dia. Post— $9\frac{3}{8}$ " long, $\frac{5}{16}$ " dia.

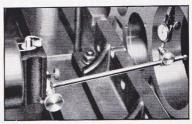
Range of Dial Attachment—.030" by thousandths of an inch

Turning fine adjusting nut brings indicator point to exact setting, simplifying many measurements. Permanent magnet base holds indicator firmly to any iron or steel surface in an upright, horizontal or even upside-down position. Tests difficult or even impossible with conventional indicators are made easily with it.

No. 743 Dial Test Indicator can be furnished without Dial Attachment



Indicator held on vertical column provides extremely accurate control on table movement.



Indicator held on end of boring machine spindle checking accuracy of bored hole.

No. 744 Dial Test Indicator

With Permanent Magnet Base
*Spindle Movement .300" by half-thousandths of an inch

Dial Holding Rod .375" Dia., 9" Long Upright .738" Dia., 7¹³/₆" Long Dial 2⁷/₂" Diameter Stem .275" Diameter Base $2\sqrt[3]{4}$ " Long, $2\sqrt[7]{6}$ " Wide, $2\sqrt[7]{6}$ " Thick

Base is simple in construction and has only one moving part—the magnet. The magnetic base, permanent magnet type, allows indicator to be held in upside down and other positions for settings impossible with other indicators. A turn of control to ON holds base to any flat iron or steel surface. With control turned to OFF, base is released. Lever style clamps permit quick, positive adjustment. Solid upright makes indicator exceptionally rigid. Dial Gage No. 726, is furnished. For Separate Parts and Extra Contact Points, see page 73.

Furnished in substantial metal case.

*Can be furnished with 1/2" spindle movement.

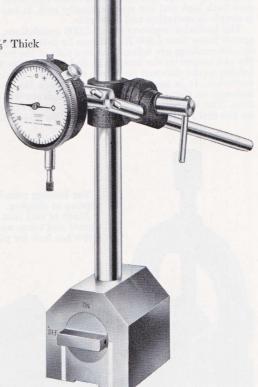
No. 744A Dial Test Indicator

With Permanent Magnet Base

Spindle Movement .020" by ten-thousandths of an inch. Has Jeweled Bearings.

For work where extreme accuracy is required. Similar to No. 744 except dial gage is graduated to .0001". See Dial Gage No. 726A, page 70.

Furnished in substantial metal case.

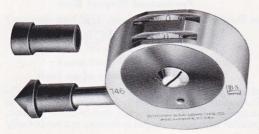


Nos. 743, 744 and 744A are for sale only in the United States of America and its Territories.

Each of the above packed one in a box.

No. 746 Vest Pocket Speed Indicator

Includes two points as shown.



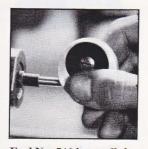
Indicator is useful for checking R. P. M. of shafting and wheels. It is easy to use and fits conveniently in a vest pocket.

After the tool has been set at zero, place thumb directly on the small depression in its side and apply the rubber point to the center of the wheel or shaft whose revolutions are to be determined. Every hundred revolutions, the steel plate lifts beneath your thumb, as if breathing. Count for one minute the number of lifts, each of which represents 100 revolutions. The R. P. M. in either direction are obtained by adding to the number

of 100 revolutions, the reading in units of 5 which appears in the slot at the top of the tool. If the R. P. M. are less than 100, the reading in opening will give R. P. M. direct.

Points are packed in envelope in box. Extra Points can be furnished.

Packed one in a box.



Feel No. 746 beat off the hundreds. Notice how simple this tool is to use and how easily R. P. M. can be determined with it.

No. 748 Speed Indicator

Includes points as shown.



This Speed Indicator accurately determines the revolutions of shafting, wheels and spindles in either direction, and measures both high and low speeds equally well. It has few parts, is simple in operation and is reliable.

The indicator registers up to 5,000 revolutions. However, speeds faster than 5,000 R.P.M. can be determined very readily. All readings are taken from one side of the indicator and the two arrows on the face of the dial indicate the figures pertaining to the different directions of rotation, eliminating any confusion. It is merely necessary to place the point of the indicator on the spindle or shaft and watch the dial for a given time. The figures showing through the small round windows on the dial read every 5 revolutions. The inside dial reading

every 100 revolutions is quickly returned to zero for repeated use by a knurled knob on the back of the indicator.

The hollow steel handle provides a convenient place to keep the rubber points when not in use. Threaded cap provides access to points. Handle is insulated from body of indicator against electricity by a fibre bushing. All the working parts are enclosed in a dull nickeled case. Two rubber points are furnished as shown. The steel point is for ordinary speeds and the rubber points are for high speeds.

This Speed Indicator is very neat, light and convenient to hade, with no rough edges or projections to interfere with its true.

Packed one in a box.

its use. Extra Points can be furnished.

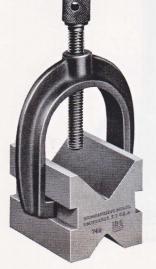
Case can be furnished.

No. 749 V Blocks and Clamp Two Blocks and One Clamp Furnished.

For holding round stock to be drilled, milled or ground. Hold work firmly and prevent turning or slipping.

Made of cast iron and intended for general machinists' use. Each block is 2'' long by $1\frac{1}{2}''$ square and takes work to $1\frac{1}{2}''$ diameter. Clamp is ribbed and very strong. Knurled head of screw has hole for pin or rod for tightening work. Blocks are not sold singly.

Extra Clamps can be furnished. Packed two blocks and one clamp in a box.









These V Blocks and Clamp hold round stock securely, simplifying many light machine operations and bench work.

For Prices and Ordering Numbers, See Colored Section

No. 749A V Blocks and Clamp

Two Blocks and One Clamp Furnished

Provide a rigid support for holding circular pieces to be drilled, gaged, ground or milled.

Hold work firmly and prevent turning and slipping.

Made of cast iron and intended for general machinists' use. Blocks are heavy and durable and suited for larger and heavier work than smaller blocks. Each block is 3'' long by $2\frac{1}{2}''$ square and takes work from $\frac{1}{2}''$ to $2\frac{1}{2}''$ diameter. Lower grooves allow blocks to be clamped to table or other working surface. Clamp is ribbed and very strong. Knurled head of screw has hole for pin or rod for tightening on work. Blocks are not sold singly.

Extra Clamps can be furnished. Packed one pair of blocks and one clamp in a box.





The large size and the lower clamping grooves are advantageous on many jobs.





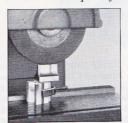


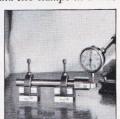
Blocks are hardened steel, accurately finished. Sides are ground parallel and are square with ends, bottom and top, and V grooves are ground central and parallel to bottom and sides. Finish ground on all four sides. Made and sold in numbered pairs, so that V grooves in blocks of same numbers are always in alignment. (We cannot agree to furnish a mating block at a later date.) Especially useful for accurately laying out work in connection with a surface plate, angle iron or knee.

Each block is $1\frac{1}{4}$ " x $1\frac{1}{4}$ " x $1\frac{1}{8}$ " approx. and will take work to 1" diameter.

Packed one pair of blocks and two clamps in a box.







These V Blocks are suited for the finest tool room work.

No. 750B V Blocks and Clamps

The stepped construction allows changing clamps quickly from small work to work 2" in diameter. The blocks can be used on their sides as the

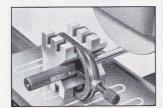
clamps do not project.

Blocks are hardened steel and sides are ground parallel and are square with ends, bottom and top. V grooves are ground central and parallel to the bottom and sides. Made and sold in numbered pairs so that the V grooves in blocks of the same numbers are always in alignment. Each block is approximately $2\frac{1}{2}$ long by $2\frac{3}{4}$ wide by 2 high.

Clamps are drop forged.

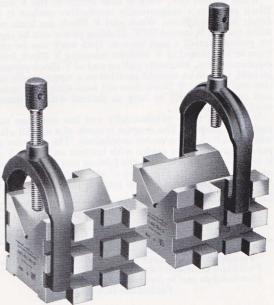
Blocks can be furnished separately but we cannot agree to furnish a mating block at a later date.

Packed one pair of blocks and two clamps in a box.





Stepped construction gives these blocks many advantages. Suitable for most accurate work.



For Prices and Ordering Numbers, See Colored Section

No. 750C V Block

This block leaves entire top side of the work accessible.

The two clamps hold stock of square or rectangular cross section, as well as round stock. A ½" hole through the center of the block allows drills or drifts to project through the work. Has groove in the bottom ½" wide and ½" deep for use on a machine table where it is clamped conveniently by the flanges.

Block is hardened steel, 3" long, 4¾" wide, 2¼" high, ground on bottom. Has a capacity for round stock to 1½" diameter. Clamps and screws are hardened.

Packed one block and two clamps in a box.



Top side of work is unobstructed when held in this block.





No. 750D Permanent Magnet V Block



Permanent Magnet V Block No. 750D follows the principle of Brown & Sharpe Permanent Magnet Chucks. It is designed for holding iron or steel work of round or rectangular cross section and, also, irregularly shaped pieces which can be placed between and in contact with the V faces. It is suited particularly for toolmaking, inspecting and manufacturing

and for both wet and dry grinding.

When turned ON, work is held firmly in the V and, if V Block rests on a magnetically conductive surface it is held firmly to this surface. Work and V Block are both released when control is turned OFF. Holding power can be regulated by giving control a part turn so that work can be removed from or positioned in V without releasing V Block from con-ductive surface. Magnetic pull on end of V Block permits it to be held, also, in an upright position on a magnetically conductive surface. The V Block does not heat under any conditions and can be left ON as long as desired without damage to work or V Block.

V Block is made substantially and has only one movable part—the magnet. The magnet is made of a special alloy and will retain its holding power indefinitely. The sides are ground parallel and at right angles with bottom and ends. V groove is central and parallel with the bottom and sides, and at right angles to the ends. The faces of the V groove are hardened and ground. Removable stop plate is furnished for the back end of the V Block.

No.	Maximum	Width	Height	*Length
	Capacity of V,	Over-all,	Over-all,	Over-all,
	Diam., Inches	Inches	Inches	Inches
750D	13/4	27/16	31/4	61/4

*Includes stop plate and control.

For sale only in the United States of America and its Territories. Furnished in finished wooden case. Matched Sets can be furnished on order.

Packed one in a box.

No. 751 Handy Block and Clamp



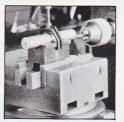
This sturdy tool is very handy for holding small circular or flat pieces for milling, grinding or drilling. It is designed for general usefulness in the home, garage or shop as a vise, anvil, V block or centering clamp.

The steel block is 3" long, 134" high and 2" wide and is casehardened. Clamp will hold round stock up to 1" diameter and flat stock up to 3/4" by 11/4".

Block or clamp can be furnished separately.

Packed one block and one clamp in a box.





Countless jobs can be done more easily with this Handy Block and Clamp.

No. 752 Toolmakers' Vise



This vise is a reliable and handy tool for use in drilling, fitting and laying out work on surface plates. It is casehardened and the base is ground. The V groove in the under side of the base takes work from $\frac{9}{22}$ " to $\frac{11}{16}$ " diameter and thus adds to the handiness of the vise as it can be used as a V block.

The large jaw is provided with a tongue which slides in a groove in the base and is held in place by a strap. This feature enables the vise to hold the work firmly and prevents the jaw from lifting. The strap can be removed and by using the jaw upside down, taper pieces can be held in the tool. The greatest capacity of the vise is 1½6″ approx. Each vise is furnished, as shown in the cut, with two steel jaws that slip on and off the screw.

Packed one in a box.

No. 754 Toolmakers' Clamps

Designed to insure greatest strength and rigidity. Made of steel, casehardened. Ends of jaws are chamfered to facilitate clamping under shoulder or in recess. Clip holds "loose" jaw in position when clamping screw is released, a very convenient and an original Brown & Sharpe feature.

No.	Opening of Jaws, Inches	Length of Jaws, Inches
754 A B C D E F	$ \begin{array}{c} $	$ \begin{array}{r} 1\frac{1}{2} \\ 2\frac{1}{8} \\ 2\frac{3}{4} \\ 3\frac{3}{8} \\ 4 \\ 5 \end{array} $



Packed one in a box.

No. 758 Toolmakers' Buttons

The positive accuracy with which holes may be located by means of these buttons recommends them for precision work. They are made carefully and their ends are ground square with the sides. An exclusive Brown & Sharpe feature is an extra long button in each set, permitting them to be used unusually close together.

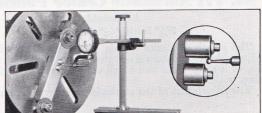
Brown & Sharpe Toolmakers' Buttons Nos. 758A, 758B and 758C are made in sets of four, of the same diameter, .300, .400 and .500 inch, respectively. In each set, three are seven sixteenths of an inch long, and one is nine sixteenths of an inch. The buttons are fastened to a steel base which is thick enough to protect the ends of the screws that hold them.

No.	Diameter, Inches
(A	.300
758 {B	.300 .400 .500
$\bar{\mathbf{C}}$. 500

Tap No. 5—40 Am. Nat'l. Coarse or 1/8" 40 U.S.F. can be furnished for use with buttons.

Packed one set in a box, three boxes in a carton.





The Long Button may be centered easily, even with a Short Button close beside it.

No. 760 Permanent Magnet Block



Permanent Magnet Block No. 760 follows the principle of Brown & Sharpe Permanent Magnet Chucks. Iron or steel work wide enough to span the insert in center of top of block can be held firmly. It is suited particularly for toolmaking, inspecting and manufacturing and for both wet and dry grinding.

When turned ON, work is held firmly on the block and, if block rests on a magnetically conductive surface, it also is held firmly to this surface. Work and block are both released when turned OFF. Holding power can be regulated by giving control a part turn so that work can be removed from or positioned on block without releasing block from conductive surface. Magnetic pull on end of block permits it to be held, also, in an upright position on a conductive surface. The block does not heat under any conditions and can be left ON as long as desired without damage to work or block.

Block is made substantially and has only one movable part—the magnet. The magnet is made of a special alloy and will retain its holding power indefinitely. The working surface and the base of the block are ground parallel and the back end is ground square with the working surface. Two removable stop plates are furnished, one for back end and one for use on either side of the block.

For sale only in the United States of America and its Territories.

No.	Working Surface, Inches	*Width, Over-all, Inches	Height, Inches	†Length, Over-all, Inches
760	27/16 x 51/4	213/16	27/16	$6\frac{1}{4}$

^{*}Includes stop plate.

Furnished in finished wooden case.

Matched Sets can be furnished on order.

Packed one in a box.

[†]Includes stop plate and control.

No. 765 Machinists' Center Punches



Brown & Sharpe Center Punches are made of tool steel selected for this type of work. They are hardened and both ends are tempered. Center Punches are about 4" long and have a nicely knurled finger grip. Points are ground carefully at an angle which will give maximum strength and penetration and at the same time provide a punch mark in which drills will start easily.

No.	Diameter at Top of Tapered Point, Inches
765 \bigg\{ \} \bigg\{ \big\{ \big\{ \big\{ \big\{ \big\} \} \big\{ \big\} \big\} \big\{ \big\{ \big\{ \big\{ \big\{ \big\{ \big\} \} \big\} \big\{ \big\{ \big\{ \big\} \} \big\} \big\} \big\} \big\{ \big\{ \big\{ \big\{ \big\{ \big\} \} \big\} \big\} \big\} \big\} \big\} \big\{ \big\}	1/16 3/32 1/8
E	7/32 7/32

Set of five sizes can be furnished in case. Packed six in a box.

No. 770 Automatic Center Punches



The striking mechanism of this Automatic Center Punch is enclosed in the knurled handle, which is of such a size and form as to be held conveniently in the hand. A downward pressure releases the striking block and makes the impression. The punch marks are of uniform depth.

The points on Styles 2 and 3 can be taken out and replaced easily if broken. The point on Style 1 is integral with the

spindle but can be replaced if necessary.

Style 1, 41/8" long, 3/8" diameter Style 2, $5\frac{1}{4}$ long, $\frac{9}{16}$ diameter Style 3, 6 long, $\frac{3}{4}$ diameter

Style 1 is adapted for carrying in the pocket, and is a small, light tool suitable for the more delicate work required in tool making. It differs slightly from illustration in that the point and spindle are integral.

Style 3 differs from the Style 2 in being slightly heavier in construction and capable of striking a much heavier blow.

Combined Spindle and Point for Style 1 Punch, and Extra

Points for either Style 2 or 3 Punch can be furnished.

Packed one in a box.

No. 771 Automatic Center Punch

Adjustable 53/4" long, 9/16" diameter

The length of stroke of this Automatic Center Punch is adjustable. This feature is one that is appreciated by mechanics, as it adapts the tool to all varieties of tool and general shop work.

The adjustment of the stroke is made by the knurled cap

on the top of the handle. To adjust for fine work requiring a light mark, turn the cap to the right; for coarse work, turn the cap to the left.

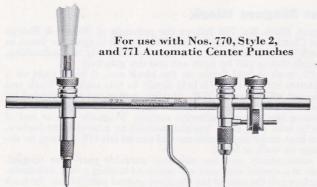
The points can be taken out and replaced easily if broken.

Extra Points can be furnished.

Packed one in a box.

No. 775 Spacing Attachments

With 51/8" Beam, Swings 8"



Useful in spacing or laying out work to be machined or drilled. The attachment screws on to the center punch, in

place of the removable point.

Fine adjustment is obtained by the adjusting screw and slide. The point is held by a spring chuck and can be adjusted to varying lengths.

Extension for No. 845 14" Steel Beam Trammel, page 83, can be used with this Attachment for large work. See, also, Points for Universal Divider and 14" Steel Beam Trammel.

Extra Offset Points and Straight Scriber Points can be furnished. Packed one in a box.

No. 778 Scribers Style 1, Single Point, Pocket Style 2, Single Point, 5" long Style 3, Double Point, 8" long

Scribers are well made. Handles are of aluminum and light in weight, and points are finely tempered tool steel.

The point of Style 1 is held firmly by a two-jawed chuck. It may be reversed and the Scriber closed to about 4" in length. This Scriber is very light and convenient to handle weighing approximately 1/4 ounce.

The points of Styles 2 and 3 screw into the holders and are knurled for finger grip.

Extra points for any of above Scribers can be furnished. Each of the above Scribers packed six in a box.

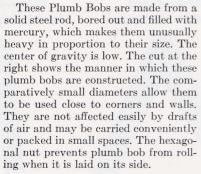
Tungsten Carbide Point

For use with Scriber No. 778, Style 1

This Tungsten Carbide Point can be used in place of the point regularly furnished with Scriber No. 778, Style 1, pocket size. It is practically wearproof and permits scriber to be used for marking on glass and other hard surfaces.

Packed one in an envelope.

No. 790 Mercury Plumb Bobs



An important feature is the device for fastening the string without a knot. After unwinding the required length, the cord is inserted in a slot in the cap which centralizes the cord and makes the bob hang true.

The points are hardened, and the bodies and points are ground. The plumb bobs are dull chromium plated and each is furnished with a braided silk line. The $3\frac{1}{2}$ oz. size can be carried easily in the vest pocket.

Weight, Ounces	Length, Inches	Diameter, Inches
31/2	4	1/2
12	$\frac{4}{53}\frac{1}{8}$	7/8

Packed one in a box.

Toolmakers' Spring Dividers and Spring Calipers

These are finely finished, well balanced tools. The spring is strong and flexible, giving the tool smooth, even action. The fulcrum stud has a large diameter flange preventing side deflection of the legs. The legs are of steel, round and highly polished and the measuring points come together evenly.

Special attention is called to the 2" sizes, as they are convenient for small, light work and for carrying in the pocket.

No. 800 Toolmakers' Spring Dividers

No.	Size, Inches
800	2 3 4 6

Packed two in a box.

No. 801 Toolmakers' Outside Spring Calipers







No.	Size, Inches
801	2 3 4 6

No.	Size, Inches
802	2 3 4 6

Sizes above refer to length of leg. Actual diametral capacity of No. 801 is approximately the same.

Each of the above packed two in a box.

Separate Parts for Toolmakers' Spring Dividers and Spring Calipers

Leg, Screw and Ball, Nut, Spring, Spring with Thumb Attachment for Dividers, Thumb Attachment, Nut Washer, and Fulcrum Stud can be furnished.

No. 810 Spring Dividers

Attractive and durable. Especially developed for those who require reliable tools of less expensive construction and finish than the Toolmakers' Dividers.

No.	Size, Inches
810	4 5 6 8

Packed two in a box.

Separate Parts for No. 810 Spring Dividers and Nos. 811 and 812 Spring Calipers

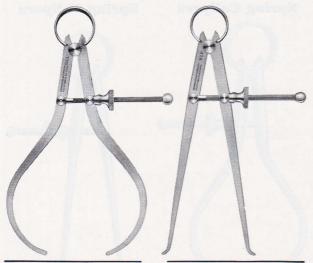
Leg, Screw and Ball, Nut, Spring, Spring with Thumb Attachment, Nut Washer, Thumb Attachment and Fulcrum Stud can be furnished.



For Prices and Ordering Numbers, See Colored Section

No. 811 Outside Spring Calipers

No. 812 Inside Spring Calipers



No.	Size, Inches	1
811	4 6 8	8

No.	Size, Inches
812	4 6
	8

Sizes above refer to length of leg. Actual diametral capacity of No. 811 is approximately the same.

Each of the above packed two in a box.

No. 826

No. 827

Transfer Firm-Joint Transfer Firm-Joint Outside Calipers Inside Calipers



No.	Size, Inches	Actual Capacity Diameter, Inches	No.	Size, In ches
826	6 12 24	$\begin{array}{c c} 7 \\ 15 \\ 29\frac{1}{2} \end{array}$	827	6 12 24

Sizes above refer to length of leg.

Packed as follows: 6", six; 12", four; and 24", one in a box.

For Prices and Ordering Numbers, See Colored Section

No. 821 Firm-Joint Outside Calipers

No. 822 Firm-Joint Inside Calipers





Size, Inches	Actual Capacity Diameter Inches
6 8	7 91/2
12	15
18	22 29½
	6 8 12

6 8
12 18

Sizes above refer to length of leg.

Packed as follows: 6", six; 8" and 12", four; 18" and 24", one in a box.

No. 835 Firm-Joint Hermaphrodite Calipers

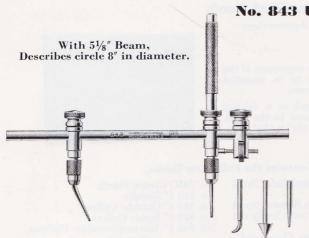
Firm-Joint Hermaphrodite Calipers are made in two styles, one with adjustable point as shown in illustration and the other with solid point.

No.	Size, Inches
835	4 6
	8

Separate parts—Clamp Screw and Nut complete, and Point can be furnished.

Packed six in a box, except 8", which is packed four in a box.





No. 843 Universal Divider

Spring friction prevents tram from sliding when loosened. One tram has fine adjustment. Points are held by spring chucks and can be changed easily. Half Offset point can be used for scribing small circles or for working close to shoulder. V point centers in holes to $\frac{1}{4}$ " diameter. (See special points below.)

Furnished with extra Straight Scriber Point, Caliper Point

and V Point, shown.

Finished Wooden Case can be furnished. Has space for extra Points. Packed one in a box.

Extension

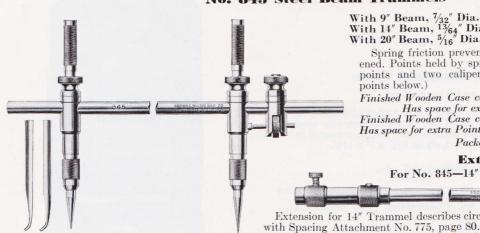
For No. 843 Divider



With Extension, Divider describes circle 37" in diameter. Extension includes coupling.

Packed one in tubular container.

No. 845 Steel Beam Trammels



With 9'' Beam, 7/32'' Dia., Describes circle 18'' in diam. With 14'' Beam, 13/4'' Dia., Describes circle 26'' in diam. With 20'' Beam, 5/16'' Dia., Describes circle 36'' in diam.

Spring friction prevents trams from sliding when loosened. Points held by spring chucks. Two straight scriber points and two caliper points furnished. (See special

Finished Wooden Case can be furnished for No. 845—14". Has space for extra Points and Extension.

Finished Wooden Case can be furnished for No. 845—20". Has space for extra Points (except V Points) and Extension. Packed one in a box.

Extensions

For No. 845-14" and 20" Trammels

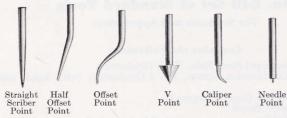
Extension for 14" Trammel describes circle 54" in diameter. It can be used

Extension for 20" Trammel describes circle 72" in diameter.

Extension for 14" packed one in tubular container; for 20", packed one in a box.

Points and Attachments

For Spacing Attachment No. 775, Divider No. 843 and Trammels No. 845-9" and 14" **Points**



V Point centers in holes to 1/4" dia.

Packed one in a package.

Pencil Lead Chuck



Spring friction prevents attachment from sliding when loosened. Takes lead .075" in dia. (cannot be used for other points).

Packed one in a box.

For Trammel No. 845-20" Points

V Points center in holes from 1/4" to 15/8" dia. Packed one pair in a box. Needle Point, Caliper Point and Straight Scriber Point can be furnished. V Points Needle

Pencil Lead Chuck

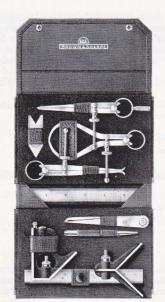
Spring friction prevents attachment from sliding when loosened. Takes lead .075" in dia. Needle Point is furnished with Pencil Lead Chuck (cannot be used for other points).

Packed one in a box.

For Prices and Ordering Numbers, See Colored Section

No. 847 Set of Standard Tools

For Students and Apprentices



A set of tools that the experience of the shop man has proved to be essential equipment for the beginner.

It is neatly arranged in a folding leatherette case as shown in the cuts. Size folded, about 7" x $4\frac{3}{4}$ " x $1\frac{3}{8}$ ".



Contains the Following Tools:

No. 300 6" Tempered Steel Rule, No. 4 Graduation

No. 402 6" Combination Square, No. 4 Graduation (with heads not hardened)

No. 650 60° Center Gage (Tempered)

No. 765C Center Punch

No. 810 4" Divider No. 811 4" Outside Caliper

No. 812 4" Inside Caliper No. 835 4" Hermaphrodite Caliper, solid point



For Students and Apprentices

This set of tools answers the requirements of technical student or apprentice; it provides a modest set of fine quality, frequently used tools, including a 1" Micrometer for precision work. Neatly arranged in folding leatherette case. Size when folded, about $9\frac{1}{4}$ " x 7" x $1\frac{1}{2}$ ".

Contains the Following Tools:

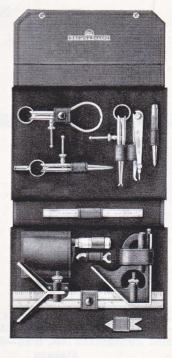
No. 11 Micrometer Caliper

No. 306A 6" Flexible Steel Rule, No. 10 Graduation No. 402 9" Combination Square, No. 4 Graduation (with heads not hardened)

No. 650 60° Center Gage (Tempered)

No. 765D Center Punch No. 800 4" Toolmakers' Divider

No. 801 4" Toolmakers' Outside Caliper No. 802 4" Toolmakers' Inside Caliper No. 835 4" Hermaphrodite Caliper, Adjustable Point





No. 849 Set of Standard Tools

For Students and Apprentices

Contains the Following:

No. 300 6'' Tempered Steel Rule, No. 4 Graduation No. 402 6'' Combination Square, No. 4 Graduation (with heads not hardened)

No. $650~60^{\circ}$ Center Gage (Tempered) No. 765C Center Punch

No. 810 5" Divider No. 811 6" Outside Caliper No. 812 6" Inside Caliper

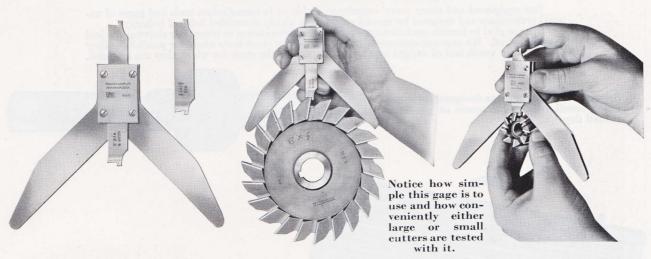
Brown & Sharpe Handbook

Furnished in a finished wooden case.

The Brown & Sharpe Handbook contains many useful hints and instructions on a large variety of operations common to machine shop practice.

Each of the above packed one set in a box.

No. 900 Cutter Clearance Gage



This handy gage determines the correct angle of clearance in grinding milling cutters, and is very simple to use. The inside surfaces of the V are brought in contact with the cutter, and the gage blade is dropped upon the tooth being gaged. The cutter is revolved sufficiently to bring the face of the tooth in contact with the gage blade. The angle of clearance in the tooth should correspond with the angle of the gage.

It may be used for both right- and left-hand cutters. The

V shaped body locates the cutter and holds the gage blade in correct relation to the center line of the cutter. All contact surfaces are hardened and ground. Two gage blades are furnished with each gage and are stamped at each end with the diameters of the cutters for which they are intended. This clearance gage will measure all style cutters, except those with less than 8 teeth, from 1/2" up to 8" in diameter, and of any

Packed one in a box.

No. 920 Hardened and Ground Steel Parallels

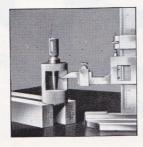


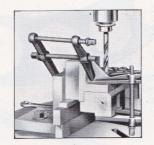
Made of special steel, hardened and ground accurately to very close limits on four sides. These parallels are straight and true. Sizes especially selected for their convenience and general usefulness.

Length, Inches	Size, Inches	Length, Inches	Size, Inches	Length, Inches	Size, Inches	Length, Inches	Size, Inches
-	1/ ₁ x 3/ ₀	e	1/2 X 3/4	12	11/16 x 11/4	12	11/4 x 11/2
6	1/4 X 3/8	6	1/2 X 3/4 1/2 X 1	12	3/4 x 1	12	11/4 x 13/4
0	1/ x 5/	0	1/2 X 5/8	12	3/4 x 11/4	12	$1\frac{1}{4} \times 2$
6	1/ v 3/	9	1/2 X 3/4	12	13/16 x 1 1/4	12	$1\frac{1}{4} \times 2\frac{1}{2}$
6	3/8 X 1/2	9	1/2 x 1	12	$1 \times 1\frac{1}{4}$	12	$1\frac{1}{2} \times 2$
6	3/8 X 5/8	9	$\frac{3}{4} \times 1$	12	1 x $1\frac{1}{2}$	12	$1\frac{1}{2} \times 3$
6	3/8 X 3/4	9	$\frac{3}{4} \times 1\frac{1}{4}$	12	1 x 2		
6	1/2 x 5/8	9	$\frac{3}{4} \times 1\frac{1}{2}$				

Packed one in a package.







Steel Parallels are handy in many phases of machine shop practice.

For Prices and Ordering Numbers, See Colored Section

Special Tools

Our equipment and many years' experience enable us to manufacture tools and gages of unusual proportions and designed for special purposes in widely diversified fields of industry.

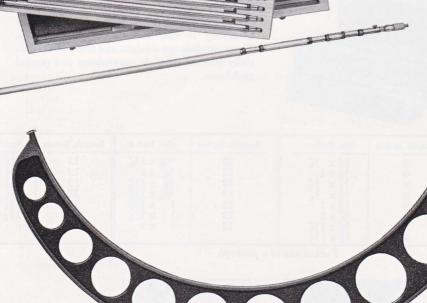
We are glad to furnish quotations upon receipt of information or blueprints showing the tool or gage desired. We urge our customers, however, to order stock tools whenever possible, as they are of proven worth and of designs found best adapted to the work for which they are intended.

Special Micrometer Gage designed for measuring small inside diameters at predeter-mined depths.



€B∋' €Ba Lie

Special Inside Micrometer for checking inside measurements of work from 6" to 30'.



Special Outside Micrometer designed to measure large steel rolls from 71" to 72" in diameter. The products shown on this and the following pages are fully described in our complete Small Tools Catalog No. 35, sent upon request. Individual catalogs or circulars describing this equipment are available also.

Cylindrical Plug Gages and Ring Gages

Furnished to American Gage Design Standard in complete range of sizes, both single and double end and in progressive and long types. Plug gages can be furnished with Pilot feature.

Standard Caliper Gages

Available in sizes from ½" to 4". These gages are strong and light and very convenient for everyday use.

Taper and other special gages are furnished to order. A gage laboratory, carefully maintained as to temperature and humidity, is devoted exclusively to gage production.



Johansson Gage Blocks

Johansson Gage Blocks and Accessories are manufactured in complete range of sizes and in sets. These blocks are made in three classes or standards with the following limits per inch:

> Class B $\pm .000008''$ A $\pm .000004''$ AA $\pm .000002''$

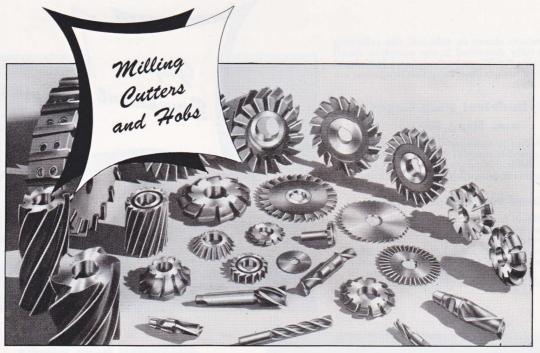
These precision blocks are practically a necessity for maintaining master laboratory standards, periodic verification of work standards and as working gages in toolrooms and for layout and setup work. They are vital to quality control.



Electronic Production Measuring and Inspecting Equipment

This equipment through electronic means provides readings of from .0001" to .00001". Various features characterize Brown & Sharpe design—readings unaffected by heat—one master only for setting—true linear response and readings even for finest increments indicated by widely spaced graduations. Available for both external and internal measurements and for incorporation into special gages, fixtures and sorting devices. Special gaging fixtures, and inspecting and sorting machines made to order.





Over 90 years of experience in their use and manufacture contributes to the excellence of Brown & Sharpe Cutters. Tested designs, selected materials, scientific heat treatment all combine to make them superior cutting tools.

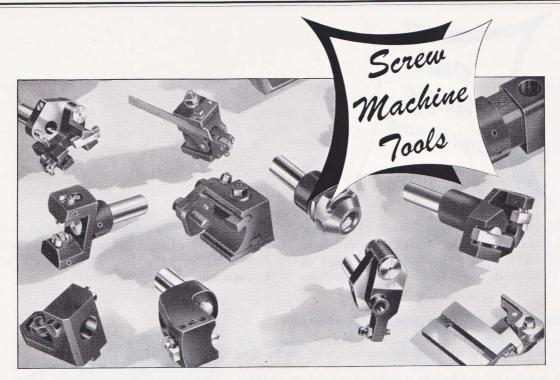
The line includes Plain Milling, Side Milling, Inserted Tooth, Angular, Convex and Concave Cutters, and other types as well as Metal Slitting Saws, Gear Cutters and Hobs. Spiral End Mills and Two-Flute Spiral End Mills, with various taper and straight shanks, and in Single- and Double-End types, with cutting features of hollow faces, rake angle and tooth structure offer economies for every end mill operation.

Carbide Cutters are furnished to order.



Permit machine tools to deliver power efficiently to cutting tools for maximum output and accurate work.

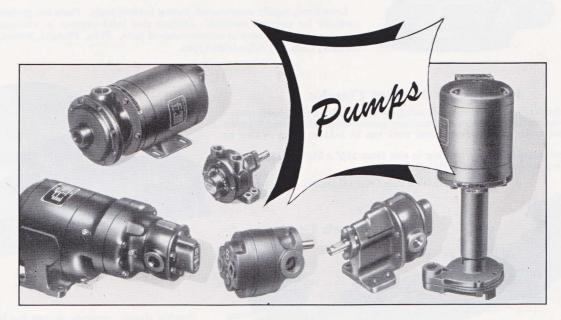
The line includes Cutter Arbors for Milling Machines, Arbors for Face Milling Cutters and Shell End Mills, Fly Cutter, Screw Slotting Cutter and Screw Arbors, Cutter Adapters and Adapters for End Mills, Arbors, Collets and other Adapters, Collets with Straight and Taper Holes—a type for every need. The Cam Lock Cutter Adapters provide positive drive with quick removal and replacement of end mills and adapters.



Provide maximum production, reliable performance accurate work and good finish. We are not only a manufacturer but an extensive user of these tools with an experience that results in superior screw machine tool design and performance.

The line includes Spring Collets, Feeding Fingers, Hollow Mills, Box Tools, Balance Turning Tools, Floating Holders,

Die, Tap and Drill Holders, Tool Posts for Circular and Square Tools, Cutting-Off Tool Posts, Angular Cutting-Off, Knee, Centering and Facing, Recessing, Knurling and Swing Tools, Fixed and Adjustable Guides and others—there's a tool for every requirement. Also, we maintain a special cam service for furnishing accurate and economically-designed cams.



Available in a complete line of geared, vane, centrifugal and motor driven types—Geared pumps in a wide range of capacities for handling oil and coolant and transfer purposes as well as for hydraulic installations—Vane pumps with advantages of automatic reversing and maintenance of delivery direction,

available in regular and stripped models for operation against pressures up to 100 lbs. per square inch—Motor Driven Centrifugal pumps for submergence in liquid and compact types for machine mounting for supplying coolant. There is a Brown & Sharpe pump to meet nearly every need.



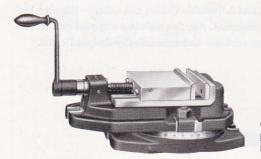
In addition to the different classes of products listed in this catalog, there also is a wide variety of other Brown & Sharpe Products listed here as Useful Equipment which finds extensive employ-

ment in simplifying machine work and protecting its accuracy. This Useful Equipment has characteristic Brown & Sharpe superior design and accuracy and serves a wide range of shop needs.

Brown & Sharpe Ground Flat Stock

Available in three types: combination Oil or Water Hardening, Oil Hardening, and Water Hardening. 145 different sizes, in 18" lengths. The combination Oil or Water Hardening stock is furnished in thicknesses up to and including $\frac{3}{16}$ " and hardens in either oil or water, an exclusive Brown & Sharpe advantage. It eliminates the necessity and expense of keeping two types of stock on hand. The Oil Hardening and Water Hardening types are furnished in thicknesses from $\frac{3}{12}$ " to 1".





Brown & Sharpe Vises

Long lived, rigidly constructed, strong holding tools. Parts are proportioned carefully for uniform strength. Designs give solid support to withstand the pressure of the cut, even at extreme ends of jaws. Plain, Flanged, Swivel, Toolmakers', Cam and Adjustable types.

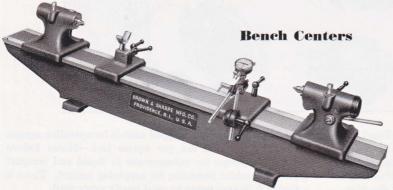
Permanent Magnet Chucks

These chucks have the unique advantage of not requiring electric current—electrical connections, switches and auxiliary generators are eliminated. Chucks do not heat under any conditions and work can be held on them as long as desired.

Eight rectangular models varying in size from $2\frac{1}{6}$ " x $5\frac{1}{4}$ " to $12\frac{1}{8}$ " x 36". Three rotary models 5", 7" and $9\frac{1}{4}$ " in diameter.



For sale only in the United States of America and its Territories.



Provide simple, accurate means for holding cylindrical work for inspection purposes. Dial gage regularly reads by thousandths but a gage for ten-thousandths can be furnished. Centers swing 8" in diameter and take work 36" in length.



Spur Gear Testing Fixture

Provides for rapid and accurate testing of spur gears. Two different tests can be made; one with gears at a fixed center distance; the other, with gears held in mesh under pressure. Center distances are set accurately from 2" to 291/2" in thousandths of an inch and a dial indicator shows run-out and variations of gears in thousandths of an inch as well as other common errors, and enables their identification.

A cam releasing device releases pressure between the gears and facilitates their removal; a lever arrangement unseats quickly the tapered studs on which gears are mounted.

No. 616 Cylindrical Grinding and Indexing Attachment

For use on surface grinders. Provides for dry grinding small cylindrical work, tapers and work requiring indexing. Grinding is done on dead centers. An indexing spring chuck with spring collets for work not ground between centers is available, interchangeable with standard index head.

Motor is completely enclosed and ball bearings in index head and indexing spring chuck are lubricated permanently and sealed.



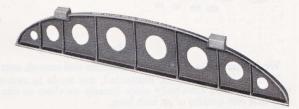
Cast Iron Surface Plates

Provide true surfaces for reference purposes. Iron is uniformly hard with no soft spots to plague users as with material where texture cannot be controlled. Special scraping pattern provides smooth bearing areas and low surface friction. Fifty-two sizes from $3\frac{1}{2}$ " x 4" to 42" x 42".



Cast Iron Straight Edges

Deep I beam cross section provides great strength. Vertical ribs further stiffen the web. Wooden blocks are provided for hand grips to prevent distortion from the effect of heat from workmen's hands. Twelve sizes from $18'' \times 1\frac{1}{2}''$ to $180'' \times 3\frac{1}{2}''$.



Work Driving Dogs

For use on grinding machines. Furnished individually and in sets. These dogs are sturdy and well balanced. Made of malleable iron with smooth japan finish. Clamp screws are hardened steel. For work from \(\frac{1}{8}'' \) to 4'' diameter.

Index Plates

For use on Brown & Sharpe Universal, Universal Spiral, Plain and Triple Index Centers.



Taper Mandrels and Expansion Bushings

Mandrels are furnished in eleven sizes from .3125", to 1.75" diameter at small end.

Bushings are cast iron and capable of expanding .005" to .007". Forty-seven sizes from $\frac{1}{2}$ " to $3\frac{3}{8}$ " outside diameter.

Lathe Mandrels

Tool steel, hardened and ground accurately. Tapered .0005" to an inch. Thirty-eight sizes from $\frac{3}{6}$ " to 3" diameter.





Self-Oiling Friction Pulleys

Cone Type

Designed for high speed and hard service. When thimble is pushed between hardened rolls in ends of levers, levers spread and draw friction surface of pulley in contact with friction cone. 8", 10", 12" and 16" diameters.

Yarn Reel

Reels yarn accurately for counts. Used in connection with roving scales and yarn testers when obtaining the stretch, strength and number of cotton, woolen, worsted, linen, silk, rayon and other yarns. Reel has 4 or 7 spindles and is 54" in circumference.

Dial graduated into 120 parts, and the number of yards reeled from each spindle is indicated on dial. Automatic feed motion lays yarn flat on reel, securing accurate and uniform measurement. The bell rings a few turns before the zero of the dial reaches index point.





Roving or Yarn and Sample Weighing Scales

The Roving or Yarn Scales, illustrated, weigh up to one pound avoirdupois in tenths of grains and are useful in connection with yarn reel for numbering yarn.

Sample Weighing Scales are similar but weigh, English Measure 0 to 1 lb. Avoirdupois by ten-thousandths of a pound and Metric Measure 0 to 500 grams by hundredths of a gram. Weigh accurately small articles, screws, samples of paper, color or drugs, and are useful for computing large quantities.

Hair Clippers

World known for their lasting qualities and smooth cutting action.

Bressant Hair Clippers, illustrated, are made in seven sizes from No. 0000 which cuts hair extremely close (nearly as close as shaving) to No. 2 which cuts hair one quarter of an inch long.

Tapering Hair Clipper, similar to Bressant, has a curved bottom surface which makes it possible to obtain a smooth, even taper.



Publications

We issue the following publications: "Practical Treatise on Milling and Milling Machines"; "Construction and Use of Automatic Screw Machines"; "Practical Treatise on Gear-

ing''; "Formulas in Gearing''; and "Brown & Sharpe Handbook."



Decimal and Millimeter Equivalents of Fractional Parts of an Inch

Inches	Inches	Mm.	Inches	Inches	Mm.	Inches	Inches	Mm.
1/64	.01563	.397	11/32	.34375	8.731	43/64	.67188	17.065
1/32	.03125	.794	23/64	.35938	9.128	11/16	.6875	17.462
3/64	.04688	1.191	3/8	.375	9.525	45/64	.70313	17.859
/16	.0625	1.587	25/64	.39063	9.922	23/32	.71875	18.256
5/64	.07813	1.984	13/32	.40625	10.319	47/64	.73438	18.653
/32	.09375	2.381	27/64	.42188	10.716	3/4	.75	19.050
7/64	.10938	2.778	7/16	.4375	11.113	49/64	.76563	19.447
/8	.125	3.175	29/64	.45313	11.509	25/32	.78125	19.844
9/64	.14063	3.572	15/32	.46875	11.906	51/64	.79688	20.240
/32	.15625	3.969	31/64	.48438	12.303	13/16	.8125	20.637
11/64	.17188	4.366	1/2	.5	12.700	53/64	.82813	21.034
/16	.1875	4.762	33/64	.51563	13.097	27/32	.84375	21.431
13/64	.20313	5.159	17/32	.53125	13.494	55/64	.85938	21.828
/32	.21875	5.556	35/64	.54688	13.890	7/8	.875	22.225
15/64	.23438	5.953	9/16	.5625	14.287	57/64	.89063	22.622
/4	.25	6.350	37/64	.57813	14.684	29/32	.90625	23.019
17/64	.26563	6.747	19/32	.59375	15.081	59/64	.92188	23.415
2/32	.28125	7.144	39/64	.60938	15.478	15/16	.9375	23.812
19/64	.29688	7.541	5/8	.625	15.875	61/64	.95313	24.209
/16	.3125	7.937	41/64	.64063	16.272	31/32	.96875	24.606
21/64	.32813	8.334	21/32	.65625	16.669	63/64	.98438	25.003
704						1	1.00000	25.400

Decimal Inch Equivalents of Millimeters and Fractional Parts of Millimeters

Mm. Inches	Mm. Inches	Mm. Inches	Mm. Inches	Mm. Inches
1/100 = .00039	26/100 = .01024	51/100 = .02008	76/100 = .02992	2 = .07874
2/100 = .00079	27/100 = .01063	52/100 = .02047	77/100 = .03032	3 = .11811
3/100 = .00118	28/100 = .01102	53/100 = .02087	78/100 = .03071	4 = .15748
4/100 = .00157	29/100 = .01142	54/100 = .02126	79/100 = .03110	5 = .19685
5/100 = .00197	30/100 = .01181	55/100 = .02165	80/100 = .03150	6 = .23622
6/100 = .00236	31/100 = .01220	56/100 = .02205	81/100 = .03189	7 = .27559
7/100 = .00276	32/100 = .01260	57/100 = .02244	82/100 = .03228	8 = .31496
8/100 = .00315	33/100 = .01299	58/100 = .02283	83/100 = .03268	9 = .35433
9/100 = .00354	34/100 = .01339	59/100 = .02323	84/100 = .03307	10 = .39370
10/100 = .00394	35/100 = .01378	60/100 = .02362	85/100 = .03346	11 = .43307
11/100 = .00433	36/100 = .01417	61/100 = .02402	86/100 = .03386	12 = .47244
12/100 = .00472	37/100 = .01457	62/100 = .02441	87/100 = .03425	13 = .51181
13/100 = .00512	38/100 = .01496	63/100 = .02480	88/100 = .03465	14 = .55118
14/100 = .00551	39/100 = .01535	64/100 = .02520	89/100 = .03504	15 = .59055
15/100 = .00591	40/100 = .01575	65/100 = .02559	90/100 = .03543	16 = .62992
16/100 = .00630	41/100 = .01614	66/100 = .02598	91/100 = .03583	17 = .66929
17/100 = .00669	42/100 = .01654	67/100 = .02638	92/100 = .03622	18 = .70866
18/100 = .00709	43/100 = .01693	68/100 = .02677	93/100 = .03661	19 = .74803
19/100 = .00748	44/100 = .01732	69/100 = .02717	94/100 = .03701	20 = .78740
20/100 = .00787	45/100 = .01772	70/100 = .02756	95/100 = .03740	21 = .82677
21/100 = .00827	46/100 = .01811	71/100 = .02795	96/100 = .03780	22 = .86614
22/100 = .00866	47/100 = .01850	72/100 = .02835	97/100 = .03819	23 = .90551
23/100 = .00906	48/100 = .01890	73/100 = .02874	98/100 = .03858	24 = .94488
24/100 = .00945	49/100 = .01929	74/100 = .02913	99/100 = .03898	25 = .98425
25/100 = .00984	50/100 = .01969	75/100 = .02953	1 = .03937	26 = 1.02362

Metric Measures

In accordance with the standard practice approved by the American Standards Association, the ratio 25.4 mm=1 inch is used for converting millimeters to inches. This factor varies only two millionths of an inch from the more exact factor 25.40005 mm, a difference so small as to be negligible for industrial length measurements.

The metric unit of length is the meter = 39.37 inches.

The metric unit of weight is the gram = 15.432 grains.

The following prefixes are used for sub-divisions and multiples: Milli = $\frac{1}{1000}$, Centi = $\frac{1}{100}$, Deci = $\frac{1}{10}$, Deca = 10, Hecto = 100, Kilo = 1000, Myria = 10,000.

Metric and English Equivalent Measures

	Measures of Length	Measures of	Capacity
Metric	English	Metric	English
1 meter	= 39.37 inches, or 3.28083 feet, or 1.09361 yards	部	61.023 cubic inches .03531 cubic foot
.3048 meter	= 1 foot	1 liter (=1 cubic decimeter) =	= \langle .2642 gal. (American)
1 centimeter	= .3937 inch		2.202 lbs. of water at
2.54 centimete			62°F.
1 millimeter	= .03937 inch, or nearly $\frac{1}{25}$ inch	28.317 liters =	= 1 cubic foot
25.4 millimeter	rs = 1 inch	3.785 liters =	= 1 gallon (American)
1 kilometer	= 1093.61 yards, or 0.62137 mile	4.543 liters =	

Measures of Weight

Metric	English
1 gram	= 15.432 grains
.0648 gram	= 1 grain
28.35 grams	= 1 ounce avoirdupois
1 kilogram	= 2.2046 pounds
.4536 kilogram	= 1 pound
1)	= (.9842 ton of 2240 pounds)
1 metric ton	$= \{19.68 \text{ cwt.}\}$
1000 kilograms	= 2204.6 pounds
1.016 metric tons \\ 1016 kilograms \}	= 1 ton of 2240 pounds

United States Standard Gage Sizes

For Sheet and Plate Iron and Steel

This is the recognized commercial standard for all uncoated sheet and plate iron and steel, and is the legal standard to be

used in determining duties and taxes levied by the United States, under act of Congress approved March 3, 1893.

No. of Gage	Approximate Thickness, Inches, (Fractions)	Approximate Thickness, Inches, (Decimals)	Weight per Sq. Ft., Ounces, Avoirdupois	Weight per Sq. Ft. Pounds Avoirdupois	No. of Gage	Approximate Thickness, Inches, (Fractions)	Approximate Thickness, Inches, (Decimals)	Weight per Sq. Ft., Oz., Avoirdupois	Weight per Sq. Ft., Lbs. Avoirdupois
0000000	1/2	.5	320	20.00	17	9/160	.0563	36	2.25
000000	15/32	.4688	300	18.75	18	1/20	.05	32	2.
00000	7/16	.4375	280	17.50	19	7/160	.0438	28	1.75
0000	13/32	.4063	260	16.25	20	3/80	.0375	24	1.50
000	3/8	.375	240	15.00	21	11/320	.0344	22	1.375
00	11/32	.3438	220	13.75	22	1/32	.0313	20	1.25
0	5/16	.3125	200	12.50	23	9/320	.0281	18	1.125
1	9/32	.2813	180	11.25	24	1/40	.025	16	1.
2	17/64	.2656	170	10.625	25	7/320	.0219	14	.875
3	1/4	.25	160	10.00	26	3/160	.0188	12	.75
4	15/64	.2344	150	9.375	27	11/640	.0172	11	.6875
5	7/32	.2188	140	8.75	28	1/64	.0156	10	.625
6	13/64	.2031	130	8.125	29	9/640	.0141	9	.5625
7	3/16	.1875	120	7.5	30	1/80	.0125	8	.5
8	11/64	.1719	110	6.875	31	7/640	.0109	8 7	.4375
9	5/32	.1563	100	6.25	32	13/1280	.0102	$6\frac{1}{2}$.4063
10	9/64	.1406	90	5.625	33	3/320	.0094	6	.375
11	1/8	.125	80	5.00	34	11/1280	.0086	$5\frac{1}{2}$.3438
12	7/64	.1094	70	4.375	35	5/640	.0078	5	.3125
13	3/32	.0938	60	3.75	36	9/1280	.0070	41/2	.2813
14	5/64	.0781	50	3.125	37	17/2560	.0066	41/4	.2656
15	9/128	.0703	45	2.8125	38	1/160	.0063	4	.25
16	1/16	.0625	40	2.5		20040	MALY ME	8 5 5 7 7	AND PAGE

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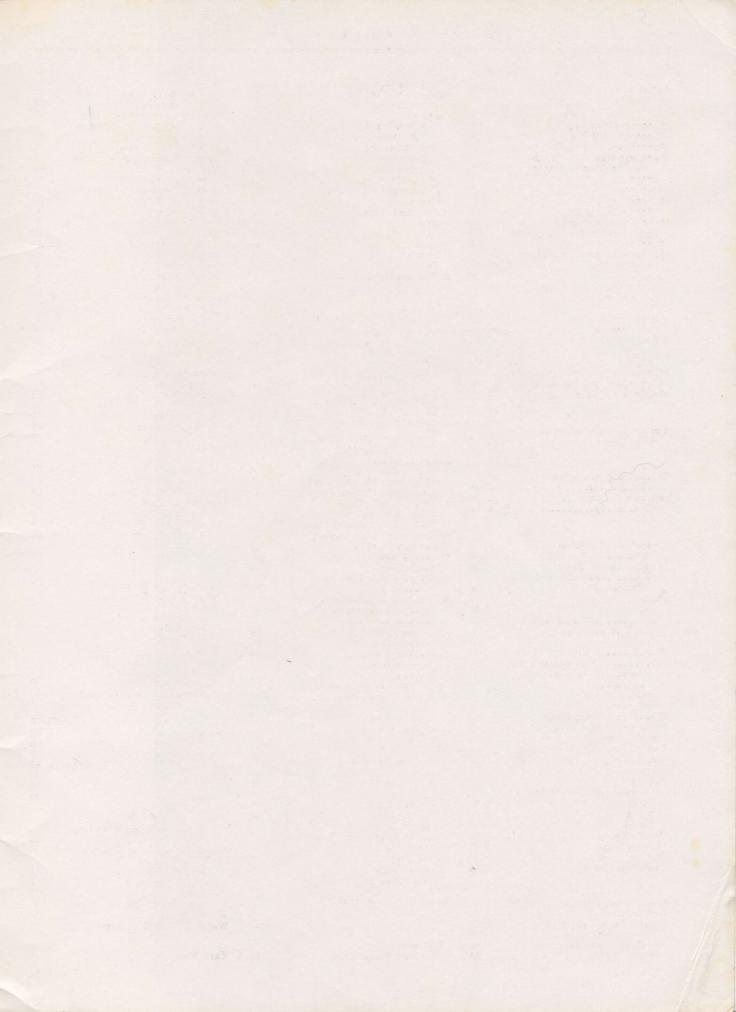
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