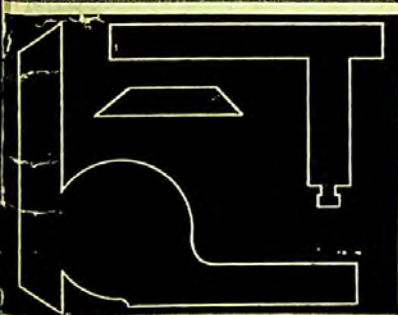
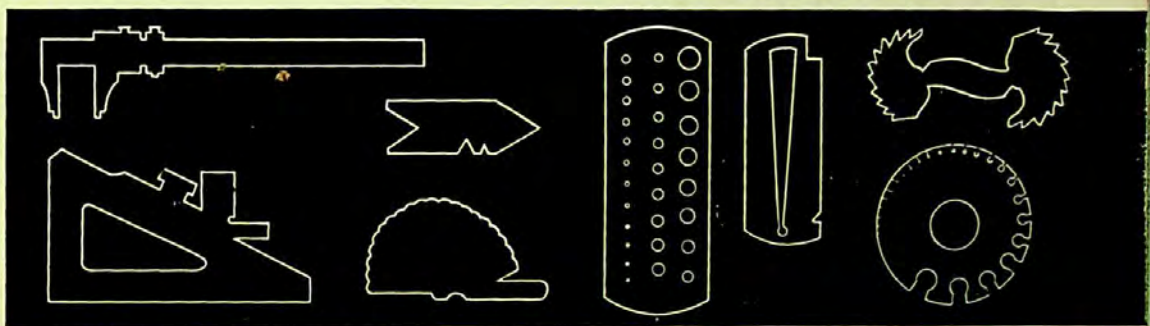
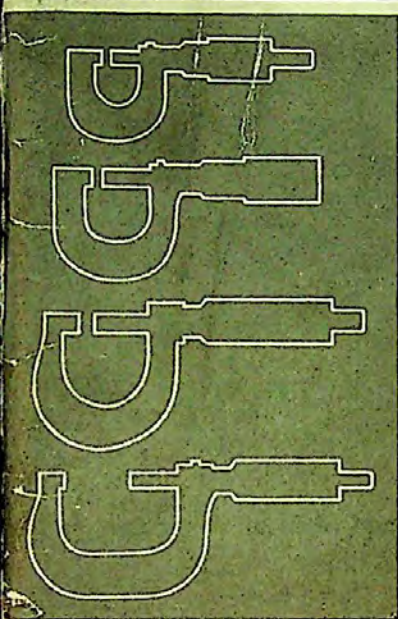


Brown & Sharpe

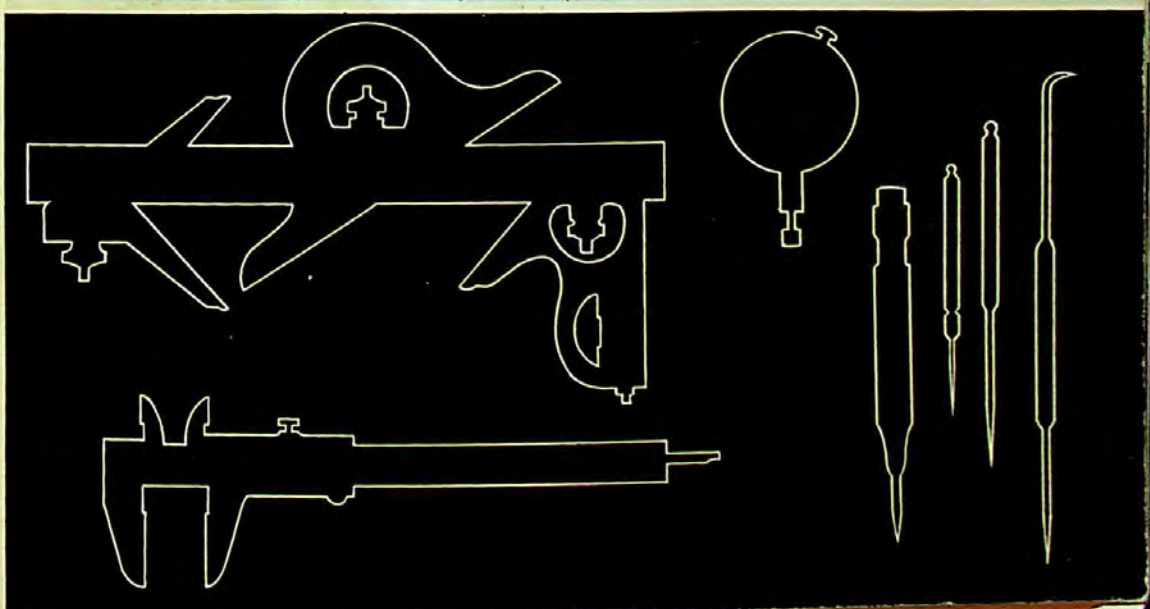
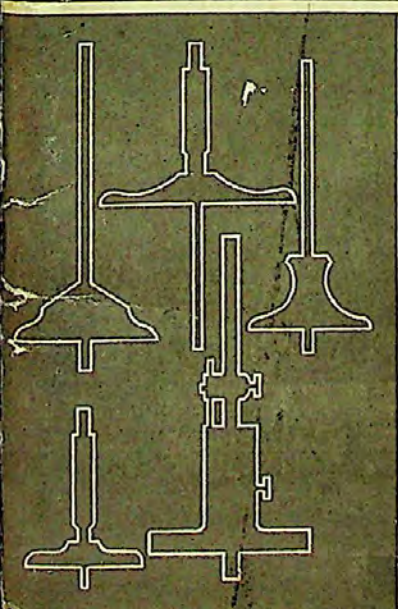
Precision Tools...

AND GAGES...



CATALOG 36M

BROCKTON OPERATING CO. INC.
"Machine Tools & Shoe Supplies"
 MEMORIAL DRIVE. — TEL. 4284 — AVON, MASS.



Rapid Index...

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Brown & Sharpe

Precision Tools AND GAGES...

"first choice in precision"



CATALOG 36M

In ordering, always specify the Ordering Number, Name of Item, and Catalog 36M.
This will permit filling your order correctly and save delay and correspondence.

1957

OTHER BROWN & SHARPE PRODUCTS —

MILLING, GRINDING AND SCREW MACHINES
CUTTERS AND ARBORS
SCREW MACHINE TOOLS
PUMPS AND HYDRAULIC PRODUCTS
MACHINE TOOL ACCESSORIES

BROWN & SHARPE MFG. CO., PROVIDENCE, R. I., U. S. A.


ESTABLISHED 1833

Brown & Sharpe

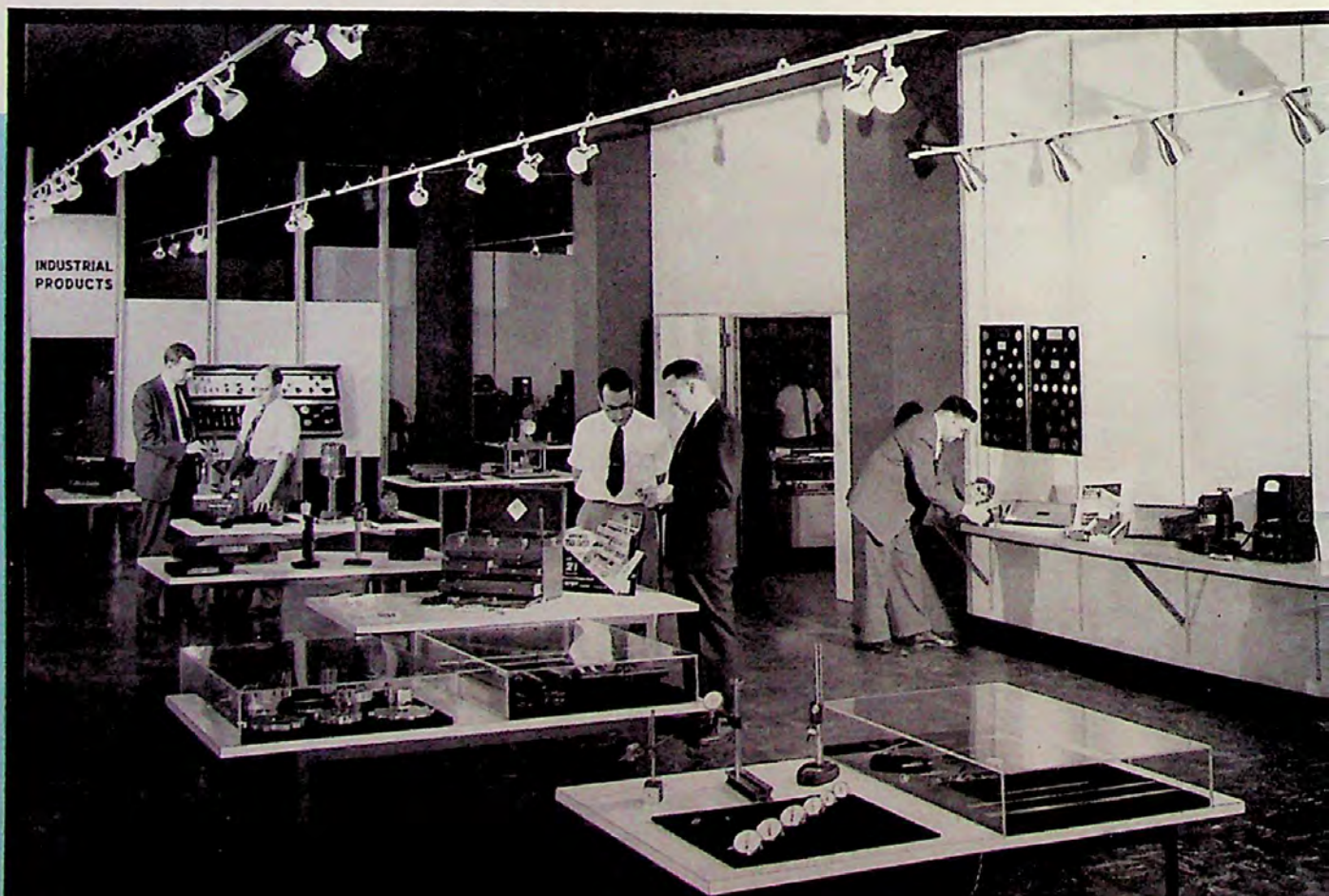
PROGRESS

Development and growth demonstrate decisively to every manufacturer the wide acclaim for the high quality of the products which the plant produces. Since 1833 when David Brown and his son Joseph R. Brown commenced a clock and watch business, the embryo of one of the largest machine shops in the world today, the business has continued to grow and progress. Following those early days when these pioneers were commencing to explore the infant industry that was to become the colossal giant of today, the Brown & Sharpe Mfg. Co., in addition to making many products known for their precision throughout the world, has invented or developed numerous other basic tools of industry. Among these early developments were the first Automatic Linear Dividing Machine in America for graduating rules, the first Vernier Caliper which was the first practical tool within reach of the machinist that provided measurements in .001", a carefully conceived system of wire gages, the first practical micrometer, and many other improvements and advances in precision tools. During the period when these products were being developed, the inventions of the Universal Milling and Grinding Machines as well as the development of the Automatic Screw Machine also were taking place.

Today the same spirit of progress is evidenced in this huge plant of approximately 43½ acres of floor space in its unique Precision Center—a symbol of progress—a section of which is shown below.



This measuring machine checks electronically to a fine degree of precision the dimensions of the taper plug gage. Measurements are taken easily and positively from the widely spaced amplifier dial graduations.



first choice in precision...

MIRACLES OF PRECISION

To make good tools, tools unvaryingly accurate and reliable, requires experience, skill, knowledge of materials, modern equipment and craftsmen instilled with the spirit of accuracy—who live it day after day.

Here at Brown & Sharpe are used the most modern methods for testing the alignment of Vernier and Micrometer assemblies, for producing a micrometer screw accurate to almost unbelievable limits and for maintaining the highest qualities in design and construction of the entire line.

Here too is the spirit that looks to the future, that is responsible for the development of many recently announced tools shown in a catalog for the first time—tools such as America's First Super Vernier Tools with Chrome Finish, the Hite-Sets, the Hite-Chek, Tri-Cal, Johansson Thrift Blocks—Blocks that bring Jo-Block precision to the actual job at a price astonishingly lower than any heretofore applying to gages finished to such close limits. Tools such as the Combination Carbide Scriber and Magnet, the new Chrome Finish Rules available in a wide variety of graduation combinations. Here are designers working for the future to develop precision tools that do a more precise job in an easier, faster manner.

Here in a Gage Laboratory, maintained at 68°F with a relative humidity of 55%, highly specialized, sensitive machines inspect standards used in controlling the accuracy of our tools to limits as small as millionths.

In another department, similarly controlled, Johansson Gage Blocks are produced with a degree of accuracy of a few millionths per inch—Blocks that are fitting companions in quality to Brown & Sharpe Tools.



Measurements as close as .00001" are made easily on this machine with an 18,000 to 1 magnification—one of the many devices that maintain the high degree of precision in Brown & Sharpe Tools.

Precision Center occupies a large area in one of the main buildings in the Brown & Sharpe plant. In one section of its pleasant surroundings are displayed representative industrial products—precision tools, milling cutters, arbors, adapters and collets, screw machine tools, pumps and machine tool accessories. Precision Center is unique in the industry. Its various areas are separated by brightly colored panels, tastefully and warmly lighted with additional spotlighting where required.

Other features of Precision Center are its dining room and auditorium with facilities for group meetings of salesmen, with moving pictures, colored slide projectors and a black board where the teacher's explanation may be amplified with designs or calculations. Classes are held here regularly for training Brown & Sharpe and distributor salesmen, bringing to them first-hand knowledge of the advantages of the products which they sell.

Precision Center is the spirit of progress. Visitors are welcome—the red carpet is always out.

Precision Center...

General Interest...

BROWN & SHARPE INDUSTRIAL PRODUCTS DIVISION

sales offices

TERRITORY SALES OFFICES

| | | | |
|--------------------------|---|---------------------------|---|
| Michigan | 405 Curtis Bldg. 2842 West Grand Blvd. Detroit 2, Mich. | Ohio | 1811 Carew Tower Cincinnati 2, Ohio |
| Midwest | 635 South 25th Ave. Bellwood, Ill. | Philadelphia | 7 Bala Ave. Bala-Cynwyd, Pa. |
| New England | 1647 Beacon St. Waban 68, Mass. | Rochester | 1008 Times Square Bldg. 45 Exchange St. Rochester 14, N. Y. |
| New York | 20 Vesey St. New York 7, N. Y. | West Coast | 3040 East Olympic Blvd. Los Angeles 23, Calif. |

TERRITORY SALES REPRESENTATIVES

In addition to the Territory Sales Offices, there are Brown & Sharpe representatives covering the following areas in the United States: Washington, D. C., the Southeast and the Southwest. These representatives can be contacted directly in these areas through the home office for service or information.

Stocks of Brown & Sharpe Industrial Products are carried by hardware and supply dealers in the principal cities and towns in the U. S., and by the leading tool dealers in Canada and foreign countries.

prices - purchasing - repairs and miscellaneous

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.

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

We pay minimum transportation costs on shipments of certain goods to distributors. Details will be given on application.

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. Always specify the ORDERING NUMBER shown in this catalog, the name of the item desired and Catalog No. 36M. All verbal instructions should be confirmed in writing.

Orders are subject to delays occasioned by strikes, fires, floods, acci-

dents 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.

REGIONAL REPAIR SERVICE. Regional repair companies are established to make repairs on certain Brown & Sharpe precision tools in several sections of the United States. (See inside back cover.)

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.

Micrometers...

Brown & Sharpe made the first practical micrometer

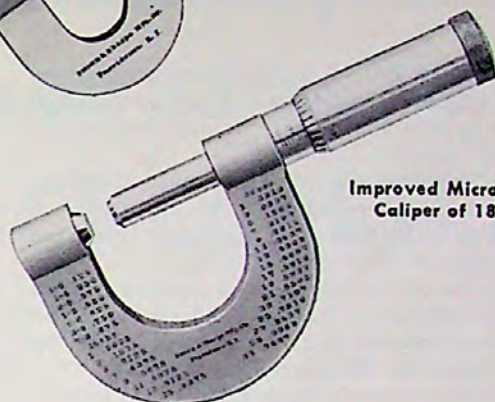
Over one hundred years ago there was patented in France a tool known as "Système Palmer". This tool was the prototype of the micrometer of today.

Messrs. J. R. Brown and Lucian Sharpe saw this tool at the Paris Exposition in 1867 and felt it might help them to solve a problem presented to them by the Bridgeport Brass Co. who had had a shipment returned to them as "out of gage". This company had discovered that no two of the three standard gages then in use agreed and sent a model of a proposed measuring tool to J. R. Brown & Sharpe. This tool was not of practical value. It could not be read easily, but there was an obvious need for a better means of measuring sheet metal.

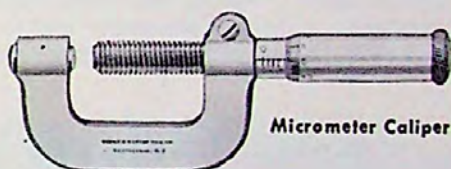
Upon returning from Paris, Messrs. Brown & Sharpe introduced the "Pocket Sheet Metal Gage", the first practical micrometer, adopting graduations similar to those on the Palmer tool and adding means of compensating for wear of measuring surfaces and screw. This was the first micrometer caliper. This early tool was made so well that even today specimens of it still will be found in use.



Pocket Sheet Metal Gage of 1867—The first practical micrometer



Improved Micrometer Caliper of 1885



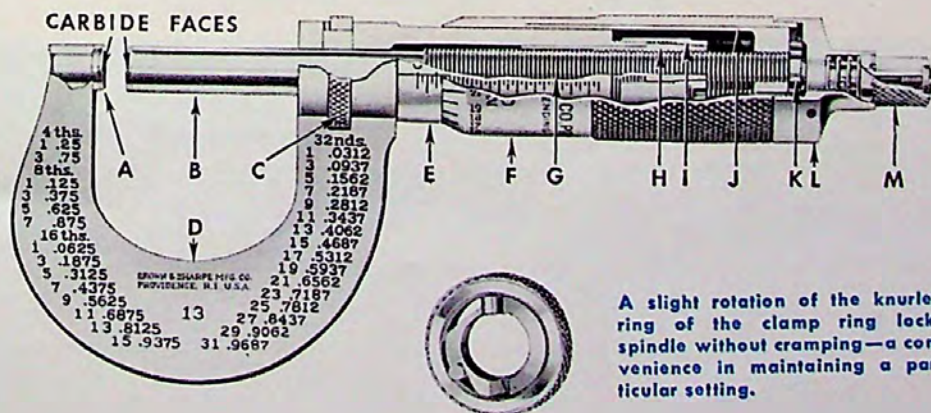
Micrometer Caliper of 1877

principle of the micrometer...

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 beveled edge of the thimble accurately sub-divide each revolution of the screw so that readings may be taken in units, usually of .001".

THE PARTS OF THE MICROMETER CALIPER



- 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

A slight rotation of the knurled ring of the clamp ring locks spindle without cramping—a convenience in maintaining a particular setting.



Reading the micrometer

Brown & Sharpe Micrometers are easy to read—jet black wide numbered graduations on non-glare dull chrome finish.

Micrometers graduated to thousandths of an inch . . .

The micrometer screw has 40 threads per inch and one complete and exact revolution moves the contact face at the end of the spindle either away from or towards the face of the anvil exactly .025".

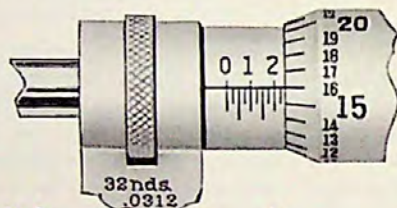
The lines on the barrel conform to the pitch of the micrometer screw, each line indicating .025" and each fourth line being numbered 1, 2, 3, etc. to indicate hundreds of thousandths—.100", .200", .300", etc. The beveled edge of the thimble is graduated into 25 parts, each line indicating .001"—1/25 of the .025" covered by one complete and exact revolution of the thimble. Each 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

| | |
|--|-------------|
| Highest figure visible on barrel | 2 = .200" |
| Lines visible between the number 2 and thimble edge | 1 = .025" |
| Line on thimble which coincides with or has passed long line on barrel | 16 = .016" |
| Reading of Measurement | Total .241" |



Micrometers graduated to ten-thousandths of an inch . . .

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

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

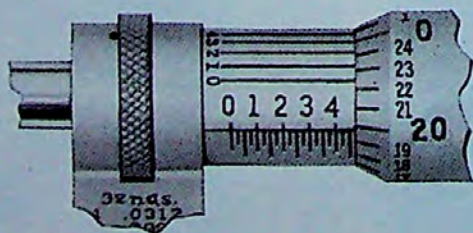
In left-hand line illustration, there are no ten-thousandths to add as the zero lines on Vernier coincide with lines on thimble. Reading = .4690"

In right-hand line illustration, the 6th graduation on the Vernier, indicating that 6/10,000" should be added to the thousandths reading, coincides with line on thimble

.4690"
.0006"

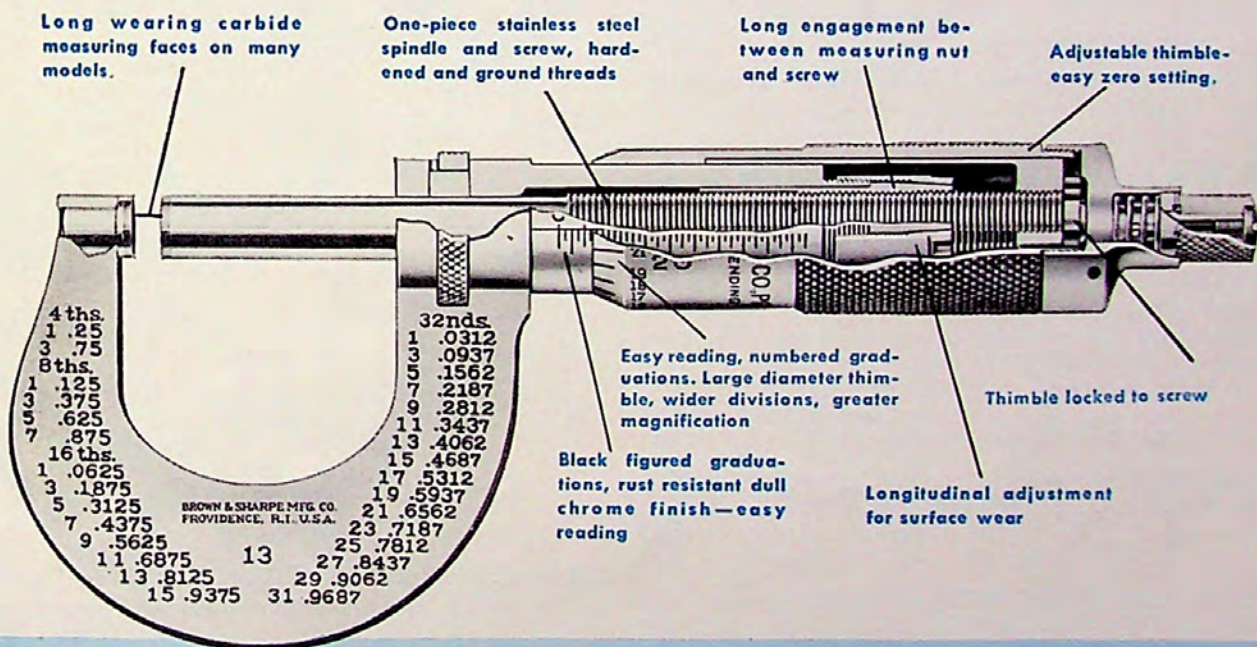
Reading = .4696"

* Micrometer Calipers 233RS and 245 read .0001" directly.



Features...

OF THE *Brown & Sharpe* MICROMETER



Brown & Sharpe are America's first micrometer calipers with one-piece stainless steel spindle and screw. The dull chrome finish is non-glaring, and with the black-figured graduations and figures, makes reading easier and surer, and the large diameter thimble provides wider divisions—greater magnification—with correspondingly greater accuracy. The most modern equipment is used for maintaining alignment of Vernier and micrometer assemblies with uniform precision. The lead of micrometer screws is

tested electronically to an accuracy of 1/100,000 inch contributing to the unvarying accuracy of these fine instruments. Decimal equivalents stamped on the frames of many models include 64ths, 32nds, 16ths and 8ths. All models except Nos. 216 and 217 have dull chrome, rust resistant finish. Many models also have long-wearing carbide faces.

For tool users these micrometer calipers are the finest precision instruments for measuring thousandths and ten-thousandths of an inch.

Brown & Sharpe Micrometers with carbide measuring faces, stainless steel spindle and screw with rust resistant finish, stand up where the going is rough, such as here on a grinding machine where they are subject to abrasive and moisture.



Micrometers...

5 and 5RS MICROMETER CALIPERS—0 to 1/2" by .001". Have Carbide Faces. Have stainless steel spindle and screw, clamp ring and carbide measuring faces.

| | | |
|------------------------|---------------|---------|
| 5 | No. 599-5-100 | \$19.85 |
| 5RS (Has ratchet stop) | No. 599-5-120 | 20.85 |

6 and 6RS MICROMETER CALIPERS—Have Carbide Faces. Similar to 5 and 5RS but read by .0001" and do not have clamp ring.

| | | |
|------------------------|---------------|---------|
| 6 | No. 599-6-100 | \$21.10 |
| 6RS (Has ratchet stop) | No. 599-6-120 | 22.10 |

8 and 8RS MICROMETER CALIPERS—0 to 1" by .001". Have hardened and ground threads and clamp ring.

| | | |
|------------------------|---------------|---------|
| 8 | No. 599-8-100 | \$18.35 |
| 8RS (Has ratchet stop) | No. 599-8-120 | 19.35 |

11 and 11RS MICROMETER CALIPERS—0 to 1" by .001". Have Carbide Faces. Have stainless steel spindle and screw, enamel I section frame and carbide measuring faces. Anvil projects 3/16".

| | | |
|-------------------------|----------------|---------|
| 11 | No. 599-11-100 | \$14.95 |
| 11RS (Has ratchet stop) | No. 599-11-120 | 15.95 |

12 and 12RS MICROMETER CALIPERS—Have Carbide Faces. Similar to 13 and 13RS but read by .001". This is one of the most popular of all 1" Micrometer Calipers where measurement in thousandths is required.

| | | |
|-------------------------|----------------|---------|
| 12 | No. 599-12-100 | \$19.85 |
| 12RS (Has ratchet stop) | No. 599-12-120 | 20.85 |

13 and 13RS MICROMETER CALIPERS—0 to 1" by .0001". Have Carbide Faces. Have stainless steel spindle and screw, clamp ring and carbide measuring faces. Narrow anvil end for measuring deep in slots. This is one of the most popular of all 1" Micrometer Calipers for taking measurement in ten-thousandths.

| | | |
|-------------------------|----------------|---------|
| 13 | No. 599-13-100 | \$22.35 |
| 13RS (Has ratchet stop) | No. 599-13-120 | 23.35 |

16 and 16RS MICROMETER CALIPERS—Have Carbide Faces. Similar to 11 & 11RS but read by .0001".

| | | |
|-------------------------|----------------|---------|
| 16 | No. 599-16-100 | \$17.45 |
| 16RS (Has ratchet stop) | No. 599-16-120 | 18.45 |

17 and 17RS MICROMETER CALIPERS—Similar to 8 and 8RS but have clamp screw instead of clamp ring. Clamp screw can be used on either side of frame. For gaging hot metal.

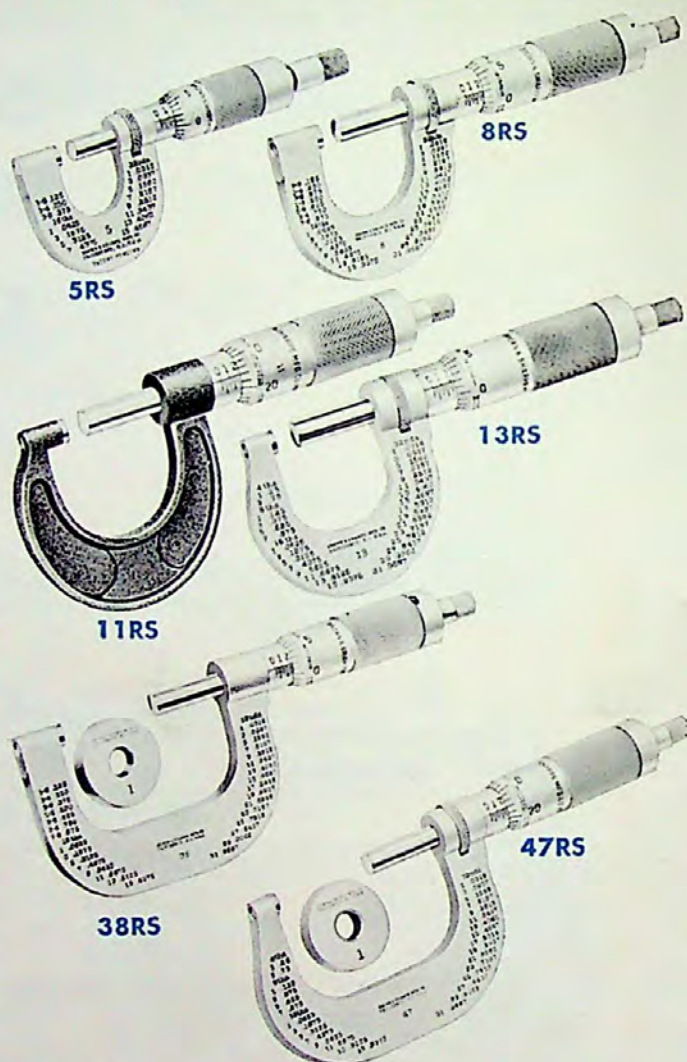
| | | |
|-------------------------|----------------|---------|
| 17 | No. 599-17-100 | \$23.00 |
| 17RS (Has ratchet stop) | No. 599-17-120 | 24.00 |

17 MICROMETER CALIPER with WOODEN HANDLE—Similar to 17 but has large winged spindle lock instead of clamp screw. Wooden handle keeps hand at distance from hot metal.

| | |
|----------------|---------|
| No. 599-17-108 | \$25.75 |
|----------------|---------|

19 and 19RS MICROMETER CALIPERS—0 to 1" by .001". Similar to 8 and 8RS but do not have clamp ring.

| | | |
|-------------------------|----------------|---------|
| 19 | No. 599-19-100 | \$17.25 |
| 19RS (Has ratchet stop) | No. 599-19-120 | 18.25 |



38 and 38RS MICROMETER CALIPERS—1" to 2" by .001". With standard. Have hardened and ground threads.

| | | |
|-------------------------|----------------|---------|
| 38 | No. 599-38-100 | \$18.85 |
| 38RS (Has ratchet stop) | No. 599-38-120 | 19.85 |

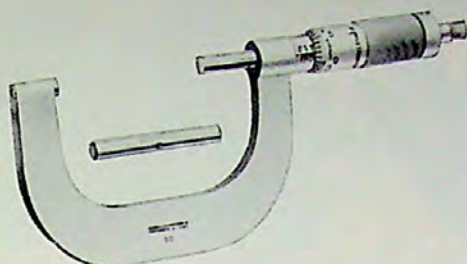
47 and 47RS MICROMETER CALIPERS—1" to 2" by .001". Have Carbide Faces. Have stainless steel spindle and screw, clamp ring and carbide measuring faces. Narrow anvil ends. With standard.

| | | |
|-------------------------|----------------|---------|
| 47 | No. 599-47-100 | \$21.60 |
| 47RS (Has ratchet stop) | No. 599-47-120 | 22.60 |

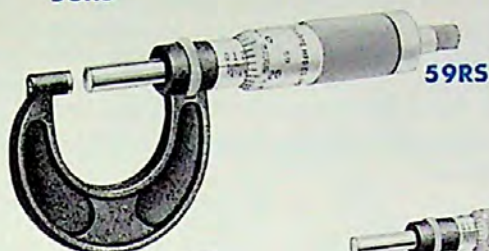
48 and 48RS MICROMETER CALIPERS—Have Carbide Faces. Similar to 47 and 47RS but read by .0001".

| | | |
|-------------------------|----------------|---------|
| 48 | No. 599-48-100 | \$24.10 |
| 48RS (Has ratchet stop) | No. 599-48-120 | 25.10 |

...unexcelled precision.



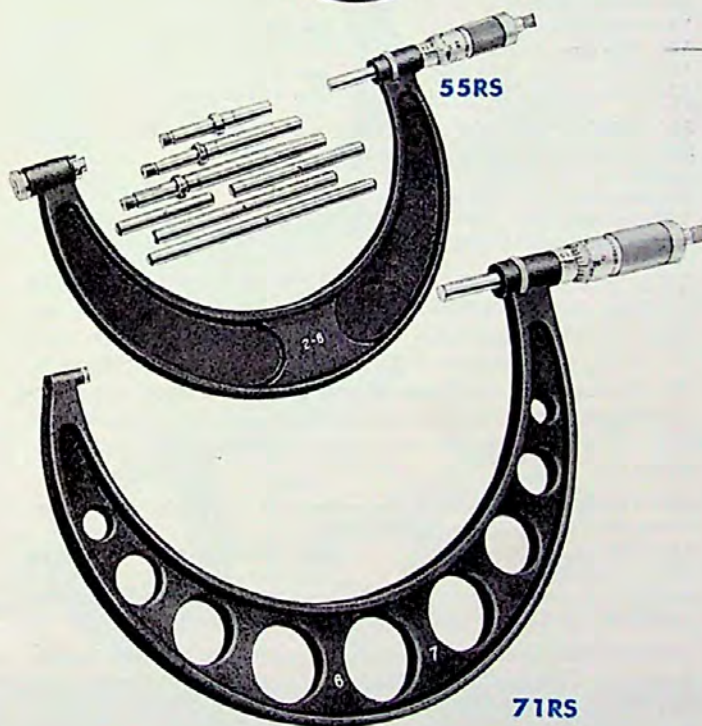
50RS



59RS



63RS



71RS

50 and 50RS MICROMETER CALIPERS—2" to 3" by .001". Have hardened and ground threads.

| | | |
|--------------------------------------|----------------|---------|
| 50 With Standard | No. 599-50-100 | \$24.50 |
| 50 Without Standard | No. 599-50-900 | 22.45 |
| 50RS (Has Ratchet Stop) With Std. | No. 599-50-120 | 25.50 |
| 50RS (Has Ratchet Stop) Without Std. | No. 599-50-920 | 24.45 |

52 and 52RS MICROMETER CALIPERS—Have Carbide Faces—Similar to 50 and 50RS but have stainless steel spindle and screw, clamp ring and carbide measuring faces.

| | | |
|--------------------------------------|----------------|---------|
| 52 With Standard | No. 599-52-100 | \$29.75 |
| 52 Without Standard | No. 599-52-900 | 27.70 |
| 52RS (Has Ratchet Stop) With Std. | No. 599-52-120 | 30.75 |
| 52RS (Has Ratchet Stop) Without Std. | No. 599-52-920 | 28.70 |

53 and 53RS MICROMETER CALIPERS—Have Carbide Faces.—Similar to 52 and 52RS but read by .0001".

| | | |
|--------------------------------------|----------------|---------|
| 53 With Standard | No. 599-53-100 | \$32.25 |
| 53 Without Std. | No. 599-53-900 | 30.20 |
| 53RS (Has Ratchet Stop) With Std. | No. 599-53-120 | 33.25 |
| 53RS (Has Ratchet Stop) Without Std. | No. 599-53-920 | 31.20 |

54 and 54RS MICROMETER CALIPERS—0 to 4" by .001". Have clamp ring. Similar to 55 and 55RS but have 0 to 4" range. Furnished in finished wooden case.

| | | |
|---------------------------------------|----------------|---------|
| 54 With 3 Standards | No. 599-54-100 | \$39.80 |
| 54 Without Stds. | No. 599-54-900 | 33.15 |
| 54RS (Has Ratchet Stop) With 3 Stds. | No. 599-54-120 | 40.80 |
| 54RS (Has Ratchet Stop) Without Stds. | No. 599-54-920 | 34.15 |

55 and 55RS MICROMETER CALIPERS—2" to 6" by .001".—Have clamp ring. Enamelled I section frame has interchangeable anvils providing extended range of measurement. Particularly suited to automotive work. Furnished in finished wooden case.

| | | |
|---------------------------------------|----------------|---------|
| 55 With 4 Standards | No. 599-55-100 | \$46.15 |
| 55 Without Stds. | No. 599-55-900 | 37.95 |
| 55RS (Has Ratchet Stop) With 4 Stds. | No. 599-55-120 | 47.15 |
| 55RS (Has Ratchet Stop) Without Stds. | No. 599-55-920 | 38.95 |

57 and 57RS MICROMETER CALIPERS—6" to 12" by .001". Have clamp ring. Similar to 55 and 55RS but have holes in frame for lightness and finger grip. For measurements from 6" to 12" where use does not warrant investment in six separate micrometers. Furnished wooden case.

| | | |
|---------------------------------------|----------------|---------|
| 57 With 6 Standards | No. 599-57-100 | \$91.30 |
| 57 Without Stds. | No. 599-57-900 | 59.15 |
| 57RS (Has Ratchet Stop) With 6 Stds. | No. 599-57-120 | 92.30 |
| 57RS (Has Ratchet Stop) Without Stds. | No. 599-57-920 | 60.15 |

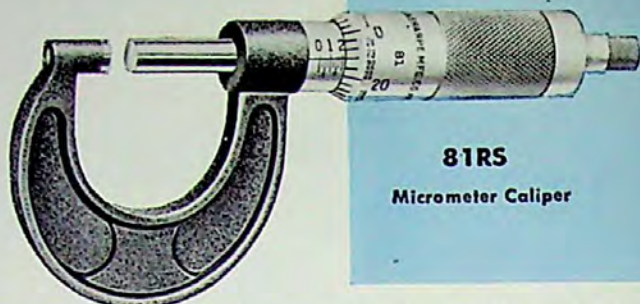
59 to 76 and 59RS to 76RS MICROMETER CALIPERS—0 to 12" by .001". Have Carbide Faces. Have one-piece stainless steel spindle and screw, enamelled I section frame and clamp rings. Anvil projects above frame for convenience in measuring. Furnished regularly without standards and without cases, but both of these are available, if desired. For listings see page 12.

| | | |
|------------------------------------|----------------|---------|
| 59 0 to 1" | No. 599-59-100 | \$16.20 |
| 59RS (Has Ratchet Stop) 0 to 1" | No. 599-59-120 | 17.20 |
| 61 1" to 2" | No. 599-61-100 | 17.75 |
| 61RS (Has Ratchet Stop) 1" to 2" | No. 599-61-120 | 18.75 |
| 63 2" to 3" | No. 599-63-100 | 22.25 |
| 63RS (Has Ratchet Stop) 2" to 3" | No. 599-63-120 | 23.25 |
| 65 3" to 4" | No. 599-65-100 | 23.75 |
| 65RS (Has Ratchet Stop) 3" to 4" | No. 599-65-120 | 24.75 |
| 67 4" to 5" | No. 599-67-100 | 25.35 |
| 67RS (Has Ratchet Stop) 4" to 5" | No. 599-67-120 | 26.35 |
| 69 5" to 6" | No. 599-69-100 | 26.85 |
| 69RS (Has Ratchet Stop) 5" to 6" | No. 599-69-120 | 27.85 |
| 71 6" to 7" | No. 599-71-100 | 29.15 |
| 71RS (Has Ratchet Stop) 6" to 7" | No. 599-71-120 | 30.15 |
| 72 7" to 8" | No. 599-72-100 | 30.70 |
| 72RS (Has Ratchet Stop) 7" to 8" | No. 599-72-120 | 31.70 |
| 73 8" to 9" | No. 599-73-100 | 32.20 |
| 73RS (Has Ratchet Stop) 8" to 9" | No. 599-73-120 | 33.20 |
| 74 9" to 10" | No. 599-74-100 | 33.75 |
| 74RS (Has Ratchet Stop) 9" to 10" | No. 599-74-120 | 34.75 |
| 75 10" to 11" | No. 599-75-100 | 35.30 |
| 75RS (Has Ratchet Stop) 10" to 11" | No. 599-75-120 | 36.30 |
| 76 11" to 12" | No. 599-76-100 | 36.80 |
| 76RS (Has Ratchet Stop) 11" to 12" | No. 599-76-120 | 37.80 |

Brown & Sharpe

New Black Frame

MICROMETERS



81RS
Micrometer Caliper

These new black frame micrometer calipers, without carbide measuring faces, offer users the high accuracy and design features of other Brown & Sharpe micrometers—a one-piece spindle and screw with hardened and ground threads, the large diameter thimble with widely spaced graduations and greater magnification, the simple thimble adjustment and long bearing between measuring nut and screw, all at the lowest prices. Furnished without standards and without cases. For listings, see page 12.

81 TO 83 MICROMETER CALIPER—0 to 3" by .001"

| | | |
|----------------------------------|----------------|---------|
| 81 0 to 1" | No. 599-81-100 | \$13.45 |
| 81RS 0 to 1" (Has Ratchet Stop) | No. 599-81-120 | 14.45 |
| 82 1" to 2" | No. 599-82-100 | 15.00 |
| 82RS 1" to 2" (Has Ratchet Stop) | No. 599-82-120 | 16.00 |
| 83 2" to 3" | No. 599-83-100 | 16.50 |
| 83RS 2" to 3" (Has Ratchet Stop) | No. 599-83-120 | 17.50 |

93 TO 95 MICROMETER CALIPERS—0 to 3" by .001"

Have Clamp Rings.

| | | |
|----------------------------------|----------------|---------|
| 93 0 to 1" | No. 599-93-100 | \$14.70 |
| 93RS 0 to 1" (Has Ratchet Stop) | No. 599-93-120 | 15.70 |
| 94 1" to 2" | No. 599-94-100 | 16.25 |
| 94RS 1" to 2" (Has Ratchet Stop) | No. 599-94-120 | 17.25 |
| 95 2" to 3" | No. 599-95-100 | 17.75 |
| 95RS 2" to 3" (Has Ratchet Stop) | No. 599-95-120 | 18.75 |



131RS

130, 130RS, 131, 131RS, 132 and 132RS MICROMETER CALIPER SETS—The Micrometers in these sets have rust resistant, dull chrome finish and easily read black graduations and figures. The large diameter thimbles have wide graduations—greater magnification.

The Micrometers in sets 131, 131RS, 132 and 132RS have one-piece stainless steel spindles and screws with accurately ground threads and long wearing carbide measuring faces. These Micrometers also have clamp rings.

SET 130—0 to 3" by .001", consists of Nos. 19, 38 and 50 Micrometers.

| | | |
|---------------------------------|-----------------|---------|
| 130 With Case, With Stds. | No. 599-130-100 | \$67.10 |
| 130 With Case, Without Stds. | No. 599-130-900 | 63.00 |
| 130 Without Case, With Stds. | No. 599-130-112 | 60.10 |
| 130 Without Case, Without Stds. | No. 599-130-912 | 56.00 |

SET 130RS—0 to 3" by .001", consists of Nos. 19RS, 38RS and 50RS Micrometers with Ratchet Stops.

| | | |
|-----------------------------------|-----------------|---------|
| 130RS With Case, With Stds. | No. 599-130-120 | \$70.10 |
| 130RS With Case, Without Stds. | No. 599-130-920 | 66.00 |
| 130RS Without Case, With Stds. | No. 599-130-132 | 63.10 |
| 130RS Without Case, Without Stds. | No. 599-130-932 | 59.00 |

SET 131—0 to 3" by .001", consists of Nos. 12, 47 and 52 Micrometers, with Carbide Faces.

| | | |
|---------------------------------|-----------------|---------|
| 131 With Case, With Stds. | No. 599-131-100 | \$78.20 |
| 131 With Case, Without Stds. | No. 599-131-900 | 74.10 |
| 131 Without Case, With Stds. | No. 599-131-112 | 71.20 |
| 131 Without Case, Without Stds. | No. 599-131-912 | 67.10 |

SET 131RS—0 to 3" by .001", consist of Nos. 12RS, 47RS and 52RS Micrometers, with Carbide Faces and Ratchet Stops.

| | | |
|-----------------------------------|-----------------|---------|
| 131RS With Case, With Stds. | No. 599-131-120 | \$81.20 |
| 131RS With Case, Without Stds. | No. 599-131-920 | 77.10 |
| 131RS Without Case, With Stds. | No. 599-131-132 | 74.20 |
| 131RS Without Case, Without Stds. | No. 599-131-932 | 70.10 |

Micrometer Caliper Sets...

SET 132—0 to 3" by .0001", consists of Nos. 13, 48 and 53 Micrometers, with Carbide Faces.

| | | |
|---------------------------------|-----------------|---------|
| 132 With Case, With Stds. | No. 599-132-100 | \$85.70 |
| 132 With Case, Without Stds. | No. 599-132-900 | 81.60 |
| 132 Without Case, With Stds. | No. 599-132-112 | 78.70 |
| 132 Without Case, Without Stds. | No. 599-132-912 | 74.60 |

SET 132RS—0 to 3" by .0001", consists of Nos. 13RS, 48RS and 53RS Micrometers, with Carbide Faces and Ratchet Stops.

| | | |
|-----------------------------------|-----------------|---------|
| 132RS With Case, With Stds. | No. 599-132-120 | \$88.70 |
| 132RS With Case, Without Stds. | No. 599-132-920 | 84.60 |
| 132RS Without Case, With Stds. | No. 599-132-132 | 81.70 |
| 132RS Without Case, Without Stds. | No. 599-132-932 | 77.60 |

133, 133RS, 135, 135RS, 137, 137RS, 138 AND 138RS MICROMETER SETS—The Micrometers in these sets are black enameled, I section frame micrometers Nos. 59 to 76 and 59RS to 76RS shown and listed on Page 9. The micrometers also have clamp rings. Furnished regularly without standards, but standards are available in packaged sets for the respective sets of micrometers. See listing on page 12.

SETS 133 AND 133RS. Three Micrometers, 0 to 3" by .001". Have Carbide Faces. Set 133RS has Ratchet Stops.

| | | |
|-----------------------------------|-----------------|---------|
| 133 With Case, Without Stds. | No. 599-133-900 | \$63.20 |
| 133 Without Case, Without Stds. | No. 599-133-912 | 56.20 |
| 133RS With Case, Without Stds. | No. 599-133-920 | 66.20 |
| 133RS Without Case, Without Stds. | No. 599-133-932 | 59.20 |

SETS 135 AND 135RS. Six Micrometers, 0 to 6" by .001". Have Carbide Faces. Set 135RS has Ratchet Stops.

| | | |
|-----------------------------------|-----------------|----------|
| 135 With Case, Without Stds. | No. 599-135-900 | \$147.90 |
| 135 Without Case, Without Stds. | No. 599-135-912 | 132.15 |
| 135RS With Case, Without Stds. | No. 599-135-920 | 153.90 |
| 135RS Without Case, Without Stds. | No. 599-135-932 | 138.15 |

SETS 137 AND 137RS. Six Micrometers, 6 to 12" by .001". Have Carbide Faces. Set 137RS has Ratchet Stops.

The case for this set includes a separate case in which standards may be placed.

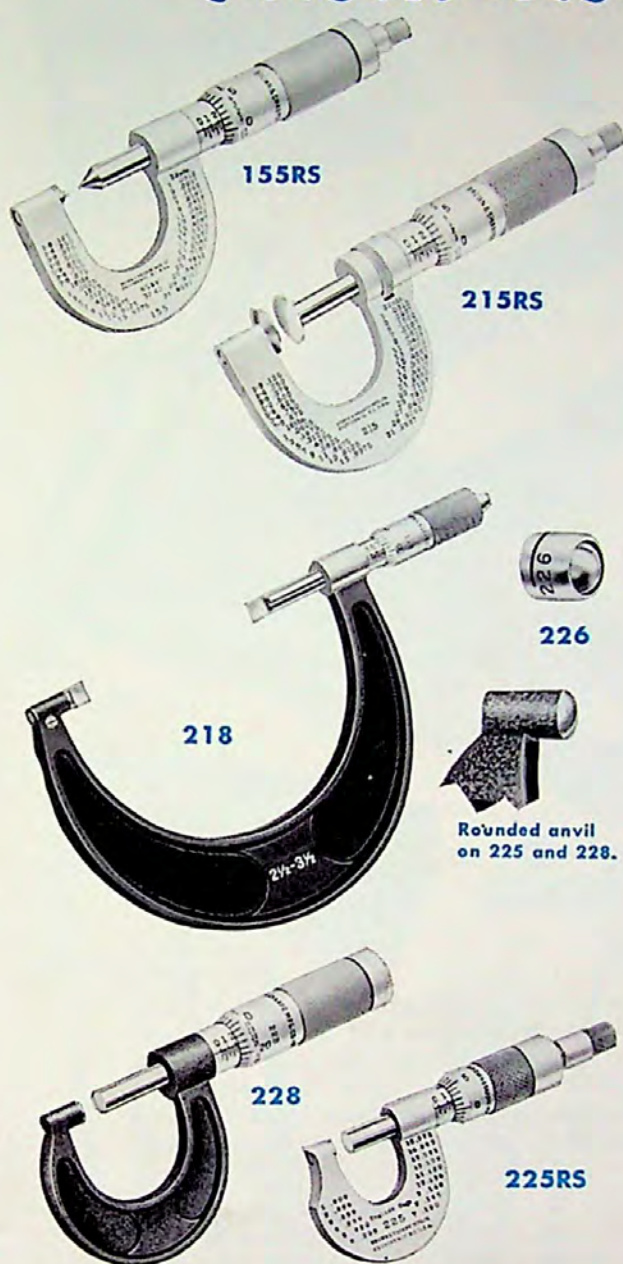
| | | |
|-----------------------------------|-----------------|----------|
| 137 With Case, Without Stds. | No. 599-137-900 | \$229.40 |
| 137 Without Case, Without Stds. | No. 599-137-912 | 197.90 |
| 137RS With Case, Without Stds. | No. 599-137-920 | 235.40 |
| 137RS Without Case, Without Stds. | No. 599-137-932 | 205.90 |

SETS 138 AND 138RS. Twelve Micrometers 0 to 12" by .001". Have Carbide Faces. Set 138RS has Ratchet Stops. The case for this set includes a separate case in which standards may be placed.

| | | |
|-----------------------------------|-----------------|----------|
| 138 With Case, Without Stds. | No. 599-138-900 | \$366.80 |
| 138 Without Case, Without Stds. | No. 599-138-912 | 330.05 |
| 138RS With Case, Without Stds. | No. 599-138-920 | 378.80 |
| 138RS Without Case, Without Stds. | No. 599-138-932 | 342.05 |

Brown & Sharpe

Micrometers... FOR EVERY PURPOSE



152 TO 155 AND 152RS TO 155RS SCREW THREAD MICROMETER CALIPERS—Pitch diameters 0 to 1" by .001". End of spindle is pointed. Anvil has accurate V and is free to rotate. Measure Unified and American Threads as well as older Am. National and U. S. Std.

These tools are fast and convenient for measuring threads. However, when adjusted to read zero with thimble and anvil together, the readings are slightly distorted, the distortion depending upon the helix angle of the thread. To obtain accurate readings the thread micrometer should be set to standard thread plug of the same pitch and diameter as the thread to be measured. When set in this manner the tool does not read exactly zero when anvil and thimble are together.

| | | | |
|--------------------------|------------------------|-----------------|---------|
| 152 | 8 to 13 thds. per in. | No. 599-152-114 | \$24.75 |
| 152RS (Has Ratchet Stop) | 8 to 13 thds. per in. | No. 599-152-134 | 25.75 |
| 153 | 14 to 20 thds. per in. | No. 599-153-114 | 24.75 |
| 153RS (Has Ratchet Stop) | 14 to 20 thds. per in. | No. 599-153-134 | 25.75 |
| 154 | 22 to 30 thds. per in. | No. 599-154-114 | 24.75 |
| 154RS (Has Ratchet Stop) | 22 to 30 thds. per in. | No. 599-154-134 | 25.75 |
| 155 | 32 to 40 thds. per in. | No. 599-155-114 | 24.75 |
| 155RS (Has Ratchet Stop) | 32 to 40 thds. per in. | No. 599-155-134 | 25.75 |

215 AND 215RS MICROMETER CALIPERS—0 to 1" by .001". Have clamp rings. Disk type surfaces for measuring form tools are 1/2" diameter, 1/16" thick in center and .015" thick at edge.

| | | |
|--------------------------|-----------------|---------|
| 215 | No. 599-215-100 | \$35.00 |
| 215RS (Has Ratchet Stop) | No. 599-215-120 | 36.00 |

216 TO 218 MICROMETER CALIPERS—1" to 3 1/2" by .001". 218 has enameled I section frame. 216 and 217 have bright frames. Blade type measuring surfaces for measuring forming tools. Blades are .030" thick, measure to 7/32" depth.

| | | | |
|-----|------------------|-------------|---------|
| 216 | 1" to 2" | No. 599-216 | \$77.00 |
| 217 | 1 1/2" to 2 1/2" | No. 599-217 | 77.00 |
| 218 | 2 1/2" to 3 1/2" | No. 599-218 | 77.00 |

225 AND 225RS MICROMETER CALIPERS—0 to 1/2" by .001". For measuring thickness of tubing. Frame cut away so rounded anvil enters tubing as small as 5/16" inside diameter.

| | | |
|--------------------------|-----------------|---------|
| 225 | No. 599-225-100 | \$19.90 |
| 225RS (Has Ratchet Stop) | No. 599-225-120 | 20.90 |

226 BALL ATTACHMENT—For measuring curved surfaces. Snaps instantly either on anvil or spindle end of micrometers having spindle .250" diameter. Subtract .250" from actual caliper reading.

| | |
|-------------|--------|
| No. 599-226 | \$1.10 |
|-------------|--------|

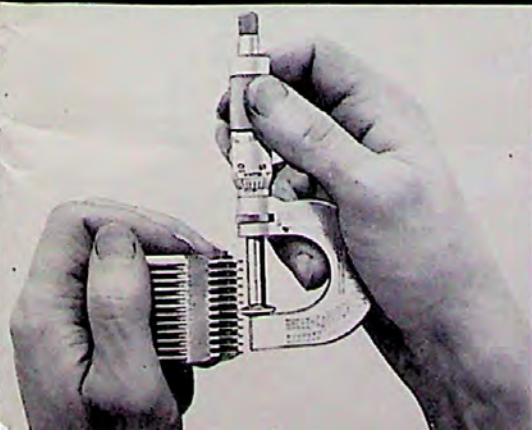
228 MICROMETER CALIPER—0 to 1" by .001". For measuring thickness of tubing. Enameled I section frame. Frame cut away so rounded anvil enters tubing as small as 1/32" inside diameter.

| | |
|-----------------|---------|
| No. 599-228-100 | \$15.50 |
|-----------------|---------|

215 and 215RS Micrometers permit easy and accurate measurements of forms of forming tools from very narrow grooves over .015" in width.

When narrow grooves and diameters of forming tools require measurement 216 to 218 are just the tools.

The narrow anvil ends of 12, 13, 47, and 48 type Micrometers provide advantages for measurements from narrow slots.





Brown & Sharpe Micrometers, standards, and cases

Micrometers...

230RS PAPER GAGE MICROMETER CALIPER—0 to $\frac{3}{8}$ " by .001" (Has ratchet stop). Disks $\frac{1}{2}$ " diameter. Disk on anvil floats. For gaging paper, etc.

No. 599-230-120 \$23.95

232 and 232RS PAPER GAGE MICROMETER CALIPERS—0 to $\frac{3}{8}$ " by .001". Disks, $\frac{1}{2}$ " diameter. Disk on anvil floats. Enamelled I section frame with deep opening permits measurements 2" from edge of material.

232 No. 599-232-100 \$30.50
232RS (Has ratchet stop) No. 599-232-120 31.50
Case No. 599-232-9999 4.50

233RS MICROMETER CALIPER—0 to $\frac{1}{2}$ " by .0001". Has Carbide Faces. Has stainless steel spindle and screw, carbide measuring faces and ratchet stop. For direct reading ten-thousandths measurements. Can be used on a bench. Furnished in finished wooden case.

No. 599-233-120 \$72.00

237 and 237RS MICROMETER CALIPERS—0 to 1" by .001". Have Carbide Faces. For gaging sheet metal. Enamelled I section frame with deep opening permits measurements 3" in from edge of work. Have stainless steel spindle and screw and carbide measuring faces.

237 No. 599-237-100 \$27.50
237RS (Has ratchet stop) No. 599-237-120 28.50
Case No. 599-237-9999 4.50

Standards...

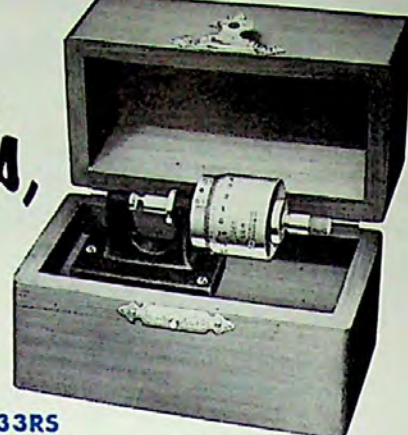
These precision standards permit the accurate setting and testing of Micrometers, and can be used also for other purposes where measurements must be established precisely.

The 1" size is a standard round Reference Disk. Sizes 2" to 5" are $\frac{1}{4}$ " diameter with flat ends and sizes 6" to 11" are $\frac{3}{8}$ " in diameter and provided with two rubber grips to resist the effects of heat and make them easier to handle.

| | | |
|-----|----------------|--------|
| 1" | No. 599-657-16 | \$2.05 |
| 2" | No. 599-9655-2 | 2.05 |
| 3" | No. 599-9655-3 | 2.55 |
| 4" | No. 599-9655-4 | 3.05 |
| 5" | No. 599-9655-5 | 3.55 |
| 6" | No. 599-655-6 | 4.10 |
| 7" | No. 599-655-7 | 4.60 |
| 8" | No. 599-655-8 | 5.10 |
| 9" | No. 599-655-9 | 5.60 |
| 10" | No. 599-655-10 | 6.10 |
| 11" | No. 599-655-11 | 6.65 |

SETS OF STANDARDS—Standards are available also in convenient sets for use with Micrometer Sets 133 and 133RS to 138 and 138RS which are sold regularly without such standards.

| | | |
|----------------------------|------------|---------|
| Set of 1" and 2" standards | No. 599-77 | \$ 4.10 |
| Set of 1" to 5" standards | No. 599-78 | 13.25 |
| Set of 6" to 11" standards | No. 599-79 | 32.15 |
| Set of 1" to 11" standards | No. 599-80 | 45.40 |



233RS



237RS



232RS



Micrometer Standards



1" Mahogany Micrometer Case

Micrometer cases...

Cases can be furnished for $\frac{1}{2}$ " to 12" and No. 216, 217 and 218 Micrometers and add to the convenience of the use of the tools and protect them against damage. Cases for the $\frac{1}{2}$ " and the 2" to 6" Micrometers are finished in imitation leather, plush lined. Cases for 1" Micrometer and the larger sizes are nicely finished wood.

| Size | No. 599-2-9999 | \$2.25 |
|---------------------------------|-----------------|--------|
| $\frac{1}{2}$ " | No. 599-12-9999 | 2.55 |
| 1" and 215 | No. 599-40-9999 | 3.05 |
| 2" 38, 47 and 48 Types | No. 599-60-9999 | 3.05 |
| 2" 61, 61RS, 82, 82RS, 94, 94RS | No. 599-50-9999 | 4.50 |
| 3" 50, 52 53 Types, 216 and 217 | No. 599-62-9999 | 3.30 |
| 3" 63, 63RS, 83, 83RS, 95, 95RS | No. 599-64-9999 | 4.35 |
| 4" 65, 65RS, 218 | No. 599-67-9999 | 4.85 |
| 5" 67, 67RS | No. 599-69-9999 | 5.60 |
| 6" 69, 69RS | No. 599-71-9999 | 6.10 |
| 7" 71, 71RS | No. 599-72-9999 | 6.65 |
| 8" 72, 72RS | No. 599-73-9999 | 7.40 |
| 9" 73, 73RS | No. 599-74-9999 | 8.40 |
| 10" 74, 74RS | No. 599-75-9999 | 9.70 |
| 11" 75, 75RS | No. 599-76-9999 | 9.95 |
| 12" 76, 76RS | | |

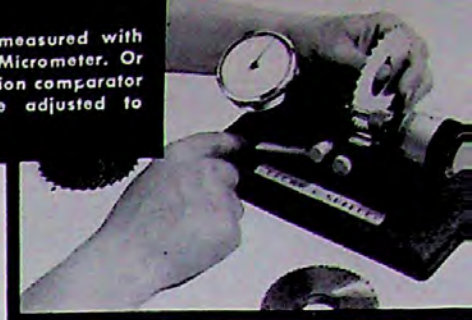
SOFT LEATHER CASES FOR MICROMETERS—These cases are especially suited for pocket use and protect tools from dust and dirt.

| | | |
|---------------------------------------|-----------------|--------|
| $\frac{1}{2}$ ", except 232 and 232RS | No. 599-4-9999 | \$7.75 |
| 1", except 237 and 237RS | No. 599-10-9999 | .75 |
| 2", except 216 | No. 599-38-9999 | .75 |

Brown & Sharpe

Bench and inside micrometers...

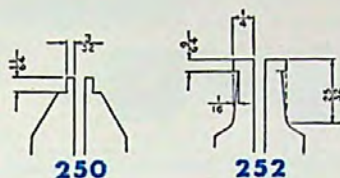
Ten-thousandths can be measured with ease on 245 by Dial or Micrometer. Or tool can be used as precision comparator with measuring pressure adjusted to meet conditions.



for unusual jobs...

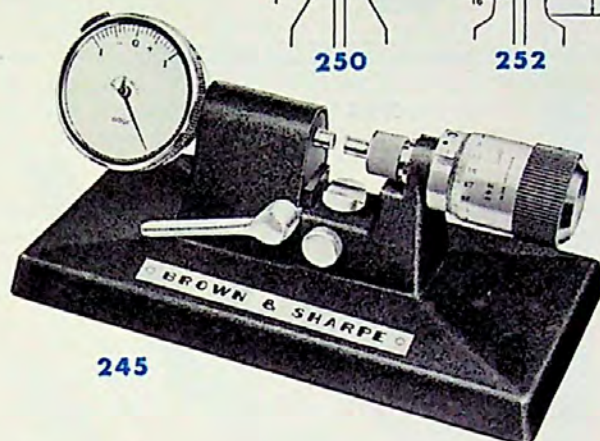


250



250

252



245

245 INDICATING BENCH MICROMETER—Has Carbide Faces. 0 to $\frac{1}{2}$ " by .0001". Measures by .0001" directly from micrometer thimble or directly from dial with micrometer set to nearest .001". Also, serves as a comparator. Retractor lever withdraws anvil for repeat measurements. Adjustable measuring pressure, 8 ozs. to 2 lbs. Furnished in finished wooden case.

No. 599-245-6 \$205.00

250 INSIDE MICROMETER CALIPER—.200" to 1.200" by .001". For small internal measurements. Has stainless steel screw with hardened and ground threads. Has clamp screw.

No. 599-250 \$32.50

Case No. 599-250-9999 2.50

252 INSIDE MICROMETER CALIPER— $\frac{1}{2}$ " to $1\frac{1}{2}$ " by .001". Similar to 250 except for range and shape of jaws (see illustration above) which permit measuring over a flange or shoulder.

No. 599-252 \$37.00

Case No. 599-250-9999 2.50

262 INSIDE MICROMETER—8" to 36" by .001". Has 7 measuring rods and extension. Measuring rods are interchangeable in holder which has thimble and micrometer screw with 1" range. Desirable where large range of long inside measurements is required.

No. 599-262 \$36.70

Wooden Case No. 599-262-9999 7.65

263 INSIDE MICROMETER—1" to 2" by .001". Has 2 measuring rods and spacing collar. Measures 1" to $1\frac{1}{4}$ " with short rod only and $1\frac{1}{4}$ " to $1\frac{1}{2}$ " with short rod and collar. Measures $1\frac{1}{2}$ " to $1\frac{3}{4}$ " with long rod only and $1\frac{3}{4}$ " to 2" with long rod and collar. Has clamp screw. See also Handle 287 on page 14.

No. 599-263 \$16.00

Case No. 599-263-9999 2.50

264 INSIDE MICROMETER—2" to 8" by .001". Has 6 measuring rods and spacing collar. Ends of rods hardened and adjustable for wear. Desirable feature is adjustable point on thimble as it receives more wear than individual rods. This permits exact overall length of micrometer head, 1.573", to be maintained. Has clamp screw. See Handle 287 on page 14.

No. 599-264 \$21.90

Case No. 599-264-9999 2.80

265 INSIDE MICROMETER—2" to 12" by .001". Similar to 264 but has 10 measuring rods and spacing collar, providing greater range. See Handle 287, page 14.

No. 599-265 \$26.45

Case No. 599-265-9999 4.10

266 INSIDE MICROMETER—2" to 8" by .001". Similar to 264 but does not have clamp screw. See Handle 287, page 14.

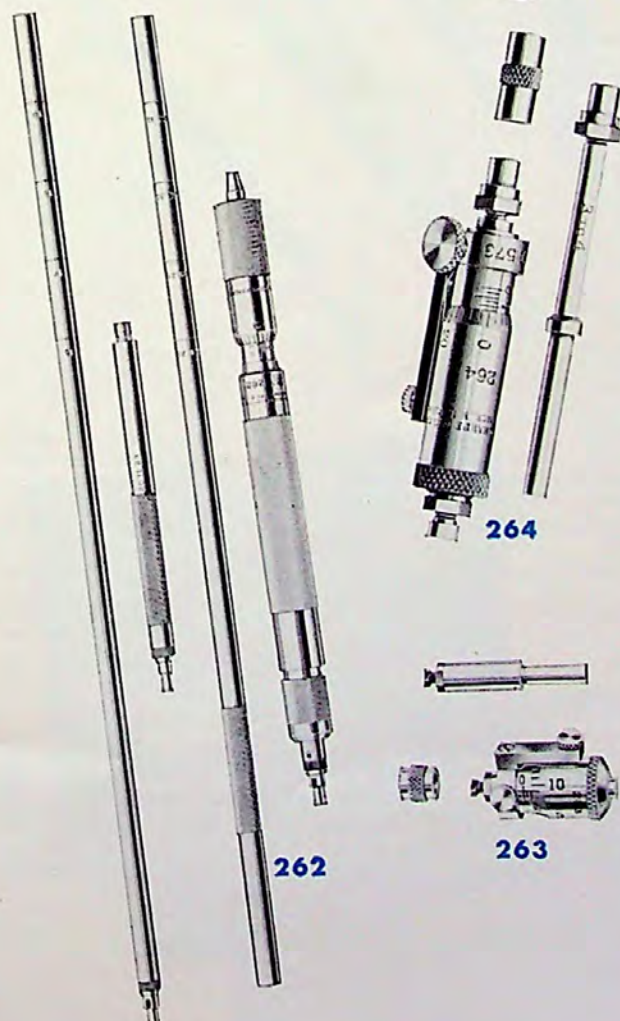
No. 599-266 \$19.40

Case No. 599-264-9999 2.80

267 INSIDE MICROMETER—2" to 12" by .001". Similar to 265 but does not have clamp screw. See Handle 287, page 14.

No. 599-267 \$23.45

Case No. 599-265-9999 4.10



262

263

264

Brown & Sharpe

Inside micrometers...

... LIGHT AND EASY TO HANDLE



268 TELESCOPING INSIDE MICROMETER—2" to 6" by .001". Has 8 measuring rods. Combines advantages of telescoping gage with an inside micrometer. Measuring point adjusts itself to the work and is locked in position by turning knurled knob on handle end. When tool is withdrawn from hole, micrometer thimble is turned until it contacts shoulder on rod and reading is taken. Handle is 3 3/4" long and placed near fixed end of tool, the most sensitive position for accurate measurement. Measuring rods are adjustable for wear.

No. 599-268-8 \$42.50
Case No. 599-268-9999 5.00

270 TUBULAR INSIDE MICROMETERS—2" to 12" by .001". Light and convenient to handle. Heads of small micrometers have 1/2" movements; large, 1". Measuring points are hardened and ground on a radius for measuring both parallel and curved surfaces. Fibre grips protect against heat of hand. Small sizes have one grip; large sizes, two. All, except smallest size, have clamp screw. See Handle 287 below.

| Range, Inches | | Range, Inches | |
|---------------|------------------------|---------------|------------------------|
| 2 to 2 1/2 | No. 599-270-25 \$13.75 | 5 to 6 | No. 599-270-60 \$14.75 |
| 2 1/2 to 3 | No. 599-270-30 13.75 | 6 to 7 | No. 599-270-70 14.75 |
| 3 to 3 1/2 | No. 599-270-35 13.75 | 7 to 8 | No. 599-270-80 14.75 |
| 3 1/2 to 4 | No. 599-270-40 13.75 | 8 to 9 | No. 599-270-90 14.75 |
| 4 to 4 1/2 | No. 599-270-45 13.75 | 9 to 10 | No. 599-270-100 14.75 |
| 4 1/2 to 5 | No. 599-270-50 13.75 | 10 to 11 | No. 599-270-110 16.00 |
| | | 11 to 12 | No. 599-270-120 16.00 |

TUBULAR INSIDE MICROMETER SETS—Furnished in finished wooden case.

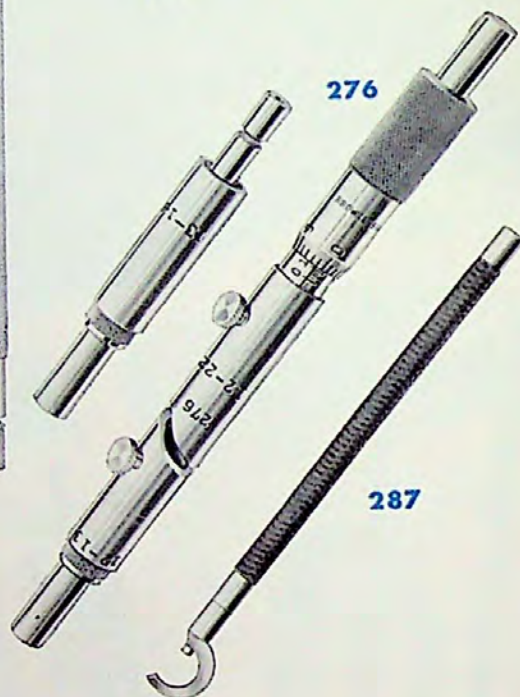
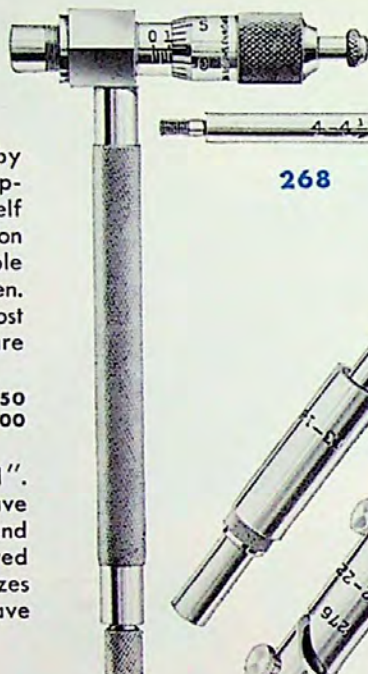
| | | | | |
|-----|----------------|--------------------|-------------|----------|
| 273 | 7 Micrometers | 2" to 6" by .001" | No. 599-273 | \$108.00 |
| 274 | 13 Micrometers | 2" to 12" by .001" | No. 599-274 | 205.00 |

276 TUBULAR INSIDE MICROMETERS—12" to 42" by .001". 3 sizes. For long inside measurements. Light and easy to handle. Hardened measuring points ground on radius, for measuring both parallel and curved surfaces. Have clamp screws. Each size has 10 measuring rods. Rods have means of adjustment and are held in position by clamp screw that fits in a V groove. Each tool furnished in finished wooden case.

| Range, Inches | |
|---------------|------------------------|
| 12 to 22 | No. 599-276-22 \$82.00 |
| 22 to 32 | No. 599-276-32 91.00 |
| 32 to 42 | No. 599-276-42 100.00 |

287 INSIDE MICROMETER HANDLE—For 263, 264, 265, 266, 267 and 270 (2" to 5") Micrometers. Handle, 5 3/8" long, permits inside micrometers to be inserted in small holes for a greater distance than by hand alone. Brass clamping plug prevents marring micrometer.

No. 599-287 \$2.25



Brown & Sharpe

Intrimik... THE INTERNAL TRI-POINT MICROMETER

Intrimik provides exclusive advantages for measuring bores and holes. It takes inside measurements directly and quickly at depths shown in listing and with extensions, at even greater depths.

The three measuring points make line contact with the surface so that the instrument aligns itself axially and radially.

Where measurements must be taken over a range of sizes, Intrimik can replace the many expensive individual plug gages necessary to establish tolerances—a further advantage it gives exact measurements not possible with gages of fixed dimensions. This frequently can save work within acceptable limits.

Sizes to 4" are finished in dull chrome with black graduations. Larger sizes have heads with black enamel finish. Measuring surfaces are high carbon, high chromium, rust and wear resistant steel. Design includes means to compensate for wear of measuring surfaces and for setting to exact calibration with a standard ring which serves an individual tool or two tools when furnished in sets.

IMPORTANT! It is recommended that individual Intrimiks be purchased with a setting ring, unless purchaser has such ring gage available, to permit periodic checking of setting, and resetting, if required.

INDIVIDUAL INTRIMIKS

RANGES: .275" to .500" by .0001"; .500" to 4.000" by .0002"; 4.000" to 8.000" by .0005".

| Range, Inches | Measure to Depth, Inches With Extensions | | | Order by Number | Price, Intrimik Only |
|-------------------------|--|-----|-----|-----------------|----------------------|
| | None | One | Two | | |
| .275 to .350 by .0001 | 2 | 6 | 10 | 599-281-3 | \$65.00 |
| .350 to .425 by .0001 | | | | 599-281-4 | 65.00 |
| .425 to .500 by .0001 | | | | 599-281-5 | 65.00 |
| .500 to .600 by .0002 | | | | 599-281-6 | 70.00 |
| .600 to .700 by .0002 | | | | 599-281-7 | 70.00 |
| .700 to .800 by .0002 | 3 | 9 | 15 | 599-281-8 | 70.00 |
| .800 to 1.000 by .0002 | | | | 599-281-10 | 74.00 |
| 1.000 to 1.200 by .0002 | | | | 599-281-12 | 74.00 |
| 1.200 to 1.400 by .0002 | | | | 599-281-14 | 74.00 |
| 1.400 to 1.600 by .0002 | | | | 599-281-16 | 74.00 |
| 1.600 to 2.000 by .0002 | 4 | 10 | * | 599-281-20 | 82.00 |
| 2.000 to 2.400 by .0002 | | | | 599-281-24 | 82.00 |
| 2.400 to 2.800 by .0002 | | | | 599-281-28 | 82.00 |
| 2.800 to 3.200 by .0002 | | | | 599-281-32 | 82.00 |
| 3.200 to 3.600 by .0002 | | | | 599-281-36 | 82.00 |
| 3.600 to 4.000 by .0002 | 4 | 10 | * | 599-281-40 | 82.00 |
| 4.000 to 5.000 by .0005 | | | | 599-281-50 | 138.00 |
| 5.000 to 6.000 by .0005 | | | | 599-281-60 | 154.00 |
| 6.000 to 7.000 by .0005 | | | | 599-281-70 | 170.00 |
| 7.000 to 8.000 by .0005 | | | | 599-281-80 | 188.00 |

*Use only one Extension. Intrimiks, 4.000" to 8.000" are made by Tesa, S.A. and sold by Brown & Sharpe through its distributors.

Intrimiks are for sale only in the United States of America and its territories, Mexico and Central America.

For setting rings, extensions and cases, see Page 16.



INTRIMIKS

INTRIMIK SETS

Furnished in wooden cases. See illustration of large set, page 16.

3 INTRIMIKS—Range .275" to .500" by .0001". Includes two Rings .350" and .500", Extension for measurements to 6" in depth. No. 599-282 **\$231.00**

3 INTRIMIKS—Range .500" to .800" by .0002". Includes two Rings .500" and .700", Extension for measurements to 9" in depth. No. 599-283 **\$252.00**

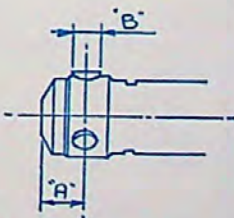
4 INTRIMIKS—Range .800" to 1.600" by .0002". Includes two Rings 1.000" and 1.400", Extension for measurements to 9" in depth. No. 599-284 **\$360.00**

6 INTRIMIKS—Range 1.600" to 4.000" by .0002". Includes three Rings 2.000", 2.800" and 3.600", Extension for measurements to 9" in depth. No. 599-285 **\$616.00**

4 INTRIMIKS—Range, 4.000" to 8.000" by .0005". Includes two Rings 5.000" and 7.000", Extension for measurements to 10" in depth. No. 599-286 **\$793.00**

Measuring Point Data

| Range, Inches | A, Inches | B, Inches |
|----------------|----------------|-----------|
| .275 to .500 | $\frac{1}{16}$ | .099 |
| .500 to .800 | $\frac{7}{32}$ | .157 |
| .800 to 1.600 | $\frac{7}{16}$ | .275 |
| 1.600 to 4.000 | $\frac{1}{2}$ | .472 |
| 4.000 to 8.000 | $\frac{1}{2}$ | .703 |



The ratchet stop provides exact and unvarying degree of measuring pressure with the tool aligned axially and radially.

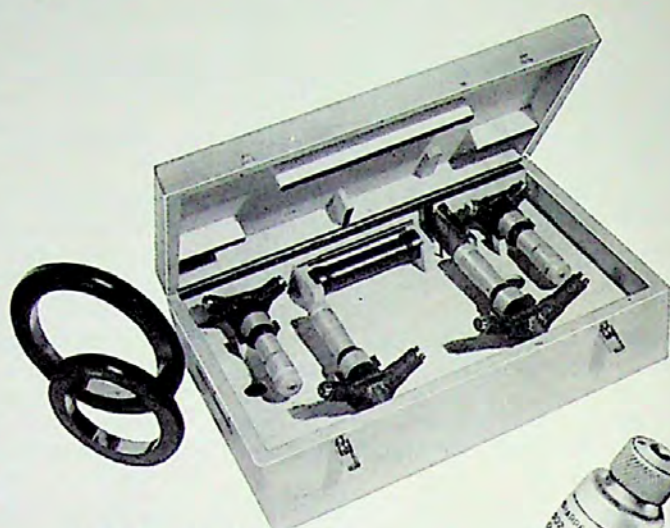


Intrimik measures the exact hole size. It detects exactly how much under or over size, saving work in many cases which otherwise might be classified spoiled.



Intrimik setting rings, extensions, cases

| | | | |
|--------------------------------|------------------|------------------|---------|
| Setting Rings, Size | .350" | No. 599-281-380 | \$ 9.50 |
| | .500" | No. 599-281-580 | 9.50 |
| | .700" | No. 599-281-780 | 11.00 |
| | 1.000" | No. 599-281-1080 | 12.00 |
| | 1.400" | No. 599-281-1480 | 15.50 |
| | 2.000" | No. 599-281-2080 | 17.75 |
| | 2.800" | No. 599-281-2880 | 20.50 |
| | 3.600" | No. 599-281-3680 | 27.50 |
| | 5" | No. 599-281-5080 | 41.50 |
| | 7" | No. 599-281-7080 | 45.00 |
| Extensions for Intrimiks | .275" to .500" | No. 599-281-321 | \$ 9.00 |
| | .500" to .800" | No. 599-281-621 | 10.00 |
| | .800" to 1.600" | No. 599-281-1021 | 15.50 |
| | 1.600" to 4.000" | No. 599-281-2021 | 16.50 |
| | 4" to 8" | No. 599-281-5021 | 26.50 |
| Cases for Individual Intrimiks | .275" to .350" | No. 599-281-9999 | \$ 6.50 |
| | .350" to .425" | | |
| | .425" to .500" | No. 599-281-9998 | 7.00 |
| | .500" to .600" | No. 599-281-9997 | 9.00 |
| | .600" to .700" | | |
| | .700" to .800" | No. 599-281-9996 | 13.00 |
| | .800" to 1.000" | | |
| | 1.000" to 1.200" | No. 599-281-9995 | 14.00 |
| | 1.200" to 1.400" | | |
| | 1.400" to 1.600" | No. 599-281-9994 | 17.25 |
| Cases for Sets | 1.600" to 2.000" | No. 599-281-9993 | 18.50 |
| | 2.000" to 2.400" | | |
| | 2.400" to 2.800" | No. 599-281-9992 | 19.50 |
| | 2.800" to 3.200" | | |
| | 3.200" to 3.600" | | |
| | 3.600" to 4.000" | | |
| | .275" to .500" | No. 599-282-9999 | \$ 8.00 |
| | .500" to .800" | No. 599-283-9999 | 11.50 |
| | .800" to 1.600" | No. 599-284-9999 | 21.00 |
| | 1.600" to 4.000" | No. 599-285-9999 | 41.75 |
| | 4" to 8" | No. 599-286-9999 | 30.00 |



LARGE INTRIMIK SET

Extension becomes integral part of Intrimik and permits measurement of deep bores and holes.



292RS

298RS

Micrometer heads...

These dull chrome finish Micrometer Heads are of the same superior design as the new Brown & Sharpe Micrometer Calipers. They have a one-piece spindle and screw and the black, figured, wide graduations on the dull chrome background make them exceptionally easy to read. In their design are adjustments for surface wear and zero setting.

1/2" MICROMETER HEADS—Shanks are 1 1/32" long and .374" to .375" diameter, and spindle projects 9/16" with micrometer set at zero.

292 and 292RS—Measure by .001"
 292 No. 599-292-100 \$10.20
 292RS (Has ratchet stop) No. 599-292-120 11.20

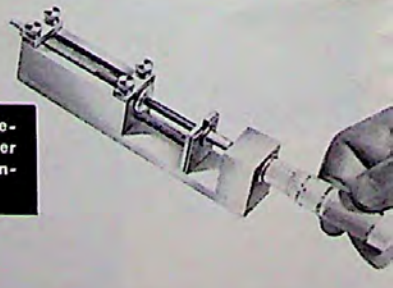
293 and 293RS Measure by .0001"
 293 No. 599-293-100 \$ 12.70
 293RS (Has ratchet stop) No. 599-293-120 13.70

1" MICROMETER HEADS—Shanks are 3/4" long and .4997±.0002" diameter and spindle projects 1 1/16" with micrometer set at zero.

297 and 297RS—Measure by .001"
 297 No. 599-297-100 \$10.20
 297RS (Has ratchet stop) No. 599-297-120 11.20

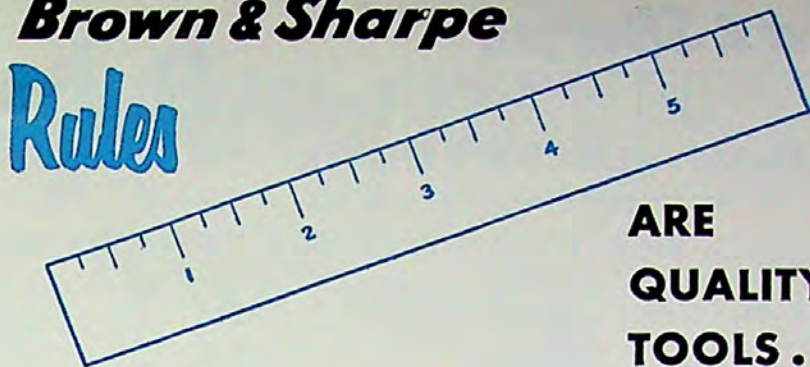
298 and 298RS—Measure by .0001"
 298 No. 599-298-100 \$12.70
 298RS (Has ratchet stop) No. 599-298-120 13.70

297 controlling microscopic movement of spring loaded plunger provides exceedingly accurate control of hyperdermic dosage.



Brown & Sharpe

Rules



**ARE
QUALITY
TOOLS...**

STANDARDS OF LENGTH—The Standards of Length which are in common use today are an Anglo-Saxon heritage adopted many years ago.

About 4000 B.C. the cubit, the distance from the tip of the middle finger to the elbow of a bent arm was a standard unit of measurement and with this unit the pyramids were built.

Divisions of the cubit followed: the Span, the length between the tips of the thumb and little finger, $\frac{1}{2}$ cubit; the Palm, the breadth of 4 fingers, $\frac{1}{6}$ cubit; the Foot, $\frac{2}{3}$ of a cubit or about 12.16 inches. Later, King Edward the 2nd, decreed the length of 3 barley corn kernels equalled 1".

As time unfolded, increasing variance was noted in the lengths of these and other existing units of measurement so that the need for clearly defined and universal standards became evident.

In modern times a standard yard was legalized in 1824 by the British Parliament but was destroyed by fire in 1834. The British Imperial Yard "Bronze No. 1" was legalized in 1855, and one of forty copies, "Bronze No. 11" was presented to the United States. At the same time another copy "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 metric system was legalized in this country in 1866 and the U.S. yard is defined as 3600/3937 part of a meter.

An important standard of length is the wave length of red cadmium light which is .000000644 meter long. Wave lengths of many other useful radiations including that of Mercury Isotope 198 have been compared with that of red cadmium.

Standards were prepared for use in our own shops, the mean errors of which were twenty millionths inch for the yard and .000005M for the meter, both being long. These standards have been subdivided carefully. Our Rules and Vernier Tools are as nearly exact copies as expert toolmakers and highly specialized equipment can make them.

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

FEATURES OF BROWN & SHARPE RULES—The extreme care used in safeguarding the accuracy of our standards is reflected in the precision of Brown & Sharpe Tools, including Steel Rules.

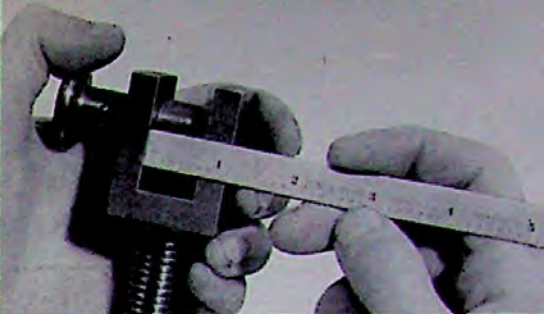
Brown & Sharpe Rules are made of the highest quality steel and are machine graduated to provide graduations of unvarying accuracy. The rules are easy to read accurately because of the uniform width and depth of the graduation lines.

There is a large variety of Brown & Sharpe Rules—a rule for every purpose. It includes, also, rules with dull chrome non-glare finish with black graduations—readable in any position—and rules with both fractional and decimal graduations.

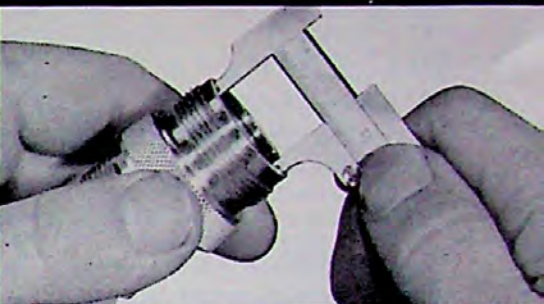
GRADUATIONS—Brown & Sharpe Rules 300, 315, 316 and 320 up to and including 12" in length are graduated in 32nds on each end of one side, an advantage in measuring the depth and width of grooves, countersinks and recesses.

Graduations and Graduation Numbers

| Graduation | No. 4 | No. 6 | No. 8 | No. 9 | No. 10 | No. 11 | No. 12 |
|------------|-------|-------|--------|-------|--------|--------|--------|
| 1st edge | 8ths | 10ths | 32nds | 16ths | 32nds | 64ths | 50ths |
| 2nd edge | 16ths | 50ths | 64ths | 32nds | 64ths | 100ths | 100ths |
| 3rd edge | 32nds | | 10ths | 64ths | | | |
| 4th edge | 64ths | | 100ths | | | | |



In measuring a slot, the rule should be held as nearly as possible perpendicularly to the face of the slot for true measurement and true sighting.



The Caliper Rule facilitates countless inside and outside measurements of bushings, tubing and other small parts.



The sliding hook of a Brown & Sharpe Hook Rule has many advantages. It permits accurate measurement from the shallowest of recesses.



The non-glare dull chrome finish rules are the easiest rules in America to read. The graduations show clearly from any angle.

With a loupe and precisely graduated rule, skilled craftsmen claim the ability to split $\frac{1}{64}$ " into three parts, and with repetitive accuracy.



TEMPERED STEEL - FLEXIBLE - NARROW - SHRINK

300 TEMPERED STEEL RULES—(No. 4 Grad. 8ths, 16ths, 32nds and 64ths), $\frac{1}{32}$ " thick except 48" which is $\frac{1}{16}$ ".

| | | |
|--|------------------|---------|
| 6" ($\frac{1}{16}$ " wide) | No. 599-300-604 | \$ 1.65 |
| 12" (1" wide) | No. 599-300-1204 | 3.15 |
| 24" ($\frac{3}{16}$ " wide) | No. 599-300-2404 | 6.85 |
| 36" (1" wide) | No. 599-300-3604 | 13.90 |
| 48" ($\frac{1}{2}$ " wide) Not tempered | No. 599-300-4804 | 19.70 |

303 NARROW TEMPERED STEEL RULES— $\frac{7}{32}$ " wide, $\frac{1}{32}$ " thick. Graduated on one edge of each side only.

| | | |
|------------------------------------|------------------|--------|
| 4" (No. 10 Grad. 32nds and 64ths) | No. 599-303-410 | \$1.15 |
| 6" (No. 10 Grad. 32nds and 64ths) | No. 599-303-610 | 1.40 |
| 6" (No. 11 Grad. 64ths and 100ths) | No. 599-303-611 | 1.45 |
| 12" (No. 10 Grad. 32nds and 64ths) | No. 599-303-1210 | 2.70 |

306 FLEXIBLE STEEL RULES (Tempered)— $\frac{1}{2}$ " wide, $\frac{1}{4}$ " thick. Graduated on both edges of one side only.

| | | |
|------------------------------------|------------------|--------|
| 6" (No. 10 Grad. 32nds and 64ths) | No. 599-306-610 | \$1.40 |
| 6" (No. 11 Grad. 64ths and 100ths) | No. 599-306-611 | 1.55 |
| 6" (No. 12 Grad. 50ths and 100ths) | No. 599-306-612 | 1.55 |
| 12" (No. 10 Grad. 32nds and 64ths) | No. 599-306-1210 | 2.70 |

306A FLEXIBLE STEEL RULE (Tempered)— $\frac{1}{2}$ " wide, $\frac{1}{4}$ " thick. Has figured graduations.

| | | |
|-----------------------------------|-----------------|--------|
| 6" (No. 10 Grad. 32nds and 64ths) | No. 599-306-691 | \$1.40 |
|-----------------------------------|-----------------|--------|

306C FLEXIBLE STEEL RULE (Tempered)— $\frac{1}{2}$ " wide, $\frac{1}{4}$ " thick. No. 9 Grad. 16ths and 32nds on one side, and 64ths on one edge of the other side. 32nds and 64ths are figured. Can be turned over quickly from one figured graduation to the other.

| | |
|--------------------|--------|
| 6" No. 599-306-692 | \$1.40 |
|--------------------|--------|

308 CHROME FINISH FLEXIBLE STEEL RULES— $\frac{1}{2}$ " wide, $\frac{1}{4}$ " thick. No. 8 Grad. 10ths and 100ths on one side; and 32nds and 64ths on other. Meets requirements of aviation industry and other work where a flexible rule is required with graduations both in decimals and fractions. Graduations are figured to further facilitate reading.

| | |
|----------------------|--------|
| 6" No. 599-308-608 | \$3.00 |
| 12" No. 599-308-1208 | 5.60 |

310 CHROME FINISH FLEXIBLE STEEL RULE— $\frac{1}{2}$ " wide, $\frac{1}{4}$ " thick. Decimal grad. No. 6, 10ths and 50ths. Graduations figured for easy reading.

| | |
|--------------------|--------|
| 6" No. 599-310-606 | \$2.40 |
|--------------------|--------|

311 FLEXIBLE STEEL RULE (Tempered)— $\frac{1}{2}$ " wide, $\frac{1}{4}$ " thick. No. 8 Grad. 32nds and 64ths on one side and 10ths and 100ths on the other. Permits measurements in fractions on one side and decimals on the other. Has figured graduations.

| | |
|--------------------|--------|
| 6" No. 599-311-608 | \$1.65 |
|--------------------|--------|

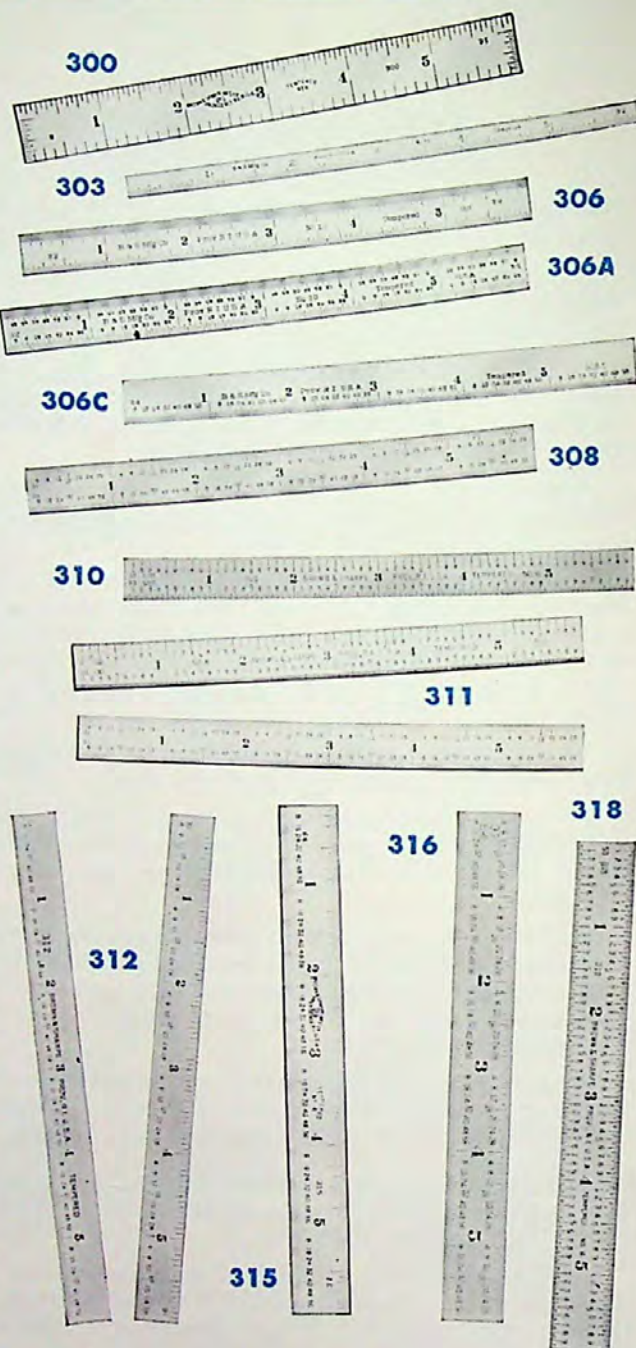
312 CHROME FINISH FLEXIBLE STEEL RULES (Tempered)— $\frac{1}{2}$ " wide, $\frac{1}{4}$ " thick. No. 9 Grad. 16ths and 32nds on one side and 64ths on one edge of other side. Easy to read. Dull chrome. Rust and stain resistant. Non-glaring. Long wearing. Has figured graduations.

| | |
|----------------------|--------|
| 6" No. 599-312-692 | \$2.30 |
| 12" No. 599-312-1292 | 4.50 |

315 TEMPERED STEEL RULES— $\frac{1}{32}$ " thick. (No. 4 Grad. 8ths, 16ths, 32nds and 64ths). Have figured graduations.

| | | |
|-----------------------------|------------------|--------|
| 2" ($\frac{3}{16}$ " wide) | No. 599-315-204 | \$.80 |
| 3" ($\frac{3}{16}$ " wide) | No. 599-315-304 | 1.05 |
| 4" ($\frac{1}{2}$ " wide) | No. 599-315-404 | 1.30 |
| 6" ($\frac{1}{2}$ " wide) | No. 599-315-604 | 1.65 |
| 12" (1" wide) | No. 599-315-1204 | 3.05 |
| 24" (1" wide) | No. 599-315-2404 | 7.15 |

For leather cases for rules, see opposite page



316 CHROME FINISH TEMPERED STEEL RULES

$\frac{1}{32}$ " thick. (No. 4 Grad. 8ths, 16ths, 32nds and 64ths.) Dull chrome. Non-glaring. Easy to read. Rust and stain resistant. Long wearing. Have figured graduations.

| | | |
|------------------------------|------------------|--------|
| 6" ($\frac{1}{16}$ " wide) | No. 599-316-604 | \$2.60 |
| 12" ($\frac{1}{16}$ " wide) | No. 599-316-1204 | 5.80 |

318 CHROME FINISH TEMPERED STEEL RULE—

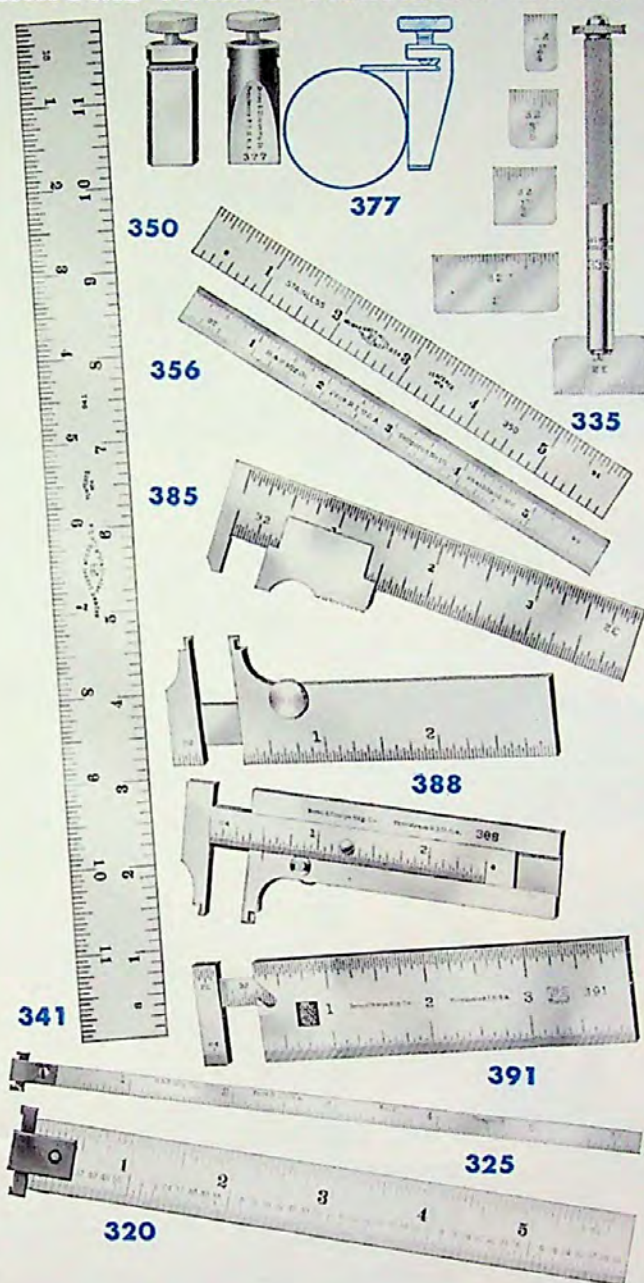
$\frac{1}{16}$ " wide, $\frac{1}{32}$ " thick. Decimal graduations: No. 6 with 10ths on each edge of one side and 50ths on each edge of the other. Graduations are figured for easy reading.

| | |
|--------------------|--------|
| 6" No. 599-318-606 | \$2.40 |
|--------------------|--------|

...for every need



CHROME FINISH-STAINLESS-HOOK AND CALIPER RULES



335 STEEL RULES WITH HOLDER (Tempered rules)—5 rules interchangeable in holder. Furnished in leatherette case. Rule lengths: $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1". No. 10 Grad. 32nds and 64ths. Rules can be set at various angles.

| RULES | | Set No. 599-335-130 | | \$5.90 |
|--------------------------|----------------|---------------------|----------------|--------|
| $\frac{1}{4}$ " | No. 99-335-210 | $\frac{3}{4}$ " | No. 99-335-610 | \$7.75 |
| $\frac{3}{8}$ " | No. 99-335-310 | 1" (No. 10) | No. 99-335-810 | .75 |
| $\frac{1}{2}$ " (No. 10) | No. 99-335-410 | 1" (No. 12) | No. 99-335-812 | .75 |
| $\frac{1}{2}$ " (No. 12) | No. 99-335-412 | Holder | No. 99-335-80 | 1.50 |

340, 341, 342, 343, 344 AND 345 TEMPERED STEEL SHRINK RULES—1" wide. (No. 4 Grad. 8ths, 16ths, 32nds and 64ths). Give allowances for shrinkages of different metals directly.

| | | | | |
|-----|----------------------------------|-----|------------------|--------|
| 340 | $\frac{1}{16}$ " shrink per foot | 12" | No. 599-340-1204 | \$4.10 |
| | | 24" | No. 599-340-2404 | 8.15 |
| 341 | $\frac{1}{8}$ " shrink per foot | 12" | No. 599-341-1204 | 4.10 |
| | | 24" | No. 599-341-2404 | 8.15 |
| 342 | $\frac{3}{16}$ " shrink per foot | 12" | No. 599-342-1204 | 4.10 |
| | | 24" | No. 599-342-2404 | 8.15 |
| 343 | $\frac{1}{4}$ " shrink per foot | 12" | No. 599-343-1204 | 4.10 |
| | | 24" | No. 599-343-2404 | 8.15 |
| 344 | $\frac{3}{8}$ " shrink per foot | 12" | No. 599-344-1204 | 4.10 |
| | | 24" | No. 599-344-2404 | 8.15 |
| 345 | $\frac{1}{2}$ " shrink per foot | 12" | No. 599-345-1204 | 4.10 |
| | | 24" | No. 599-345-2404 | 8.15 |

350 STAINLESS STEEL RULES (Tempered)—(No. 4 Grad. 8ths, 16ths, 32nds and 64ths).

| | | | |
|-----|--------------------------|------------------|--------|
| 6" | ($\frac{1}{16}$ " wide) | No. 599-350-604 | \$2.40 |
| 12" | (1" wide) | No. 599-350-1204 | 4.60 |

356 FLEXIBLE STAINLESS STEEL RULE (Tempered)— $\frac{1}{2}$ " wide. Graduated on both edges of one side only.

| | | | |
|----|--------------------------------|----------------|--------|
| 6" | (No. 10 Grad. 32nds and 64ths) | No. 599-356-30 | \$2.40 |
|----|--------------------------------|----------------|--------|

377 KEY SEAT CLAMPS—For laying out keyways. Easily attached to steel rules, combination square blades and straight edges.

| | | |
|------|-------------|--------|
| Pair | No. 599-377 | \$1.95 |
|------|-------------|--------|

385 SLIDE CALIPER RULE— $\frac{1}{16}$ " wide, about $\frac{1}{16}$ " thick. For measuring small rods, sheet stock etc. Graduated in 32nds on both edges of one side only. $4\frac{3}{16}$ " long. Jaws are $\frac{3}{8}$ " deep.

| | |
|-----------------|--------|
| No. 599-385-430 | \$8.50 |
|-----------------|--------|

388 POCKET SLIDE CALIPER RULE—Accurately measures inside and outside diameters. Clamp nut locks slide. Graduated in 32nds on one edge for 3", and in 64ths on slide for $2\frac{1}{2}$ ". $\frac{1}{8}$ " thick. Jaws are $\frac{5}{8}$ " long and measure to 2". Nibs can be inserted in holes as small as $\frac{1}{8}$ " dia.

| | |
|-----------------|--------|
| No. 599-388-330 | \$9.10 |
|-----------------|--------|

391 STEEL CALIPER RULES*—Graduated on one side in 8ths and 16ths and on the other in 32nds and 64ths. Slide graduated in 32nds and 64ths.

| | | | |
|----|-----------------------------------|-----------------|---------|
| 3" | (Slide measures $2\frac{1}{4}$ ") | No. 599-391-330 | \$12.00 |
| 4" | (Slide measures $3\frac{1}{4}$ ") | No. 599-391-430 | 17.00 |

*Furnished to order chromium plated.

LEATHER CASES FOR RULES

Has clip. For 300, 315, 316, 318 and 350—6" Rules.

| | |
|------------------|--------|
| No. 599-300-9998 | \$3.30 |
|------------------|--------|

Has clip. For 303, 306, 306A, 306C, 308, 310, 311, 312 and 356—6" Rules.

320 TEMPERED HOOK RULES— $\frac{1}{20}$ " thick. (No. 4 Grad. 8ths, 16ths, 32nds and 64ths). Have figured graduations and end graduations. Sliding hook facilitates accurate measurements from shallow shoulders.

| | | | |
|-----|--------------------------|------------------|--------|
| 6" | ($\frac{1}{16}$ " wide) | No. 599-320-604 | \$2.90 |
| 12" | (1" wide) | No. 599-320-1204 | 4.35 |

325 NARROW TEMPERED HOOK RULES— $\frac{7}{32}$ " wide, $\frac{1}{20}$ " thick. (No. 10 Grad. 32nds and 64ths). Permit measurements through holes as small as $\frac{3}{8}$ " diameter.

| | | |
|-----|------------------|--------|
| 6" | No. 599-325-610 | \$2.55 |
| 12" | No. 599-325-1210 | 3.85 |

Caliper rules packed one in a box; Key Seat Clamps, one pair in a box, six boxes in a carton; and all other above Rules packed six in a box except 24" Rules which are packed one in a package.

Brown & Sharpe

Combination Squares

Features...

Combination Squares, Combination Sets and Protractors have been designed and constructed with the idea that they will be the best tools of their kind. The unhardened heads are of cast iron and the hardened heads are dropped forged—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, with the graduations required for a particular job, to be used as desired. The knurled tip on the bolt permits it to be reversed without its being removed from the head itself.

The round clamping groove allows the blades to be inserted quickly in the heads, and the bolt forces the blade against the bottom of the slot, in accurate alignment with the head, and the round 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 scribes which can be inserted in a hole in the head for safe-keeping when not in use are furnished with the square heads.

The square heads have wide surfaces and, together with the blade, make excellent try squares. Also, the blade, either with a square head or a protractor, can be used as a depth or height gage and the 45 degree angle finds frequent use. The ends of the center heads are ground accurately and this tool can be used as a T square as well as on round work of a large diameter.

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

Combination Squares...

Blades are Tempered

With Heads Hardened

| | | | |
|-----|-----|------------------|---------|
| 400 | 6" | No. 599-400-604 | \$11.40 |
| 400 | 12" | No. 599-400-1204 | 14.85 |
| 400 | 24" | No. 599-400-2404 | 19.30 |
| 401 | 6" | No. 599-401-604 | 7.70 |
| 401 | 12" | No. 599-401-1204 | 10.10 |
| 401 | 24" | No. 599-401-2404 | 14.55 |

With Heads Not Hardened

| | | | |
|-----|-----|------------------|---------|
| 402 | 6" | No. 599-402-604 | \$ 7.90 |
| 402 | 9" | No. 599-402-904 | 10.40 |
| 402 | 12" | No. 599-402-1204 | 11.40 |
| 402 | 24" | No. 599-402-2404 | 15.85 |
| 403 | 6" | No. 599-403-604 | 5.50 |
| 403 | 12" | No. 599-403-1204 | 8.25 |
| 403 | 24" | No. 599-403-2404 | 12.70 |

Graduations 400, 401, 402, and 403

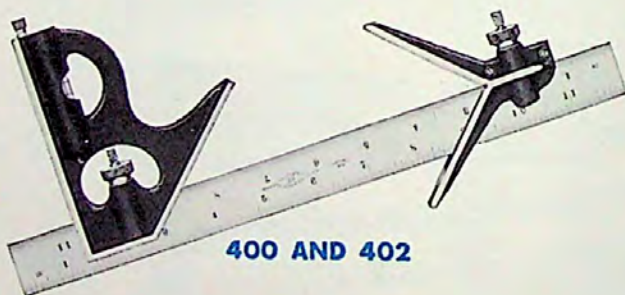
| Edge | 1st | 2nd | 3rd | 4th |
|-------|------|-------|-------|-------|
| No. 4 | 8ths | 16ths | 32nds | 64ths |

Nos. 400 and 402 have Square and Center Heads; Nos. 401 and 403 have Square Head only.

A protractor checks angular surfaces easily.

The square head and blade serve as depth or height gage.

The ends of centerheads are ground accurately—useful on work of large as well as small diameters.



Brown & Sharpe

Combination sets, protractors and attachments

Blades are Tempered

COMBINATION SETS—With Square and Center Heads Hardened and Protractor

| | | | |
|-----|-----|--|---------|
| 425 | 12" | No. 599-425-1204 | \$22.00 |
| 425 | 24" | No. 599-425-2404 | 26.45 |
| 438 | 12" | with Reversible Protractor Head No. 599-438-1204 | 24.55 |
| 438 | 24" | Protractor Head No. 599-438-2404 | 29.10 |

With Square and Center Heads Not Hardened and Protractor

| | | | |
|-----|-----|--|---------|
| 426 | 12" | No. 599-426-1204 | \$18.55 |
| 426 | 24" | No. 599-426-2404 | 23.00 |
| 439 | 12" | with Reversible Protractor Head No. 599-439-1204 | 21.10 |
| 439 | 24" | Protractor Head No. 599-439-2404 | 25.55 |

PROTRACTORS

| | | | |
|------|-----|------------------|---------|
| 450 | 12" | No. 599-450-1204 | \$11.65 |
| 450 | 24" | No. 599-450-2404 | 16.10 |
| *456 | 12" | No. 599-456-1204 | 14.20 |
| *456 | 24" | No. 599-456-2404 | 18.65 |

* Not shown. Has Reversible Protractor Head

Graduations 425, 426, 438, 439, 450 and 456

| Edge | 1st | 2nd | 3rd | 4th |
|-------|------|-------|-------|-------|
| No. 4 | 8ths | 16ths | 32nds | 64ths |

ATTACHMENTS—For use on 12" and 24" Brown & Sharpe Combination Squares and Sets.

465 HEIGHT GAGE ATTACHMENT—Used from extreme top to bottom of blade. Inside end of pointer aligns with blade edge for accurate reading. Frame is drop forged. Pointer is hardened, tempered and ground.

No. 599-465 \$6.60

468 DEPTH GAGE ATTACHMENT—0 to 4 1/2". Particularly useful in measuring depths of wide recesses. Frame is drop forged. 6" blade had No. 10 Grad. 32nds and 64ths, or No. 11, 64ths and 100ths. 3/4" rod is useful in small holes.

| | | | |
|-----|--------------|----------------|--------|
| 468 | No. 10 Grad. | No. 599-468-62 | \$5.50 |
| 468 | No. 11 Grad. | No. 599-468-65 | 5.50 |

SEPARATE PARTS—Blades, except as noted, have No. 4 Grad., 8ths, 16ths, 32nds and 64ths.

| | | |
|---|-------------------|--------|
| Blade, 6" | No. 599-9400-604 | \$2.75 |
| Blade, 9" | No. 599-9400-904 | 3.50 |
| Blade, 12" | No. 599-9402-1204 | 4.50 |
| Blade, 12", No. 8 Grad., 32nds, 64ths, 10ths and 100ths | No. 599-9400-1208 | 4.50 |
| Blade, 12" with Figured Graduations | No. 599-9400-1204 | 5.50 |
| Stainless Steel Blade, 12" with Figured Graduations | No. 599-9403-1204 | 6.40 |
| Blade, 18" | No. 599-9400-1804 | 6.90 |
| Blade, 24" | No. 599-9400-2404 | 8.95 |
| Square Head, Not Hard., 6" | No. 599-9402-1106 | 2.75 |
| Square Head, Not Hard., 9", 12", or 24" | No. 599-9402-1109 | 3.75 |
| Square Head, Hard., 6" | No. 599-9400-1006 | 4.95 |
| Square Head, Hard., 9", 12", or 24" | No. 599-9400-1009 | 5.60 |
| Center Head, Not Hard., 6" | No. 599-9402-2106 | 2.40 |
| Center Head, Not Hard., 9", 12" or 24" | No. 599-9402-2109 | 3.15 |
| Center Head, Hard., 6" | No. 599-9400-2006 | 3.70 |
| Center Head, Hard., 9", 12", or 24" | No. 599-9400-2009 | 4.75 |
| Protractor, Plain, 9", 12", or 24" | No. 599-9425-3009 | 7.15 |
| Protractor, Reversible, 9", 12", or 24" | No. 599-9438-3109 | 9.70 |
| Scriber | No. 99-400-1056 | .60 |
| Level Glass | No. 99-400-1054 | .60 |

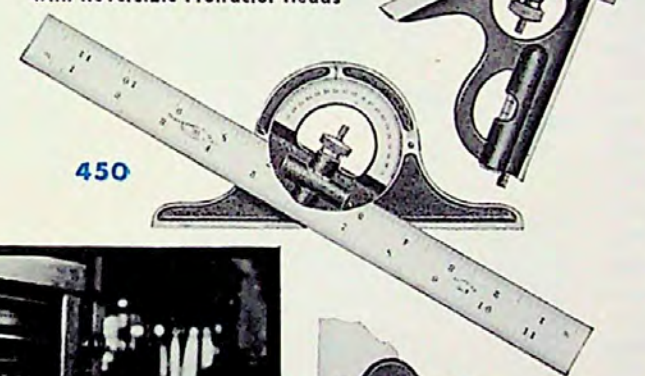


425 AND 426



438 AND 439

with Reversible Protractor Heads



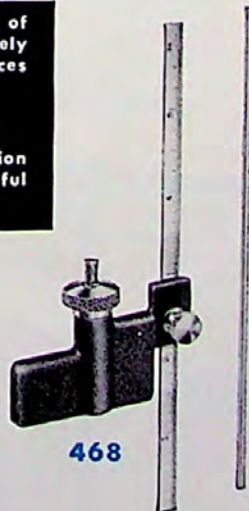
450



465

Note easy measurement of distance between widely spaced stepped surfaces with 468.

With 465 a Combination Square becomes a useful height gage.



468



Brown & Sharpe

Bevel protractors and bevels,

Bevel Protractors are among the finest of precision tools, requiring expert skill in manufacture, fitting and graduating. In the tools having a Vernier, the graduations are below the dial surface, protected from wear and in the Brown & Sharpe design the Vernier graduations are on the swivel itself close to the dial for easy, accurate readings and alignment.

Reading the vernier...

The Vernier is used with a dial graduated in degrees for a complete circle of 360° . It is divided into 24 spaces, 12 each side of zero. Each group of 12 divisions on the Vernier, numbered 0 to 60, equals, in over-all spacing, 23 divisions or 23° on the dial.

Thus, one division on the Vernier equals $\frac{1}{2}$ of 23° or $11\frac{1}{2}^\circ$ so that the difference between one division on the Vernier and two divisions on the dial is $\frac{1}{2}^\circ$ or 5 minutes.

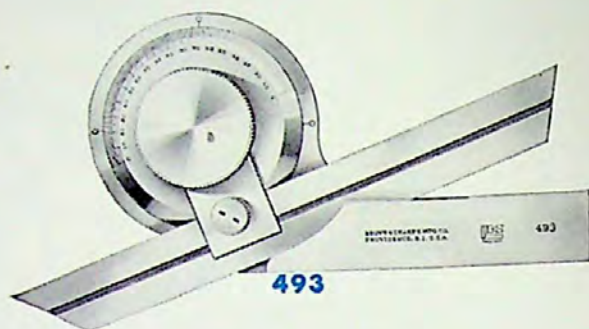
When the reading is exact to an even degree, the zero on the Vernier coincides with a graduation on the dial. This leaves a space between graduations on the scale and the 5, 10, 15, 20, 25, etc., line graduations on the Vernier of 5', 10', 15', 20', 25', etc., respectively, the difference increasing $5'$ or $\frac{1}{2}^\circ$ at each Vernier graduation in numerical order until at the 60' graduation on the Vernier, the lines again coincide.

Thus, when the 5', 10' or 15', etc., line on Vernier coincides with a line on scale, the zero on Vernier has moved 5', 10' or 15' past an even degree graduation on scale to bring these lines together.

To Read—Note the whole degrees that the zero on the Vernier has moved from the zero on the dial. To this reading add the number of minutes indicated by the Vernier. To determine this Vernier reading, count in the same direction as that in which zero on Vernier has moved, the number of divisions from the zero on the dial to the graduation on Vernier which coincides with a graduation on the dial. As each Vernier division represents 5 minutes, this number multiplied by 5 minutes represents the number of minutes to be added to the degree reading.

Example—Upper illustration shows the zero graduation on the Vernier coinciding with a whole degree graduation on the dial. This indicates that the reading is in whole degrees. The reading, therefore, equals 17° .

In lower illustration, however, in the same direction the zero on the Vernier has moved from the zero on the dial; the 10th graduation on the Vernier coincides with a graduation on the dial. This indicates that $10 \times 5'$ or $50'$ should be added to the reading of 12° on the dial. The reading then equals $12^\circ 50'$.



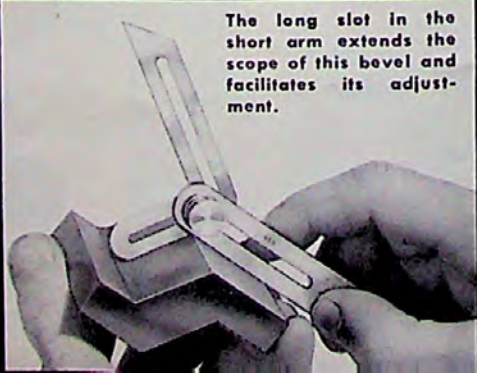
Bevel protractors accurately establish angles and determine relationships between surfaces of machine parts.



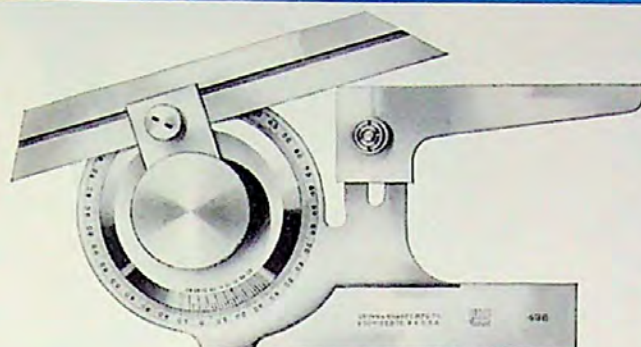
Bevel protractor with acute angle attachment solves easily accurate measurement of acute angles.



The long slot in the short arm extends the scope of this bevel and facilitates its adjustment.



lay out and transfer angles with precision...



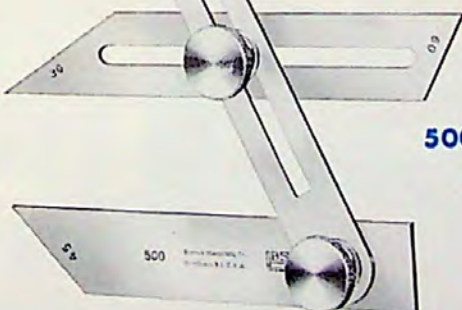
496



498



499



500

493 BEVEL PROTRACTOR— With 6" or 12" blade. For work where angles are to be measured to a degree of accuracy not requiring a vernier. Dial, graduated 0 to 90° from each extremity of arc of 180°, is rigidly clamped by thumb nut. Blade, 1/16" thick, can be moved longitudinally and clamped independently of dial. Extra blades and cases can be furnished. See listings below.

| | | |
|----------------|----------------|---------|
| With 6" Blade | No. 599-493-6 | \$25.25 |
| With 12" Blade | No. 599-493-12 | 27.50 |

495 UNIVERSAL BEVEL PROTRACTOR— With 6" or 12" blade. For all classes of work where angles are to be measured. Dial is graduated in degrees through a complete circle and the vernier reads to 5 minutes or 1/12 degree. Dial clamped by thumb nut. Blade, 1/16" thick, can be moved longitudinally and clamped independently of dial. Extra blades and cases can be furnished. See listings below.

| | | |
|----------------|----------------|---------|
| With 6" Blade | No. 599-495-6 | \$36.00 |
| With 12" Blade | No. 599-495-12 | 37.50 |

496 UNIVERSAL BEVEL PROTRACTOR— With Acute Angle Attachment. With 6 or 12-inch blade. Designed for all classes of work where angles are to be laid out with precision. With the Acute Angle Attachment, extremely small angles can be established easily and quickly.

As one side of the tool is flat, it can be laid flat upon paper or work. Dial is graduated in degrees through a complete circle and the graduations are below the surface, protecting them from wear. The Vernier reads to five minutes or one twelfth of a degree and a small thumb pinion provides extremely fine adjustments. Dial is clamped rigidly in position. Blade is about 1/16" thick and can be moved back and forth and clamped independently of the dial. Extra blades and cases can be furnished. See listings below.

| | | |
|----------------|----------------|---------|
| With 6" Blade | No. 599-496-6 | \$41.00 |
| With 12" Blade | No. 599-496-12 | 43.00 |

Extra Blades for Nos. 493, 495 and 496 Bevel Protractors

| | | |
|-----------------|-----------------|--------|
| Size, 6" Blade | No. 599-9493-21 | \$2.25 |
| Size, 12" Blade | No. 599-9493-22 | 4.25 |

Cases for Nos. 493, 495 and 496 Bevel Protractors

| | | |
|-----------|------------------|--------|
| 6" Blade | No. 599-493-9998 | \$4.00 |
| 12" Blade | No. 599-493-9999 | 6.00 |

498 UNIVERSAL BEVEL— Case and tongue of this bevel are each 3" long and 1 1/32" wide. Long slot in case and slot in tongue with an off-set enable the user to get angles that cannot be obtained with a conventional bevel having only a straight slot in the tongue. No. 599-498 \$5.25

499 UNIVERSAL BEVEL— Case is 3" long. Both case and tongue are 1 1/32" wide. Long case slot and offset tongue are advantageous for many settings. No. 599-499 \$5.40

500 COMBINATION BEVEL— For transferring any angle from one surface to another. Also for laying out angles. Body is 4" long. Slotted blade swings to any angle and is clamped by knurled nut. Auxiliary blade is attached quickly to slotted blade and clamped in position by knurled nut. One end of body is square and other end beveled to 45°. Auxiliary blade is beveled to 60° on one end and to 30° on the other. No. 599-500 \$5.90

The auxiliary arm on this combination bevel extends its usefulness. Here it is being used to establish layout lines on flat stock.

Straight edges and...

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 tool steel of the highest grade is used.

36" sizes and larger 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.

526 BEVELED STEEL STRAIGHT EDGES—One edge only beveled $\frac{1}{16}$ " in thickness. Not hardened.

| | | |
|---|----------------|---------|
| 12" long, $1\frac{3}{8}$ " wide, $\frac{1}{16}$ " thick | No. 599-526-12 | \$ 4.50 |
| 24" long, $1\frac{3}{8}$ " wide, $\frac{1}{16}$ " thick | No. 599-526-24 | 10.25 |
| 36" long, $2\frac{1}{8}$ " wide, $\frac{1}{16}$ " thick | No. 599-526-36 | 17.25 |
| 48" long, $2\frac{1}{8}$ " wide, $\frac{1}{16}$ " thick | No. 599-526-48 | 24.25 |
| 60" long, 3" wide, $\frac{1}{16}$ " thick | No. 599-526-60 | 35.00 |
| 72" long, 3" wide, $\frac{1}{16}$ " thick | No. 599-526-72 | 47.50 |

527 HARDENED STEEL STRAIGHT EDGES—Hardened on edges to resist wear and bruises. For hard and continuous service.

| | | |
|--|----------------|---------|
| 3 $\frac{3}{4}$ " long, $1\frac{1}{8}$ " wide, $\frac{1}{16}$ " thick | No. 599-527-3 | \$ 1.65 |
| 7" long, $1\frac{1}{8}$ " wide, $\frac{1}{16}$ " thick | No. 599-527-7 | 3.00 |
| 13 $\frac{3}{4}$ " long, $2\frac{1}{8}$ " wide, $\frac{1}{16}$ " thick | No. 599-527-13 | 6.60 |
| 20" long, $2\frac{1}{8}$ " wide, $\frac{1}{16}$ " thick | No. 599-527-20 | 11.50 |
| 27" long, 3" wide, $\frac{1}{16}$ " thick | No. 599-527-27 | 14.75 |
| 39" long, $3\frac{3}{8}$ " wide, $\frac{1}{16}$ " thick | No. 599-527-39 | 25.00 |

Special long Straight Edges made on request.

528 STANDARD STEEL STRAIGHT EDGES—Not hardened.

| | | |
|---|----------------|---------|
| 6" long, 1" wide, $\frac{3}{64}$ " thick | No. 599-528-6 | \$ 1.25 |
| 12" long, $1\frac{1}{4}$ " wide, $\frac{3}{64}$ " thick | No. 599-528-12 | 2.75 |
| 18" long, $1\frac{3}{4}$ " wide, $\frac{3}{64}$ " thick | No. 599-528-18 | 4.65 |
| 24" long, $1\frac{3}{4}$ " wide, $\frac{3}{64}$ " thick | No. 599-528-24 | 6.50 |
| 36" long, 2" wide, $\frac{3}{64}$ " thick | No. 599-528-36 | 11.50 |
| 48" long, $2\frac{1}{2}$ " wide, $\frac{3}{64}$ " thick | No. 599-528-48 | 18.50 |
| 60" long, 3" wide, $\frac{3}{64}$ " thick | No. 599-528-60 | 26.50 |
| 72" long, 3" wide, $\frac{3}{64}$ " thick | No. 599-528-72 | 36.00 |

530 TOOLMAKERS' KNIFE-EDGE STRAIGHT EDGES—For extreme accuracy. Testing edge is very narrow and of semicircular cross section providing a line contact that discloses even minute curvatures and provides an accurate test even if straight edge is not held exactly at right angles to surface being tested. High grade tool steel, seasoned to remove internal strains. Hardened.

| | | |
|---|---------------|---------|
| 2 $\frac{1}{4}$ " long, $1\frac{1}{8}$ " wide | No. 599-530-2 | \$ 6.60 |
| 3 $\frac{1}{4}$ " long, $1\frac{3}{8}$ " wide | No. 599-530-3 | 9.00 |
| 4 $\frac{1}{2}$ " long, $1\frac{3}{8}$ " wide | No. 599-530-4 | 11.50 |
| 6 $\frac{1}{4}$ " long, $1\frac{3}{8}$ " wide | No. 599-530-6 | 17.00 |

| | | |
|--|-------------------|--------|
| Glass Test Bar in Case | No. 599-531-7 | \$9.90 |
| Case for 2 $\frac{1}{4}$ " Straight Edge | No. 599-9530-9996 | 1.00 |
| Case for 3 $\frac{1}{4}$ " Straight Edge | No. 599-9530-9997 | 1.00 |
| Case for 4 $\frac{1}{2}$ " Straight Edge | No. 599-9530-9998 | 1.00 |
| Case for 6 $\frac{1}{4}$ " Straight Edge | No. 599-9530-9999 | 1.00 |

531 TOOLMAKERS' KNIFE-EDGE STRAIGHT EDGE SET—

Includes the four 530 Straight Edges with Glass Test Bar in Case. Test bar also has individual case.

| | |
|------------------|------------------------|
| No. 599-531 | \$60.75 |
| Case for 531 Set | No. 599-9531-9999 6.60 |



Knife-Edge Straight Edges are the finest. Semicircular shape of edge provides line contact even when tool is not at 90° with testing surface.



Squares ...

FOR UNEXCELLED ACCURACY

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.

540 HARDENED STEEL SQUARES—Beams and edges of blades are hardened.

| | | |
|---------------------------|----------------|---------|
| 3" Blade, 2 1/4" Beam | No. 599-540-3 | \$ 9.60 |
| 4 1/2" Blade, 3 1/4" Beam | No. 599-540-4 | 13.55 |
| 6" Blade, 4 3/8" Beam | No. 599-540-6 | 16.60 |
| 12" Blade, 7 1/8" Beam | No. 599-540-12 | 37.25 |
| 18" Blade, 10 1/4" Beam | No. 599-540-18 | 70.00 |

Cases for No. 540 Hardened Steel Squares

| | | |
|--------------|------------------|---------|
| 3" Blade | No. 599-540-9993 | \$ 3.45 |
| 4 1/2" Blade | No. 599-540-9994 | 3.85 |
| 6" Blade | No. 599-540-9995 | 4.60 |
| 12" Blade | No. 599-540-9997 | 7.75 |
| 18" Blade | No. 599-540-9999 | 11.25 |

541 HARDENED STEEL SQUARES—Very rigid. Beams and edges of blades hardened.

| Size, Inches | In Wooden Case | | Without Case | |
|--------------------------|----------------|----------|--------------|----------|
| | Number | Price | Number | Price |
| 24 Blade 13 1/2" Beam | 599-541-24 | \$115.00 | 599-8541-24 | \$100.00 |
| 36 Blade 19 1/2" Beam | 599-541-36 | 223.50 | 599-8541-36 | 205.10 |

542 HARDENED STEEL SQUARES WITH BEVELED EDGES

For most exacting work. Blades, beveled on both edges of each side, make practically line contact with work. Beams and blade edges hardened.

| | | |
|---------------------------|---------------|---------|
| 3" Blade, 2 1/4" Beam | No. 599-542-3 | \$11.50 |
| 4 1/2" Blade, 3 1/4" Beam | No. 599-542-4 | 15.50 |
| 6" Blade, 4 3/8" Beam | No. 599-542-6 | 19.25 |

Cases for No. 542 Hardened Steel Squares with Beveled Edges.

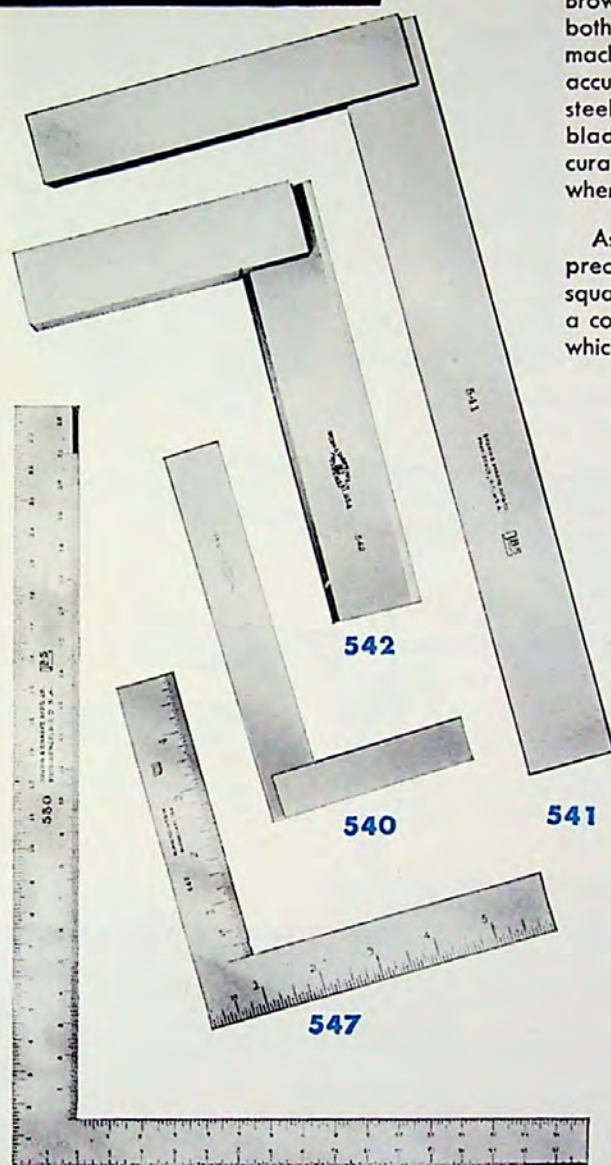
| | | |
|--------|------------------|--------|
| 3" | No. 599-540-9993 | \$3.45 |
| 4 1/2" | No. 599-540-9994 | 3.85 |
| 6" | No. 599-540-9995 | 4.60 |

547 THIN STEEL SQUARE—Accurate for squareness on inner and outer edges. Machine divided graduations both sides to 16ths and 32nds. Not hardened.

| | | |
|-------------------|---------------|--------|
| 6" Blade, 1" wide | No. 599-547-6 | \$9.70 |
|-------------------|---------------|--------|

550 STEEL SQUARE FOR MILLWRIGHTS—Meets the needs of those requiring a more accurate tool than ordinary carpenters' square. 24" long blade, 2" wide; 18" short blade, 1 1/2" wide. Accurate inner and outer 90° angles. Machine divided graduations, are made heavy for easy reading. Blades, 1/8" thick at corner, taper to 1/16" at ends. Both sides have one inside and one outside edge graduated in 8ths; the other edges in 16ths. One inside and outside edge has last inch in 64ths; preceding inch in 32nds. Not hardened.

No. 599-550 \$35.00



The semicircular testing edge on 542 provides a line contact even if square is at a slight angle with testing surface.

541 is a precise tool for testing the squareness of large surfaces. This square is carefully made and very rigid.



Brown & Sharpe

Diemakers', toolmakers' and adjustable squares

552 DIE MAKER'S SQUARE—For measuring die clearances, determining drafts on patterns, etc. Blade is locked in position by a small clamp screw and can be set for any angle up to 8° either side of zero. Graduations show setting in degrees. Clamp screw on back of square locks setting. Straight blade is $2\frac{1}{4}$ " long, $\frac{7}{32}$ " wide (except for $\frac{5}{8}$ " on one end where it is narrowed to $\frac{7}{64}$ " and graduated for 1" on each end—in 32nds on one end and 64ths on the other. Offset blade for obstructed view, $\frac{1}{8}$ " wide, is beveled on both sides of each edge. Remainder of blade, $\frac{7}{32}$ " wide, fits into body of square.

No. 599-552 \$11.70

554 ADJUSTABLE SQUARE—Useful on small work. Tempered blades may be adjusted longitudinally, held accurately in body, and reversed easily. Wide blade, $2\frac{1}{2}$ " long, is graduated on one side, one edge in 32nds and the other in 64ths. Blade with beveled ends is for establishing 60° and 45° angles. Narrow blade, $\frac{1}{8}$ " wide, is graduated on one side in 32nds. Beam is hardened and ground. No. 599-554 \$8.05

555 ADJUSTABLE SQUARE—Answers the requirement for a reliable square with a 4" adjustable blade. Blade is adjustable longitudinally, held firmly in accurate alignment and reversed easily. Tempered blade is graduated in 8ths, 16ths, 32nds and 64ths. Beam is hardened and ground.

No. 599-555 \$9.90

559 TOOLMAKER'S SURFACE PLATE SQUARE—The convenient one-piece form of this square makes it especially suitable for use on surface plates and also makes the tool itself substantial and strong. Made of hardened steel, 4" high, and $2\frac{1}{16}$ " between opposite edges. Both ends are square with all four edges.

599-559 \$17.00



552



559



555



554

552, with straight blade, determines clearance angle and measurement in one operation.

554 with bevel blade checks easily squareness of surfaces too confined to permit use of regular blade.

With 559 several surfaces can be checked for squareness at one time.

Offset blade permits unobstructed view for accurate sighting with 552.

555 with its 4" adjustable blade permits checking a large range of square surfaces.

Its substantial form makes 559 ideal for use on surface plates.

Brown & Sharpe

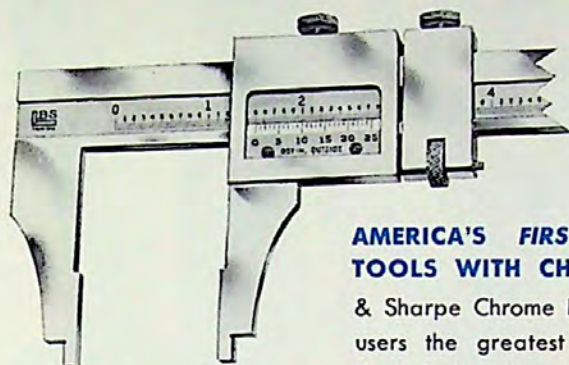


THE FIRST VERNIER CALIPER

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 scale

Verniers...

of tool. This results in a small difference between divisions on Vernier and scale. Utilizing this principle Joseph R. Brown invented the Vernier Caliper in 1851, the first functional tool within reach of the machinist for measuring in .001".



Note the Super Vernier Plate—twice as long—twice as easy to read.

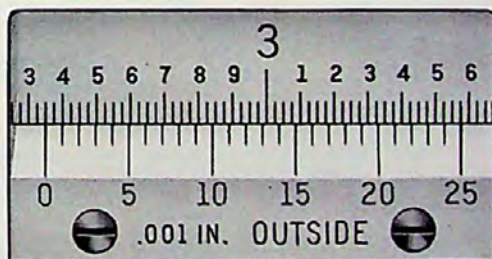
AMERICA'S FIRST SUPER VERNIER TOOLS WITH CHROME FINISH—

Brown & Sharpe Chrome Finish Vernier Tools offer users the greatest advantages in Vernier Tool design since the original invention of the Vernier Caliper by Joseph R. Brown in 1851. For the first time they place machine cut, jet black graduations and figures on a non-glare, dull chrome sunken background. The new Vernier plates are over twice as long as conventional Vernier plates—read twice as easily. These are truly gems of precision. Every Vernier Tool user should examine these new Super Vernier Tools and note their advantages.

Chrome finish— SUPER VERNIER TOOLS

- **Dull Chrome Sunken Background for Graduations and Figures**—eliminates reflections—protects graduations from wear.
- **Jet black graduations and figures**—easily read—quickly aligned.
- **Long Vernier Plates**—twice the length of conventional plates for easier alignment of matching lines.
- **Machine Cut Graduations**—uniform—make accurate alignment on Vernier and scale graduations easier.
- **Hard Chrome Finish**—protects surfaces from wear—rust and corrosion resistant.
- **Greater Rigidity**—long bearing surface of sliding jaw reduces any tendency to deflect.

Reading... THE VERNIER



The Vernier shown is used with a scale which is graduated in 40ths or .025ths of an inch. The 25 divisions are numbered every 5th division and equal 49 divisions on the scale, or $49 \times .025'' = 1.225''$. Thus, one division on the Vernier equals $1/25$ of $1.225'' = .049''$. The difference between a division on the Vernier and two divisions on the scale equals $.050'' - .049'' = .001''$.

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 .001'' at each Vernier division in numerical order until, at the 25th graduation, the lines again coincide (illustration at left).

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 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 scale.

Example:—The illustration at left shows the zero graduation on the Vernier coinciding with a fortieth graduation on the scale (the second fortieth beyond an even tenth graduation). The reading therefore equals $2.000'' + .300'' + .050'' = 2.350''$. The illustration at right, 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 $2.000'' + .300'' + .050'' + .018'' = 2.368''$.

Verniers...

WITH MACHINE CUT GRADUATIONS ...

570 VERNIER CALIPERS—36" and 48". Read by .001". These Vernier Calipers are of conventional style and do not have dull chrome finish and other features of 571 Super Vernier Calipers with chrome finish. Outside measurements are taken directly from one side of the bar; inside from the other. Jaws are hardened. Larger sizes furnished to order.

| Size | Lgth. of Jaws | Approx. Width of Jaws, Closed | With Case | | Without Case | |
|------|---------------|-------------------------------|-----------------|-------------|-----------------|-------------|
| | | | Order by Number | Price, Each | Order by Number | Price, Each |
| 36" | 2 3/4" | 1/2" | 599-570-36 | \$188.70 | 599-8570-36 | \$161.45 |
| 48" | 3 1/2" | 3/4" | 599-570-48 | 312.40 | 599-8570-48 | 272.50 |

571 SUPER VERNIER CALIPERS—with Chrome Finish. These are America's first Super Vernier Calipers with Chrome Finish and they have all the advantages described on Page 27—the sunken background for jet black graduations and figures—the long Vernier plate—the extra rigidity because of the longer bearing surface, and machine cut graduations which are extremely uniform in spacing and size, making alignment of Vernier and scale graduations easier and surer. Graduated front and back to take inside and outside measurements directly in .001".

| Size | Lgth. of Jaws | Approx. Width of Jaws, Closed | Lgth. Vernier Plate | With Case | | Without Case | |
|------|---------------|-------------------------------|---------------------|-----------------|-------------|-----------------|-------------|
| | | | | Order by Number | Price, Each | Order by Number | Price, Each |
| 6" | 1 3/4" | 1/4" | 1.225" | 599-571-6 | \$ 52.50 | 599-8571-6 | \$ 47.25 |
| 12" | 2 3/4" | 3/8" | 1.225" | 599-571-12 | 68.25 | 599-8571-12 | 60.75 |
| 24" | 2 3/4" | 3/8" | 1.225" | 599-571-24 | 115.00 | 599-8571-24 | 105.00 |

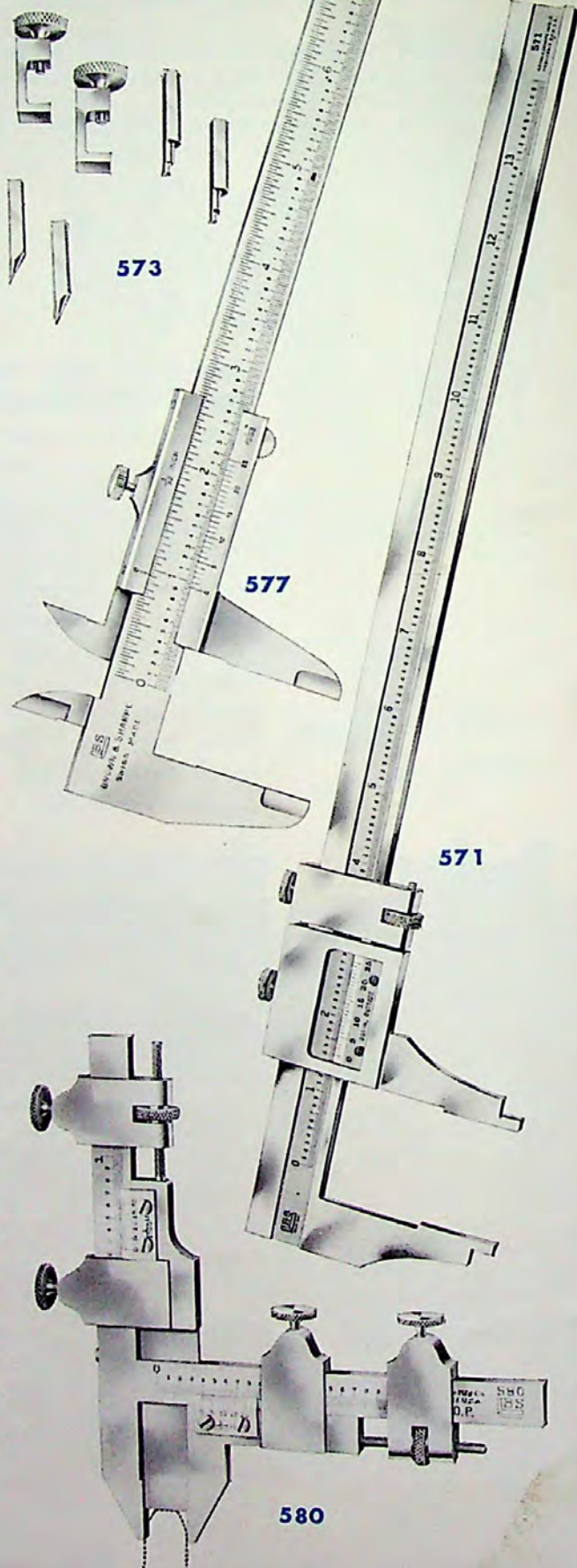
573 CENTER AND SMALL HOLE ATTACHMENT SET—For Brown & Sharpe 6", 12" and 24" Vernier Calipers. Center points convert Calipers into a precision divider. Small hole points permit measurement between small holes. Small point .025" radius; large .050". Furnished in case. No. 599-573-6-1 \$23.00

TRI-CAL NO. 577 UNIVERSAL VERNIER CALIPER—One tool—three uses. This remarkable tool has two integral pairs of jaws for inside and outside measurements and the narrow end of the sliding jaw reaches deep into slots or holes for depth measurements. Graduated in 32nds and also to read with the Vernier in .001" for measurements from 0 to 5 3/4". Has extra long Vernier plate for easy reading. Graduations are accurate, but not machine cut as with other Brown & Sharpe Vernier tools. Made of stainless steel with hardened edges and jaws. Measuring faces are precision ground and lapped. Knurled pusher knob facilitates setting. Furnished in case. No. 591-577-5 \$22.00

580 GEAR TOOTH VERNIERS—Read by .001". Measure thickness at pitch line or chordal thickness of gear teeth and distance from top of tooth to chord. Thickness of tooth and addendum are measured respectively by the sliding jaw and the tongue which have adjusting screws.

| Pitch Diam. | With Case | | Without Case | |
|-------------|-----------------|-------------|-----------------|-------------|
| | Order by Number | Price, Each | Order by Number | Price, Each |
| 20-2 | 599-580-2 | \$92.75 | 599-8580-2 | \$ 87.50 |
| 10-1 | 599-580-1 | 121.25 | 599-8580-1 | 115.00 |

Furnished also with tungsten carbide measuring tips. Price on Application.



Hite-Sets and Hite-Chek...

FOR ACCURATE HEIGHT SETTINGS . . .

Hite-Sets bring new ease and speed to accurate height settings and measurements from surface plates and machine tables. They consist of a hardened and lapped base with a stand which supports a carrier with precision blocks spaced on 1" centers and actuated for height by a super-accurate Micrometer Head. Turning the micrometer thimble raises or lowers the measuring blocks providing settings in .0001". As the measuring blocks are exactly .5000", settings also can be made from the bottom surfaces as well, an advantage for many measurements. Blocks are accurate over entire range to within .00005". They project 1/4" beyond spacing blocks and are fastened in carrier permanently. Inch values are engraved on carrier.

Hite-Sets consistently provide repeat height settings. Micrometer head has 1" range and reads directly in .0001". Head has dull finish and easily read jet black figures and graduations. Measuring faces are long-wearing carbide. Adjustment is provided for 0 setting and includes 1/8" movement which permits setting instrument to a reference other than the plane of the base.

No. 582 is made in 10" size only and has rectangular base 2 1/2" by 4 3/8" designed to provide clearance for in-the-machine settings as well as for surface plate work. No. 583 is furnished in two sizes, 10" and 20" with round bases, which rest on hardened and lapped buttons.

| Number | Size | Base | Order by Number | Price, Each |
|--------|------|-----------------|-----------------|-------------|
| 582 | 10" | 2 1/2" x 4 3/8" | 599-582-1030 | \$360.00 |
| 583 | 10" | 6" Diam. | 599-583-1030 | 360.00 |
| 583 | 20" | 8" Diam. | 599-583-2030 | 650.00 |

Hite-Sets are furnished in wooden cases.

584 HITE-CHEK—12" Range—Hite-Chek is a reliable, comparatively inexpensive tool for accurately transferring height settings from gage blocks, length standards, and from precision instruments of the Hite-Set class shown above. For use on surface plates and for machine settings where surface areas permit.

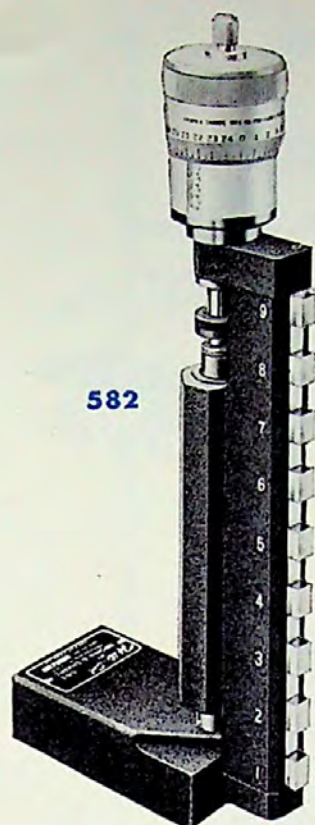
Chrome plated tubular post carries adjustable slide. Slide is reversible and has integral dial indicator holding arm with supports for both cylindrical hole and ball socket type swivel clamps.

Fine adjustment screw has range of 1/16". Slide is locked positively in position on upright. Reversing extends range to 14"; also provides greater clearance when 7026 Indicator is used.

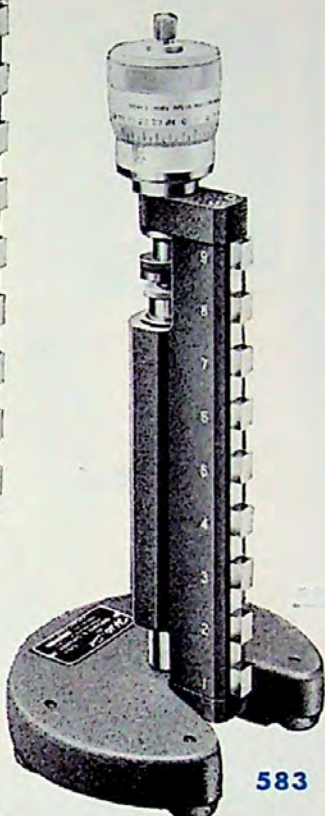
Base which rests on five hardened and accurately lapped steel buttons, is 4" wide, 6 1/2" long and 1 3/8" high and finished in black wrinkled enamel. Overall height of instrument is 14". Furnished in wooden case.

No. 599-584-12 \$52.00*

* Price does not include dial indicator. Dial indicators can be furnished in two styles as listed on page 51 of this catalog.



582

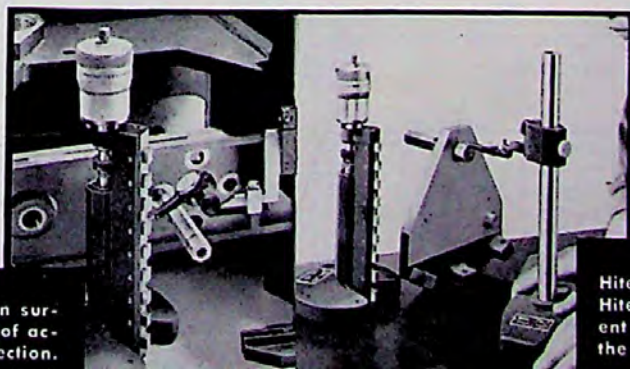


583



Hite-Chek and Dial Indicator with ball socket clamp. List price does not include indicator.

584



Hite-Chek transferring setting from Hite-Set. With Hite-Set as many different measurements may be made as the work may require.

Hite settings from a Hite-Set on surface plate bring a high degree of accuracy to tool making and inspection.

Verniers...

585A and 585B DEPTH GAGE ATTACHMENTS— For all Brown & Sharpe Vernier Height Gages both conventional and super types. Convert Height Gages into precision depth gages.

585A 7" long for 10" and 12" gages No. 599-585-7 \$5.25
585B 10" long for 18" and 24" gages No. 599-585-10 6.75

585C and 585D OFFSET MARKERS— For Brown & Sharpe Vernier Height Gages of conventional design (not super type). Extend usefulness of Height Gages. Can be used in inverted position also.

585C 3" long for 10" Gages No. 599-585-3 \$5.25
585D 4" long for 18" and 24" gages No. 599-585-4 7.90

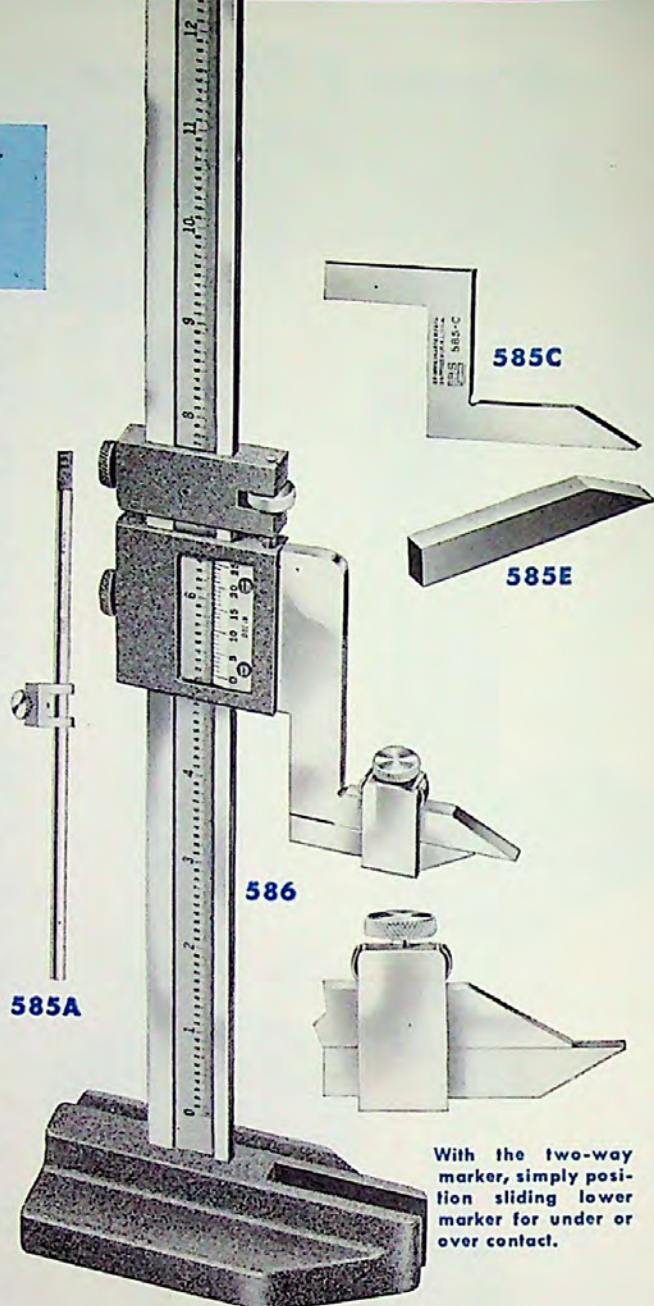
585E TUNGSTEN CARBIDE MARKER— For 10" and 12" Vernier Height Gages in both conventional and super types. Permits marking layout lines on glass, hardened steel and other hard materials.

585E No. 599-585-5 \$10.75

586 SUPER VERNIER HEIGHT GAGES— With Chrome Finish. Super Vernier Height Gages with Chrome Finish have all the advantages of the Chrome Finish Super Vernier Tools described on page 27 plus other outstanding advances in design.

In addition to the chrome finish, jet black, machine cut graduations, and long Vernier plate, these Super Vernier Height Gages have an offset arm which permits measurement from 0 over the full range of each instrument. The heavy slotted base provides increased stability and contributes to the reading from 0 over the entire range of the tool.

Another outstanding advantage is the ingenious two-way marker. Simply by loosening the knurled clamp screw the desired marker may be positioned without removal for measurement from under or over a working surface.



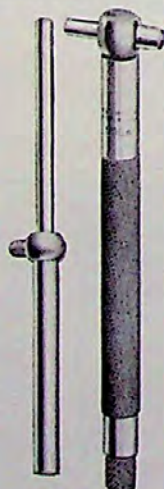
With the two-way marker, simply position sliding lower marker for under or over contact.

| Size, Inches | Arm Height, Inches | Vernier Plate Length, Inches | Base | | | With Case | | Without Case | |
|--------------|--------------------|------------------------------|----------------|---------------|----------------|-----------------|-------------|-----------------|-------------|
| | | | Height, Inches | Width, Inches | Length, Inches | Order by Number | Price, Each | Order by Number | Price, Each |
| 12 | .375 | 1.225 | 7/8 | 2 | 4 | 599-586-12 | \$84.00 | 599-8586-12 | \$75.00 |
| 18 | .500 | 1.225 | 1 | 2 1/2 | 5 1/2 | 599-586-18 | 173.00 | 599-8586-18 | 162.00 |
| 24 | .500 | 1.225 | 1 | 3 3/8 | 7 | 599-586-24 | 320.00 | 599-8586-24 | 302.00 |

Telescoping Gages...

590 TELESCOPING GAGES— 1/2" to 6". Convenient for internal measurements with a micrometer caliper. Only small leg telescopes. Handle is always in most sensitive position for measurement. Heads do not fly apart and become lost when handle is removed.

Set of 5 Heads and 3 3/4" Handle No. 599-590 \$18.75
590A 3 3/4" Handle No. 599-590-1 .75
590B 1/2" to 3/4" Gage only No. 599-590-2 3.00
590C 3/4" to 1 1/4" Gage only No. 599-590-3 3.00
590D 1 1/4" to 2 1/8" Gage only No. 599-590-4 3.75
590E 2 1/8" to 2 1/2" Gage only No. 599-590-5 3.75
590F 3 1/2" to 6" Gage only No. 599-590-6 4.50
590H 9" Handle No. 599-590-8 4.50



590

Small measurements are no problem with 586. Observe the offset marker dropped down through the slot in base.



MICROMETER AND VERNIER

599 DEPTHGAGE—0 to 2". Has four measuring rods. Measures distance between shoulders and flanges from 1" to 3" as well as depths. In measuring depth, 1", the length of the body is subtracted from micrometer reading over the length of body and exposed section of rod. Body is hardened and ground. Rods are polished. No. 599-599 \$5.00

600 VERNIER DEPTH GAGES—6", or 6" and 12" blades. Read by .001". For obtaining accurate depth measurements of holes, recesses in dies, etc. Blade 1/4" wide. 6" blade measures to 3 1/2". 12" blade to 9 1/2". Furnished in cases.

| Size, Blades | With Case | | Without Case | |
|--------------|-----------------|-------------|-----------------|-------------|
| | Order by Number | Price, Each | Order by Number | Price, Each |
| 6" | 599-600-630 | \$34.25 | 599-8600-630 | \$29.00 |
| 6" and 12" | 599-600-1230 | 49.75 | 599-8600-1230 | 43.00 |

605 MICROMETER DEPTH GAGES—0 to 2 1/2" by .001". Have 2" or 4" base (gage with 2" base shown). Micrometer screw has 1/2" movement. Adjustable measuring rod provides range of measurement. Rod has graduations each half inch which receive clamping fingers at top of thimble and accurately position rod. Rods are about .100" in diameter. Ends of rods and bottom surfaces of bases are hardened.

| | | |
|-------------------------------|------------------|---------|
| With 2" Base | No. 599-605-2000 | \$18.00 |
| With 4" Base | No. 599-605-4000 | 19.25 |
| Case for No. 605 with 2" Base | No. 599-605-9998 | 2.20 |
| Case for No. 605 with 4" Base | No. 599-605-9999 | 3.75 |

608 AND 608RS CHROME FINISH MICROMETER DEPTH GAGES—These Gages are made even more appealing with dull chrome finish on base, barrel, thimble and ratchet stop, with easily read jet black graduations and figures. Further improvement permits the interchangeable measuring rods to be adjusted easily for any depth gage with chrome finish. Thus limited ranges of certain gages can be increased by adding extra rods listed below. The measuring rods are inserted easily by simply removing the cap on the end of the thimble.

| No. | Description | Order by Number | Price, Each |
|-------------------------|--------------------------|-----------------|-------------|
| 608 | 0 to 3" with 2 1/2" base | 599-608-2100 | \$20.75 |
| | 0 to 3" with 4" base | 599-608-4100 | 24.75 |
| | 0 to 6" with 2 1/2" base | 599-608-2200 | 28.10 |
| | 0 to 6" with 4" base | 599-608-4200 | 32.10 |
| | 0 to 9" with 4" base | 599-608-4300 | 39.75 |
| | 3" to 9" with 4" base | 599-608-4400 | 31.00 |
| 608RS with Ratchet Stop | 0 to 3" with 2 1/2" base | 599-608-2120 | 21.75 |
| | 0 to 3" with 4" base | 599-608-4120 | 25.75 |
| | 0 to 6" with 2 1/2" base | 599-608-2220 | 29.10 |
| | 0 to 6" with 4" base | 599-608-4220 | 33.10 |
| | 0 to 9" with 4" base | 599-608-4320 | 40.75 |
| | 3" to 9" with 4" base | 599-608-4420 | 32.00 |

Cases for 608 and 608RS

| | | |
|---------------------|------------------|--------|
| 2 1/2" Base 0 to 3" | No. 599-607-9994 | \$2.80 |
| 4" Base 0 to 3" | No. 599-607-9996 | 3.40 |
| 2 1/2" Base 0 to 6" | No. 599-607-9995 | 5.35 |
| 4" Base 0 to 6" | No. 599-607-9997 | 5.60 |
| 4" Base 0 to 9" | No. 599-607-9998 | 6.10 |
| 4" Base 3" to 9" | No. 599-607-9999 | 6.60 |

Extra Measuring Rods for 608 and 608RS

| | | |
|----------------------|------------------|--------|
| 1/8" Diam. 3" to 4" | No. 99-607-640-1 | \$2.35 |
| 1/8" Diam. 4" to 5" | No. 99-607-650-1 | 2.45 |
| 1/8" Diam. 5" to 6" | No. 99-607-660-1 | 2.45 |
| 3/16" Diam. 0 to 1" | No. 99-607-611-1 | 2.35 |
| 3/16" Diam. 1" to 2" | No. 99-607-621-1 | 2.35 |
| 3/16" Diam. 2" to 3" | No. 99-607-631-1 | 2.35 |

608RS

With 4" Base

599

608RS

With 2 1/2" Base

600

605

Vernier Depth Gages provide precise measurement in .001" in holes and recesses.

Convenient Base Shape of this Micrometer Depth Gage allows it to be held securely against surface from which measurement is taken.



Rule Depth Gages

FOR MANY USES

615 RULE DEPTH GAGES—0 to 3" with 4" Rule and 4" Rod. 0 to 5" with 6" Rule or with 6" Rule and 6" Rod. Rules have No. 10 Grad., 32nds and 64ths. Head is hardened steel $2\frac{1}{2}$ " long, $\frac{1}{8}$ " wide. Rods are $\frac{5}{16}$ " in diameter—convenient for small holes.

| | | |
|-------------------------------|----------------|--------|
| 0 to 3", with 4" Rule and Rod | No. 599-615-42 | \$3.70 |
| 0 to 5", with 6" Rule and Rod | No. 599-615-62 | 4.45 |
| 0 to 5", with 6" Rule only | No. 599-615-60 | 3.70 |

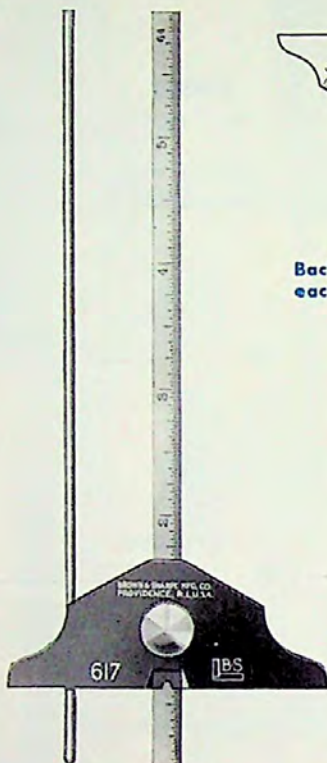
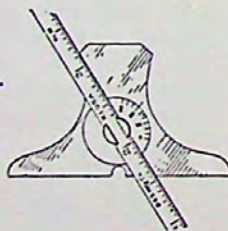
616 RULE DEPTH GAGE—0 to 5"—Adjusted easily to any angle in relation to head. Turret graduated every 10° from 0 to 90°. Rule is locked at any angle by the large clamp nut. Small clamp nut locks depth setting. Head is hardened steel and base is $2\frac{1}{2}$ " long, $\frac{1}{8}$ " wide. 6" Rule has No. 10 Grad., 32nds and 64ths. A 303 4" Narrow Tempered Steel Rule can be used with this gage, if desired.

No. 599-616-60 \$4.85

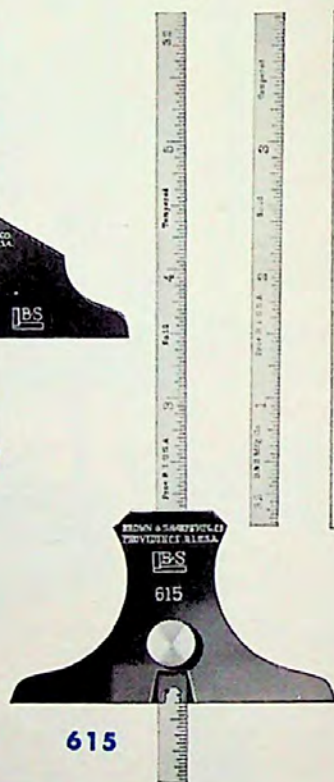
617 DRILL POINT GAGE AND DEPTH GAGE—0 to 5" with 6" Rule or with 6" Rule and 6" Rod. Rule has No. 10 Grad., 32nds and 64ths. Rod is $\frac{5}{16}$ " in diameter. Useful for checking angle of drill points when sharpening them and for determining whether point is central. Also useful as a depth gage. The head is hardened steel with a base $2\frac{1}{2}$ " long, $\frac{1}{8}$ " wide. Its top is ground carefully to angles of 59° each side of blade and accurately graduated.

| | | |
|----------------------|----------------|--------|
| With 6" Rule and Rod | No. 599-617-62 | \$5.50 |
| With 6" Rule only | No. 599-617-60 | 5.00 |

Backside of head has protractor graduations.



617

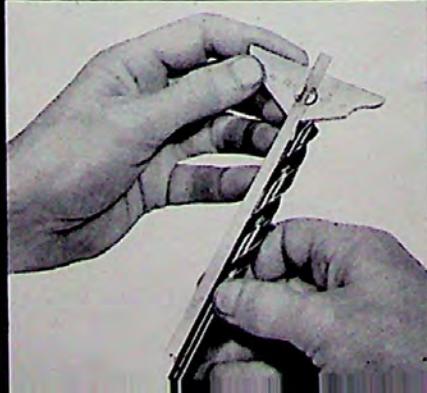
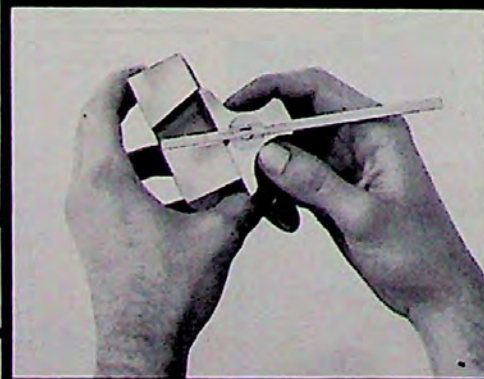
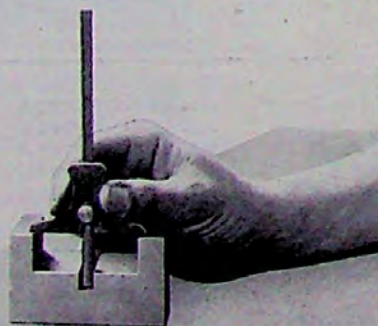


615

615 is handy for countless depth measurements where the degree of precision does not require measurements in .001".

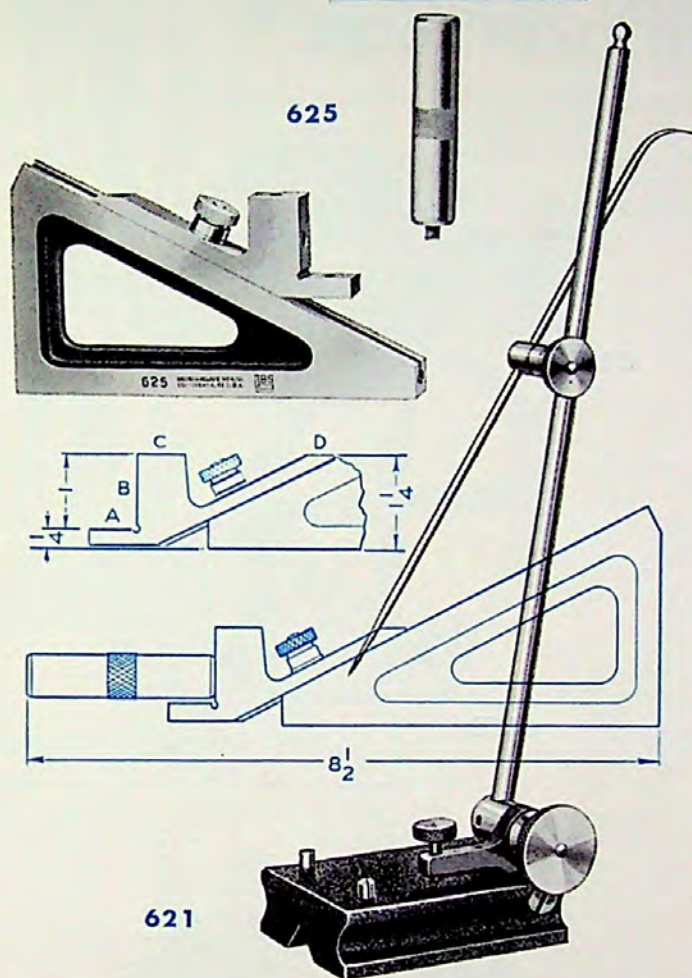
616 takes not only depth measurements but those of angles from 0 to 90°.

With 617 the angularity of drill points can be checked when sharpened.



Brown & Sharpe

Universal Surface Gages... Planer and Shaper Gage.



620, 621 AND 622 UNIVERSAL SURFACE GAGES—

Extremely versatile in use. Spindle adjusted quickly and locked at any angle above or below base. Fine adjustment is made by small knurled nut. Brown & Sharpe design permits gage to be held and adjusted with one hand. Base has V groove for cylindrical work and two gage pins for use against edge of surface plate or T slot. Scriber can be inserted in swivel bolt in place of spindle for small work. Dial Attachment 7025, page 51 used with 621 and 622, tests in places inaccessible to large dial indicators. Also, 621 and Universal Dial Indicator Set 7740, page 57, become a useful combination as 7740 swivel fits spindle of 621.

620 has Base $2\frac{1}{4}'' \times 1\frac{1}{2}''$ and 4'' Spindle

| | | |
|-----------------------------|----------------|--------|
| 620A With Base Not Hardened | No. 599-620-41 | \$8.80 |
| 620B With Base Hardened | No. 599-620-42 | 9.70 |

621 has Base $3\frac{1}{8}'' \times 2\frac{1}{2}''$

| | | |
|---|-----------------|---------|
| 621A With Base Not Hardened and 9'' Spindle | No. 599-621-91 | \$ 9.95 |
| 621B With Base Not Hardened and 9'' and 12'' Spindles | No. 599-621-121 | 10.95 |
| 621C With Base Hardened and 9'' Spindle | No. 599-621-92 | 12.15 |
| 621D With Base Hardened and 9'' and 12'' Spindles | No. 599-621-122 | 13.15 |

622 has Heavy Base $4'' \times 3\frac{3}{8}''$

| | | |
|--|-----------------|---------|
| 622A With Base Not Hardened and 12'' Spindle | No. 599-622-121 | \$12.75 |
| 622B With Base Not Hardened and 12'' and 18'' Spindles | No. 599-622-181 | 14.00 |
| 622C With Base Hardened and 12'' Spindle | No. 599-622-122 | 14.75 |
| 622D With Base Hardened and 12'' and 18'' Spindles | No. 599-622-182 | 16.00 |

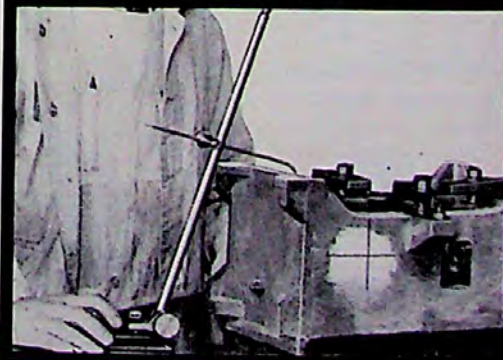
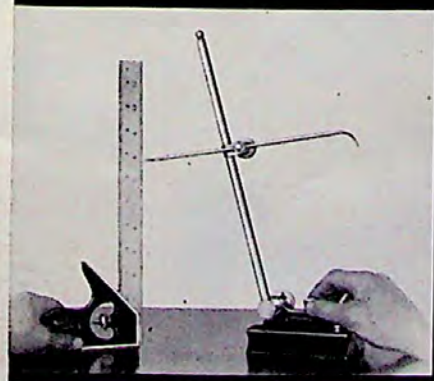
625 PLANER AND SHAPER GAGE—Simplifies accurate setting of cutting tools. Design of slide provides settings from $\frac{1}{4}''$ to $8\frac{1}{2}''$ with one extension. Surfaces C and D (see line illustrations) are 1.000'' from surface A, a combination convenient for many settings. Extension usable on three surfaces, A, B and C, is 2.500'' long. Gage can be used on its side. Base is steel forging and is hardened as are slide and extension. Working surfaces are ground.

No. 599-625 \$11.90

The surface gage is one of the handiest tools in the shop. Here fine adjustment is precisely setting pointer to scale graduations.

On surface plate or machine table a surface gage can precisely locate point on fixture or workpiece.

Set to a Micrometer the Planer and Shaper Gage provides precise setting for planer tool for correspondingly accurate machining.



Brown & Sharpe

Fillet and Radius Gages... Screw Pitch Gages

WITH BLADE LOCKS

627 FILLET AND RADIUS GAGES—Long, sliding, double-ended blades facilitate use of these tools. Only half the usual number of blades required for a given range. Blades are hard rolled steel and can be clamped securely. Convex and concave radii of same size are on same blade. Two styles 627A and 627B have 8 blades of form for fillets and radii in corners or against shoulders. 627C has 15 blades and 627D 16 of form for laying out forming tools as well as for gaging fillets and radii.

| | | | |
|------|--|---------------|--------|
| 627A | $\frac{1}{32}$ " to $\frac{1}{16}$ ", by 64ths | No. 599-627-1 | \$4.00 |
| 627B | $\frac{1}{32}$ " to $\frac{3}{64}$ ", by 64ths | No. 599-627-2 | 5.00 |
| 627C | $\frac{1}{32}$ " to $\frac{1}{4}$ ", by 64ths | No. 599-627-3 | 4.10 |
| 627D | $\frac{1}{64}$ " to $\frac{1}{2}$ ", by 64ths | No. 599-627-4 | 5.40 |

FEATURES OF SCREW PITCH GAGES—The blades of Screw Pitch Gages are cut deeply with 60° angle. Tops of teeth are flattened so that one blade suffices for gaging both V and present day Unified and American Threads as well as the older American National or U.S. Standard, an original Brown & Sharpe feature, and a very advantageous one. The number of threads per inch is stamped on each blade and the Blade Lock securely locks any blade or blades in position for use—a handy convenience.

630 SCREW PITCH GAGE—22 Pitches, 9 to 40. Includes 11½ and 27 threads per inch for pipe threads. 16 pitch blade also checks 8 P. No. 599-630 \$2.75

631 SCREW PITCH GAGE—24 Pitches, 4 to 30. Similar to 630 and includes 11½ and 27 threads per inch for pipe threads. No. 599-631 \$3.05

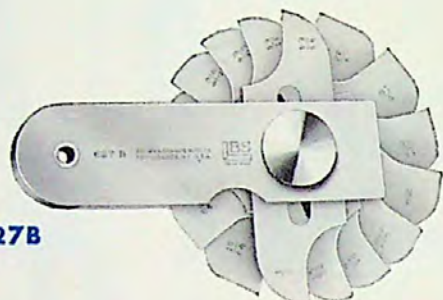
632 SCREW PITCH GAGE—30 Pitches, 4 to 42. With 11½ and 27 threads per inch for pipe threads. No. 599-632 \$3.65

633 SCREW PITCH GAGE—51 Pitches, 4 to 84. For those who require wide range of pitches. Triangular shape compactly houses 51 blades. Includes 11½ and 27 threads per inch for pipe threads. No. 599-633 \$6.50

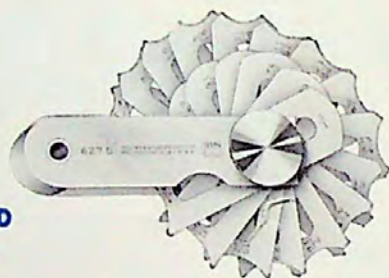
634 SCREW PITCH GAGE—22 Pitches, 32 to 74. For those using fine threads. No. 599-634 \$2.85

635 SCREW PITCH GAGE—25 Pitches, 2¼ to 20. Similar to 634 but for coarse threads. Includes gage for grinding thread tools. No. 599-635 \$3.75

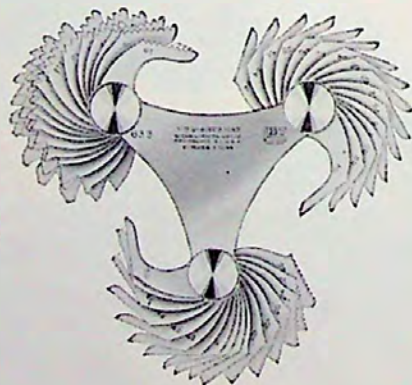
Each of the above packed one in a box; six boxes in a carton.



627B



627D



633



630



634

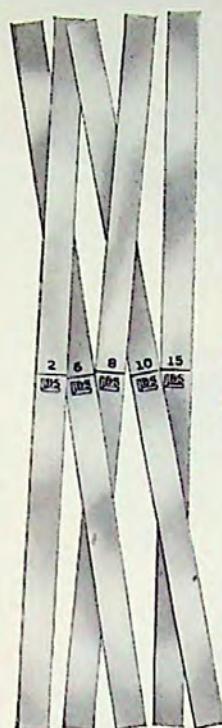
All these gages have blade locks.

Brown & Sharpe

Thickness Gages and Thickness Gage Stock

RELIABLE AND CONVENIENT

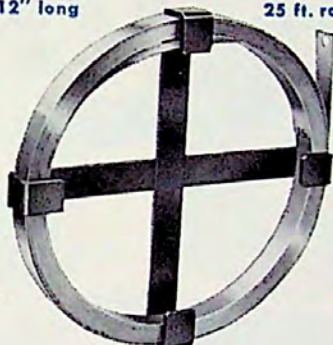
Brown & Sharpe Thickness Gages are reliable instruments for measuring or checking small distances. Blades are tempered and distinguished by large, easily read figures. Eyelets in ends of cases are a convenience in hanging up tool and some styles have a blade lock for locking blades in position for use.



THICKNESS GAGE STOCK

1/2" wide
12" long

1/2" wide
25 ft. roll



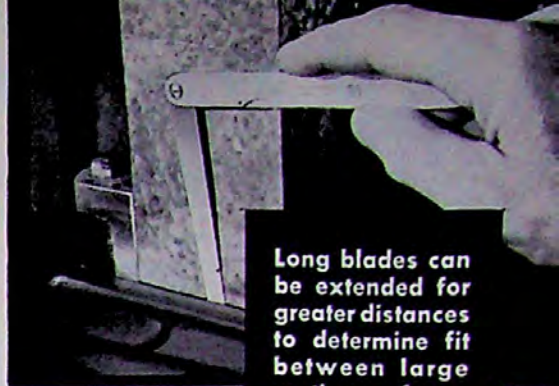
THICKNESS GAGE STOCK—15 Thicknesses. This accurate, high grade uniformly tempered stock, 1/2" wide, is available in thicknesses .0015", and .002" to and including .015" by .001" in 12" lengths. Each size marked in large figures and packed in envelope bearing length and thickness.

| | | |
|--------------|------------------|--------|
| .0015" Thick | No. 599-9647-15 | \$5.55 |
| .002" Thick | No. 599-9647-20 | .55 |
| .003" Thick | No. 599-9647-30 | .55 |
| .004" Thick | No. 599-9647-40 | .55 |
| .005" Thick | No. 599-9647-50 | .55 |
| .006" Thick | No. 599-9647-60 | .55 |
| .007" Thick | No. 599-9647-70 | .55 |
| .008" Thick | No. 599-9647-80 | .55 |
| .009" Thick | No. 599-9647-90 | .55 |
| .010" Thick | No. 599-9647-100 | .55 |
| .011" Thick | No. 599-9647-110 | .55 |
| .012" Thick | No. 599-9647-120 | .55 |
| .013" Thick | No. 599-9647-130 | .55 |
| .014" Thick | No. 599-9647-140 | .55 |
| .015" Thick | No. 599-9647-150 | .55 |

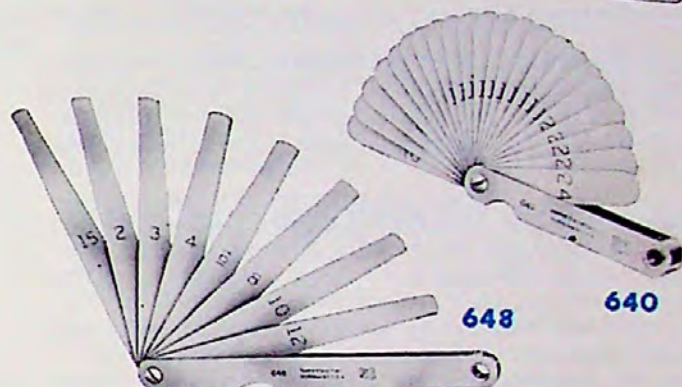
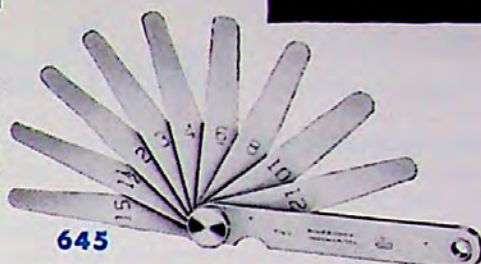
Packed one piece in an envelope; 12 pieces of a size in a box.

THICKNESS GAGE STOCK—25 ft. rolls, 1/2" wide in 10 sizes. Size marked at 6" intervals. Reel is a desirable feature; permits length desired to be withdrawn without binding.

| | | |
|--------------|------------------|---------|
| .0015" Thick | No. 599-9642-15 | \$12.50 |
| .002" Thick | No. 599-9642-20 | 12.50 |
| .003" Thick | No. 599-9642-30 | 12.50 |
| .004" Thick | No. 599-9642-40 | 9.00 |
| .005" Thick | No. 599-9642-50 | 9.00 |
| .006" Thick | No. 599-9642-60 | 9.00 |
| .007" Thick | No. 599-9642-70 | 7.25 |
| .008" Thick | No. 599-9642-80 | 7.25 |
| .010" Thick | No. 599-9642-100 | 7.25 |
| .015" Thick | No. 599-9642-150 | 7.25 |



Long blades can be extended for greater distances to determine fit between large mating surfaces.



640 THICKNESS GAGE—22 Blades, 2 3/16" x 1/2", varying from .004" to .025", inclusive, by .001". Blades are tempered.
No. 599-640 \$5.05

642 THICKNESS GAGE—9 Blades, 2 3/16" by 1/2", .0015", .002", .003", .004", .006", .008", .010", .012" and .015". Blades are tempered.
No. 599-642 \$3.30

644 THICKNESS GAGE—9 Blades, 3" x 1/2", .0015", .002", .003", .004", .006", .008", .010", .012" and .015". Blades are tempered.
No. 599-644 \$3.30

645 THICKNESS GAGE—9 Blades, 3" long, .0015", .002", .003", .004", .006", .008", .010", .012" and .015". Blades are 1/2" wide at heel, 1/4" wide at tip and tempered. Blade lock securely positions blade or blades desired.
No. 599-645 \$3.30

647 THICKNESS GAGE—Similar to 645. 26 Tapered Blades, 3" long, .0015" to .0025" inclusive by .0005", and .003" to .025" by .001". Blades are tempered. Has blade lock.
No. 599-647 \$6.90

648 THICKNESS GAGE—8 Tapered Blades, 4 1/2" long, .002", .003", .004", .006", .008", .010", .012" and .015". Tempered blades taper 2 3/4" from 1/4" wide tip to 1/2" blade width.
No. 599-648 \$4.60

649 THICKNESS GAGE—Similar to 648 but has 8 Tapered Blades, 6" long, .002", .003", .004", .006", .008", .010", .012" and .015". Tempered blades taper 2 3/4" from 1/4" wide tip to 1/2" blade width.
No. 599-649 \$6.00

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



Brown & Sharpe

Center Gage & Center Gage Attachment Standard End Measuring Rods Standard Measuring Disks Taper Parallel Gage Set

650 CENTER GAGE—Tempered. 60° angles for Unified and American Threads as well as for older Am. Nat'l or U.S. Std. The graduations, 14, 20, 24 and 32 to the inch, are useful in determining number of threads per inch. The table is useful for determining tap drill sizes.
Packed twelve in a box. No. 599-650-1 \$1.55

654 CENTER GAGE ATTACHMENT—Holds center gage firmly against lathe spindle or face plate in setting cutting tool. Base has V groove and top slot with flat spring for holding gage. For setting both internal and external tools. Packed three in a box. No. 599-654 \$1.10

655 STANDARD END MEASURING RODS—3" to 23" long. 3/8" Dia. high grade steel. Hardened ends, ground accurately as sections of true spheres. Useful for measuring parallel surfaces, rings and cylinders, setting tools and testing measuring tools. Rubber grips resist effect from heat of hands. One grip on 3" and 4" rods; two on larger sizes.

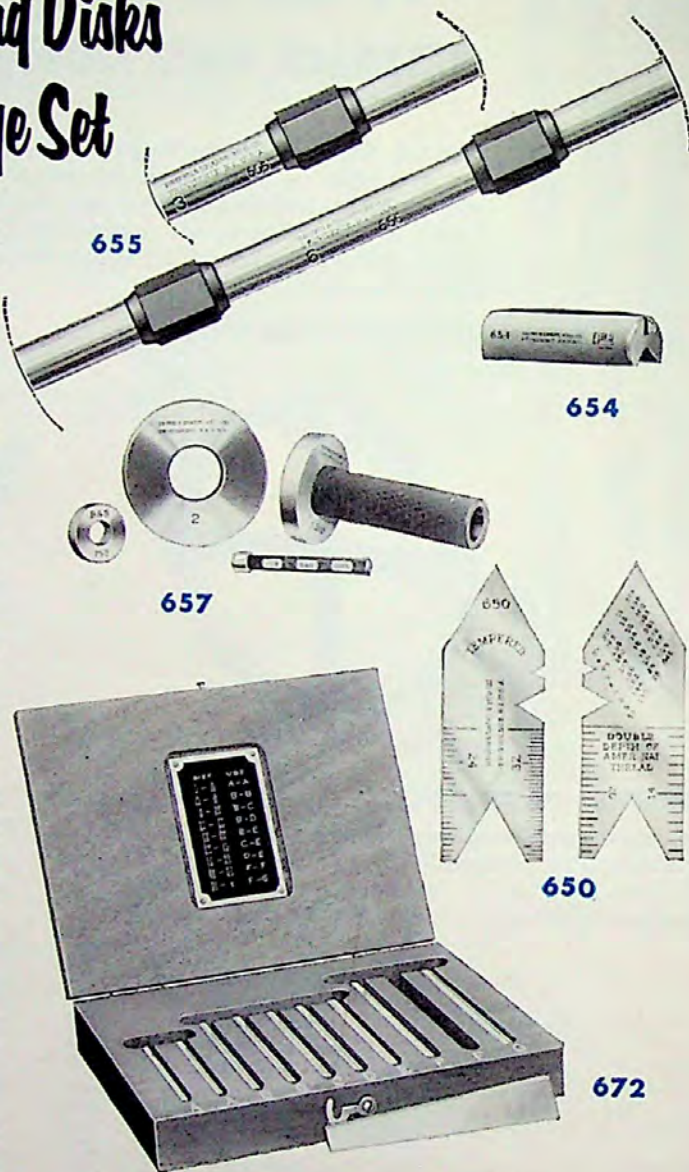
| | | | |
|--------------------|--------|--|--------|
| 3" No. 599-655-3 | \$3.50 | 14" No. 599-655-14 | \$8.65 |
| 4" No. 599-655-4 | 3.95 | 15" No. 599-655-15 | 8.90 |
| 5" No. 599-655-5 | 4.30 | 16" No. 599-655-16 | 9.45 |
| 6" No. 599-655-6 | 4.10 | 17" No. 599-655-17 | 10.35 |
| 7" No. 599-655-7 | 4.60 | 18" No. 599-655-18 | 11.20 |
| 8" No. 599-655-8 | 5.10 | 19" No. 599-655-19 | 12.25 |
| 9" No. 599-655-9 | 5.60 | 20" No. 599-655-20 | 13.00 |
| 10" No. 599-655-10 | 6.10 | 21" No. 599-655-21 | 13.75 |
| 11" No. 599-655-11 | 6.65 | 22" No. 599-655-22 | 14.80 |
| 12" No. 599-655-12 | 7.40 | 23" No. 599-655-23 | 15.80 |
| 13" No. 599-655-13 | 8.10 | Intermediate and larger sizes made to order. | |

657 STANDARD REFERENCE DISKS—High grade tool steel, hardened, ground and lapped to size to Class XX tolerances. Handles are available for internal testing. For use as reference and not working gages. 1/4" and 3/16" sizes have handles.

| | | | |
|-----------------------|---------|------------------------------|---------|
| 1/4" No. 599-657-4 | \$11.00 | 1 1/8" No. 599-657-18 | \$ 9.50 |
| 3/16" No. 599-657-5 | 11.00 | 1 1/4" No. 599-657-20 | 9.50 |
| 1/8" No. 599-657-6 | 7.20 | 1 3/8" No. 599-657-22 | 11.00 |
| 3/8" No. 599-657-7 | 7.20 | 1 1/2" No. 599-657-24 | 11.00 |
| 1/2" No. 599-657-8 | 7.20 | 1 5/8" No. 599-657-26 | 14.25 |
| 5/8" No. 599-657-9 | 7.20 | 1 3/4" No. 599-657-28 | 14.25 |
| 3/4" No. 599-657-10 | 7.20 | 1 7/8" No. 599-657-30 | 14.25 |
| 11/16" No. 599-657-11 | 7.20 | 2" No. 599-657-32 | 14.25 |
| 3/4" No. 599-657-12 | 7.20 | 2 1/4" No. 599-657-36 | 18.00 |
| 13/16" No. 599-657-13 | 7.20 | 2 1/2" No. 599-657-40 | 18.00 |
| 7/8" No. 599-657-14 | 7.20 | 2 3/4" No. 599-657-44 | 18.00 |
| 15/16" No. 599-657-15 | 7.20 | 3" No. 599-657-48 | 18.00 |
| 1" No. 599-657-16 | 2.05 | Special sizes made to order. | |

| | | |
|-----------------------------------|----------------|--------|
| Handle For Disks 3/16" to 1/2" | No. 599-9657-1 | \$2.00 |
| Handle For Disks 3/8" to 1" | No. 599-9657-2 | 2.15 |
| Handle For Disks 1 1/8" to 1 3/4" | No. 599-9657-3 | 2.75 |
| Handle For Disks 1 7/8" to 3" | No. 599-9657-4 | 3.00 |

658 STANDARD REFERENCE DISK SET—This set includes all sizes listed above and also handles. Furnished in substantial wooden case. Set No. 599-658-1 \$310.00



672 TAPER PARALLEL GAGE SET—1/4" to 1". For shops lacking full sets of plug gages. To measure a hole size select two correct pieces, expand in hole along tapered surfaces and measure with micrometer. Set consists of 10 gages of high grade tool steel, hardened and ground to very close limits. The small sizes, A and B, are spring tempered to prevent breaking. Measuring surfaces are ground on a radius according to size of member. Furnished in neat wooden case with instructions plainly stamped on plate in cover.

You can size any hole from 1/4" to 1" with a micrometer and a Taper Parallel Gage Set—even the odd sizes.

No. 599-672 \$40.00

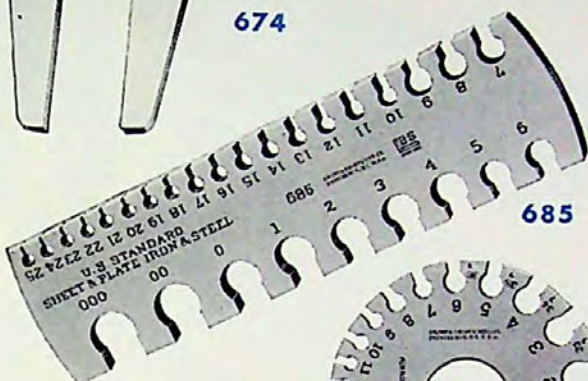
Brown & Sharpe

Gages...

ACCURATELY CHECK SIZES



674



685



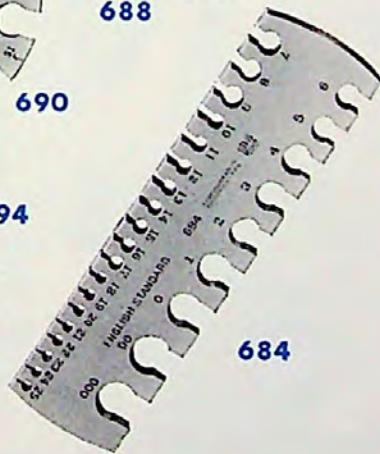
688



690



694



684

674 ROLLING MILL CALIPER GAGE—Made of tool steel, drop-forged to withstand severe strain of use on heavy work in measuring sheet iron and steel. Also useful in stock and store room. Jaws hardened. Tongue graduated one side in 32nds. Gage is $5\frac{1}{16}$ " long and $\frac{1}{2}$ " thick; measures to 4". Jaws are $2\frac{1}{8}$ " deep. Clamp nut locks slide in position. No. 599-674 \$35.75

684 ROLLING MILL GAGE—English or Birmingham Standard—000 to 25. Adapted to withstand rough usage in rolling mills in gaging iron wire and hot and cold rolled sheet steel. Sizes are English Standard, or Stubs' Iron Wire or Birmingham Gage (designates the Stubs' Soft Wire Sizes). Hardened. For gage sizes, see inside back cover. No. 599-684 \$11.00

685 ROLLING MILL GAGE—U.S. Standard—Adopted by Congress, March 3, 1893. 000 to 25. Hardened steel about $\frac{1}{8}$ " thick. Adapted to withstand rough usage in rolling mills. Sizes, used for determining duties and taxes levied by United States, are commercial standard in U.S. for uncoated sheet and plate iron and steel. For gage sizes, see inside back cover. No. 599-685 \$11.50

688 BROWN & SHARPE WIRE GAGE—American Standard—The generally accepted standard for non-ferrous metals. Adopted by brass manufacturers, January 1858. 0 to 36. Hardened. Decimal equivalents stamped on reverse side. Screw Slotting Cutters also made to this gage. For gage sizes, see inside back cover. No. 599-688-1 \$5.25

690 ENGLISH STANDARD WIRE GAGE—Same as Stubs' Iron Wire or Birmingham Gage. 0 to 36. Hardened. Decimal equivalents stamped on reverse side. For gage sizes, see inside back cover. No. 599-690-1 \$5.25

692 STEEL WIRE GAGE—American Steel and Wire Co.'s (Washburn & Moen) Standard. Similar to 688. 0 to 36. Hardened. For gaging steel wire and drill rod. For gage sizes, see inside back cover. No. 599-692 \$5.25

694 U.S. STANDARD GAGE—Adopted by Congress, March 3, 1893, for sheet and plate iron and steel. 0 to 36. Hardened. Recognized standard in U.S. for uncoated sheet and plate iron and steel. Sizes are used for determining duties and taxes levied by United States. Decimal equivalents on reverse side. For gage sizes, see inside back cover. No. 599-694 \$5.25

696 STEEL MUSIC WIRE GAGE—American Steel and Wire Co.'s Standard. Similar to 688. 000000 to 33. Hardened. Decimal equivalents on reverse side. For gage sizes, see inside back cover. No. 599-696 \$5.25

Caliper Gage packed one in a box. Others packed six in a box.

With 650 and 654 it is easy to line up thread tool.

672 permits measuring hole sizes from $\frac{1}{4}$ " to 1" with micrometer accuracy.

Wire Gages simplify the determination of sizes of sheet stock as well as wire.



Brown & Sharpe



...Gages

SCREW...DRILL... SCREW TAP...TOOL

700 POCKET SCREW AND WIRE GAGE—Similar to 701 but has front graduated for Am. Std. Screws, old style, 0 to 30 and to measure wire or screws from $\frac{1}{16}$ " to $\frac{7}{16}$ ". Back side measures Birmingham, or Stubs' Iron or old English Wire Gage 17 to 0000 and Brown & Sharpe (American) Wire Gage 15 to 0000. For gage sizes, see inside back cover. No. 599-700 \$6.50

701 UNIFIED AND AMERICAN SCREW GAGE—Front graduated for fine threads and back for coarse threads, Unified and American, as well as for older Am. Nat'l or U.S. Std. Am. National Std. Wood Screws can also be sized on this gage. Edge with angular and 90° slots graduated in 8ths for measuring screws. $4\frac{1}{2}$ " long, $1\frac{1}{32}$ " and $\frac{3}{64}$ " thick. No. 599-701 \$6.50

705 TWIST DRILL GAGE—Also for High Speed Steel drill rod. Hole sizes tested for accuracy after hardening. Large gage, 1 to 60, is $5\frac{1}{4}$ " x $1\frac{5}{8}$ " x $\frac{1}{16}$ "; small, 61 to 80, $2\frac{1}{2}$ " x $\frac{3}{4}$ " x $\frac{1}{16}$ ". Decimal equivalents on front of large gage.

705, 1 to 60 No. 599-705-1 \$6.25

705, 61 to 80 No. 599-705-2 \$6.90

707 TWIST DRILL AND MACHINE SCREW TAP GAGE—1 to 60. Hole sizes tested for accuracy after hardening. Table gives tap size, pitch, and drill sizes for tap for Unified and American as well as older Amer. Nat'l. or U.S. Std. Threads and hole through which tap will pass. $6\frac{1}{8}$ " x $2\frac{5}{8}$ " x $\frac{1}{16}$ ". For decimal equivalents of twist drill gage, see inside back cover. No. 599-707 \$6.50

710 JOBBERS' DRILL GAGE—For twist drills. Hole sizes tested for accuracy after hardening. Decimal equivalents stamped on front side. $6\frac{1}{4}$ " x $2\frac{3}{8}$ " x $\frac{1}{16}$ ". No. 599-710 \$5.50

715 29° SCREW THREAD TOOL GAGE (Acme Standard)—Hardened. Provides a standard for grinding thread tools. Has 29° included angle. Setting gage is included. No. 599-715 \$6.85

716 29° SCREW THREAD TOOL GAGE (Acme Standard). Hardened. Provides a standard for grinding thread tools. Has 29° included angle. No. 599-716 \$5.25

720 WORM THREAD TOOL GAGE—Hardened. Furnishes correct form for tools for worm threads. Figures give threads per inch. A tool setting gage is included. No. 599-720 \$6.50

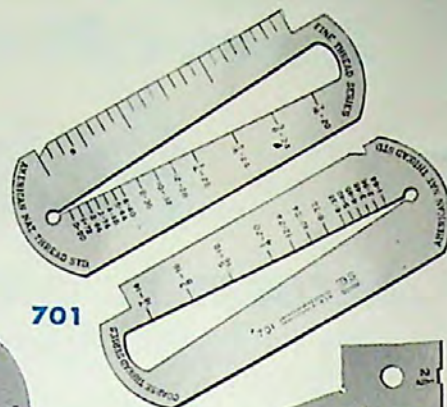
724 UNIFIED AND AMERICAN SCREW THREAD TOOL GAGE—Hardened. Provides standard for grinding thread tools. For Unified and American threads as well as older Am. Nat'l. or U.S. Std. Angles are 60°. No. 599-724 \$6.75

Each of the above packed six in a box.

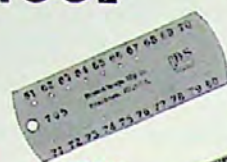
900 CUTTER CLEARANCE GAGE—Determines correct clearance angle in sharpening cutters. Simply place cutter in V and revolve to bring face of tooth in contact with gage blade. Clearance angle should match angle of gage. The V body locates cutter and holds blade in correct alignment with center line of cutter. Tests all right- and left-hand cutters with eight teeth or more from $\frac{1}{2}$ " to 8" diameter. Contact surfaces are hardened and ground. Furnished with two blades marked with cutter diameters for which each should be used.

No. 599-900 \$20.00

You know the size of drill to use for tap and for hole through which tap will pass. Both sizes are stamped on the gage.



701



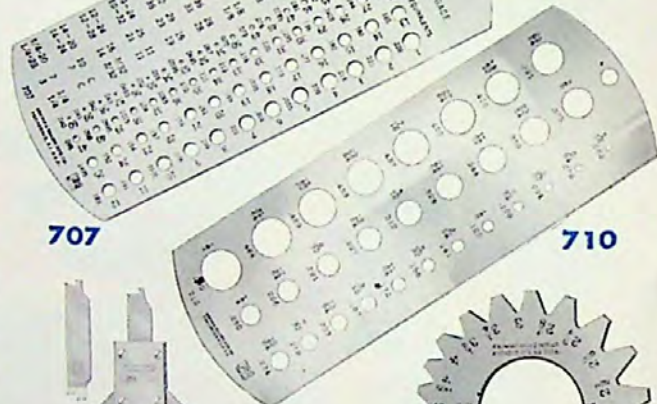
705



707



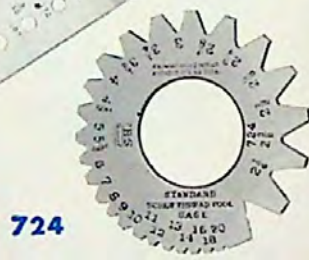
716



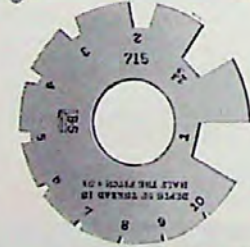
710



900



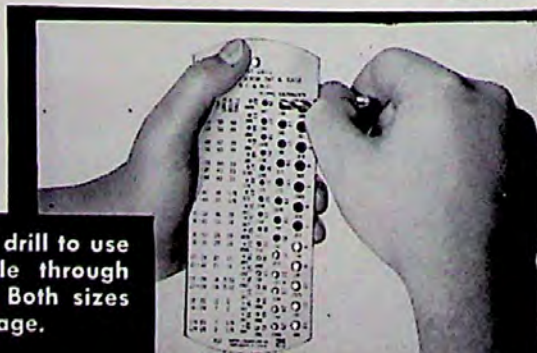
724



715

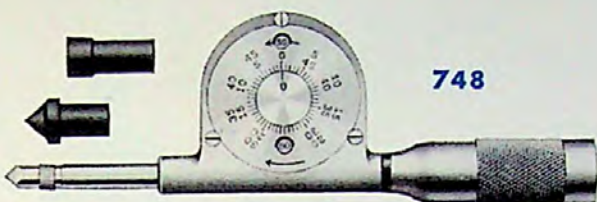


720



Brown & Sharpe

Speed Indicators & V Blocks



748

746 VEST POCKET SPEED INDICATOR—Useful for checking speed of rotating shafts, etc. After setting at zero, place thumb directly on the small depression on the side of the tool, and apply the rubber point to the center of the rotating shaft whose R.P.M. is to be determined. Every hundred revolutions the steel plate lifts beneath thumb. Counting the number of lifts in one minute (each representing 100) and adding the reading in units of 5 which appears in the slot at the top of the tool, gives the R.P.M. Includes 2 rubber points.

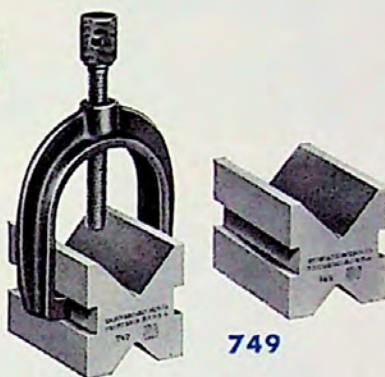
| | | |
|----------------|-----------------|--------|
| | No. 599-746 | \$7.00 |
| Recessed Point | No. 599-9746-23 | .30 |
| V Point | No. 599-9746-22 | .30 |



746

748 SPEED INDICATOR—Dull nicked. Accurately determines speed of shafting, etc., running in either direction. Registers up to 5,000 revolutions. 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 by a knurled knob on the back. Handle is insulated against electricity and is hollow to hold the two rubber points when not in use.

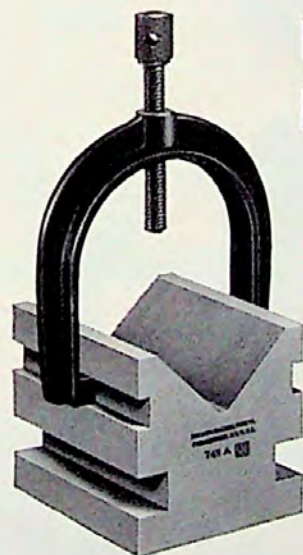
| | | |
|----------------|------------------|---------|
| | No. 599-748 | \$12.00 |
| Case | No. 599-748-9999 | 2.50 |
| Recessed Point | No. 599-9746-23 | .30 |
| V Point | No. 599-9746-22 | .30 |



749

749 V BLOCKS AND CLAMP—Blocks and one clamp hold round stock to be drilled, milled or ground. Made of cast iron. Each block is 2" long by 1 1/2" square and takes work to 1 1/2" diameter.

| | | |
|-------------|----------------|--------|
| | No. 599-749 | \$5.00 |
| Extra Clamp | No. 599-9749-2 | 1.25 |



749A

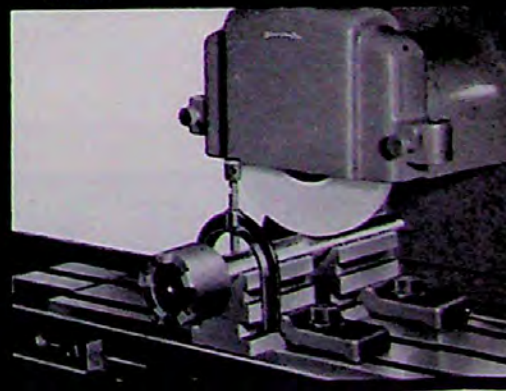
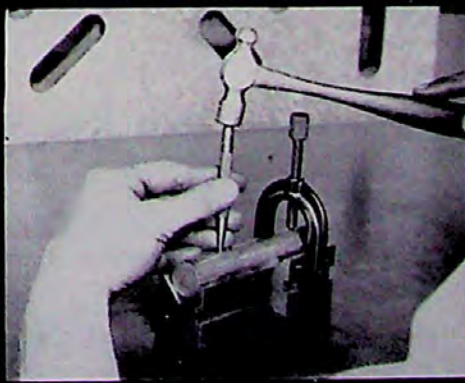
749A V BLOCKS AND CLAMP—Two blocks and one clamp, for larger and heavier work. Made of cast iron. Each block is 3" long by 2 1/2" square and takes work from 1/2" to 2 1/2" diameter. Lower grooves permit blocks to be clamped to table.

| | | |
|-------------|-----------------|---------|
| | No. 599-749-1 | \$12.00 |
| Extra Clamp | No. 599-9749-12 | 1.85 |

746 is small but mighty. As its spindle turns, the steel plate lifts under the thumb each one hundred revolutions. It is as simple as that.

749 V Block and Clamp provide a handy means for holding round stock for light machine operations and bench work.

For large, heavy work 749A V Blocks and Clamps are the answer. There is a Brown & Sharpe V Block and Clamp for every need.



Brown & Sharpe

V Blocks and Clamps

A STYLE FOR EVERY NEED



750A V BLOCKS AND CLAMPS—Suited for the finest tool room work. Made in numbered pairs, of hardened steel, and accurately finished all over. Each block is $1\frac{5}{8}$ " long by $1\frac{1}{4}$ " square and takes work to 1" diameter.

No. 599-750-1 \$15.30

750B V BLOCKS AND CLAMPS—Stepped construction allows changing work quickly from small work to work 2" diameter. As clamps do not project, the blocks can be used on their sides. Blocks are hardened steel, accurately ground all over. Made in numbered pairs. Each block is $2\frac{1}{2}$ " long, $2\frac{3}{4}$ " wide, by 2" high. Clamps are drop forged. A single block and clamp can be furnished.

No. 599-750-2 \$25.00

Single No. 750B block and clamp

No. 599-9750-2 \$13.50

750C V BLOCK—Leaves entire top side of the work accessible. Two clamps hold work of round, square or rectangular cross section. A $\frac{1}{2}$ " hole through the center of the block allows drills, etc., to project through the work. Has groove in bottom $\frac{5}{8}$ " wide and $\frac{1}{8}$ " deep for use as tongue slot on a machine table. Block is hardened steel, 3" long, $4\frac{3}{4}$ " wide, $2\frac{1}{4}$ " high, ground on bottom. Holds round stock to $1\frac{1}{2}$ " diameter. Clamps and screws are hardened.

No. 599-750-3 \$23.00

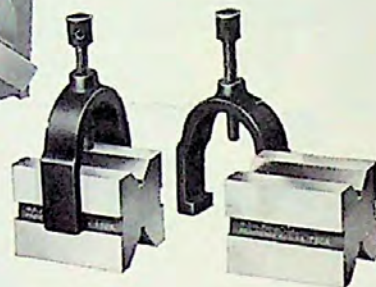
750D PERMANENT MAGNET V BLOCK—For holding iron or steel work which can be placed between and in contact with the V faces. Suited for toolmaking, inspection and both wet and dry grinding. When turned "ON", the permanent magnet holds the work firmly in the V and if the block rests on a magnetically conductive surface, it is held firmly to this surface. Turning control to "OFF" releases both. Used similarly when block is placed on end. Holding power can be regulated. V block does not heat and can be left "ON" as long as desired. Block is accurately ground and faces of V groove are hardened. Removable stop plate furnished for back end of block. V takes round stock to $1\frac{3}{4}$ " diameter. Block is $6\frac{1}{4}$ " long overall including stop plate and control, $2\frac{7}{16}$ " wide and $3\frac{1}{4}$ " high. Furnished in finished wooden case. Matched sets of blocks can be furnished.

No. 599-750-4 \$57.00

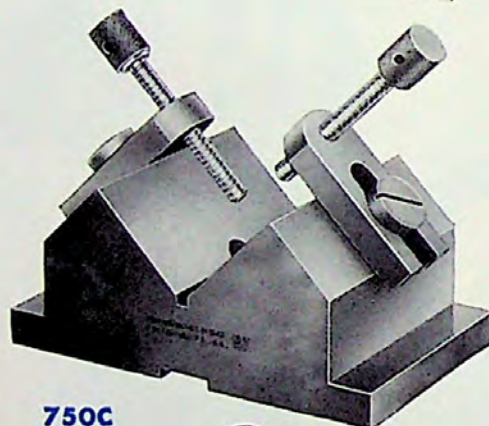
For sale only in the United States of America, its Territories and Canada.



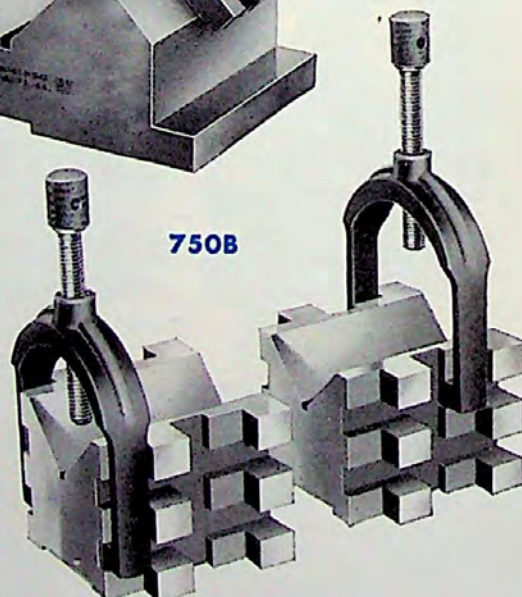
750D



750A



750C

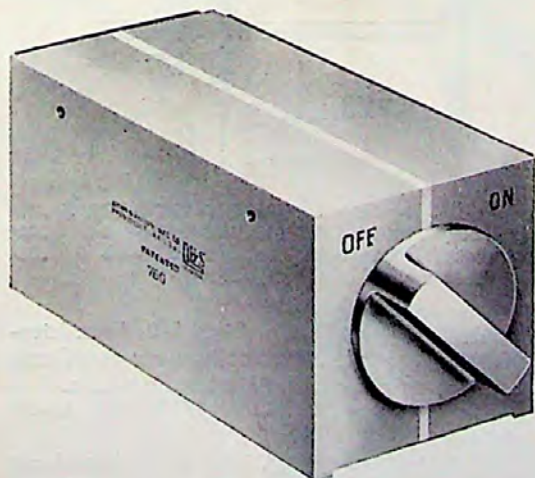
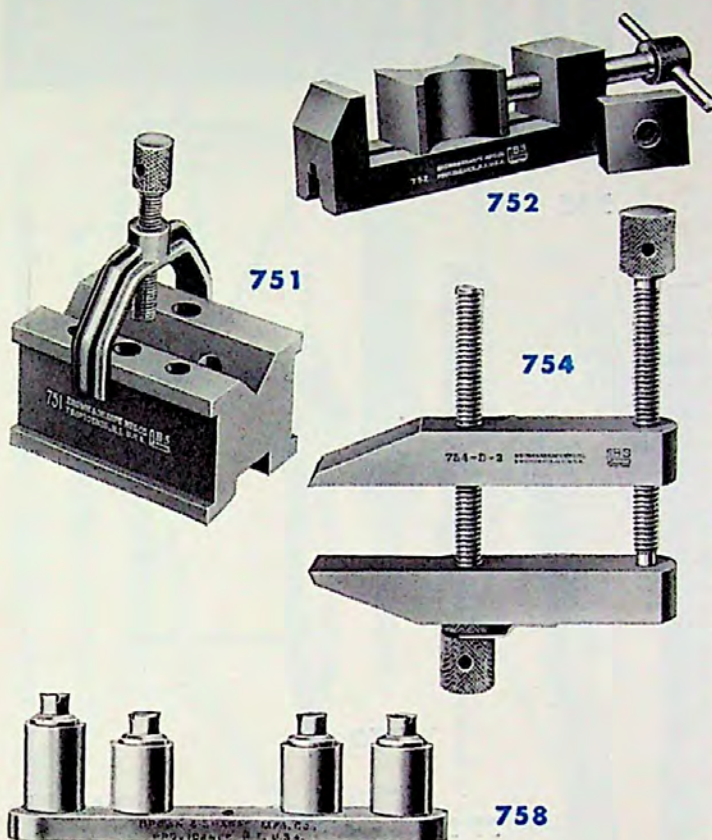
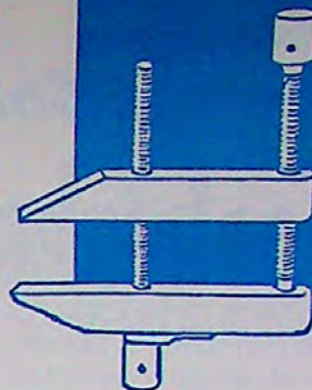


750B

Brown & Sharpe

Toolmakers' Tools

MAKE HARD JOBS EASIER



751 HANDY BLOCK AND CLAMP— For general use for holding small circular or flat pieces for milling, grinding or drilling. Used as a vise, anvil, V block or centering clamp. Block is case hardened, 3" long, 1 3/4" high and 2" wide. Will hold round stock up to 1" diameter and flat stock up to 3/4" by 1 1/4". Block or clamp can be furnished separately.

No. 599-751 \$11.00
No. 599-9751 9.50
No. 599-9751-2 1.50

Block only
Clamp only

752 TOOLMAKERS' VISE— Handy for use in drilling, fitting and laying out work on surface plates. Case hardened. V groove in ground base takes work from 1/2" to 1 1/8" diameter. Tongue on large jaw slides in groove in base and is held in place by a strap that prevents jaw from lifting. 1 1/8" capacity. Furnished with two steel jaws as shown.

No. 599-752 \$8.50

754 TOOLMAKERS' CLAMPS— Steel, case hardened. Ends of jaws chamfered to facilitate clamping under shoulder or in recess. Clip holds loose jaw in position when clamp screw is released, a convenient and original Brown & Sharpe feature.

| | Jaws Open, Inches | Length Jaws, Inches | Number | Price |
|-----|----------------------|------------------------|------------|--------|
| 754 | A 3/8 | 1 1/2 | 599-754-5 | \$2.05 |
| | B 1 | 2 1/2 | 599-754-8 | 2.25 |
| | C 1 1/2 | 2 3/4 | 599-754-12 | 2.40 |
| | D 2 | 3 3/4 | 599-754-16 | 2.90 |
| | E 2 1/2 | 4 | 599-754-20 | 3.25 |
| | F 3 1/2 | 5 | 599-754-28 | 5.10 |

758 TOOLMAKERS' BUTTONS— Precisely locate holes with positive accuracy. Ends ground square with sides. The long button, a Brown & Sharpe exclusive, permits buttons to be used close together. Made in sets of four of the same diameter—three 7/16" long, one 1/2" long. Steel base holder protects ends of screws.

758 { A .300" dia. No. 599-758-3 \$7.50
B .400" dia. No. 599-758-4 7.50
C .500" dia. No. 599-785-5 7.50

Tap No. 5-40 N.C. for use with buttons No. 783-101-1 1.00

760 PERMANENT MAGNET BLOCK— Holds firmly iron or steel work. Suited for toolmaking, inspecting or manufacturing and for wet or dry grinding. When turned "ON" work is held firmly on block, and block, also, is held on any magnetically conductive surface. When turned to "OFF" both block and work are released. Holding power can be regulated in strength by partial turning of control. Magnetic pull on end of block permits use in upright position. Work can be left on block as long as desired as it does not heat under any conditions. Block is made substantially; retains its holding

Brown & Sharpe

Toolmakers' Tools

765 MACHINISTS' CENTER PUNCHES—Made of tool steel selected for this type of work. Hardened with both ends tempered. About 4" long with knurled finger grip. Points ground at angle for maximum strength and penetration with a punch mark in which drills start easily. Have a black oxide finish which provides some resistance to rust.

| | | | |
|-----|-----------------------------------|---------------|--------|
| 765 | A 1/16" dia. top of tapered point | No. 599-765-2 | \$.40 |
| | B 3/32" dia. top of tapered point | No. 599-765-3 | .40 |
| | C 1/8" dia. top of tapered point | No. 599-765-4 | .40 |
| | D 3/16" dia. top of tapered point | No. 599-765-5 | .40 |
| | E 1/4" dia. top of tapered point | No. 599-765-7 | .40 |
| | Set of five in case | No. 599-765 | 2.35 |

Individual punches packed six in a box

770 AUTOMATIC CENTER PUNCHES—Downward pressure releases striking block and makes punch marks of uniform depth. Points on Styles 2 and 3 are replaceable and integral with spindle on Style 1 but can be replaced. Larger sizes strike heavier blows.

| | | | |
|-----|--------------------------------|---------------|--------|
| 770 | Style 1 4 1/8" long, 3/8" dia. | No. 599-770-1 | \$3.60 |
| | Style 2 5 1/4" long, 1/2" dia. | No. 599-770-2 | 4.60 |
| | Style 3 6" long, 3/4" dia. | No. 599-770-3 | 6.00 |

Combined Spindle and Point for

| | | |
|---------|------------------|--------|
| Style 1 | No. 599-9770-112 | \$1.20 |
| Style 2 | No. 599-9770-212 | .55 |
| Style 3 | No. 599-9770-312 | .55 |

771 AUTOMATIC CENTER PUNCH—Adjustable. 5 3/4" long, 1/2" dia. Adjustment of stroke made by turning knurled cap. Permits setting for coarse or fine work and for different materials.

No. 599-771 \$4.90

Point for No. 771 No. 599-9770-212 .55

775 SPACING ATTACHMENT—5 1/8" beam. Swings 8". For use with 770, Style 2 and 771 Automatic Center Punches. Useful in laying out work to be machined. Attachment replaces point on center punch. Has fine adjustment. Extension for 845—14", page 45, can be used with this attachment for large work. Furnished with straight and offset points. See, also, points listed on page 45.

| | | |
|------------------------|-----------------|---------|
| | No. 599-775 | \$10.50 |
| Offset Point | No. 599-9775-25 | .60 |
| Straight Scriber Point | No. 599-9775-28 | .45 |

776 COMBINATION SCRIBER AND MAGNET—This "double ender" is an innovation in scribes. The Carbide Scriber marks anything—even glass or hardened steel and the permanent magnet picks up small parts from narrow slots or small holes. Cap with pocket clip fits either end. Packed ten in a box. No. 599-776 \$1.85

777 RETRACTABLE POINT SCRIBER—Handy, light and inexpensive. Works like a pen. A push of plunger exposes hardened steel scriber. A push on clip and scriber springs back in holder.

Packed ten in a box. No. 599-777 \$.80

778 SCRIBERS—Handles are aluminum for lightness. Points are finely tempered tool steel. Point of Style 1, held by two-jawed chuck, can be reversed and scriber closed to about 4" in length. Points of Styles 2 and 3 screw into holders.

| | | | |
|-----|---------|---------------|--------|
| 778 | Style 1 | No. 599-778-1 | \$.85 |
| | Style 2 | No. 599-778-2 | .75 |
| | Style 3 | No. 599-778-3 | 1.55 |



765



It is easy to locate points accurately with an Automatic Center Punch. Adjustable type controls point size.

Tungsten Carbide Point for 778, Style 1



778

Pocket Style 1

Style 2

Style 3

| | | | |
|-----|---------------------------------|------------------|--------|
| 778 | Point for Style 1 | No. 599-9778-102 | \$.35 |
| | Straight Point for Styles 2 & 3 | No. 599-9778-22 | .35 |
| | Right-Angle Point for Style 3 | No. 599-9778-33 | .35 |

Scribers packed six in a box.

TUNGSTEN CARBIDE POINT—For Style 1 Scriber. Interchangeable with regular point. Practically wear proof and permits scribing lines on glass and other hard surfaces.

No. 599-9778-12 \$2.50

790 MERCURY PLUMB BOBS—Solid steel, bored out and filled with mercury. Unusually heavy in proportion to size, with low center of gravity. Not easily affected by drafts. Hexagonal nut prevents rolling. Cord is locked through slot in cap which centralizes it and makes bob hang true.

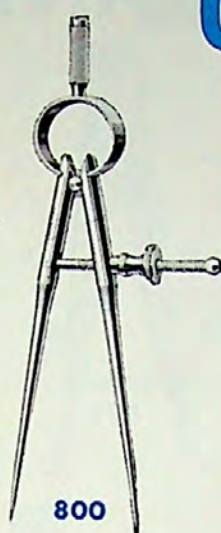
Points are hardened and body and points are ground. Dull chrome plated. Furnished with braided silk line.

| | | | |
|-----|--------------------------------------|----------------|--------|
| 790 | Wt. 3 1/2 ozs., lgth. 4", dia. 1/2" | No. 599-790-3 | \$4.65 |
| | Wt. 6 ozs., lgth. 4 1/2", dia. 3/8" | No. 599-790-6 | 5.90 |
| | Wt. 12 ozs., lgth. 5 1/2", dia. 1/2" | No. 599-790-12 | 7.15 |

Brown & Sharpe

Calipers and Dividers...

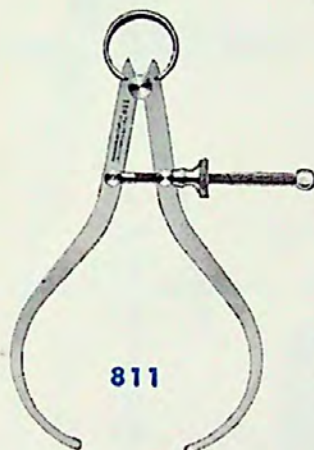
ACCURATELY TRANSFER DIMENSIONS



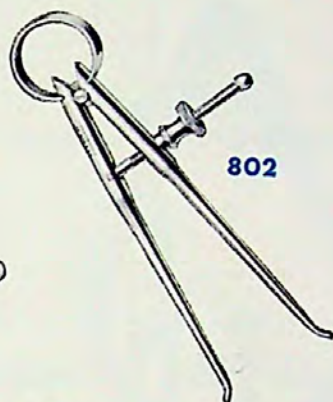
800



801



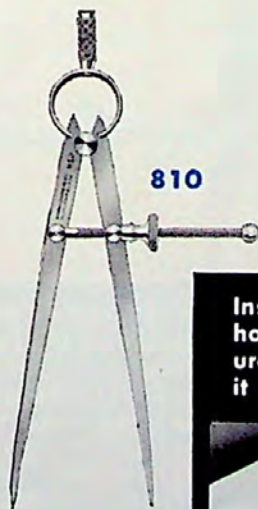
811



802



812



810

800 TOOLMAKERS' SPRING DIVIDERS—These are finely finished, well balanced tools. The spring is strong and flexible, giving 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.

| | | | |
|-----|----|---------------|--------|
| 800 | 2" | No. 599-800-2 | \$2.60 |
| | 3" | No. 599-800-3 | 2.85 |
| | 4" | No. 599-800-4 | 3.35 |
| | 6" | No. 599-800-6 | 3.75 |

801 TOOLMAKERS' OUTSIDE SPRING CALIPERS—Have same features of construction as 800. Sizes refer to length of leg; actual diametral capacity is approximately the same.

| | | | |
|-----|----|---------------|--------|
| 801 | 2" | No. 599-801-2 | \$2.60 |
| | 3" | No. 599-801-3 | 2.85 |
| | 4" | No. 599-801-4 | 3.35 |
| | 6" | No. 599-801-6 | 3.75 |

802 TOOLMAKERS' INSIDE SPRING CALIPERS—Have same features of construction as 800.

| | | | |
|-----|----|---------------|--------|
| 802 | 2" | No. 599-802-2 | \$2.60 |
| | 3" | No. 599-802-3 | 2.85 |
| | 4" | No. 599-802-4 | 3.35 |
| | 6" | No. 599-802-6 | 3.75 |

810 SPRING DIVIDERS—Reliable tools of less expensive construction and finish.

| | | | |
|-----|----|---------------|--------|
| 810 | 4" | No. 599-810-4 | \$2.35 |
| | 5" | No. 599-810-5 | 2.45 |
| | 6" | No. 599-810-6 | 2.65 |
| | 8" | No. 599-810-8 | 3.00 |

811 OUTSIDE SPRING CALIPERS—Similar in construction to 810. Sizes refer to length of leg. Actual diametral capacity is approximately the same.

| | | | |
|-----|----|---------------|--------|
| 811 | 4" | No. 599-811-4 | \$2.35 |
| | 6" | No. 599-811-6 | 2.65 |
| | 8" | No. 599-811-8 | 3.00 |

812 INSIDE SPRING CALIPERS—Similar in construction to 810.

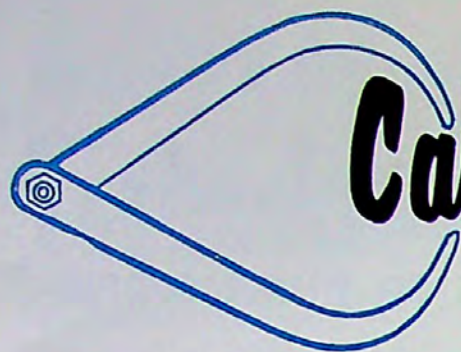
| | | | |
|-----|----|---------------|--------|
| 812 | 4" | No. 599-812-4 | \$2.35 |
| | 6" | No. 599-812-6 | 2.65 |
| | 8" | No. 599-812-8 | 3.00 |

Each of the above packed two in a box.

Inside Spring Calipers check diameter of hole, width of recesses and similar measurements. Set accurately to a micrometer it can be used with surprising precision.

Spring Calipers should be held lightly in the fingers. With familiarity, variance as small as a few thousandths of an inch can be determined.





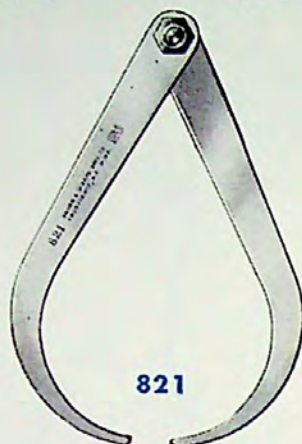
Brown & Sharpe

Calipers... FIRM JOINT

821 FIRM-JOINT OUTSIDE CALIPERS

Sizes refer to length of leg.

| | | | |
|-----|----------------------|----------------|--------|
| 821 | 6" (Cap. 7" dia.) | No. 599-821-6 | \$1.95 |
| | 8" (Cap. 9½" dia.) | No. 599-821-8 | 2.55 |
| | 12" (Cap. 15" dia.) | No. 599-821-12 | 3.35 |
| | 18" (Cap. 22" dia.) | No. 599-821-18 | 5.90 |
| | 24" (Cap. 29½" dia.) | No. 599-821-24 | 8.65 |



821



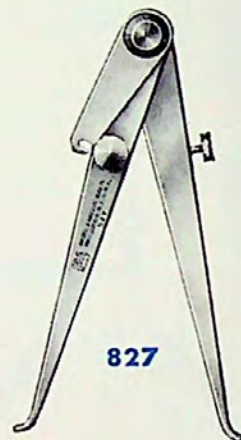
822

822 FIRM-JOINT INSIDE CALIPERS

| | | | |
|-----|-----|----------------|--------|
| 822 | 6" | No. 599-822-6 | \$1.95 |
| | 8" | No. 599-822-8 | 2.55 |
| | 12" | No. 599-822-12 | 3.35 |
| | 18" | No. 599-822-18 | 5.90 |
| | 24" | No. 599-822-24 | 8.65 |



826



827

826 TRANSFER FIRM-JOINT OUTSIDE CALIPERS

Sizes refer to length of leg.

| | | | |
|-----|----------------------|----------------|--------|
| 826 | 6" (Cap. 7" dia.) | No. 599-826-6 | \$5.75 |
| | 12" (Cap. 15" dia.) | No. 599-826-12 | 8.00 |
| | 24" (Cap. 29½" dia.) | No. 599-826-24 | 18.25 |

827 TRANSFER FIRM-JOINT INSIDE CALIPERS

| | | | |
|-----|-----|----------------|--------|
| 827 | 6" | No. 599-827-6 | \$5.75 |
| | 12" | No. 599-827-12 | 8.00 |
| | 24" | No. 599-827-24 | 18.25 |

835 FIRM-JOINT HERMAPHRODITE CALIPERS

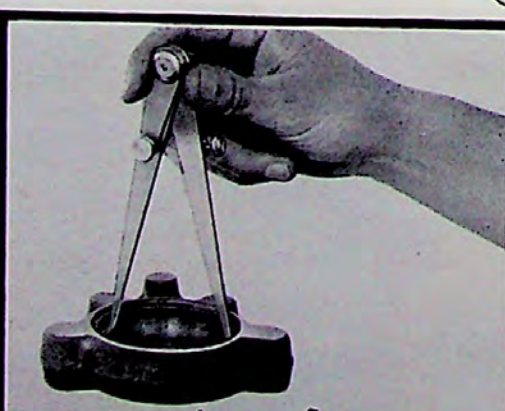
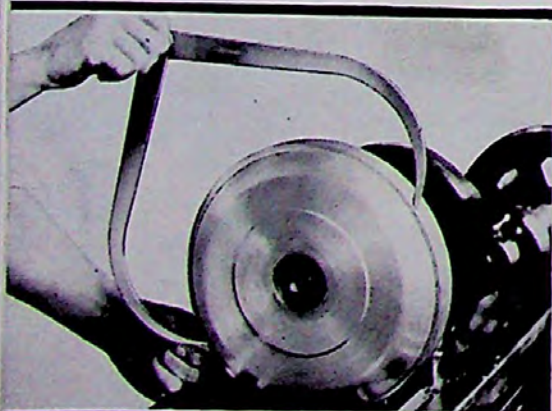
Two styles—one with adjustable point and one with solid point.

| | | | |
|---------------------|---------------------|----------------|--------|
| 835 | 4" with Adj. Point | No. 599-835-4 | \$2.85 |
| | 4" with Solid Point | No. 599-835-41 | 2.35 |
| | 6" with Adj. Point | No. 599-835-6 | 3.25 |
| | 6" with Solid Point | No. 599-835-61 | 2.85 |
| | 8" with Adj. Point | No. 599-835-8 | 3.55 |
| | 8" with Solid Point | No. 599-835-81 | 3.25 |
| Clamp Screw and Nut | | No. 99-835-414 | \$.60 |
| Point | | No. 99-835-413 | .45 |



835

Packed as follows: 4" and 6", six; 8" and 12", four; 18" and 24", one in a box.



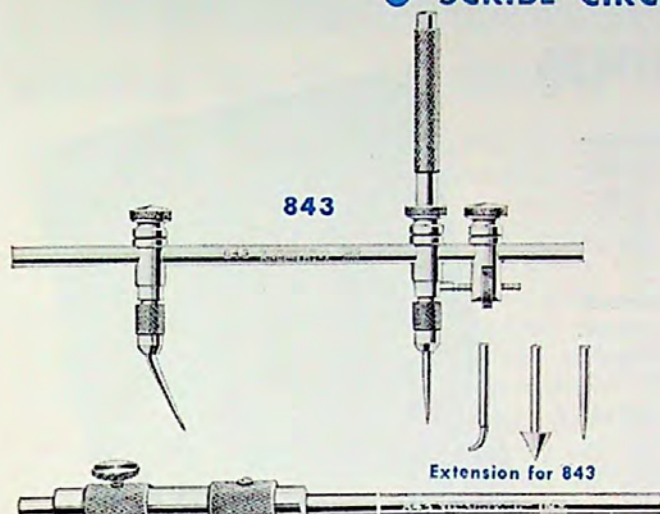
Firm-Joint Calipers are desirable where the fine adjustment of spring calipers is not required. They are adjusted by tapping them lightly against the bench.

With Transfer Caliper inside measurements may be taken over a flange or ring—an advantage for certain measurements.

Dividers and Trammels...

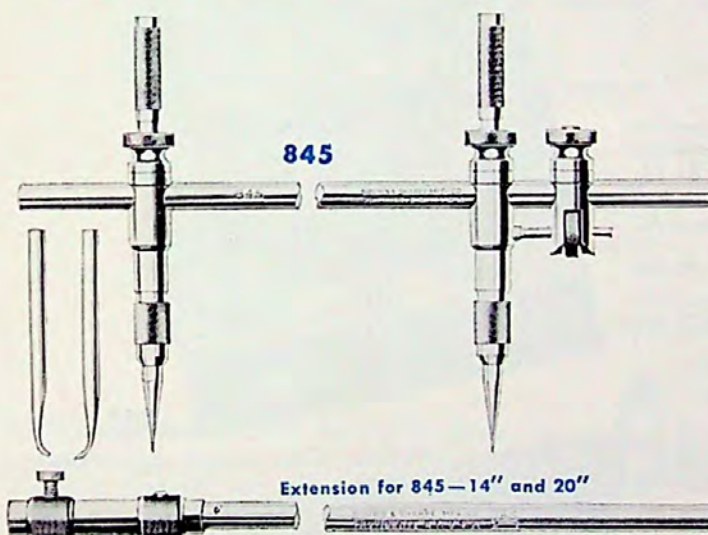
- ACCURATELY LAY OUT AND TRANSFER DISTANCES
- SCRIBE CIRCLES

843



Extension for 843

845



Extension for 845—14" and 20"

Points for 775, 843 and 845—9" and 14"

Straight scribe point

Half offset point

Offset point

Pencil lead chuck

V point

Caliper point

Needle point

843 UNIVERSAL DIVIDER With $5\frac{1}{8}$ " beam. Scribes circle 8" in diameter. Spring friction prevents tram from sliding when loosened. One tram has fine adjustment. Easily changed points held by spring chucks. Furnished with 2 straight points, half offset point, V point (centers in holes to $\frac{1}{4}$ " diameter), and caliper point.

| | |
|---------------------------------------|---------|
| No. 599-843 | \$12.00 |
| Finished Wooden Case No. 599-843-9999 | 2.50 |

EXTENSION FOR 843 With extension, divider scribes circle 37" in diameter. Includes coupling.

| | |
|-------------------|--------|
| No. 599-9845-1422 | \$3.00 |
|-------------------|--------|

845 STEEL BEAM TRAMMELS With 9" beam, $\frac{7}{32}$ " dia. scribes circle 18" in diameter. With 14" beam, $\frac{13}{64}$ " dia. scribes circle 26" in diameter. With 20" beam, $\frac{5}{16}$ " dia. scribes circle 36" in diameter. Two straight scribe points and two caliper points furnished.

| | | |
|------------------------------|------------------|---------|
| With 9" beam | No. 599-845-9 | \$10.50 |
| With 14" beam | No. 599-845-14 | 12.00 |
| Finished Wooden Case for 14" | No. 599-845-9998 | 5.00 |
| With 20" beam | No. 599-845-20 | 13.25 |
| Finished Wooden Case | No. 599-845-9999 | 6.00 |

EXTENSION FOR 14" Scribes circle 54" in diameter. Can be used with Spacing Attachment 775.

| | |
|-------------------|--------|
| No. 599-9845-1422 | \$3.30 |
|-------------------|--------|

EXTENSION FOR 20" Scribes circle 72" in diameter.

| | |
|-------------------|--------|
| No. 599-9845-2022 | \$3.30 |
|-------------------|--------|

POINTS FOR 775, 843 AND 845—9" AND 14"

| | | |
|--|-------------------|--------|
| Straight Scribe Point | No. 599-9843-28 | \$.45 |
| Half Offset Point | No. 599-9843-24 | .60 |
| Offset Point | No. 599-9775-25 | .60 |
| V Point (centers in holes to $\frac{1}{4}$ " dia.) | No. 599-9843-26 | .70 |
| Caliper Point | No. 599-9843-23 | .60 |
| Needle Point | No. 599-9845-1427 | .60 |

PENCIL LEAD CHUCK (FOR 845—14") Takes lead .075" in dia.

| | |
|-------------------|--------|
| No. 599-9845-1421 | \$1.45 |
|-------------------|--------|

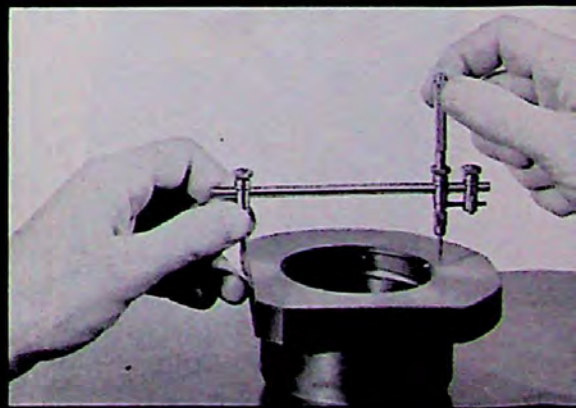
POINTS FOR 845—20"

| | | |
|---|-------------------|--------|
| V points (pair) center in holes from $\frac{1}{4}$ " to $1\frac{1}{8}$ " dia. | No. 599-9845-2026 | \$5.50 |
| Needle Point | No. 599-9845-2027 | 1.35 |
| Caliper Point | No. 599-9845-2023 | .60 |
| Straight Scribe Point | No. 599-9845-2028 | .60 |

PENCIL LEAD CHUCK (FOR 845—20") Needle point furnished.

| | |
|-------------------|--------|
| No. 599-9845-2021 | \$4.50 |
|-------------------|--------|

Universal Divider with caliper point can scribe an arc or establish distances from the edge of a machine part.



Brown & Sharpe

Sets of Standard Tools

FOR STUDENTS AND APPRENTICES

847 SET OF STANDARD TOOLS For students and apprentices—essential equipment for the beginner. Neatly arranged in folding leatherette case. Size folded, 7" x 4 $\frac{3}{4}$ " x 1 $\frac{3}{8}$ ". Contains the following tools—300-6", 402-6", 650, 765- $\frac{1}{8}$ ", 810-4", 811-4", 812-4" and 835-4".

No. 599-847 \$26.65

848 SET OF STANDARD TOOLS For students and apprentices. A modest set of fine quality, frequently used tools including a 1" micrometer. Neatly arranged in folding leatherette case. Size when folded, 9 $\frac{1}{4}$ " x 7" x 1 $\frac{1}{2}$ ". Contains the following tools—11, 306A, 402-9", 650, 765- $\frac{3}{32}$ ", 800-4", 801-4" 802-4" and 835-4".

No. 599-848 \$47.35

849 SET OF STANDARD TOOLS For students and apprentices. Furnished in finished wooden case. Contains the following tools—300-6", 402-6", 650, 765- $\frac{1}{8}$ ", 810-5, 811-6", 812-6" and Brown & Sharpe Handbook.

No. 599-849 \$26.50

PUBLICATIONS

We issue the following publications

Construction and Use of Automatic Screw Machines. Includes instructions on setup and operation, as well as designing cams. Gives many useful tables and illustrations of actual jobs.

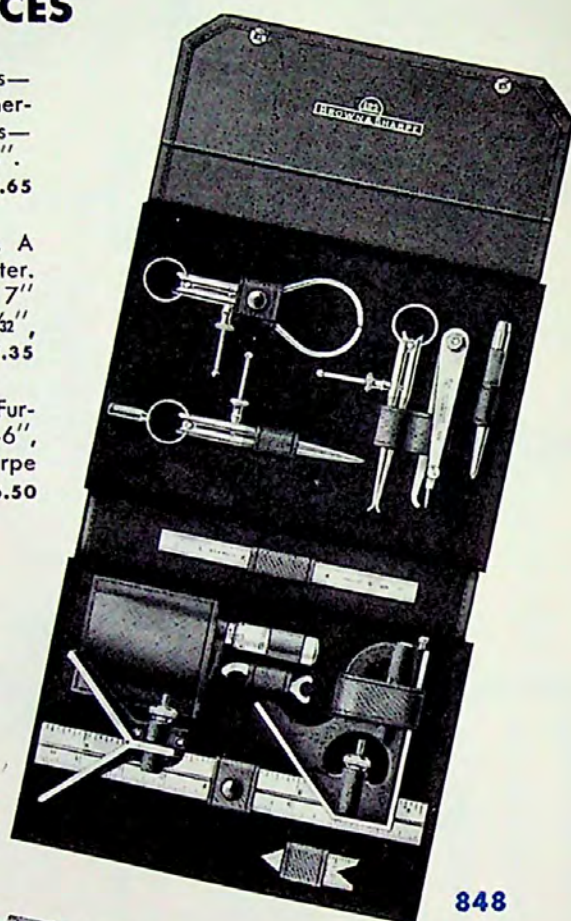
No. 783-1-502 Paper Cover \$1.75

Set-up and Operation of Brown & Sharpe Automatic Screw Machines. 14 self-covered booklets for training operators. Progressively develops in detail from simple job to more intricate work requiring turret tools and attachments.

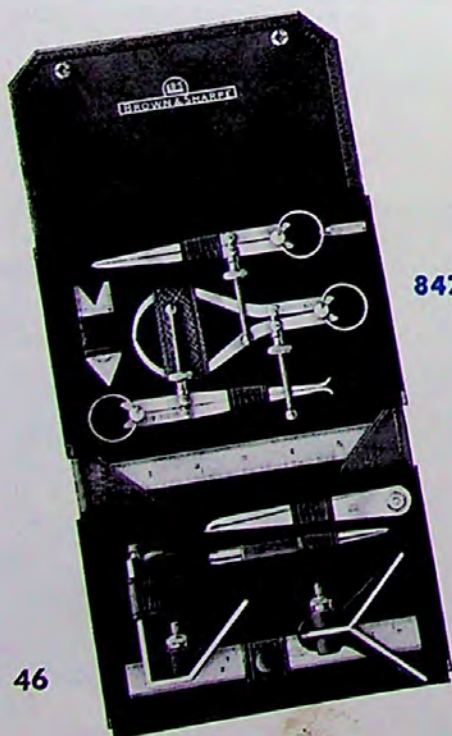
No. 783-1-301 \$1.25

Brown & Sharpe Handbook. To assist the beginner in the use of machines and machinists' tools.

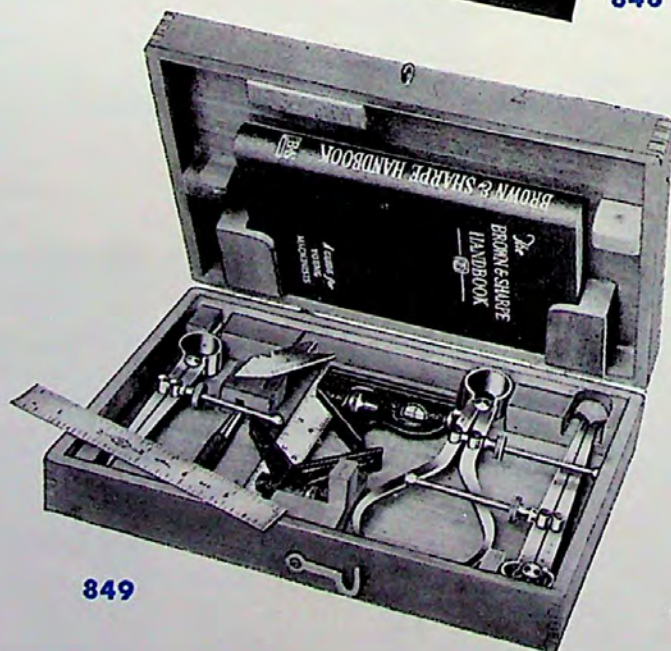
No. 783-1-1 Imitation Leather Cover \$1.50



848



847



849

Brown & Sharpe

Apprentice Tool Chest

CONTAINS 21 PRECISION TOOLS

860 APPRENTICE TOOL CHEST This tool chest contains twenty-one precision tools especially selected by specialists for the requirements of the average apprentice—a selection based on the experience of many years in the world-esteemed Brown & Sharpe Apprentice Course.

The chest has drawers of several depths and widths with mirror in the cover, and is completely locked with cover in closed position. It is made of fine quality oak generally preferred by experienced toolmakers and machinists.

A registration card is packed with each chest, and when returned to Brown & Sharpe, a chrome plate with the name of the owner engraved on it will be furnished for the chest without charge.

The chest is a life time purchase. Ample space is provided for the addition of other tools required for broadened work requirements. Apprentices wishing to have a purchase of this chest financed may ask their distributor about such arrangements.

A list of the tools in the chest appears at the right. For safety in shipment, each is furnished in its original individual package, and each represents a tool of the finest quality in its class—Brown & Sharpe Tools are the choice of skilled craftsmen the world over.



860

- | | |
|---|---|
| 1—13 RS Micrometer 0-1" | 3—754 Clamps (1", 2", 3½") |
| 1—316 6" Steel Rule | 1—765 Set Center Punches |
| 1—335 Steel Rules—Set | 1—778 Style 3 Scriber |
| 1—438 12" Combination Set | 1—800 6" Divider |
| 1—540 6" Steel Square | 1—801 6" Outside Caliper |
| 1—590 Telescoping Gages Set | 1—802 6" Inside Caliper |
| 1—616 Rule Depth Gage | 1—835 6" Hermaphrodite—Adjustable Point |
| 1—621D Universal Surface Gage (9" & 12") with Hardened Base | 1—7025 BesTest Dial Test Indicator |
| 1—647 Thickness Gage | 1—Precision Tool Catalog |
| 1—650 Center Gage | |
| 1—749 V Blocks and Clamp | |

NO. 599-860 — COMPLETE, \$198.50

920 HARDENED AND GROUND STEEL PARALLELS

Special steel, hardened and ground. Straight and true and finished to close limits on four sides. It is not necessary to purchase Brown & Sharpe Hardened and Ground Steel Parallels in numbered pairs. These Parallels are made to such close limits that they can be purchased individually or, if desired, matched with another individual parallel which avoids confusion and makes impossible the inaccurate matching of parallels of different numbers. Individual matching parallels may be procured at any time.



920

Ground Steel Parallels

| Size | Number | Price | Size | Number | Price |
|--------------|------------|--------|-----------------|-------------|---------|
| 6" x ¼" x ¾" | 599-920-4 | \$5.00 | 9" x ¾" x 1¼" | 599-920-60 | \$11.00 |
| 6" x ¼" x ½" | 599-920-8 | 5.00 | 9" x ¾" x 1½" | 599-920-64 | 12.00 |
| 6" x ¼" x ¾" | 599-920-12 | 5.00 | 12" x 1½" x 1¼" | 599-920-68 | 13.00 |
| 6" x ¼" x ¾" | 599-920-16 | 5.75 | 12" x ¾" x 1" | 599-920-72 | 12.75 |
| 6" x ¾" x ½" | 599-920-20 | 5.75 | 12" x ¾" x 1¼" | 599-920-76 | 13.75 |
| 6" x ¾" x ¾" | 599-920-24 | 5.75 | 12" x 1½" x 1¼" | 599-920-80 | 14.00 |
| 6" x ¾" x ¾" | 599-920-28 | 5.75 | 12" x 1" x 1¼" | 599-920-84 | 14.50 |
| 6" x ½" x ¾" | 599-920-32 | 6.50 | 12" x 1" x 1½" | 599-920-88 | 15.00 |
| 6" x ½" x ¾" | 599-920-36 | 6.50 | 12" x 1" x 2" | 599-920-92 | 16.50 |
| 6" x ½" x 1" | 599-920-40 | 6.50 | 12" x 1¼" x 1½" | 599-920-96 | 15.50 |
| 9" x ½" x ¾" | 599-920-44 | 9.00 | 12" x 1¼" x 1¾" | 599-920-100 | 16.50 |
| 9" x ½" x ¾" | 599-920-48 | 9.00 | 12" x 1¼" x 2" | 599-920-104 | 18.50 |
| 9" x ½" x 1" | 599-920-52 | 9.00 | 12" x 1¼" x 2½" | 599-920-108 | 21.00 |
| 9" x ¾" x 1" | 599-920-56 | 11.00 | 12" x 1½" x 2" | 599-920-112 | 21.00 |
| | | | 12" x 1½" x 3" | 599-920-116 | 25.00 |

Brown & Sharpe

THE MOST RUGGED DIAL INDICATORS AVAILABLE

A simple, rugged design with exclusive operation features, metals selected for their appropriateness and strength, and manufactured by skilled craftsmen, bring you in Brown & Sharpe Dial Indicators lasting, on-the-job accuracy.

There are no die castings in these indicators. Vital parts are high brass forgings.

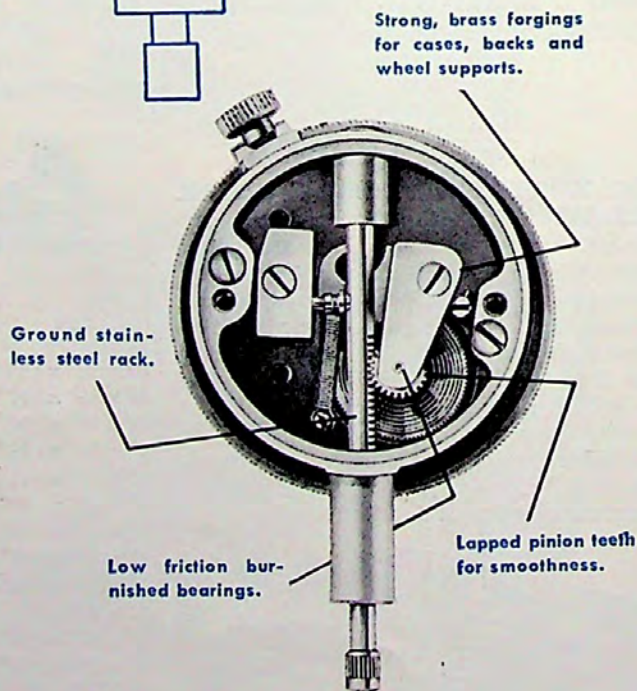
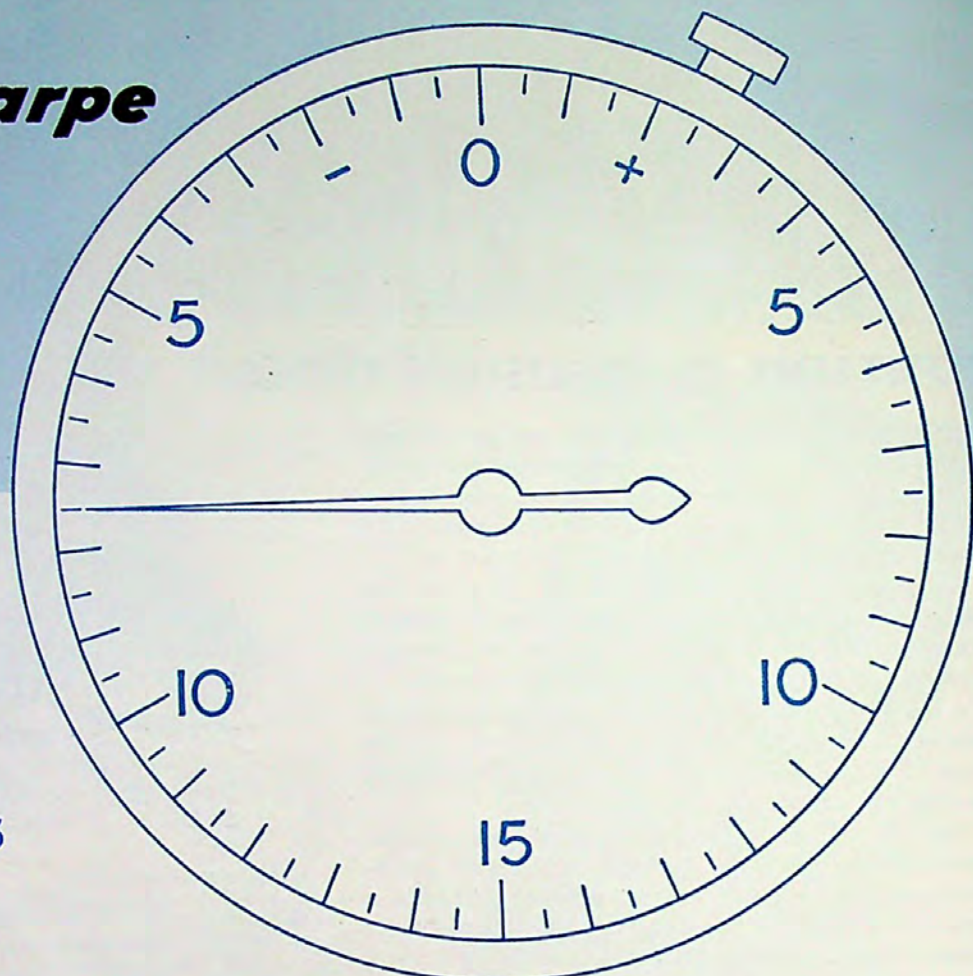
Staffs and pinions are hardened, high carbon steel, and the pivots or bearings are burnished to a mercury like finish. The pinion teeth are contour lapped after hardening for perfection of form. This results in a high degree of smoothness of operation and low friction.

In a mechanical wear test, conducted for over two years and still continuing, on "in" and "out" strokes, these indicators have surpassed government specifications over one thousand times.

The exterior finish is in keeping with their internal superiority—chrome over heavy nickel plate.

Note the following important features:

1. Simple, rugged design.
2. Cases, backs and wheel supports are brass forgings.
3. Lapped pinion teeth provide for smoothness.
4. Burnished bearings—low friction.
5. Ground stainless steel racks.
6. Seamless tubing for bezels.
7. Dials printed from accurate engravings.
8. Dial wheel supports held by screws to eliminate possibility of distortion.



Dial Indicators . . .

"1000 TIMES BETTER THAN THE U. S. GOVERNMENT SPECIFICATIONS IN CONTINUING RUNNING TEST"

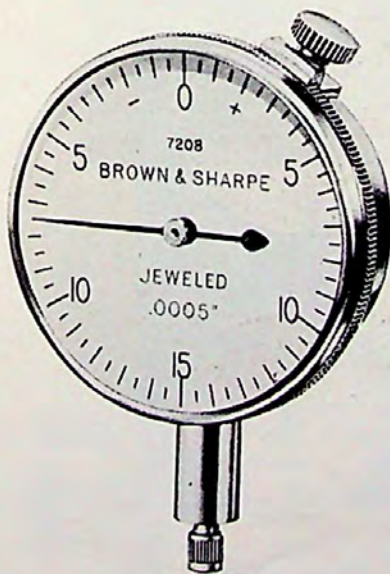
JEWELLED BEARINGS • Dial Indicators, jeweled throughout, have reduced internal friction with a resulting very fine degree of sensitivity. This low friction provides a lower contact pressure and the closest of relationships between movement of contact point and the indicator hand.

While the jeweled bearings provide a very fine degree of sensitivity, dial indicators so equipped are correspondingly more delicate than indicators with plain bearings, the jewels being more subject to shock and strain as well as to violent temperature changes.

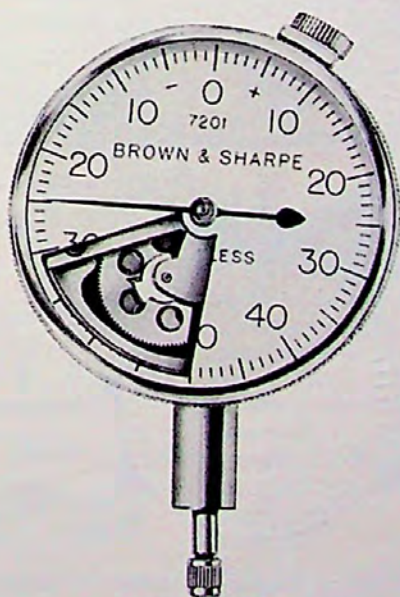
Accordingly, the requirements of the work and the conditions should be considered carefully when ordering indicators in order to have the type best suited for the work.

SHOCKLESS MECHANISM • Frequently, when used with uneven work there is severe shock on impact of indicator contact point, sufficient to strain or damage regular dial indicators. The Brown & Sharpe patented Shockless Mechanism eliminates strain or damage to the gear teeth or bearings from such severe shock. The Shockless Mechanism functions in both directions of the rack movement. It is simple and positive and is built into the rack gear assembly and does not induce speed to the gear train.

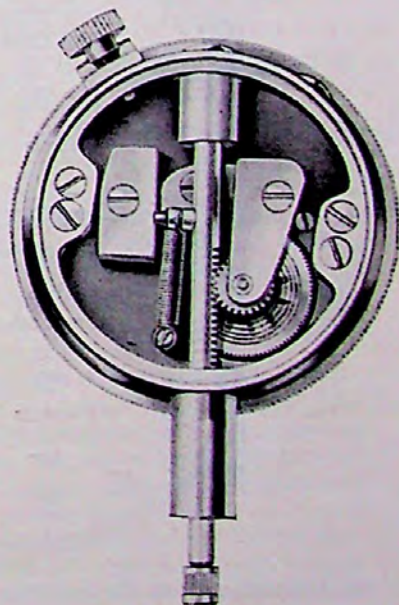
The Shockless Mechanism is available on all Brown & Sharpe Dial Indicators Nos. 7101 to 7383. Price, Extra, \$3.00



**JEWELLED
7208**



**SHOCKLESS
FRONT VIEW
of 7201**



**SHOCKLESS
REAR VIEW
of 7201**



Brown & Sharpe

Dial Indicators

DIMENSIONS (INCHES)

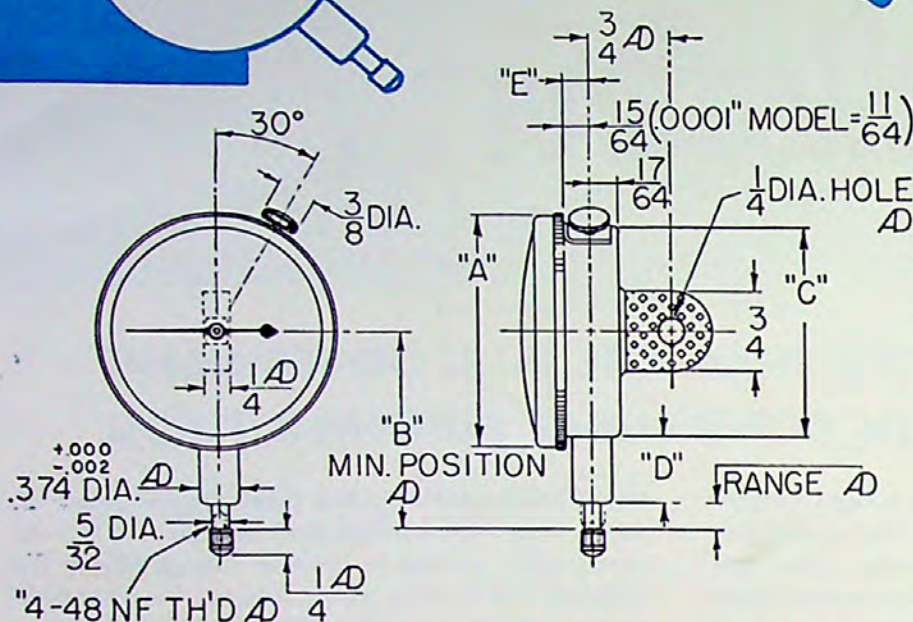
| Series | 7100 | 7200 | 7300 |
|----------|---------|---------|-------|
| AD GROUP | 1 | 2 | 3 |
| A | 1 11/16 | 2 1/4 | 2 3/4 |
| B (AD) | 1 5/8 | 2 | 2 1/8 |
| C | 1 13/32 | 1 31/32 | 2 1/2 |
| D | 4 3/4 | 4 9/4 | 5 1/8 |
| E | 1/4 | 1/4 | 1 1/4 |

RANGE

2 1/2 turns of hand from 9:00 o'clock at—rest position.

ACCURACY

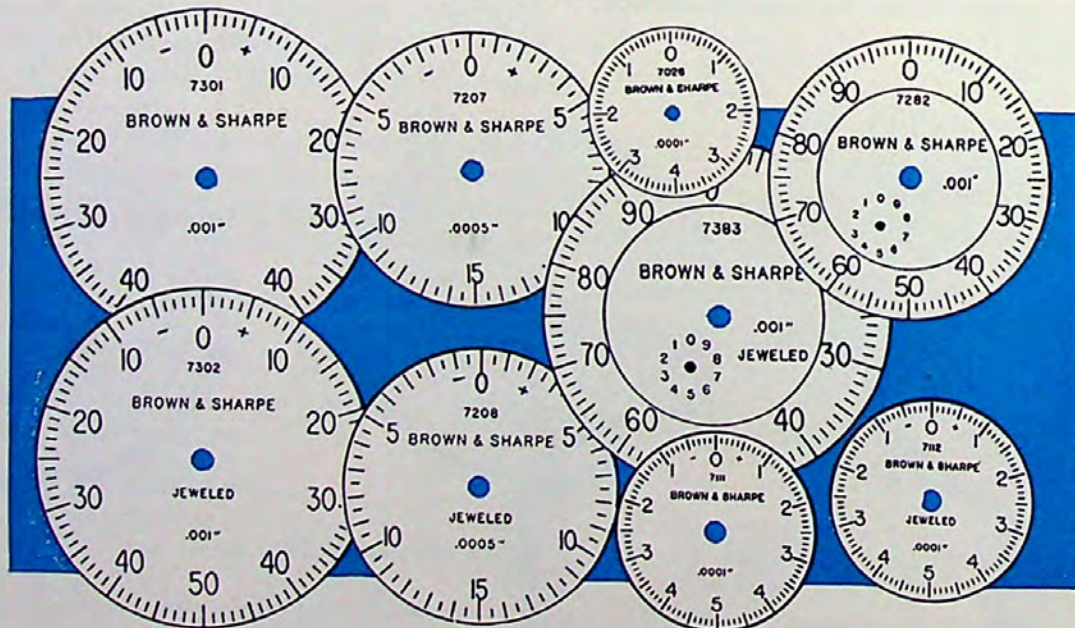
"To within one graduation, plus or minus, at any point from approximate 10:00 o'clock position to final 2:00 o'clock position (2 1/3 turns)."



American Gage Design specifications (CS) (E) (119-45), govern several important dimensions on dial indicators, and provide uniform standards that meet the need for greater accuracy and more universal interchangeability of the dial indicators used on machine tools, jigs and fixtures. AGD specifications are incorporated in all Brown & Sharpe Nos.

7040, and 7100, 7200 and 7300 series dial indicators, with the exception of long range models. American Gage Design specifications (designated AD) as well as other dimensions of Brown & Sharpe Dial Indicators in three different sizes are shown in the above illustration.

DIAL FACES



The illustration shows the sharpness and quality of graduations on dial faces of Brown & Sharpe Dial Indicators.

Except for the two dial faces, Nos. 7282 and 7383, used with indicators having 1" movement, all the different graduations shown are furnished on Brown & Sharpe Dial Indi-

cators in all three sizes, 1 1/16", 2 1/4" and 2 3/4" diameter dials. The graduations on dial faces of Indicators with 1" movement are for use with indicators having 2 1/4" and 2 3/4" dials, while the smallest dial at the top is used only on Dial Indicator No. 7026.

give lasting on the job accuracy...

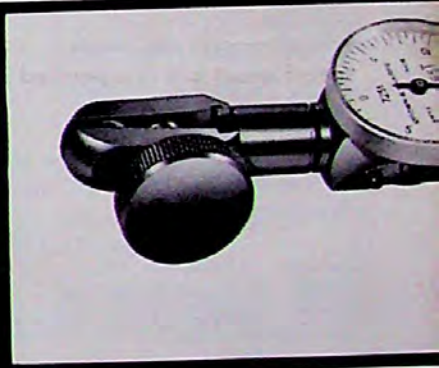


**BesTest
7025
DIAL INDICATOR**
RANGE
.030" BY .0005"

The BesTest is one of the most versatile of the small dial indicators on the market today. The dial reading is balanced 0 to 15 to 0 and the mechanism provides a smooth low friction movement. Indicator is designed for use on Surface Gages, Vernier Height Gages, Magnicators shown on page 59 of this catalog and, also, the Hite-Chek shown on page 29 and on similar holding tools. Positioning of the small lever on the side of the case, beneath the dial, reverses the direction of the contact point. Dial has clear black graduations. Swivel clamp attaches on the under side of indicator or at the end in the "up close" position at left or with the extension at right.

Its small size permits the BesTest to be used in places inaccessible to larger measuring instruments. It measures only 2.6" over the point and body. Its stem is 1 1/8" long and only 3/8" dia. Dial is 1" in diameter over bezel. Furnished with rod for use in Surface Gages 621 and 622, with 2 bars for 12" and larger Vernier Height Gages, body extension and 3 hardened contact points .04", .08" and .120" in dia. which are adjustable and interchangeable. Furnished in nicely fitted wooden case. Replacement points listed on page 61. **No. 599-7025 Price, Each \$26.00**

The versatility of the swivel clamp is shown in illustrations at right. Swivel can be used directly beneath the dial, with the short plug or with the extension according to the requirements of the work.



**7026
DIAL INDICATOR**
RANGE
.008" BY .0001"

This small Dial Indicator is shown full size in the illustration. The dial is graduated 0-4-0. This Dial Indicator, because of its precision, is intended for use only in holding devices of the more rigid type such as Vernier Height Gages, and the Hite-Chek shown on page 29 of this catalog, for accurately checking close tolerance work, toolmaking, inspection, production and in special fixtures.

Its action is automatically reversible and does not require the movement of a lever to change the action for "over" or "under" work. The indicator hand rotates in one direction (clockwise) whether the top or bottom of the contact point is in use. Contact point is screwed into holder and cannot drop out, and the contact finger swivels easily and is adjustable to 180°, maintaining its position without slipping. It is furnished with two bars, one for a 12" Vernier Height Gage and the other for larger Height Gages, and with one contact point, .100" diameter. Swivel clamp can be used from bottom or end of indicator casing. Replacement points .100" and .031" diameter on page 61. Furnished in blue plastic case compartmented to hold the separate parts. **No. 599-7026 Price, Each \$35.00**

BROWN & SHARPE NOS. 7101 TO 7112 DIAL INDICATORS are comparatively small in size and intended for use where space is limited or where the use of several Dial Indicators on fixtures or machines may require the smaller size because of space limitations. Like other Brown & Sharpe Dial Indicators they are equipped with hardened and burnished steel pivots with accompanying low friction movement. The value of the dial graduations is indicated clearly on the face of each model.

These Dial Indicators are furnished both with plain and jeweled bearings and also are available furnished with patented shockless mechanism, page 49. Indicators also can be furnished special with continuous dial graduations at no extra cost.

Bezel and white enameled dial face can be turned to position zero as desired and the bezel clamp permits dial to be clamped in any position. Lug on back of Dial Indicator has $\frac{1}{4}$ " hole. Point of Indicator can be removed and replaced by points of different forms and lengths listed on page 61. Dial with bezel is $1\frac{1}{16}$ " diameter and stem is .375" diameter. Indicators have chrome finish over heavy nickel plate.

7101 DIAL INDICATOR— Spindle Movement .250" by .001" Dial is graduated from 0 to 50 to 0. Has plain bearings.
No. 599-7101 \$16.50

7102 DIAL INDICATOR— Has Jeweled Bearings. Spindle Movement .250" by .001" Similar to 7101, but has jeweled bearings.
No. 599-7102 \$20.25

7107 DIAL INDICATOR— Spindle Movement .075" by .0005" Dial graduated 0 to 15 to 0. Has plain bearings.
No. 599-7107 \$19.50

7108 DIAL INDICATOR— Has Jeweled Bearings. Spindle Movement .075" by .0005" Similar to 7107, but has jeweled bearings.
No. 599-7108 \$27.00

7111 DIAL INDICATOR— Spindle Movement .025" by .0001" Dial graduated from 0 to 5 to 0. Has plain bearings.
No. 599-7111 \$31.50

7112 DIAL INDICATOR— Has Jeweled Bearings. Spindle Movement .025" by .0001" Similar to 7111, but has jeweled bearings.
No. 599-7112 \$39.00



7101
AND
7102

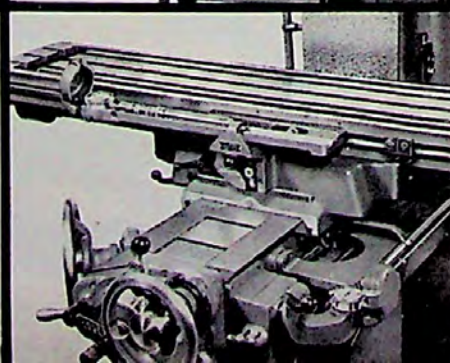
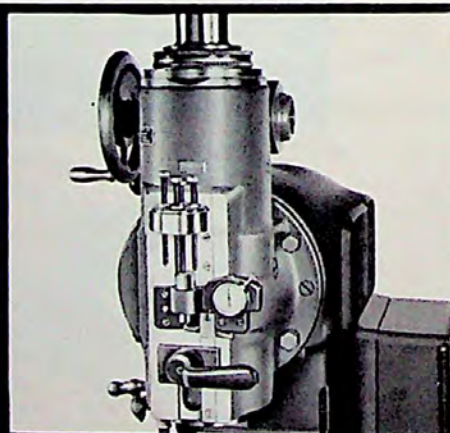


7107
AND
7108

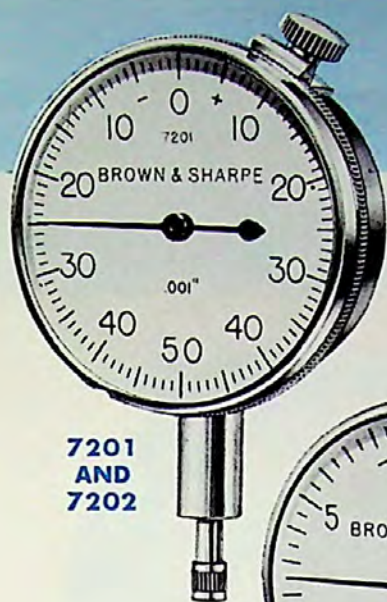


7111
AND
7112

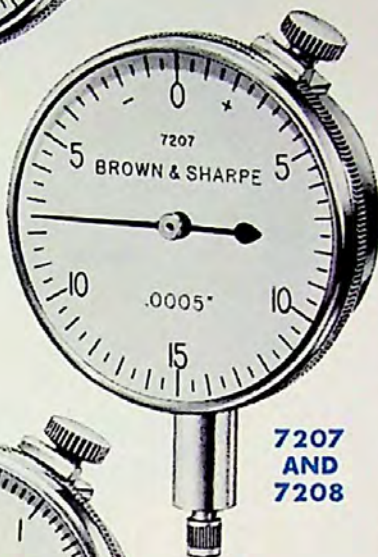
Dial Indicators bring high degree of precision to machine adjustments. Here one is used for the precision setting of spindle for depth of cut.



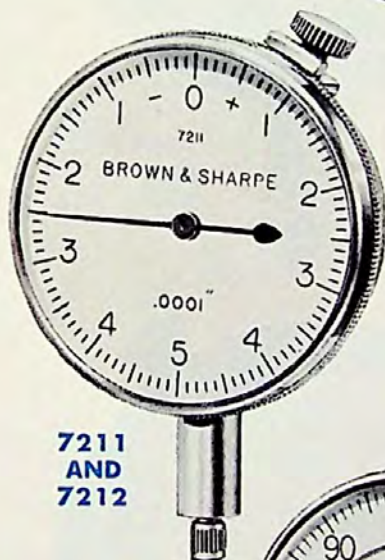
accurate and easy to read



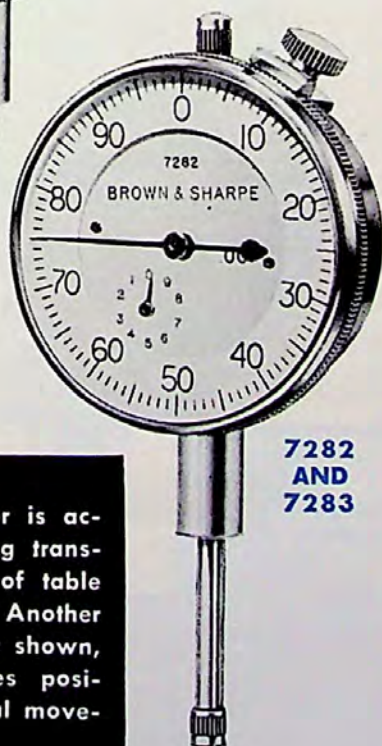
**7201
AND
7202**



**7207
AND
7208**



**7211
AND
7212**



**7282
AND
7283**

This Dial Indicator is accurately controlling transverse movement of table to close limits. Another Dial Indicator, not shown, similarly facilitates position of longitudinal movement.

7201 TO 7284 are the most popular of Brown & Sharpe Dial Indicators. Their size, $2\frac{1}{4}$ " across the bezel, facilitates reading, and yet is comparatively compact. This size is used on all Brown & Sharpe Dial Test Indicators except Nos. 7740 and 7743.

Indicators are available with plain or jeweled bearings and dials are printed from engravings which provide accuracy of spacing and concentricity with the hand pinion. Bezel can be turned with dial to desired position and clamped by the bezel clamp. Point can be removed and replaced with any one of the several points listed on page 61. Lug on back has $\frac{1}{4}$ " hole.

These indicators are available also with the patented Shockless Mechanism described on page 49. Models with balanced dial graduations can be furnished special with continuous graduations at no extra cost, and models with continuous graduations also can be furnished with balanced dial faces. Case, bezel and back are chrome plated over heavy nickel plate.

7201 DIAL INDICATOR—Spindle Movement .250" by .001" Dial graduated 0 to 50 to 0. Has plain bearings.

No. 599-7201 \$16.00

7202 DIAL INDICATOR—Has Jeweled Bearings—Spindle Movement .250" by .001" Similar to No. 7201 above but has jeweled bearings.

No. 599-7202 \$19.75

7207 DIAL INDICATOR—Spindle Movement .075" by .0005" This Indicator is furnished regularly with Brown & Sharpe Dial Test Indicators except 7740 and 7743, as well as on some other Brown & Sharpe products. Dial graduated from 0 to 15 to 0. Has plain bearings.

No. 599-7207 \$18.50

7208 DIAL INDICATOR—Has Jeweled Bearings—Spindle Movement .075" by .0005" Similar to No. 7207 but has jeweled bearings.

No. 599-7208 \$26.00

7211 DIAL INDICATOR—Spindle Movement .025" by .0001" Dial graduated 0 to 5 to 0. Has plain bearings.

No. 599-7211 \$31.00

7212 DIAL INDICATOR—Has Jeweled Bearings—Spindle Movement .025" by .0001" Similar to 7211 but has jeweled bearings. Furnished with Brown & Sharpe Dial Test Indicators reading to .0001" and with other products requiring an indicator graduated in these increments.

No. 599-7212 \$38.50

7282 LONG RANGE DIAL INDICATOR—Spindle Movement 1.000" by .001" Long Range Dial Indicators are especially suited for quality control jobs requiring close tolerance and inspection, measuring of slide travel, motions, cams and similar dimensions. Furnished with movable dials and count hands, the count hand indicating each $\frac{1}{10}$ " of the movement of the spindle or one complete revolution of indicator hand. Dial graduated 0 to 100. Has plain bearings.

No. 599-7282 \$19.00

7283 LONG RANGE DIAL INDICATOR—Has Jeweled Bearings—Spindle Movement 1.000" by .001" Similar to 7282 but has jeweled bearings.

No. 599-7283 \$22.75

7284 LONG RANGE INDICATOR—Spindle Movement 1.000" by .0005" Generally similar to 7282, but gives readings in .0005". Dial graduated from 0 to 50. Counter hand indicates each $\frac{1}{20}$ " spindle movement or one complete revolution of indicator hand. Two complete revolutions of the counter hand indicate the entire 1" spindle movement.

No. 599-7284 \$22.00

Brown & Sharpe

Dial Indicators...

DIAL INDICATORS NO. 7301 TO 7383—Have dials of large diameter with correspondingly widely spaced graduations which are easy to read and permit the estimating of partial increments with greater ease. These indicators are 2¾" across the bezel, and are desirable where space limitations permit their use.

They are furnished both with plain and jeweled bearings.

Dials are printed from engravings with accuracy in spacing and concentricity with the hand pinion, and the bezel can be turned to desired operating position and clamped securely in position. Point can be removed and replaced by any one of the several points shown on page 61. Lug on back of the indicator has ¼" hole.

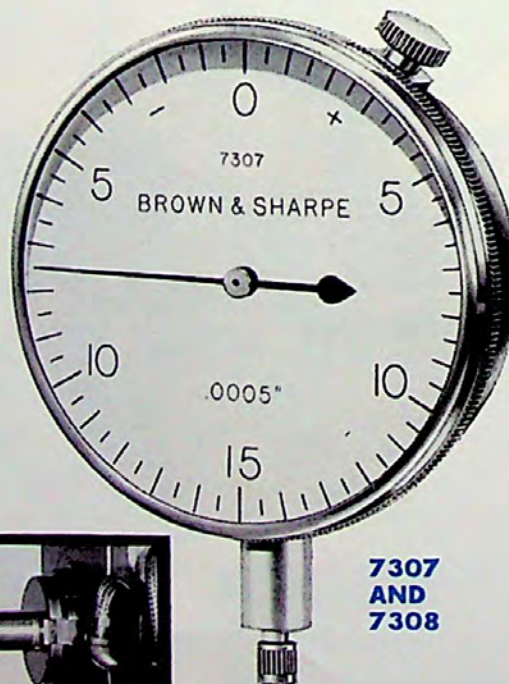
Indicators are available also with shockless mechanism listed on page 49. Models with balanced dial graduations can be furnished special with continuous graduations at no extra cost, and models with continuous graduations also can be furnished with balanced dial faces. Case, bezel and back are chrome plated over heavy nickel plate.

7301 DIAL INDICATOR—Spindle Movement .250" by .001" Dial graduated 0 to 50 to 0. Has plain bearings.
No. 599-7301 \$20.00

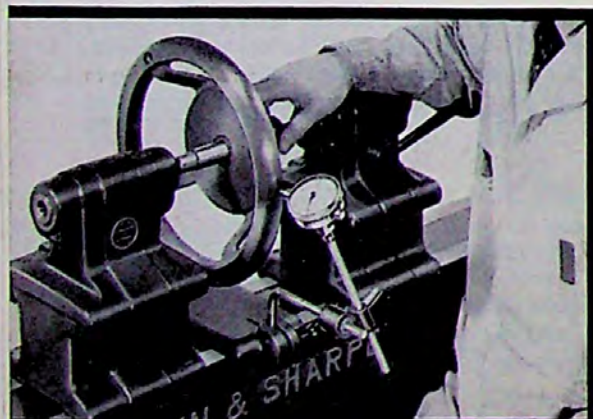
7302 DIAL INDICATOR—Has Jeweled Bearings—Spindle Movement .250" by .001". Similar to 7301 but has jeweled bearing.
No. 599-7302 \$23.75



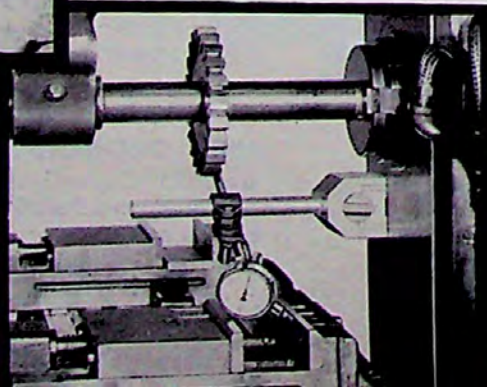
**7301
AND
7302**



**7307
AND
7308**

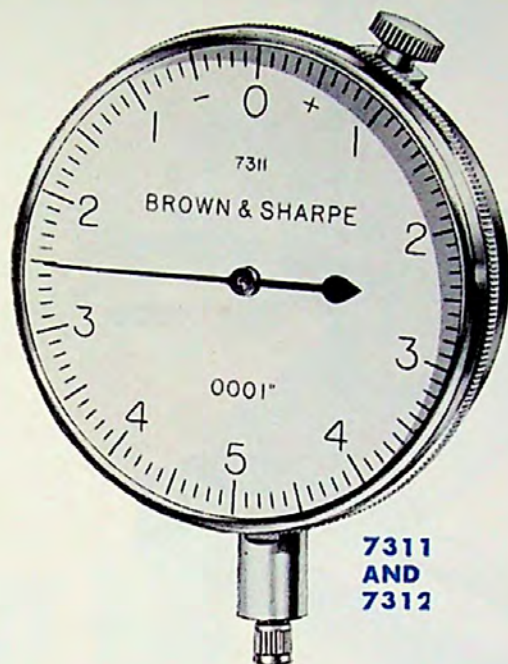


Above, Dial Indicator is being used to check diameter of large turned work piece mounted on raising blocks in bench center.

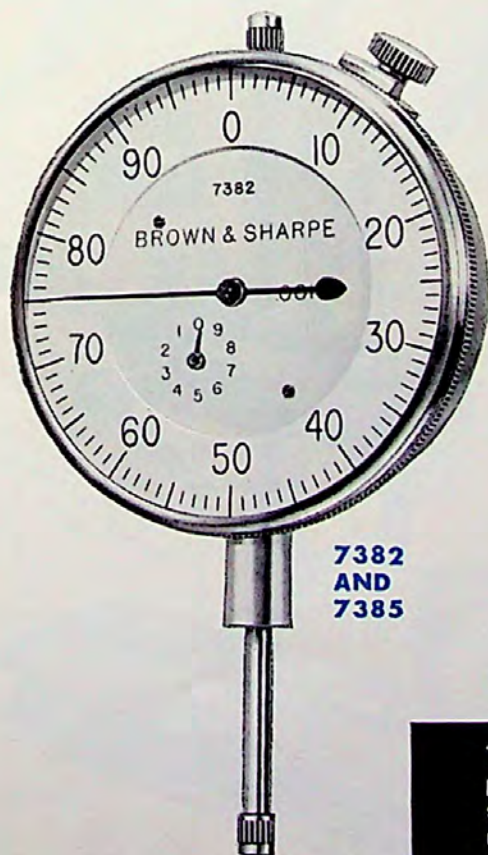


At left, 7744 mounted on vertical column in horizontal position is lining up vise on machine table.

insure a low friction movement



7311
AND
7312



7382
AND
7385

7307 DIAL INDICATOR—Spindle Movement .075" by .0005". This Dial Indicator shown on Page 54 is graduated from 0 to 15 to 0. Has plain bearings.

No. 599-7307 \$23.00

7308 DIAL INDICATOR—Has Jeweled Bearings—Spindle Movement .075" by .0005". Similar to 7307 but has jeweled bearings.

No. 599-7308 \$30.50

7311 DIAL INDICATOR—Spindle Movement .025" by .0001". Dial graduated 0 to 5 to 0. Has plain bearings.

No. 599-7311 \$36.50

7312 DIAL INDICATOR—Has Jeweled Bearings—Spindle Movement .025" by .0001". Similar to 7311 but has jeweled bearings.

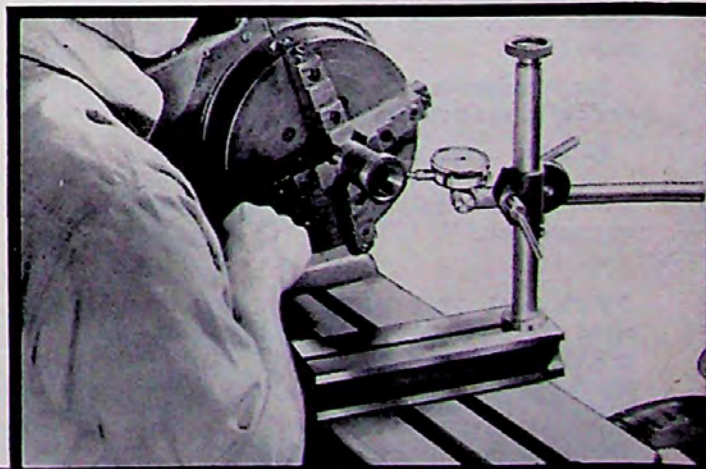
No. 599-7312 \$44.00

7382 LONG RANGE DIAL INDICATOR—Spindle Movement 1.000" by .001". Long Range Dial Indicators are especially suited for quality control jobs that require close tolerance and inspection, the measuring of slide travel, motions, cams and other dimensions of a size greater than the spindle travel of regular dial indicators. Furnished regularly with movable dials and count hands, the count hand indicating each one-tenth of an inch of movement of the spindle or one complete revolution of indicator hand. Dial graduated 0 to 100. Has plain bearings.

No. 599-7382 \$23.00

7383 LONG RANGE DIAL INDICATOR—Has Jeweled Bearings—Spindle Movement 1.000" by .001". Similar to 7382 but has jeweled bearings.

No. 599-7383 \$26.75



The heavy base of 7731 makes it suitable for high precision work, and this super rigid indicator has a separate clamp for each movement. Individual adjustments can be made without disturbing the other settings.

Dial Test Indicator Sets

7730 DIAL TEST INDICATOR SET—* Spindle Movement .075" by .0005". Tubular Upright and Lever Style Clamps. Dial Holding Rod .375" Dia., 9" Long. Upright .738" Dia., 8¾" Long. Dial 2¼" Diameter. Stem .375" Diameter. Base 8½" Long, 2¼" Wide.

Especially serviceable to setup men, erectors or inspectors of machines for determining surface, spindle or arbor accuracy, and to toolmakers for obtaining comparative measurements on close work. Tubular upright is very rigid. Knurled nut at top of upright conveniently clamps upright to base. Dial holding rod is adjustable to any angle; can be used independently as in lathe tool post. Lever style clamp permits fast, positive adjustments. Tool Post Clamp, Tool Post Clamp Rod and Adapter Bushing are included with indicator. For description of Dial Indicator furnished, see Dial Indicator 7207, page 53.

For Attachments, Separate Parts, Extra Contact Points and Backs, see pages 59 to 61.

Furnished in substantial metal case.

No. 599-7730 \$46.75

* Can be furnished with 1.000" spindle movement. Price on application.

7731 DIAL TEST INDICATOR SET—* Spindle Movement .075" by .0005". Has Tubular Construction and Separate Clamp for each adjustment. Dial Holding Rod .738" Dia., 9½" Long. Upright .987" Dia., 10" Long. Dial 2¼" Diameter. Stem .375" Diameter. Base 10" Long, 3" Wide.

With this super rigid indicator, any individual adjustment can be made without disturbing the others. Lever style clamps permit easy, secure clamping. Tubular upright and dial holding rod are light and strong—indicator is easy to handle. For description of Dial Indicator furnished, see 7207, page 53.

For Attachments, Separate Parts, Extra Contact Points and Backs, see page 59 to 61.

Furnished in substantial metal case.

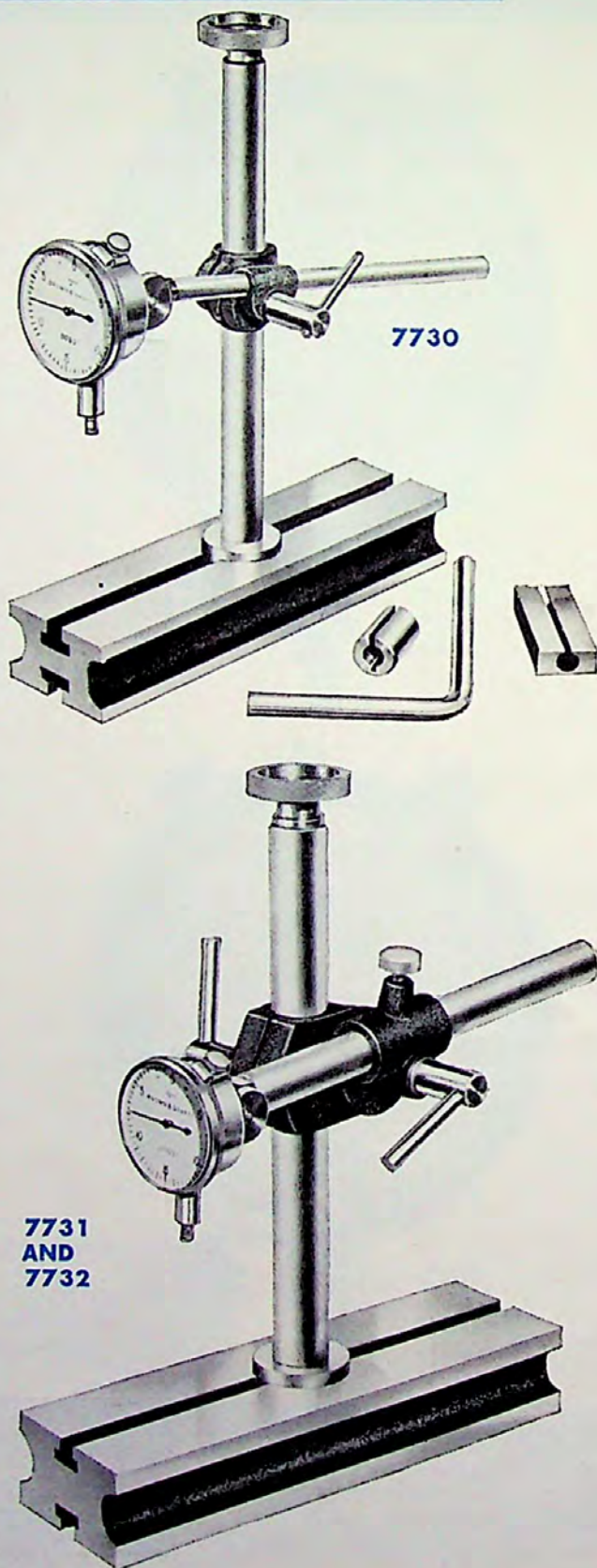
No. 599-7731 \$66.50

* Can be furnished with 1.000" spindle movement. Price on application.

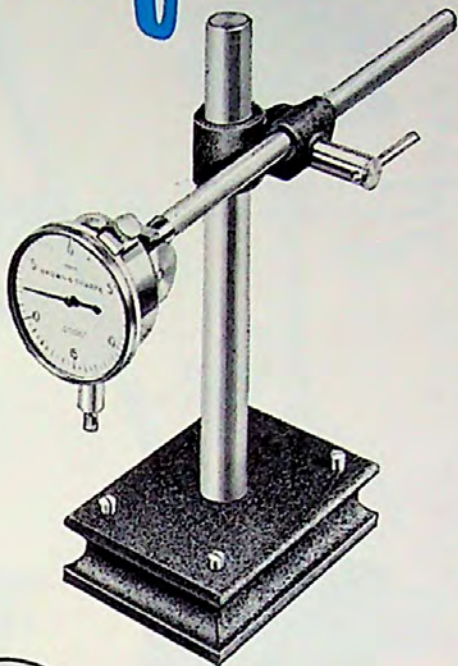
7732 DIAL TEST INDICATOR SET—Spindle Movement .025" by .0001". Has Jeweled Bearings. Similar to 7731, except that dial indicator is graduated to .0001" and has jeweled bearings. (See 7212, page 53). For work where extreme accuracy is required.

Furnished in substantial metal case.

No. 599-7732 \$86.50



are useful in many ways.



7733

7733 DIAL TEST INDICATOR SET—* Spindle Movement .075" by .0005". Dial Holding Rod .375" Dia., 9" Long. Dial 2 1/4" Diameter. Stem .375" Diameter. Upright .738" Dia., 8" Long. Base 4 1/4" Long, 3 1/4" Wide, 1 1/8" Thick.

Solid upright, .738" in diameter, makes this indicator exceptionally rigid and particularly suited for those who wish to use it with a Dial Indicator graduated to .0001".

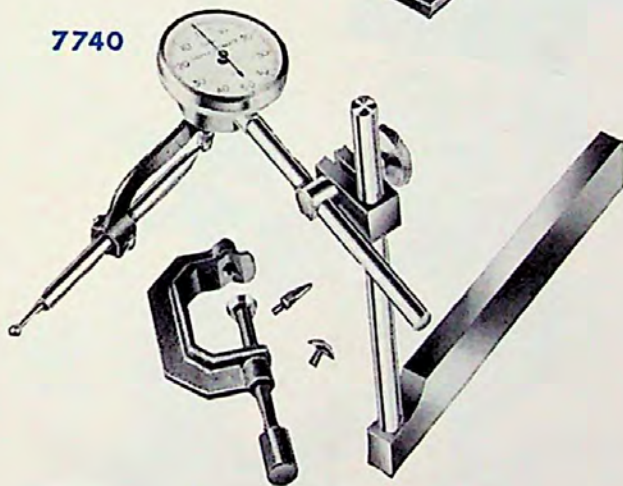
Base has a gage pin at each corner. Pins can be pushed down and used against edge of surface plate, straight edge or against the side of a T slot.

Indicator is well suited for use in the Motor Service Shop for testing crankshafts in grinding machines and accurately setting work in a lathe.

For description of Dial Indicator, see 7207, page 53.

For Attachments, Separate Parts, Extra Contact Points and Backs, see page 59 to 61.

Furnished in substantial metal case. No. 599-7733 \$39.65
* Can be furnished with 1.000" spindle movement. Price on application.



7740

NO. 7740 UNIVERSAL DIAL INDICATOR SET—

Spindle Movement .200" by .001". Set includes Dial Indicator, Hole Attachment 7802, Bar with Upright, Clamp, Swivel, Dial Holding Rod and three Contact Points. Hole Attachment 7803 can be used, also, if desired. Dial graduated 0 to 50 to 0. Bezel turns to bring zero under hand.

Can be adjusted to almost any position and used in places inaccessible to ordinary larger indicators. Hole Attachment enters holes to a depth of $1\frac{1}{16}$ ". Clamp has brass swivel to prevent marring work. Bar is case hardened steel, $5\frac{5}{16}$ " long, $\frac{3}{8}$ " thick and $\frac{7}{8}$ " wide. Upright—.312" dia., 5" long. Swivel also fits Brown & Sharpe Surface Gages No. 621. Furnished in case.

| | |
|--------------|---------|
| No. 599-7740 | \$25.50 |
|--------------|---------|

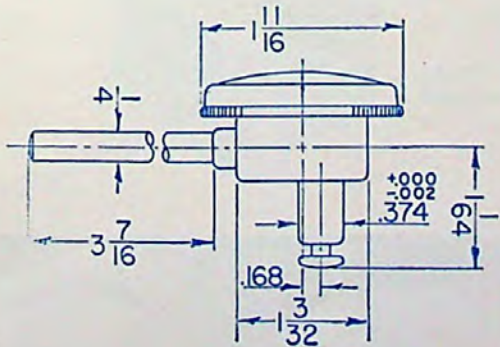
No. 599-7740 \$25.50

Finished wooden case for 7740. No. 599-7740-9999 \$4.00

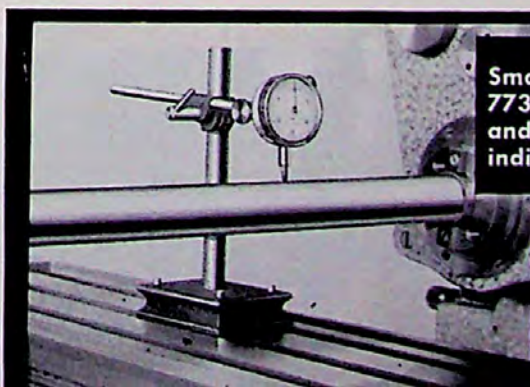
SEPARATE PARTS FOR NO. 7740

7040 Dial Indicator only with Dial Holding Rod and three Contact Points. **No. 599-7040 \$17.75**

| | | |
|--|--------------|------|
| Hole Attachment | No. 599-7802 | 3.25 |
| Clamp | No. 599-7914 | 1.50 |
| Bar with Upright | No. 599-7915 | 1.50 |
| Sliding Swivel | No. 599-7916 | 1.50 |
| Contact Points, see listing on page 61 | | |



Dimensions of Dial Indicator



Small, compact base of 7733 is manipulated easily, and gage pins line up the indicator from T slot.

Brown & Sharpe

Permanent magnet bases,

7743 DIAL TEST INDICATOR SET—With Fine Adjustment and Permanent Magnet Base. Range of Dial Indicator—.030" by .0005". Base 2 $\frac{7}{16}$ " Wide, 3 $\frac{1}{8}$ " Long, 1 $\frac{1}{16}$ " High (approx). Post—9 $\frac{3}{8}$ " Long, $\frac{5}{16}$ " Dia.

Turning fine adjusting nut accurately 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. 599-7743 \$57.50

7743—Without Dial Indicator.

No. 599-7743-7 \$31.50

7744 DIAL TEST INDICATOR SET—With Permanent Magnet Base. * Spindle Movement .075" by .0005". Dial Holding Rod .375" Dia., 9" Long. Upright .738" Dia., 7 $\frac{1}{16}$ " Long. Dial 2 $\frac{1}{4}$ " Dia. Stem .375" Diameter. Base 2 $\frac{3}{4}$ " Long, 2 $\frac{1}{16}$ " Wide, 2 $\frac{1}{16}$ " Thick.

Base is simple in construction and has only one working part—the magnet. The permanent magnet base allows indicator to be held in upside down and other positions for settings impossible with conventional 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 clamp permits quick, positive adjustment. Solid upright makes indicator exceptionally rigid. For description of Dial Indicator, see 7207, page 53. For Attachments, Separate Parts, Extra Contact Points and Backs, see pages 59 to 61.

Furnished in substantial metal case. No. 599-7744 \$56.50

* Can be furnished with 1.000" spindle movement. Price on application.

7744—Without Dial Indicator.

No. 599-7744-7 \$38.00

7745 DIAL TEST INDICATOR SET—With Permanent Magnet Base. Spindle Movement .025" by .0001". Has Jeweled Bearings.

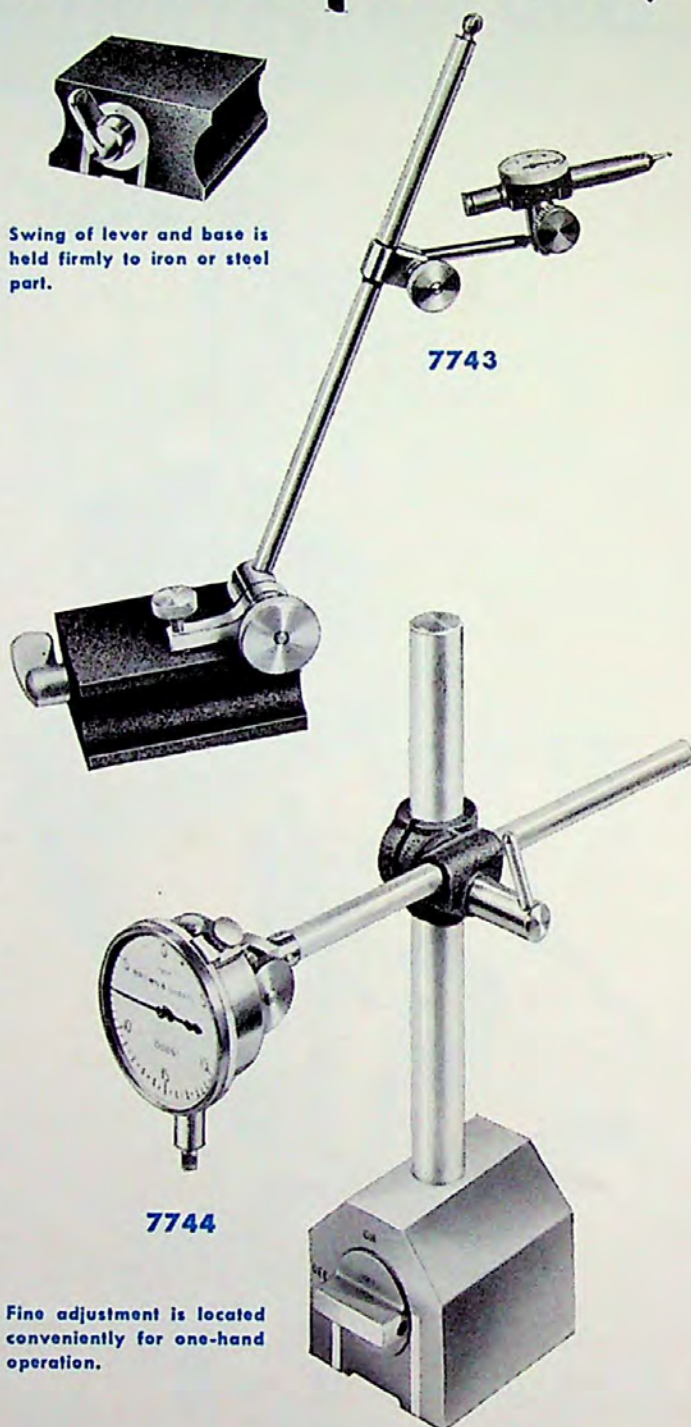
For work where extreme accuracy is required. Similar to 7744 except dial indicator is graduated to .0001". See Dial Indicator 7212, page 53.

Furnished in substantial metal case. No. 599-7745 \$76.50

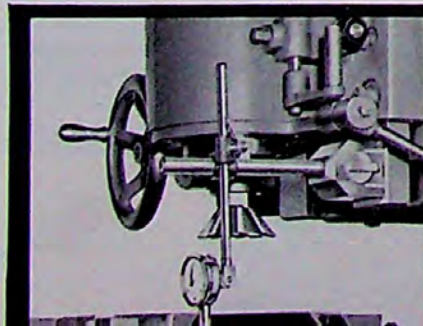
7743, 7744, and 7745 are for sale only in the United States of America, its Territories and Canada.



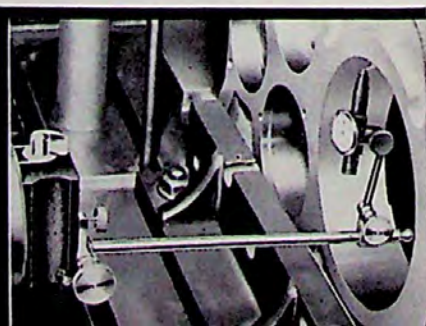
Swing of lever and base is held firmly to iron or steel part.



Fine adjustment is located conveniently for one-hand operation.



At left—7744 used in horizontal position on vertical Milling Machine to check setup of table fixture.



At right—unusual application with 7743 held on end of boring machine spindle rotated with dial attachment to check concentricity of hole.

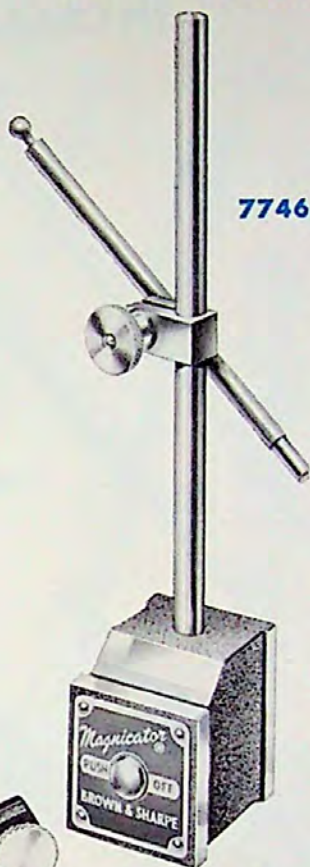
hole and universal attachments...

GIVE INDICATORS GREAT VERSATILITY

7804
AND
7805



7746



7746 MAGNicator®—With Permanent Magnet Base. For Dial Indicators with both Cylindrical and Ball Socket Swivels. Dial Holding Rod .250" Dia., 5½" Long. Upright .375" Dia., 7" High. Base 1½" Wide, 1⅞" Deep and 1⅞" High.

Tests difficult or impossible with conventional indicators are made easily with the 7746 Magnicator.

A simple, one-hand push-button controls the magnetic holding power (pressed from the back, it's "ON"; from the front, it's "OFF"). The three flat energized faces, two sides and bottom, hold firmly to a magnetically conductive surface in any position—upright, horizontal or even upside-down. The V surface holds to round surfaces for tests from spindle to table, or to work.

Smallness and light weight make the Magnicator convenient to handle and its design accommodates Dial Indicators 7025 and 7026 as well as many other indicators.

Furnished in three different ways:

| | | | |
|-------------|--|---------------------|----------------|
| 7746 | As shown, without indicator | No. 599-7746 | \$19.75 |
| 7747 | With 7025 Dial Attachment, Range .030" by .0005" | No. 599-7747 | 45.75 |
| 7748 | With 7026 Dial Attachment, Range .008" by .0001" | No. 599-7748 | 54.75 |

These tools are for sale only in the United States of America, its Territories and Canada.

7800, 7801, 7802 AND 7803 HOLE ATTACHMENTS—

For Use with Dial Test Indicators. Adapt Dial Test Indicators for testing internal and other surfaces which cannot be reached with the spindles of dial indicators. Rigid and sensitive. An added feature is the adjustable fulcrum screw by which any looseness or play in the finger can be eliminated. For use with dial indicators having either .275" diameter or .375" diameter stems.

Fingers are ⅞" in diameter. 7800 and 7802 will enter holes to 1⅞" depth; 7801 and 7803 to 1⅜" depth. 7800 and 7801 are for use with dial indicators with .275" diameter stems; 7802 and 7803 with .375" diameter stems.

7800 and 7802 are for use in deep holes. 7801 and 7803 are suited particularly for use in short, shallow holes or for rough grinding and boring operations as, with short fingers, the tendency to chatter is reduced. The fingers are hardened.

| | | | |
|-------------|---------------------------------------|---------------------|---------------|
| 7800 | Use with Indicator stem of .275" dia. | No. 599-7800 | \$3.25 |
| 7801 | Use with Indicator stem of .275" dia. | No. 599-7801 | 3.25 |
| 7802 | Use with Indicator stem of .375" dia. | No. 599-7802 | 3.25 |
| 7803 | Use with Indicator stem of .375" dia. | No. 599-7803 | 3.25 |

7804 AND 7805 UNIVERSAL ATTACHMENTS—

For Use on Dial Test Indicators. For testing internal and other surfaces that cannot be reached conveniently with regular straight spindle of dial indicator. Consists of a small cylinder that clamps over end of dial indicator stem. Inside cylinder, a rod rests against dial indicator point. This rod is actuated by a 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. These attachments cannot be used on Long Range Indicators.

| | | | |
|-------------|---------------------------------------|---------------------|---------------|
| 7804 | Use with Indicator stem of .275" dia. | No. 599-7804 | \$6.25 |
| 7805 | Use with Indicator stem of .375" dia. | No. 599-7805 | 6.25 |

7801
AND
7803

7800
AND
7802

Hole Attachments 7800 to 7803 permit accurate internal tests with Dial Test Indicators. Available for two stem sizes.

Brown & Sharpe

Attachments —

INCREASE INDICATOR

7806 CLAMP ATTACHMENT—For Use with Dial Indicators. Capacity $\frac{1}{8}$ " to $2\frac{3}{4}$ " Diam., Rod .375" Dia., $5\frac{1}{2}$ " Long.

Holds dial indicator swivel and arm to arbor, spindle or similar machine member while checking runout of parts or alignment of fixtures. Brass shoe on bolt end swivels to prevent marring finished surface. For indicators having swivels for uprights and dial holding rods .375" in diameter and for Indicator Sets 7730, 7733, 7744 and 7745 having uprights .738" in diameter by means of an Adapter Bushing

No. 599-7806 \$4.10

7807 AND 7808 DIAL HOLDING RODS—With Fine Adjustment.

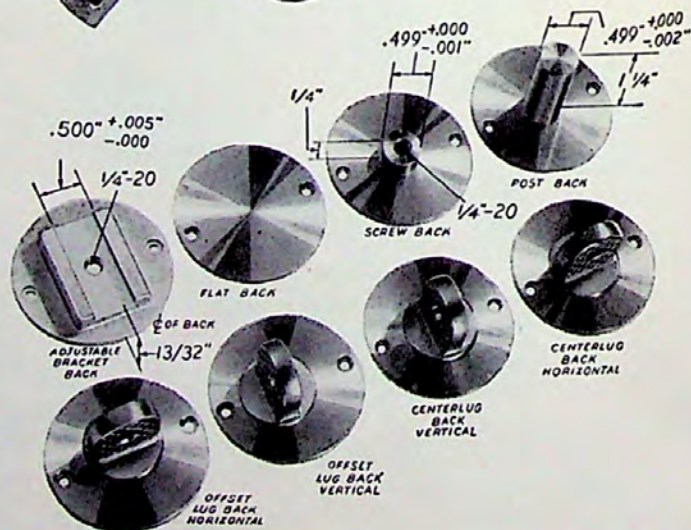
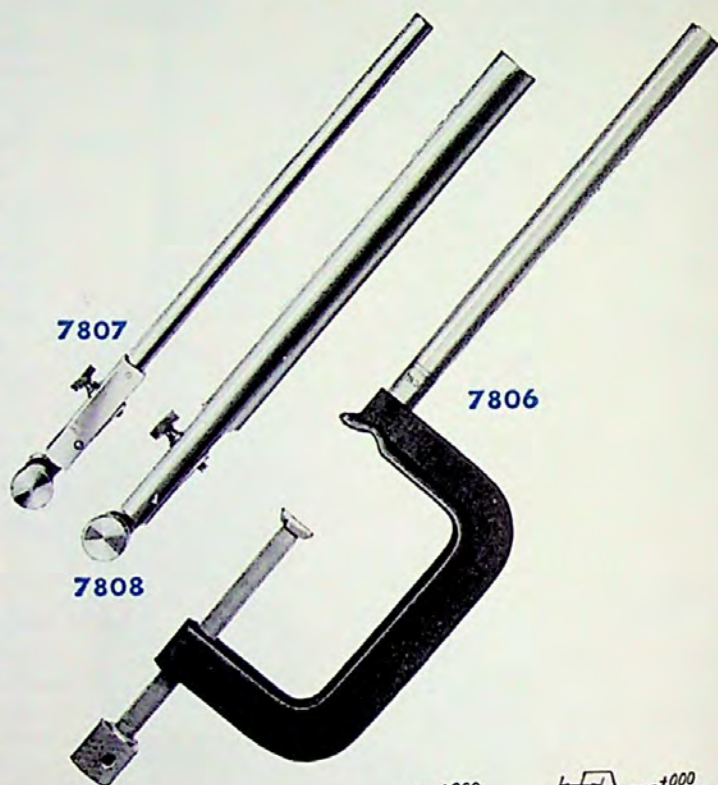
Very advantageous in accurately positioning the Dial Indicator. With the indicator set in approximate position, turning the fine adjustment screw will bring indicator point in contact with the work and further turning will swing indicator hand to the desired position on the dial. 7807 is for use with 7730, 7733, 7744 and 7745 indicator sets. 7808 for 7731 and 7732 indicator sets.

No. 599-7807 \$ 7.50
No. 599-7808 12.50

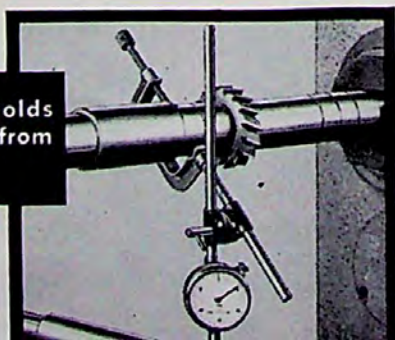
BACKS FOR DIAL INDICATORS—Space limitations, unusual nature of the work and special application frequently require the use of an Indicator Back of a special nature. Backs are made to AGD specifications. Brown & Sharpe Dial Indicators are equipped regularly with back having the vertical center lug.

Diameter shown in left hand columns below.

| Vertical Center Lug Back | | | | Screw Back | | | |
|--------------------------|--------------|--------|--|----------------------------|--------------|--------|--|
| $1\frac{1}{8}$ " | 599-7850-100 | \$1.15 | | $1\frac{1}{8}$ " | 599-7854-100 | \$3.50 | |
| $2\frac{1}{4}$ " | 599-7850-200 | 1.15 | | $2\frac{1}{4}$ " | 599-7854-200 | 3.50 | |
| $2\frac{3}{4}$ " | 599-7850-300 | 1.40 | | $2\frac{3}{4}$ " | 599-7854-300 | 3.75 | |
| Offset Lug Back | | | | Adjustable Bracket Back | | | |
| $1\frac{1}{8}$ " | 599-7851-100 | \$1.15 | | $1\frac{1}{8}$ " | 599-7855-100 | \$3.50 | |
| $2\frac{1}{4}$ " | 599-7851-200 | 1.15 | | $2\frac{1}{4}$ " | 599-7855-200 | 3.50 | |
| $2\frac{3}{4}$ " | 599-7851-300 | 1.40 | | $2\frac{3}{4}$ " | 599-7855-300 | 3.75 | |
| Flat Back | | | | Horizontal Center Lug Back | | | |
| $1\frac{1}{8}$ " | 599-7852-100 | \$1.15 | | $1\frac{1}{8}$ " | 599-7856-100 | \$1.15 | |
| $2\frac{1}{4}$ " | 599-7852-200 | 1.15 | | $2\frac{1}{4}$ " | 599-7856-200 | 1.15 | |
| $2\frac{3}{4}$ " | 599-7852-300 | 1.40 | | $2\frac{3}{4}$ " | 599-7856-300 | 1.40 | |
| Post Back | | | | Horizontal Offset Lug Back | | | |
| $1\frac{1}{8}$ " | 599-7853-100 | \$3.50 | | $1\frac{1}{8}$ " | 599-7857-100 | \$1.15 | |
| $2\frac{1}{4}$ " | 599-7853-200 | 3.50 | | $2\frac{1}{4}$ " | 599-7857-200 | 1.15 | |
| $2\frac{3}{4}$ " | 599-7853-300 | 3.75 | | $2\frac{3}{4}$ " | 599-7857-300 | 1.40 | |



7806 Attachment holds dial gage firmly from machine arbor.



and parts...

USEFULNESS



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

DIAL HOLDING RODS—For use with 7730, 7733, 7744 and 7745 Indicator Sets. No. 599-7900 \$3.25

For use with 7731 and 7732 Sets. No. 599-7901 \$8.25

UPRIGHTS—Upright, .375" diameter, for No. 730, old style. No. 599-7902 \$4.75

Upright, .738" diameter, for 7730. Can be used with bases No. 730 formerly equipped with .375" diameter upright. No. 599-7903 \$6.25

Upright, .987" diameter (not shown) for 7731 and 7732. No. 599-7904 \$9.25

PERMANENT MAGNET BASE AND UPRIGHT—For use with Indicators 7730, 7733, 7744 and 7745. Upright is .738" dia. and 7 1/16" long. Permanent Magnet Base holds in upside down and other positions on small iron or steel surface. No. 599-7905 \$23.75

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

SLIDING SWIVELS—Sliding Swivel, with two .375" holes for Nos. 730 and 733 old style having upright .375" diameter. No. 599-7906 \$3.75

Sliding Swivel with one .375" and one .738" hole for 7730 and 7733 having uprights .738" in diameter, and 7744 and 7745. No. 599-7907 \$3.75

Sliding Swivel, with one .738" and one .987" hole for 7731 and 7732. No. 599-7908 \$11.25

ADAPTER BUSHING—Adapts Swivel with .738" hole for use with 7806 Attachment, Dial Holding Rods, Uprights and Tool Post Clamp Rods .375" dia. No. 599-7909 \$.85

ANGULAR BASE STOPS—For Indicators 7730, 7731 and 7732. Permit indicators to be located from dovetail or angular surface. Ends of legs are rounded.

Angular Stop for 7730. No. 599-7910 \$1.35

Angular Stop for 7731 & 7732. No. 599-7911 \$1.35

PLAIN BASE STOPS—For Indicators 7730, 7731 and 7732. Permit indicators to be located from T slots and square edges.

Plain stop for 7730. No. 599-7912 \$1.75

Plain Stop for 7731 and 7732. No. 599-7913 \$1.75

CONTACT POINTS—Regular, Button, Round Pointed, and Ball Points are available as listed. The other Points shown are furnished to order as well as other special Points including carbide, sapphire or diamond tip contact points. Brown & Sharpe Dial Indicators are regularly furnished with 1/4" long Regular Points.

Regular Points

| | | |
|-------------|------------|-------|
| 1/4" length | 599-7880-1 | \$.25 |
| 1/2" length | 599-7880-2 | .25 |
| 3/4" length | 599-7880-3 | .25 |
| 1" length | 599-7880-4 | .25 |

Round Pointed Points

| | | |
|-------------|------------|-------|
| 1/4" length | 599-7882-1 | \$.50 |
| 1/2" length | 599-7882-2 | .50 |
| 3/4" length | 599-7882-3 | .50 |
| 1" length | 599-7882-4 | .50 |

Button Points

| | | |
|------------|------------|-------|
| 1/4" diam. | 599-7881-1 | \$.75 |
| 3/8" diam. | 599-7881-2 | .75 |
| 1/2" diam. | 599-7881-3 | .75 |

Ball Points for No. 7025 Dial Indicator

| | | |
|------------|------------|-------|
| .04" diam. | 599-7883-1 | \$.50 |
| .08" diam. | 599-7883-2 | .50 |
| .12" diam. | 599-7883-3 | .50 |

Ball Points for 7026 Dial Indicator

| | | |
|-------------|------------|--------|
| .031" diam. | 599-7884-1 | \$1.50 |
| .10" diam. | 599-7884-2 | 1.50 |

Brown & Sharpe

Special Precision Tools...

Frequently, a special precision tool can simplify or make easy an otherwise difficult measurement. However, the successful design and manufacture of special precision tools depends upon the knowledge and experience of the manufacturer as such designs frequently cannot be based on a prototype or similar tool. Where precision definitely is a criterion, many considerations and influences are involved in the conception of a new product.

Brown & Sharpe is particularly well fortified with knowledge and experience gained in over one hundred years in the manufacture of precision products, as well as with equipment appropriate for such demanding manufacture. Customers are invited to discuss with us any needs which they may have for special precision tools to do odd and unusual jobs, or for the adapting of any of our current designs for special applications.

Special Super Micrometer Head with figured graduations reading .0001" directly. Note dual system of graduations which permit reading the setting as micrometer screw is advanced or withdrawn.

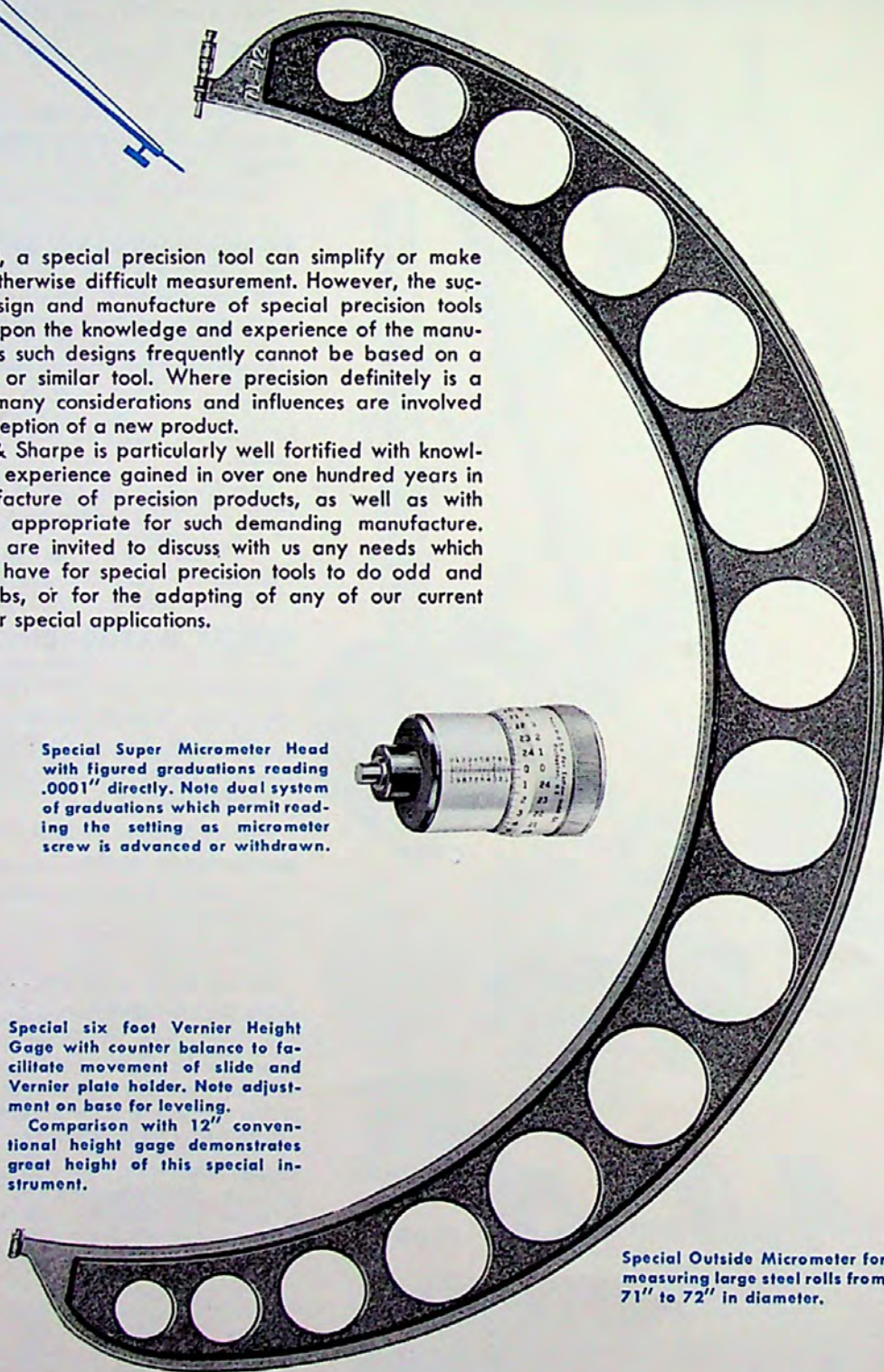


Special six foot Vernier Height Gage with counter balance to facilitate movement of slide and Vernier plate holder. Note adjustment on base for leveling.

Comparison with 12" conventional height gage demonstrates great height of this special instrument.



Special Outside Micrometer for measuring large steel rolls from 71" to 72" in diameter.



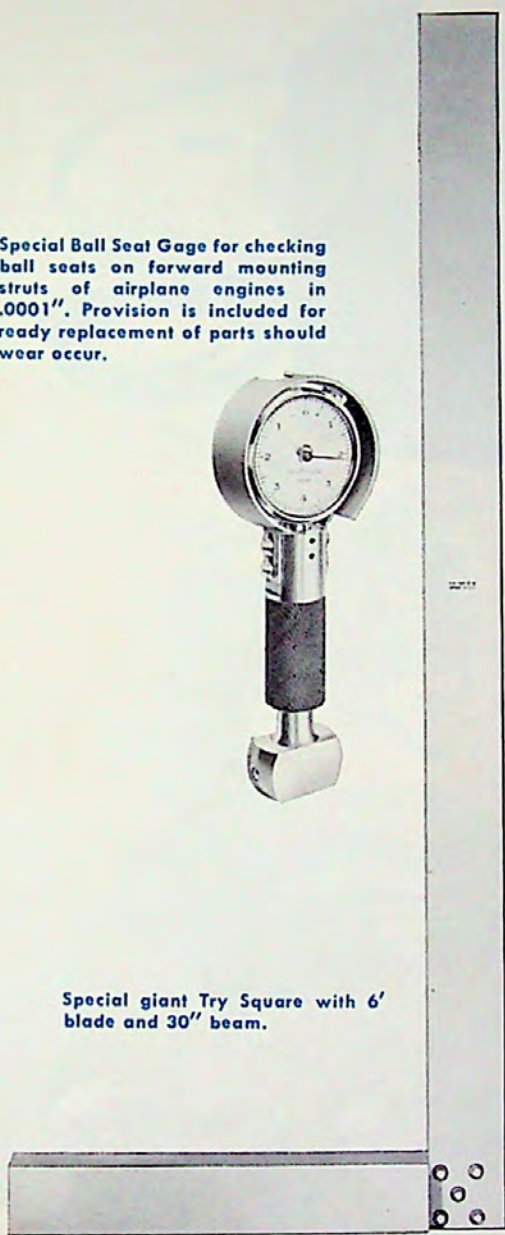
Special 12' 6"-Vernier Caliper. The uniform, accurate spacing of the graduations over such a long distance, and the alignments and adjustments are of vital importance in a precision tool of such great size.

Note comparative size of 12" Vernier Caliper with the 12' 6" giant.

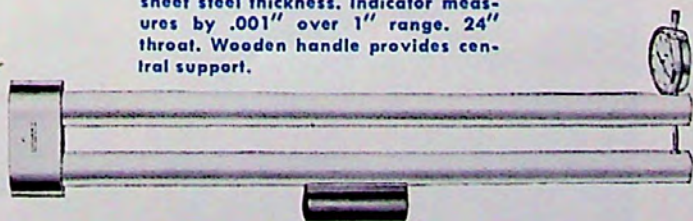
Special Ball Seat Gage for checking ball seats on forward mounting struts of airplane engines in .0001". Provision is included for ready replacement of parts should wear occur.



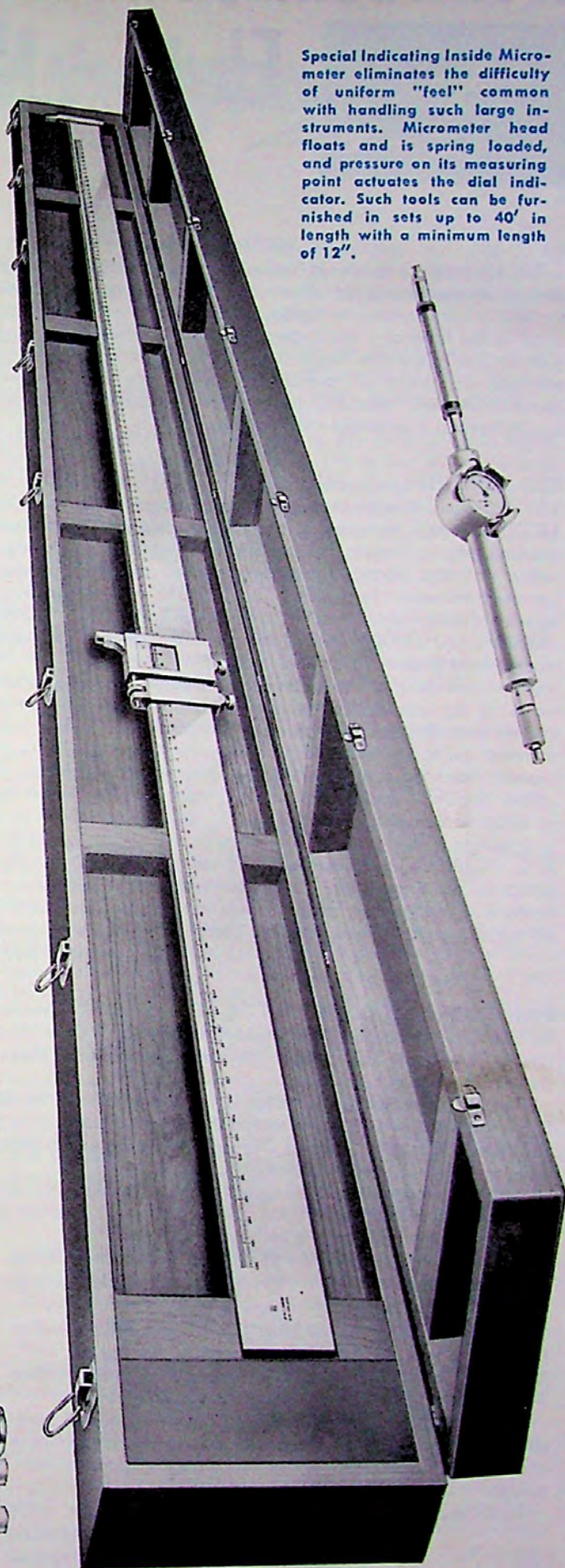
Special giant Try Square with 6' blade and 30" beam.



A specially designed tool for checking sheet steel thickness. Indicator measures by .001" over 1" range. 24" throat. Wooden handle provides central support.



Special Indicating Inside Micrometer eliminates the difficulty of uniform "feel" common with handling such large instruments. Micrometer head floats and is spring loaded, and pressure on its measuring point actuates the dial indicator. Such tools can be furnished in sets up to 40' in length with a minimum length of 12".



Electronic Measuring and Inspecting

This equipment provides reliable means for taking external and internal measurements electronically in units varying from .0001" to .00001". It employs the highly dependable Wheatstone bridge circuit in the form of a strain gage. Its design provides simple adjustment and desirable flexibility. All important heat generating electrical equipment is separate from measuring units preventing temperature drift troubles. Its unvarying accuracy helps make quality control a practical accomplishment.

950 AMPLIFIER—Simplified Setting .0001" to .00001". The 950 Amplifier, through electronic means, magnifies from 1800 to 18000 times the movement of the gaging points of the comparators and gaging devices used with it. This high degree of magnification variation permits the widely spaced dial graduations to represent values of from .0001" to .00001" and the graduation selector is calibrated in increments of .0001", .00005", .000025", .00002", and .00001", with settings between these graduations made easily to match tolerance limits.

At a movement of the graduation selector, measurements are made at the established tolerance marked on the selector dial. Intermediate divisions to conform to any tolerances between these extreme limits are established easily. Meter response is very rapid. Pointer moves quickly to dead stop without vibration.

The "Set Zero" control permits the meter pointer to be set easily at zero when making a setting.

Amplifier is designed for use with power circuits of 115 volts A. C., 50/60 cycles. Fluctuations of from 105 to 125 volts do not affect the readings. Other power characteristics require converter. Power is turned on or off by switch at front of instrument. Furnished with eight feet of two-wire cord, and leatherette cover.

No. 599-950 \$399.00

951 EXTERNAL COMPARATOR—Range 0-4"—Measures by .0001" to .00001". Simplified setting. One Master Only. Enclosed Elevating Screw. Adjustable Pressure. Reversible Anvil.

The 951 External Comparator is for use with the 950 Brown & Sharpe Amplifier. The construction is rugged throughout to resist vibration. Measuring point is Norbide to reduce wear. Diamond point can be furnished to order.

Mechanism is shock-protected. Anvil is reversible, one side having a narrow surface for small parts. Only one master or gage block is required and instrument is self-checking.

Furnished with three feet of shielded, three-wire cable, and leatherette cover.

No. 599-951 \$531.00

952 INTERNAL COMPARATOR ATTACHMENT—For Use with 951 External Comparator. Range 1/2"-2". Measures by .0001"—.00001". Simplified Setting. One Master only. Frictionless. No Pivots to Wear.

Range of measurement is made possible by use of interchangeable plugs. Measuring point is tipped with carbide to resist wear. Frictionless linkage from gaging point to comparator makes for accurate response.

Furnished with one Plug finished to a specified size.

| | |
|-------------|------------------------|
| No. 599-952 | \$232.00 |
| Extra Plug | Order by Size \$100.00 |



950



951



952

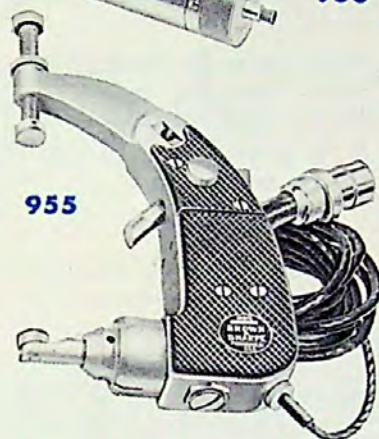
External comparator 951—in use with Amplifier 950 mounted on Signal Light Attachment 958.



Equipment — provides unvarying accuracy...



953



955



958

The cartridge in this fixture tests spindles in a wide range of diameters. Its versatility adapts Cartridge for practically unlimited applications in testing fixtures and other measuring devices.

953 GAGE HEAD CARTRIDGE—Measures by .0001" to .00001". Frictionless. Unaffected by Dust or Moisture. For Severe Service. Adjustable Pressure. Wide Adaptability. For Gages, Fixtures and Sorting Devices.

953 Gage Head Cartridge is for use with 950 Brown & Sharpe Amplifier. Spindle with measuring point is mounted in diaphragms. Movement is frictionless. Measuring point normally furnished is hardened steel.

Pressure adjustable from 3/4 pound to 2 1/2 pounds, when amplifier is set to .0001" sensitivity; from 1 1/2 ounces to 2 1/2 pounds when set to .00001". Diamond, carbide or tungsten carbide contact points can be furnished on order. Furnished with 6 feet of special 3-wire shielded cable.

No. 599-953 \$165.00

Tap for cartridge can be furnished to order. 1 1/4" 20 Am. Nat. Thrd. No. 783-101-2. Price on Application.

955 ELECTRONIC CALIPER—Range—1", 4 Sizes—0 to 1, 1" to 2", 2" to 3" and 3" to 4". Measures by .0001" to .00001".

On-the-Machine—Fixture—or Bench Measurements. Adjustable Pressure. Unaffected by Moisture or Dust. One Master Only. Carbide Measuring Surfaces.

The 955 Electronic Caliper is for use with 950 Brown & Sharpe Electronic Amplifier. The range of measurements from 0 to 4" is made possible by four interchangeable jaws. Each jaw has a range of 1" and is provided with an adjustable back rest to make the caliper self-centralizing.

Pressure is factory set at 1 1/2 pounds and is adjustable from 1 pound to 5 pounds.

Caliper has a dull chrome and aluminum finish with knurled plastic insulation pads attached to each side of body and jaws for convenience in handling, and to minimize the effect of heat from the hands. Furnished with seven feet of shielded light, flexible cable and connector for amplifier.

One flat and one hex wrench are included. Interchangeable jaws, also, can be furnished separately.

955 Electronic Caliper

| | | |
|---------|---------------|----------|
| 0 - 1" | No. 599-955-1 | \$197.00 |
| 1" - 2" | No. 599-955-2 | 197.00 |
| 2" - 3" | No. 599-955-3 | 197.00 |
| 3" - 4" | No. 599-955-4 | 197.00 |

Interchangeable Jaws

| | | |
|---------|------------------|---------|
| 0 - 1" | No. 599-9955-125 | \$45.00 |
| 1" - 2" | No. 599-9955-225 | 45.00 |
| 2" - 3" | No. 599-9955-325 | 45.00 |
| 3" - 4" | No. 599-9955-425 | 45.00 |

957 ELECTRONIC CALIPER SET—Includes one caliper body, four interchangeable jaws with combined range of measurement of 0 to 4", and necessary wrenches. Furnished in wooden case.

No. 599-957 \$352.00

958 SIGNAL LIGHT ATTACHMENT—For Use with 950 Amplifier. Attaches easily and quickly to the bottom of 950 Brown & Sharpe Amplifier. Three lights in back of red, amber and blue lenses disclose at a glance condition of work piece. Amber light glows if work piece is within tolerance; red light if too small, and blue light if too large. Attachment is adjusted easily and quickly.

Furnished with leatherette cover which accommodates both 950 Amplifier and Signal Light Attachment when assembled together.

No. 599-958 \$286.00

Brown & Sharpe

Johansson

THRIFT

Blocks

GENERAL DESCRIPTION—Johansson Thrift and Gage Blocks are rectangular pieces of tool steel measuring $\frac{3}{8}$ " by $1\frac{3}{8}$ " by whatever third dimension may be specified and which is held to within a few millionths of an inch. Final finish is performed by burnishing or plating with chromium. Internal tension of the blocks is relieved, and the molecules of the metal approach a state of equilibrium, hence warping or "growing" is checked.

USES—Johansson Gage Blocks generally are used for master laboratory standards to control measurements, toolroom measuring instruments or checking inspection gages. Used with accessories the blocks will check angles, inside or outside measurements, locations, inspection, plug or production gages and micrometer calipers. They are also used to set mechanical, electrical, and snap gages, and make up into super-accurate height and snap gages. They may be assembled into precision trammels for scribing lines and circles and spacing or locating points.

STANDARDS OF ACCURACY—There are three classes, or standards of Johansson Gage Blocks—"Thrift" or "B", "A" and "AA"—and these limits, for a block up to 1" in length and for each inch of length or longer blocks, are as follows:—

| Class | Accuracy |
|-----------------|--------------------|
| "Thrift" or "B" | $\pm .000008$ inch |
| "A" | $\pm .000004$ inch |
| "AA" | $\pm .000002$ inch |

The fidelity with which Gage Blocks will cross-check is demonstrated by the manner in which this stack of seventy-six blocks exactly coincides in overall length with the length of a single block.

INSPECTION—Johansson Gage Blocks are long-wearing and little affected by ordinary temperature changes. As blocks wear with use, they should be inspected once a year. After inspection, a certificate of inspection is issued indicating actual sizes. Charges for such inspection are moderate.

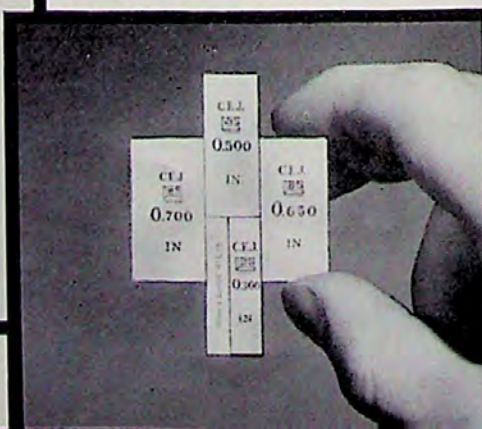
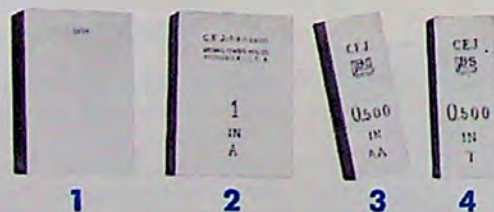
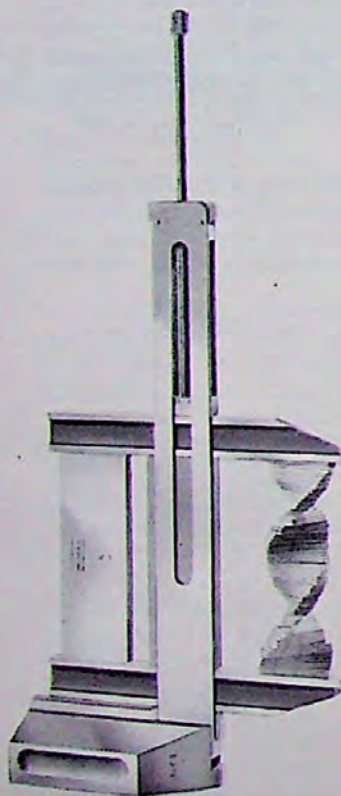
PARALLELISM—Making one steel surface parallel with another is difficult; but to generate those parallel surfaces a predetermined distance apart, in millionths of an inch, enormously complicates the task. That this has been accomplished is proved by the way Johansson Gage Blocks consistently match each other, disclosing no lack of accuracy when any are reversed.

FLATNESS—Johansson methods of finishing produce a flat surface with the appearance of burnished silver, approaching more nearly a perfect plane than any other surface produced by the hand of man. When "wrung" together, two or more of the blocks cling as though magnetized. The degree of this cohesion has been demonstrated to be more than thirty times that which could be ascribed to atmospheric pressure.

CHROMIUM PLATING—The Gage Blocks in Class "B" working and Class "A" inspection sets can be furnished chromium plated. The extra hard wearing surfaces of these chromium plated blocks make them desirable where service is exceptionally severe.

The classifications of "Jo"-Blocks may be identified as follows: "B", "A", and "AA" blocks in sets have a serial number etched on the backs (Fig. 1). "A" and "AA" blocks are identified by the etched letters on the faces (Figs. 2 and 3). "B" quality blocks have no letter on the faces, and "Thrift" Blocks have the letter "T" (Fig. 4).

Parallelism is demonstrated by the fact that any block in any combination may be turned, end to end, without affecting the total size or the parallelism of the two extreme surfaces.



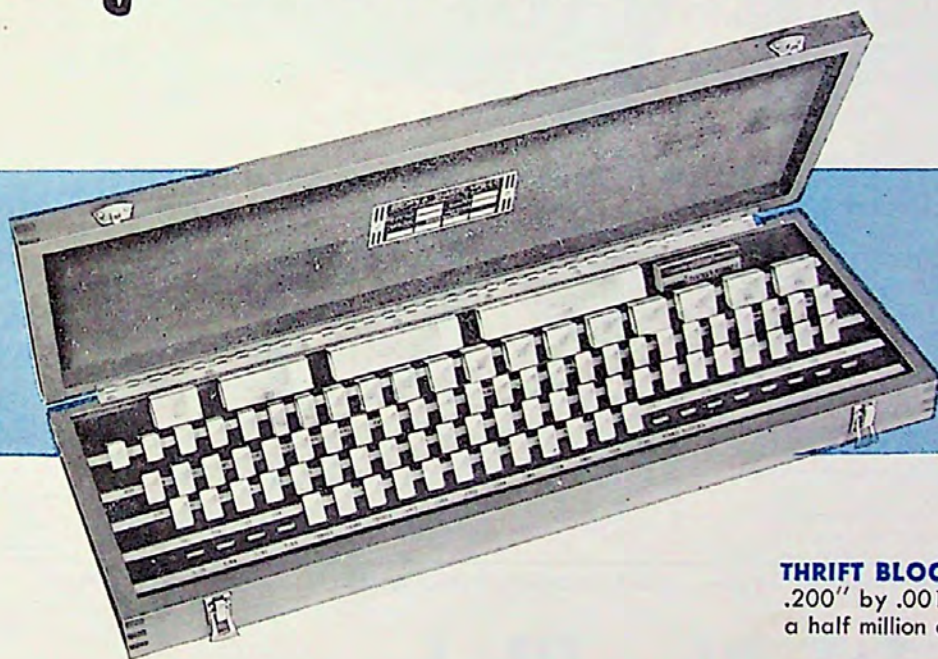
offer high accuracy - low cost...

Brown & Sharpe Thrift Blocks give you "Class B" accuracy at a greatly reduced cost: "Thrifty-Jo's" can be used to check working gages or assembled into actual working gages by using the Jo-Block Accessories. They save time and money on hundreds of different measurements.

Johansson Thrift Blocks have an accuracy and parallelism of $\pm .000008$ inch with surface finish from 1.0 to 1.5 micro-inch R. M. S. The flatness is within .000006 inch.

The two sets of "Thrifty-Jo's" cover the majority of shop measurements. Individual or chromium carbide wear blocks are available. Jo-Block Accessories can be used to simplify the applications of the new blocks, and extend their usefulness.

Thrift Blocks... SET NO. 1



Set is furnished in case and includes a deburring stone and chamois cloth for wiping the blocks prior to use. Extra spaces are provided for wear blocks, and other blocks which may be added.

THRIFT BLOCK SET NO. 1—84 Blocks—.100" to .200" by .001"; .200" to over 12" by .000025"—a half million different gage sizes.

Twenty-five Millionths (.000025") Series—3 Blocks
.100025" .100050" .100075"

One Ten-Thousandth (.0001") Series—9 Blocks
.1001" to .1009" by .0001"

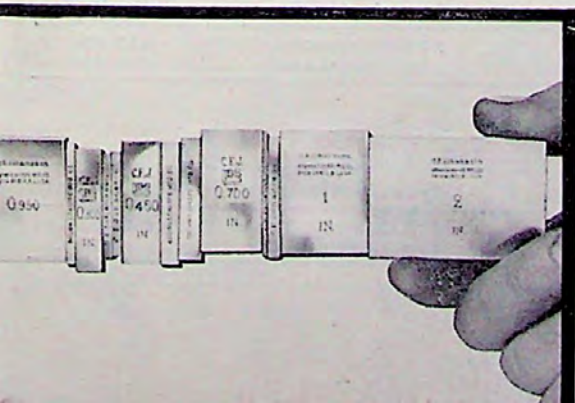
One Thousandth (.001") Series—49 Blocks
.101" to .149" by .001"

Fifty One-Thousandths (.050") Series—19 Blocks
.050" to .950" by .050"

Inch (1.000") Series—4 Blocks
1.000" to 4.000" by 1.000"

No. 598-1-120 \$270.00

"Wrung" together, "Jo"-Blocks have sustained a weight of 220 pounds, of which atmospheric pressure could have contributed no more than 6.6 pounds.





Brown & Sharpe

Thrift Blocks...

SET AND INDIVIDUALS

THRIFT BLOCK SET NO. 2— 36 Blocks—.300" to over 8" by .000050"—over 150,000 different gage sizes.

Fifty-Millionths (.000050") Series—1 Block
.100050"

One Ten-Thousandth (.0001") Series—9 Blocks
.1001" to .1009" by .0001"

One Thousandth (.001") Series—9 Blocks
.101" to .109" by .001"

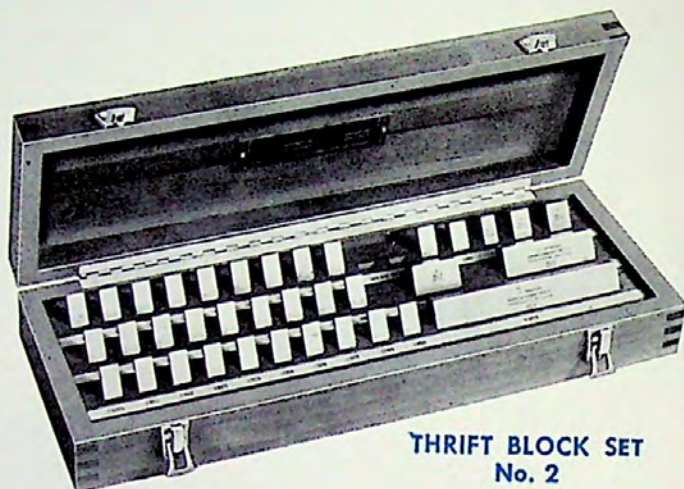
Ten One-Thousandths (.010") Series—9 Blocks
.110" to .190" by .010"

One Hundred One-Thousandths (.100") Series—5 Blocks
.100" to .500" by .100"

Inch (1.000") Series—3 Blocks
1.000" 2.000" 4.000"

Set is furnished in case having spaces providing for wear blocks, and chamois cloth for wiping blocks prior to use.

No. 598-2-120 \$135.00



**THRIFT BLOCK SET
No. 2**

INDIVIDUAL THRIFT BLOCKS—STANDARD SIZES—Only listed sizes furnished

| Size, Inches | Price, Each | Size, Inches | Price, Each | Size, Inches | Price, Each | Size, Inches | Price, Each | Size, Inches | Price, Each | Size, Inches | Price, Each | Size, Inches | Price, Each |
|----------------|-------------|--------------|-------------|---------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|
| .050 | \$4.50 | .1003 | \$2.75 | .104 | \$2.75 | .114 | \$2.75 | .126 | \$2.75 | .137 | \$2.75 | .149 | \$2.75 |
| $\frac{1}{16}$ | | .1004 | | .105 | | .115 | | .127 | | .138 | | .150 | |
| $\frac{3}{16}$ | | .1005 | | .106 | | .116 | | .128 | | .139 | | .160 | |
| $\frac{1}{2}$ | | .1006 | | .107 | | .117 | | .129 | | .140 | | .170 | |
| .100 | \$2.75 | .1007 | \$2.75 | .108 | \$2.75 | .118 | \$2.75 | .130 | \$2.75 | .141 | \$2.75 | .180 | \$2.75 |
| .100025 | | .10075 | | .109 | | .119 | | .131 | | .142 | | .190 | |
| .10005 | | .1008 | | $\frac{3}{4}$ | | .120 | | .132 | | .143 | | .200 | |
| .100075 | | .1009 | | .110 | | .121 | | .133 | | .144 | | .250 | |
| .1001 | \$2.75 | .101 | \$2.75 | .111 | \$2.75 | .122 | \$2.75 | .134 | \$2.75 | .145 | \$2.75 | .300 | \$3.30 |
| .1002 | | .102 | | .112 | | .123 | | .135 | | .146 | | .350 | |
| .10025 | | .103 | | .113 | | .124 | | .136 | | .147 | | .400 | |
| | | | | | | .125 | | | | .148 | | .450 | |
| | | | | | | | | | | | | .500 | \$3.75 |
| | | | | | | | | | | | | .550 | |
| | | | | | | | | | | | | .600 | |
| | | | | | | | | | | | | .650 | |
| | | | | | | | | | | | | .700 | \$4.00 |
| | | | | | | | | | | | | .750 | |
| | | | | | | | | | | | | .800 | |
| | | | | | | | | | | | | .850 | |
| | | | | | | | | | | | | .900 | \$4.00 |
| | | | | | | | | | | | | .950 | |
| | | | | | | | | | | | | 1.000 | |
| | | | | | | | | | | | | 2.000 | |
| | | | | | | | | | | | | 3.000 | 7.25 |
| | | | | | | | | | | | | 4.000 | 8.75 |
| | | | | | | | | | | | | | 10.50 |

For intermediate sizes, not listed above, see listing of Class "B" Blocks, Page 71.

Thrift Carbide Wear Blocks...

WEAR BLOCKS are made of highly wear-resistant chromium carbide for service as facing blocks in Johansson "Thrift" Block combinations. Available in two sizes—.050" and .100"—individually and in sets of two of one size in a case.

| INDIVIDUAL WEAR BLOCKS | | |
|------------------------|-----------------|-------------|
| Size, Inches | Order by Number | Price, Each |
| .050 | 598-05000-443 | \$13.50 |
| .100 | 598-10000-443 | 13.50 |

ACCESSORIES—A variety of Accessory Sets, Adjustable Holders, and Sine Bars, which simplify the use of Thrift Blocks for shop measurements is shown on pages 72 and 73.

| SETS of TWO WEAR BLOCKS in CASE | | |
|---------------------------------|-----------------|----------------|
| Size, Inches | Order by Number | Price, per Set |
| .050 | 598-05000-305 | \$31.50 |
| .100 | 598-10000-305 | 31.50 |

Brown & Sharpe

Johansson Gage Block Sets...

TRUE GEMS OF PRECISION

"JO"-Blocks® represent one of the most highly regarded precision standards. They are made with extreme care of stabilized steel in which internal tension is relieved under carefully controlled conditions. The blocks are "true gems of precision".

A shop equipped with Johansson Gage Blocks is equipped to work to the finest degree of precision.

GAGE BLOCK SET NO. 1—81 Blocks—.100" to .200" by .001". .200" to over 12" by .0001". Made in three classes: Working Set Class B, Inspection Set Class A, Laboratory Set Class AA. 120,000 different gage sizes from minimum sizes of .100" to .200" by .001" and from .200" to over 12" by .0001".

One Ten-Thousandth (.0001") Series—9 Blocks
.1001" to .1009" by .0001"

One Thousandth (.001") Series—49 Blocks
.101" to .149" by .001"

Fifty One-Thousandths (.050") Series—19 Blocks
.050" to .950" by .050"

Inch (1.000") Series—4 Blocks
1.000" to 4.000" by 1.000"

| Class | Order by Number | Price |
|----------------------|-----------------|----------|
| "B" Chromium Plated | 598-1-111 | \$539.00 |
| "A" Plain | 598-1-122 | 550.00 |
| "A" Chromium Plated | 598-1-112 | 682.00 |
| "AA" Plain | 598-1-123 | On App. |
| "AA" Chromium Plated | | On App. |

Furnished complete in case.

GAGE BLOCK SET NO. 2—35 Blocks—.300" to over 8" by .0001". Made in three classes: Working Set Class B, Inspection Set Class A, Laboratory Set Class AA. 80,000 different gage sizes from minimum size of .300" to over 8" by .0001".

One Ten-Thousandth (.0001") Series—9 Blocks
.1001" to .1009" by .0001"

One Thousandth (.001") Series—9 Blocks
.101" to .109" by .001"

Ten One-Thousandths (.010") Series—9 Blocks
.110" to .190" by .010"

One Hundred One-Thousandths (.100") Series—5 Blocks
.100" to .500" by .100"

Inch (1.000") Series—3 Blocks
1.000" 2.000" 4.000"

| Class | Order by Number | Price |
|----------------------|-----------------|----------|
| "B" Chromium Plated | 598-2-111 | \$242.00 |
| "A" Plain | 598-2-122 | 272.00 |
| "A" Chromium Plated | 598-2-112 | 332.00 |
| "AA" Plain | 598-2-123 | On App. |
| "AA" Chromium Plated | | On App. |

Furnished complete in case.



SET. No. 1

GAGE BLOCK SET NO. 3—36 Blocks—.150" to over 4.250" by .00005". Made in two classes: Working set Class B, Inspection Set Class A. 80,000 different gage sizes from minimum size of .150" to over 4.250" by .00005".

Five One-Hundred-Thousandths (.00005") Series—1 Block
.05005"

One Ten-Thousandth (.0001") Series—9 Blocks
.0501" to .0509" by .0001"

One Thousandth (.001") Series—9 Blocks
.051" to .059" by .001"

Ten One-Thousandths (.010") Series—10 Blocks
.050" to .150" by .010"

One Hundred One-Thousandths (.100") Series—5 Blocks
.100" to .500" by .100"

Inch (1.000") Series—2 Blocks
1.000" 2.000"

| Class | Order by Number | Price |
|---------------------|-----------------|----------|
| "B" Chromium Plated | 598-3-111 | \$302.00 |
| "A" Plain | 598-3-122 | 332.00 |
| "A" Chromium Plated | 598-3-112 | 411.00 |

Furnished complete in case.

GAGE BLOCK SET NO. 4—28 Blocks—.040" to .060" by .0001", .060" to over .375" by .00005".

Five One-Hundred-Thousandths (.00005") Series—1 Block
.02005"

One Ten-Thousandths (.0001") Series—9 Blocks
.0201" to .0209" by .0001"

One Thousandth (.001") Series—9 Blocks
.021" to .029" by .001"

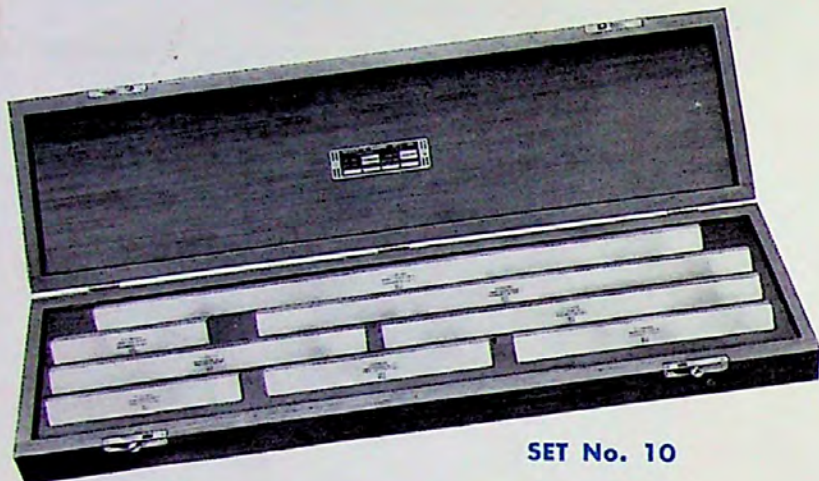
Ten One-Thousandths (.010") Series—9 Blocks
.010" to .090" by .010"

Class "A" Plain | No. 598-4-122 | \$429.00
Furnished complete in case.

Brown & Sharpe

Gage Block Sets...

MEASUREMENT STANDARDS FOR INDUSTRY



SET No. 10

GAGE BLOCK SET NO. 10— 8 Blocks—5" to 84" by 1". 74 different gage sizes of even 1" lengths between a minimum size of 5" and a maximum of 84". Furnished plain only and not chromium plated in two classes: Inspection Set Class A, Laboratory Set Class AA—5.000" to 8.000" by 1.000"; 10.000" and 12.000" to 20.000" by 4.000".

| | | |
|-----------------------------|----------------|----------------|
| Class "A" Plain | No. 598-10-122 | \$496.00 |
| Class "AA" Plain | No. 598-10-123 | On Application |
| Furnished complete in case. | | |

GAGE BLOCK SET NO. 15—7 Blocks—.03125" to 3.96875" by .03125". 127 different gage sizes. Furnished plain or chromium plated except the .03125" gage block is not chromium plated.

Made in two classes: Working Set Class B, Inspection Set Class A—.03125", .0625", .125", .250", .500", 1.000", 2.000".

* Not chromium plated

| | | |
|-----------------------------|----------------|---------|
| Class "B" Chromium Plated | No. 598-15-111 | \$70.50 |
| Class "A" Plain | No. 598-15-122 | 77.00 |
| Class "A" Chromium Plated | No. 598-15-112 | 96.00 |
| Furnished complete in case. | | |

CARBIDE WEAR BLOCKS *—Made of tungsten carbide, highly resistant to wear, and furnished in two sizes, .050" and .100", for service as outer blocks in gage block combinations.

Cases can be furnished for sets of two of one size or for sets of two of each of the two sizes. * See also page 68 for Thrift Carbide Wear Blocks

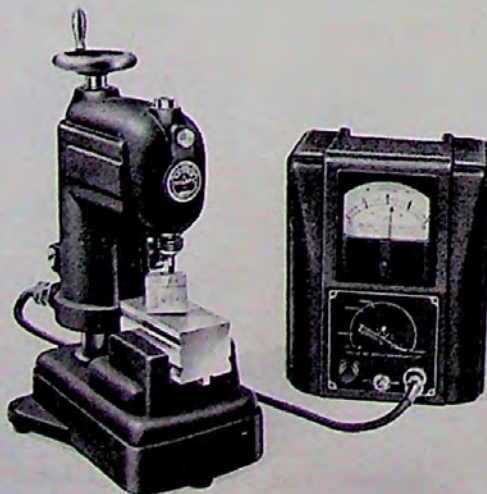
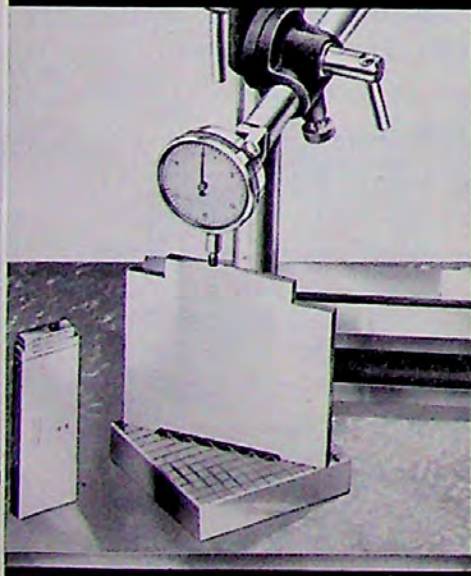
| Size, Inches | Price, Each | |
|--------------|-------------|-----------|
| | Class "B" | Class "A" |
| .050 | \$18.00 | \$24.25 |
| .100 | 18.00 | 24.25 |

Cases for sets of two or four blocks—each \$4.50

Set to "Jo"-Block size, a dial gage discloses when work under inspection is "on the button."

Highly precise electronic measuring equipment depends on "Jo"-Blocks for original setting.

"Jo"-Blocks with jaws precisely determine length measurements.



Individual Gage Blocks...

STANDARD SIZES

| Size, Inches | Price Each Class B Plain | Class B Chrome | Class A Plain | Size, Inches | Price Each Class B Plain | Class B Chrome | Class A Plain |
|--------------|--------------------------------|-------------------|------------------|--------------|--------------------------------|-------------------|------------------|
| .010 | \$17.40 | | \$23.00 | .108 | | | |
| .020 | | | | .109 | | | |
| .02005 | | | | .110 | | | |
| .0201 | | | | .111 | | | |
| .0202 | | | | .112 | | | |
| .0203 | | | | .113 | | | |
| .0204 | | | | .114 | | | |
| .0205 | | | | .115 | | | |
| .0206 | | | | .116 | | | |
| .0207 | | | | .117 | | | |
| .0208 | | | | .118 | | | |
| .0209 | 14.45 | | 19.00 | .119 | | | |
| .021 | | | | .120 | | | |
| .022 | | | | .121 | | | |
| .023 | | | | .122 | | | |
| .024 | | | | .123 | | | |
| .025 | | | | .124 | | | |
| .026 | | | | .125 | | | |
| .027 | | | | .126 | | | |
| .028 | | | | .127 | | | |
| .029 | | | | .128 | | | |
| .030 | 12.20 | | 16.00 | .129 | | | |
| .03125 | 12.20 | | 16.00 | .130 | | | |
| .040 | 10.35 | | 13.50 | .131 | | | |
| .050 | | | | .132 | \$5.00 | \$6.00 | \$7.00 |
| .05005 | | | | .133 | | | |
| .0501 | | | | .134 | | | |
| .0502 | | | | .135 | | | |
| .0503 | | | | .136 | | | |
| .0504 | | | | .137 | | | |
| .0505 | | | | .138 | | | |
| .0506 | | | | .139 | | | |
| .0507 | | | | .140 | | | |
| .0508 | | | | .141 | | | |
| .0509 | 8.15 | 9.80 | 10.50 | .142 | | | |
| .051 | | | | .143 | | | |
| .052 | | | | .144 | | | |
| .053 | | | | .145 | | | |
| .054 | | | | .146 | | | |
| .055 | | | | .147 | | | |
| .056 | | | | .148 | | | |
| .057 | | | | .149 | | | |
| .058 | | | | .150 | | | |
| .059 | | | | .160 | | | |
| .060 | | | | .170 | | | |
| .0625 | | | | .180 | | | |
| .070 | 7.40 | 8.90 | 10.00 | .190 | | | |
| .080 | 6.65 | 8.00 | 8.50 | .200 | | | |
| .090 | 5.95 | 7.15 | 8.00 | .250 | | | |
| .100 | 5.00 | 6.00 | | .300 | | | |
| .10001 | | | | .350 | | | |
| .10002 | | | | .400 | 5.95 | 7.15 | 8.00 |
| .10003 | | | | .450 | | | |
| .10004 | | | | .500 | | | |
| .10005 | | | 7.00 | .550 | | | |
| .10006 | | | | .600 | | | |
| .10007 | | | | .650 | 6.65 | 8.00 | 8.75 |
| .10008 | | | | .700 | | | |
| .10009 | | | | .750 | | | |
| .1001 | | | | .800 | | | |
| .1002 | | | | .850 | | | |
| .1003 | | | | .900 | 7.40 | 8.90 | 10.00 |
| .1004 | | | | .950 | | | |
| .1005 | | | | 1.000 | | | |
| .1006 | | | | 2.000 | 13.30 | 15.95 | 18.00 |
| .1007 | | | | 3.000 | 16.20 | 19.45 | 22.00 |
| .1008 | | | | 4.000 | 19.10 | 22.90 | 26.50 |
| .1009 | 5.00 | 6.00 | 7.00 | 5.000 | 26.50 | | 35.50 |
| .101 | | | | 6.000 | 30.85 | | 41.00 |
| .102 | | | | 7.000 | 35.30 | | 47.00 |
| .103 | | | | 8.000 | 39.65 | | 53.00 |
| .104 | | | | 10.000 | 48.45 | | 65.00 |
| .105 | | | | 12.000 | 57.20 | | 76.00 |
| .106 | | | | 16.000 | 75.25 | | 100.00 |
| .107 | | | | 20.000 | 92.95 | | 123.00 |

Individual Gage Blocks make it possible for owners of sets with several damaged or excessively worn blocks to re-establish their complete sets through the purchase of one or more blocks.

These blocks also are the ideal answer for the accurate establishing of distances in testing and inspection fixtures and other precise measuring devices.

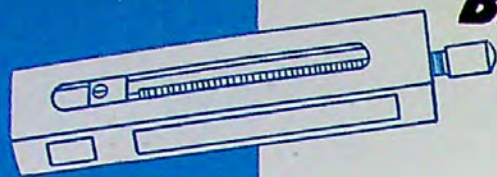
SPECIAL SIZES

Individual gage blocks are made in special sizes not listed in the table of standard sizes at left from size .010" to 20.000" at prices listed below.

| Size, Inches | Price, Each Class A Plain |
|-----------------------|---------------------------------|
| .010 to .020 | \$44.50 |
| Over .020 to .030 | 34.00 |
| Over .030 to .040 | 26.00 |
| Over .040 to .050 | 21.00 |
| Over .050 to .060 | 18.00 |
| Over .060 to .070 | 17.00 |
| Over .070 to .080 | 16.00 |
| Over .080 to .090 | 14.50 |
| Over .090 to .100 | 13.00 |
| Over .100 to .150 | 12.00 |
| Over .150 to .200 | 13.00 |
| Over .200 to .400 | 14.50 |
| Over .400 to .600 | 16.00 |
| Over .600 to .800 | 17.00 |
| Over .800 to 1.000 | 18.00 |
| Over 1.000 to 2.000 | 28.00 |
| Over 2.000 to 3.000 | 39.00 |
| Over 3.000 to 4.000 | 50.00 |
| Over 4.000 to 5.000 | 60.00 |
| Over 5.000 to 6.000 | 71.00 |
| Over 6.000 to 7.000 | 81.50 |
| Over 7.000 to 8.000 | 91.50 |
| Over 8.000 to 9.000 | 102.00 |
| Over 9.000 to 10.000 | 113.00 |
| Over 10.000 to 11.000 | 123.00 |
| Over 11.000 to 12.000 | 134.00 |
| Over 12.000 to 13.000 | 144.00 |
| Over 13.000 to 14.000 | 155.00 |
| Over 14.000 to 15.000 | 165.00 |
| Over 15.000 to 16.000 | 176.00 |
| Over 16.000 to 17.000 | 187.00 |
| Over 17.000 to 18.000 | 197.00 |
| Over 18.000 to 19.000 | 208.00 |
| Over 19.000 to 20.000 | 235.00 |

For Special Marking of Gage Blocks, in special sizes, up to and including five characters, add \$.55 to above prices.

Class "AA" Blocks in sizes .050" to 20.000", Price on Application—For Chromium Plated Johansson Gage Blocks Class "A", in sizes .050" to 4", increase prices in table above 25%.



Brown & Sharpe

Accessories...

INCREASE THE USEFULNESS OF YOUR "JO"-BLOCKS

While the uses of Gage Blocks are practically unlimited, special accessories still further broaden these uses. The accessories simplify the various application of the Gage Blocks, and extend their uses at great savings in time and with reduction of expense.

The accessories are designed carefully and made with great care. Their finished parallel surfaces are accurate to within ten millionths of an inch per inch unless otherwise specified.

With accessories, practically every measurement which may be required under normal conditions can be made with the maximum obtainable accuracy.

ACCESSORY SET 44—8 Pieces Furnished complete in case.
No. 598-44 Per Set \$133.00

ACCESSORIES ORDERED SEPARATELY

| Quantity Each | Description | Size, Inches | No. | Price, Each |
|---------------|-------------------|--------------|---------|-------------|
| 2 | Jaws | .100 x 2 | 598-200 | \$11.00 |
| 2 | Jaws | .250 x 2 | 598-202 | 14.00 |
| 1 | Adjustable Holder | 4% | 598-243 | 24.00 |
| 1 | Center Point | | 598-262 | 12.00 |
| 1 | Scriber | | 598-266 | 9.50 |
| 1 | Foot Block | 1.375 | 598-281 | 32.50 |



SET No. 45

ACCESSORY SET 45—13 Pieces. Furnished complete in case.
No. 598-45 Per Set \$215.00

ACCESSORIES ORDERED SEPARATELY

| Quantity Each | Description | Size, Inches | No. | Price, Each |
|---------------|-------------------|--------------|---------|-------------|
| 2 | Jaws | .100 x 2 | 598-200 | \$11.00 |
| 2 | Jaws | .200 x 2 | 598-201 | 13.00 |
| 2 | Jaws | .250 x 2 | 598-202 | 14.00 |
| 1 | Adjustable Holder | 1% | 598-241 | 11.00 |
| 1 | Adjustable Holder | 2% | 598-242 | 17.50 |
| 1 | Adjustable Holder | 4% | 598-243 | 24.00 |
| 1 | Adjustable Holder | 8% | 598-245 | 32.00 |
| 1 | Center Point | | 598-262 | 12.00 |
| 1 | Scriber | | 598-266 | 9.50 |
| 1 | Foot Block | 1.375 | 598-281 | 32.50 |



Adjustable Holder

ADJUSTABLE HOLDERS 241 TO 246—Used in almost unlimited applications of gage blocks for shop measurements.

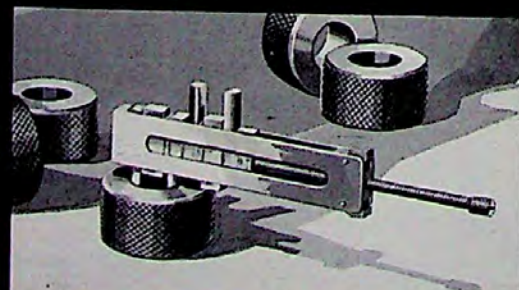
| | Size of Opening, Inches | Type Adjusting Nut | No. | Price, Each |
|-----|-------------------------|--------------------|---------|-------------|
| 241 | 1 1/4 | Solid | 598-241 | \$11.00 |
| 242 | 2% | Solid | 598-242 | 17.50 |
| 243 | 4% | Split | 598-243 | 24.00 |
| 244 | 5% | Split | 598-244 | 26.00 |
| 245 | 8% | Split | 598-245 | 32.00 |
| 246 | 9% | Split | 598-246 | 32.00 |

ACCESSORY SET 47—20 Pieces. Furnished complete in case.
No. 598-47 Per set \$350.00

ACCESSORIES ORDERED SEPARATELY

| Quantity Each | Description | Size, Inches | No. | Price, Each |
|---------------|-------------------|--------------|---------|-------------|
| 2 | Jaws | .100 x 2 | 598-200 | \$11.00 |
| 2 | Jaws | .200 x 2 | 598-201 | 13.00 |
| 2 | Jaws | .250 x 2 | 598-202 | 14.00 |
| 2 | Jaws | .500 x 3 | 598-203 | 17.00 |
| 2 | Jaws | .750 x 5 | 598-205 | 20.00 |
| 2 | Jaws | .750 x 6 | 598-213 | 20.00 |
| 1 | Adjustable Holder | 2% | 598-242 | 17.50 |
| 1 | Adjustable Holder | 5% | 598-244 | 26.00 |
| 1 | Adjustable Holder | 9% | 598-246 | 32.00 |
| 1 | Center Point | | 598-262 | 12.00 |
| 2 | Tram Points | | 598-264 | 11.00 |
| 1 | Scriber | | 598-266 | 9.50 |
| 1 | Foot Block | 1.375 | 598-281 | 32.50 |

With jaws and adjustable holders "Jo"-Blocks provide accurate maximum and minimum limit gage.



Brown & Sharpe

Sine Bars...

**MEASURE ANGLES
ACCURATELY**

SINE BARS 291 AND 293—Sine Bars measure angles accurately and locate work at a desired angle to some other surface or line. They always are used in conjunction with some true surface from which measurements can be taken, preferably a thoroughly clean surface plate.

The principal is the computation of the exact degree of angularity which a 5" or 10" bar makes with a plane surface by determining the precise vertical height of one end. The correct combination of Johansson Thrift or Gage Blocks placed beneath the elevated end of the Sine Bar provides the height and a table of constants giving the heights for the various angles of settings is furnished with the Sine Bar.

Sine Bars are made in two classes with respect to accuracy:

Class B: .000020" per inch of length

Class A: .000010" per inch of length

Parallelism: .000025" per inch of length

Furnished Complete in Case

**Sine Bar
No. 291**

| | Length, Center to Center, Inches | Size Body, Inches | Class | No. | Price |
|-----|--|-------------------------|-------|-------------|---------|
| 291 | 5 | 1 | B | 598-219-121 | \$98.50 |
| | | | A | 598-291-122 | 138.50 |
| 293 | 10 | 1 1/4 | B | 598-293-121 | 150.00 |
| | | | A | 598-293-122 | 209.50 |

Building

GAGE BLOCK COMBINATIONS

In selecting blocks, begin with the right-hand figure of the combination size required and work from right to left, using the least number of blocks. Take the first two blocks of the required combination, holding them as in Fig. 1. Wipe each contacting surface on the palm of the hand or wrist to clean, then place the contacting surfaces together, as in Fig. 2. With a slight inward pressure, slide one block on the other as in Fig. 3. If the contacting surfaces are clean they will take hold as though magnetized. Continue as above until the required combination is completed.

The blocks are self-checking—equal combinations checking against each other, or against a single block. Fig. 4 shows how an inch block checks against nine blocks totaling an inch.

Care and handling...

OF JOHANSSON GAGE BLOCKS

1. Do not clean Gage Blocks or Accessories with a dirty rag or chamois which might contain emery or other dust, causing damage to the finished measuring surfaces.
2. Gage Blocks, Accessories and Cases should be kept free from dust, filings, moisture, etc.
3. After using Gage Blocks and Accessories and before returning them to the case, wipe with a piece of dry chamois to remove finger marks and then wipe with a chamois permeated with white petrolatum (free from acid) or a mixture made by melting equal parts of white petrolatum and anhydrous lanolin (wool fat) to preserve them from corrosion.
4. Remove high spots (caused by bruises) on finished measuring surface of Gage Blocks and Accessories with a very fine hand deburring stone (which can be pur-

chased from us), being careful to hone only high spots. Under no circumstances hone the entire finished measuring surface, as it will destroy accuracy and usefulness of the block or accessory.

5. Johansson Gage Blocks and Accessories should be inspected at least once every 12 months for defects due to abuse, wear, or accidents.
6. Johansson Gage Blocks and accessories should not be left in combination when through using, but should be separated and the gaging surfaces treated as outlined in item 3.

Johansson Thrift and Gage Blocks and Accessories should be inspected at least once each year to eliminate possible errors due to wear or damage.

Inspection Service...

The inspection service includes:

1. The measuring and inspection of all Johansson Gage Blocks and Accessories. (Measurements taken at the approximate center of the gaging surface.)
2. Removal of all "high spots" caused by use or accident.
3. A Certificate of Inspection that gives the specified size and variation in millionths of an inch.
4. A recommendation for replacements of any blocks or accessories worn beyond original accuracy.
5. Shipments of blocks and accessories by the owner for inspection to be made (transportation charges prepaid) to Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

Inspection charges for individual gage blocks: "Thrift," Class "B," and Class "A," \$.50 up to 1" of length and \$.50 for each additional inch of length or fraction thereof on longer blocks. Minimum charge, \$1.50. Maximum charge, \$2.50.

Class "AA," \$1.75 up to 1" of length and for each additional inch of length or fraction thereof on longer blocks. Minimum charge, \$8.00.

| For Set No. | Description | Inspection Charge Per Set |
|-------------|----------------------------------|---------------------------|
| 1 | Classes "Thrift," "B" & "A"..... | \$47.50 |
| | Class "AA"..... | Price on Application |
| 2 | Classes "Thrift," "B" & "A"..... | 21.00 |
| | Class "AA"..... | Price on Application |
| 3 | Classes "B" & "A"..... | 20.00 |
| 4 | Classes "B" & "A"..... | 15.00 |
| 10 | Classes "B" & "A"..... | 30.00 |
| | Class "AA"..... | Price on Application |
| 15 | Classes "B" & "A"..... | 4.25 |
| 44 | | 5.50 |
| 45 | | 9.50 |
| 47 | | 22.00 |

Certificate of Inspection

The certificate of inspection issued by Brown & Sharpe following an inspection of Johansson Gage Blocks includes any variation from the specified size in millionths of an inch for each block. The certificate carries the set number, serial

number, date of inspection and the name of the owner of the blocks. Inspection is made, of course, under the same ideal conditions used in the manufacture of the blocks and assures users of the continuing accuracy of their sets.

Brown & Sharpe

Cylindrical Taper Gages...

HAVE ACCURATE, HONED FINISHES

The accuracy and reliability of taper gages are vitally important wherever they are used, for any error in them or in their design is reflected in the finished part and can result in waste in assembly and loss of time and material.

At Brown & Sharpe there is much special equipment especially developed for the accurate manufacture of taper gages and also the Electralign [®], an electronic device which brings super-precision to the accurate setting of the swivel table for grinding tapers. With this device tapers can be ground to a tolerance of 0.000025 inch (25 millionths of an inch).

The honed finish which Brown & Sharpe Taper Gages are given is an outstanding characteristic. This finish, done mechanically, does not in any way alter the accuracy of the gage as would the irregularities introduced by a hand lapping operation.

In one of the most vital steps in the manufacture of gages, inspection, there is used also a highly specialized electronic measuring machine in a gage laboratory maintained at 68° F with a relative humidity of 55%. Under these ideal conditions, gages are inspected to limits as small as millionths. This is responsible, perhaps, more than anything else, for the unvarying accuracy for which Brown & Sharpe Taper Gages, both standard and special, are known.

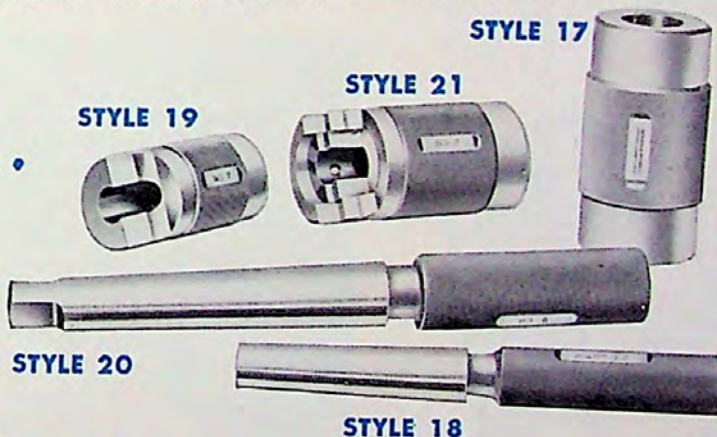
Our Gage Department welcomes inquiries for Standard Cylindrical Taper Gages as well as Special Cylindrical Taper Gages and offers the benefits of specialized equipment, carefully controlled manufacturing conditions, and extensive experience not only as manufacturers of gages, but as users also.

Brown & Sharpe gages bring dependable and precise accuracy to every job on which they are used.



This measuring machine checks electronically the dimensions of plug gages. Measurements are made easily and read positively from the widely spaced amplifier dial graduations.

Standard...



Special...



Brown & Sharpe

Ground

Brown & Sharpe was the original Ground Flat Stock. It was introduced many years ago because of the obvious need for such a product in our own extensive manufacturing. The success of the stock was immediate because incorporated in it then as today were specifications based on our knowledge of the requirements for a steel of superior quality both as to machining and heat treatment which customers found beneficial both in convenience and economy.

Today, Brown & Sharpe Oil Hardening Precision Ground Flat Stock continues to be a superior product. Its analysis is controlled by Brown & Sharpe's rigid specifications to meet conditions of the present. The stock is free from "Decarb" and is annealed to give a fully spheroidized structure as shown in the photomicrograph at the right.

This stock has excellent machineability and is easy to harden.

Brown & Sharpe Oil Hardening Precision Ground Flat Stock is a non-deforming manganese, chromium, tungsten electric furnace steel having the following typical analysis:

| | | | |
|-----------|------|----------|-----|
| Carbon | .90 | Chromium | .50 |
| Manganese | 1.20 | Tungsten | .50 |
| Vanadium | .20 | | |

The stock has a hardness range of 170 to 207 Brinell. As we use the stock extensively in our own plant for many

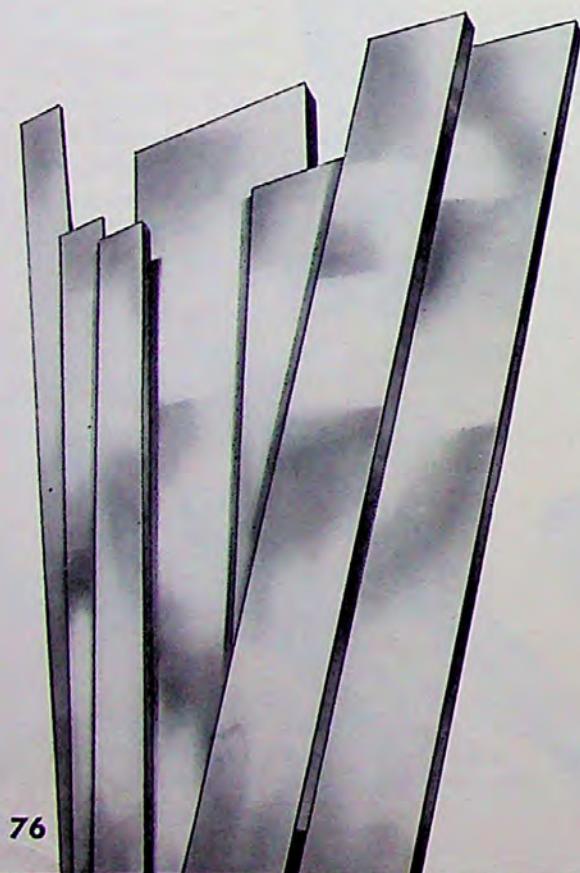
precision parts, we recommend the following heat treatment from our long experience. To harden, heat to 1500° F. and then quench in warm, light oil. This steel always should be quenched in oil to minimize hardening distortion. It should not be quenched in water since cracking may result. Temper immediately to desired hardness. A slightly oxidizing furnace atmosphere is recommended. Where heating is done in a salt bath a slightly lower temperature may be used and the total heating time may be reduced slightly.

Under certain conditions a stress-relieving tempering operation at about 1100° F. will prove beneficial. This most commonly is done between rough and finish machining to remove stresses originating from rough machining cuts.

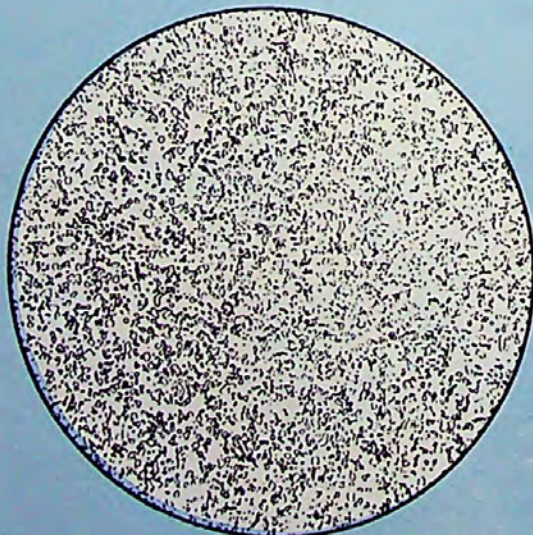
Tolerances of the stock are as follows: thickness within $\pm .001''$; width 1" and under, standard to $+.005''$; above 1" standard to $+.010''$. Surface finish is 35 micro inches or better.

This superior Oil Hardening Precision Ground Flat Stock offers great savings in time and labor. With this material the toolmaker commences working where his skill is best utilized and does not waste hours and expense in milling and grinding bar stock to size.

Brown & Sharpe Ground Flat Stock is packaged for your convenience in envelopes (large sizes in cartons) with complete heat treating instructions.



Actual photomicrograph shows spheroidized structure of Brown & Sharpe Oil Hardening Ground Flat Stock made to Brown & Sharpe specifications with especially controlled annealing for better machining and hardening.



Flat Stock

"THE ORIGINAL FLAT STOCK"

The representative pieces made from Brown & Sharpe Ground Flat Stock shown at the left suggest the wide adaptability of the stock for practically unlimited applications. These parts demonstrate clearly how economically the stock can be employed to simplify the manufacture of parts of many sizes and shapes. Right to size when you get it—ready to be machined to dimension and shape.

All sizes are 18" long

| Size, In. | Order by Number | Price, per Piece |
|------------------------------------|-----------------|------------------|
| $\frac{1}{64} \times 1$ | 730-4-3 | \$ 2.21 |
| $\frac{1}{64} \times 1\frac{1}{2}$ | 730-8-3 | 2.66 |
| $\frac{1}{64} \times 2$ | 730-12-3 | 3.22 |
| $\frac{1}{64} \times 2\frac{1}{2}$ | 730-16-3 | 3.80 |
| $\frac{1}{64} \times 3$ | 730-20-3 | 4.55 |
| $\frac{1}{64} \times 4$ | 730-24-3 | 6.14 |
| $\frac{1}{32} \times \frac{1}{2}$ | 730-26-3 | 1.52 |
| $\frac{1}{32} \times \frac{3}{4}$ | 730-28-3 | 1.52 |
| $\frac{1}{32} \times 1$ | 730-32-3 | 1.58 |
| $\frac{1}{32} \times 1\frac{1}{2}$ | 730-36-3 | 2.09 |
| $\frac{1}{32} \times 2$ | 730-40-3 | 2.60 |
| $\frac{1}{32} \times 2\frac{1}{2}$ | 730-44-3 | 3.10 |
| $\frac{1}{32} \times 3$ | 730-48-3 | 3.73 |
| $\frac{1}{32} \times 3\frac{1}{2}$ | 730-52-3 | 4.30 |
| $\frac{1}{32} \times 4$ | 730-56-3 | 5.06 |
| $\frac{1}{32} \times 5$ | 730-60-3 | 7.59 |
| $\frac{1}{32} \times 6$ | 730-64-3 | 9.93 |
| $\frac{3}{64} \times \frac{1}{2}$ | 730-66-3 | 1.52 |
| $\frac{3}{64} \times 1$ | 730-68-3 | 1.52 |
| $\frac{3}{64} \times 1\frac{1}{2}$ | 730-72-3 | 1.90 |
| $\frac{3}{64} \times 2$ | 730-76-3 | 2.46 |
| $\frac{3}{64} \times 2\frac{1}{2}$ | 730-80-3 | 3.04 |
| $\frac{3}{64} \times 3$ | 730-84-3 | 3.61 |
| $\frac{3}{64} \times 4$ | 730-88-3 | 4.69 |
| $\frac{3}{64} \times 5$ | 730-92-3 | 6.83 |
| $\frac{3}{64} \times 6$ | 730-96-3 | 9.36 |
| $\frac{3}{64} \times 8$ | 730-98-3 | 13.67 |
| $\frac{1}{16} \times \frac{1}{2}$ | 730-100-3 | 1.08 |
| $\frac{1}{16} \times \frac{3}{4}$ | 730-104-3 | 1.14 |
| $\frac{1}{16} \times 1$ | 730-108-3 | 1.33 |
| $\frac{1}{16} \times 1\frac{1}{4}$ | 730-112-3 | 1.52 |
| $\frac{1}{16} \times 1\frac{1}{2}$ | 730-116-3 | 1.84 |
| $\frac{1}{16} \times 2$ | 730-120-3 | 2.28 |
| $\frac{1}{16} \times 2\frac{1}{2}$ | 730-124-3 | 2.72 |
| $\frac{1}{16} \times 3$ | 730-128-3 | 3.36 |
| $\frac{1}{16} \times 3\frac{1}{2}$ | 730-132-3 | 3.98 |
| $\frac{1}{16} \times 4$ | 730-136-3 | 4.69 |
| $\frac{1}{16} \times 5$ | 730-140-3 | 6.14 |
| $\frac{1}{16} \times 6$ | 730-144-3 | 8.73 |
| $\frac{1}{16} \times 8$ | 730-146-3 | 12.51 |
| $\frac{3}{32} \times \frac{1}{2}$ | 730-148-3 | 1.45 |
| $\frac{3}{32} \times \frac{3}{4}$ | 730-152-3 | 1.58 |
| $\frac{3}{32} \times 1$ | 730-156-3 | 1.84 |
| $\frac{3}{32} \times 1\frac{1}{2}$ | 730-160-3 | 2.21 |
| $\frac{3}{32} \times 2$ | 730-164-3 | 2.60 |
| $\frac{3}{32} \times 2\frac{1}{2}$ | 730-168-3 | 2.97 |

Continued on pages 78 and 79

All sizes are 18" long

| Size, In. | Order by Number | Price, per Piece | Size, In. | Order by Number | Price, per Piece |
|------------------------------------|-----------------|------------------|------------------------------------|-----------------|------------------|
| $\frac{3}{16} \times 3$ | 730-172-3 | \$ 3.48 | $\frac{1}{4} \times 3$ | 730-368-3 | \$ 6.46 |
| $\frac{3}{16} \times 3\frac{1}{2}$ | 730-176-3 | 4.18 | $\frac{1}{4} \times 3\frac{1}{2}$ | 730-372-3 | 7.52 |
| $\frac{3}{16} \times 4$ | 730-180-3 | 4.87 | $\frac{1}{4} \times 4$ | 730-376-3 | 8.73 |
| $\frac{3}{16} \times 5$ | 730-184-3 | 6.83 | $\frac{1}{4} \times 5$ | 730-380-3 | 11.07 |
| $\frac{3}{16} \times 6$ | 730-188-3 | 9.36 | $\frac{1}{4} \times 6$ | 730-384-3 | 13.54 |
| $\frac{3}{16} \times 8$ | 730-189-3 | 13.67 | $\frac{1}{4} \times 8$ | 730-385-3 | 16.95 |
| $\frac{1}{8} \times \frac{1}{8}$ | 730-191-3 | 2.51 | $\frac{1}{4} \times 10$ | 730-386-3 | 21.02 |
| $\frac{1}{8} \times \frac{1}{2}$ | 730-192-3 | 1.58 | $\frac{1}{4} \times 12$ | 730-387-3 | 25.03 |
| $\frac{1}{8} \times \frac{3}{4}$ | 730-196-3 | 1.84 | $\frac{5}{16} \times \frac{5}{16}$ | 730-388-2 | 3.17 |
| $\frac{1}{8} \times 1$ | 730-200-3 | 1.96 | $\frac{5}{16} \times \frac{1}{2}$ | 730-392-3 | 3.10 |
| $\frac{1}{8} \times 1\frac{1}{4}$ | 730-204-3 | 2.21 | $\frac{5}{16} \times 1$ | 730-396-3 | 3.80 |
| $\frac{1}{8} \times 1\frac{1}{2}$ | 730-208-3 | 2.34 | $\frac{5}{16} \times 1\frac{1}{2}$ | 730-400-3 | 4.49 |
| $\frac{1}{8} \times 2$ | 730-212-3 | 2.72 | $\frac{5}{16} \times 2$ | 730-404-3 | 5.31 |
| $\frac{1}{8} \times 2\frac{1}{2}$ | 730-216-3 | 3.10 | $\frac{5}{16} \times 2\frac{1}{2}$ | 730-408-3 | 6.46 |
| $\frac{1}{8} \times 3$ | 730-220-3 | 3.73 | $\frac{5}{16} \times 3$ | 730-412-3 | 7.59 |
| $\frac{1}{8} \times 3\frac{1}{2}$ | 730-224-3 | 4.30 | $\frac{5}{16} \times 4$ | 730-416-3 | 9.93 |
| $\frac{1}{8} \times 4$ | 730-228-3 | 4.99 | $\frac{5}{16} \times 5$ | 730-417-3 | 13.04 |
| $\frac{1}{8} \times 5$ | 730-232-3 | 6.96 | $\frac{5}{16} \times 6$ | 730-418-3 | 14.99 |
| $\frac{1}{8} \times 6$ | 730-236-3 | 9.87 | $\frac{5}{16} \times 8$ | 730-413-3 | 19.21 |
| $\frac{1}{8} \times 8$ | 730-234-3 | 14.18 | $\frac{5}{16} \times 10$ | 730-414-3 | 25.03 |
| $\frac{1}{8} \times 10$ | 730-235-3 | 17.96 | $\frac{5}{16} \times 12$ | 730-415-3 | 27.93 |
| $\frac{3}{16} \times \frac{3}{16}$ | 730-237-3 | 2.60 | $\frac{3}{8} \times \frac{3}{8}$ | 730-420-3 | 3.80 |
| $\frac{3}{16} \times \frac{1}{2}$ | 730-238-3 | 1.77 | $\frac{3}{8} \times \frac{1}{2}$ | 730-424-3 | 3.86 |
| $\frac{3}{16} \times \frac{3}{4}$ | 730-240-3 | 1.90 | $\frac{3}{8} \times \frac{3}{4}$ | 730-428-3 | 4.18 |
| $\frac{3}{16} \times 1$ | 730-244-3 | 2.21 | $\frac{3}{8} \times 1$ | 730-432-3 | 4.49 |
| $\frac{3}{16} \times 1\frac{1}{2}$ | 730-248-3 | 2.72 | $\frac{3}{8} \times 1\frac{1}{2}$ | 730-436-3 | 5.06 |
| $\frac{3}{16} \times 2$ | 730-252-3 | 3.48 | $\frac{3}{8} \times 2$ | 730-440-3 | 6.01 |
| $\frac{3}{16} \times 2\frac{1}{2}$ | 730-256-3 | 4.24 | $\frac{3}{8} \times 2\frac{1}{2}$ | 730-444-3 | 7.27 |
| $\frac{3}{16} \times 3$ | 730-260-3 | 4.99 | $\frac{3}{8} \times 3$ | 730-448-3 | 8.73 |
| $\frac{3}{16} \times 3\frac{1}{2}$ | 730-262-3 | 5.31 | $\frac{3}{8} \times 4$ | 730-452-3 | 11.13 |
| $\frac{3}{16} \times 4$ | 730-264-3 | 5.75 | $\frac{3}{8} \times 5$ | 730-453-3 | 15.06 |
| $\frac{3}{16} \times 6$ | 730-265-3 | 10.47 | $\frac{3}{8} \times 6$ | 730-455-3 | 16.63 |
| $\frac{3}{16} \times 8$ | 730-266-3 | 14.76 | $\frac{3}{8} \times 7$ | 730-449-3 | 19.36 |
| $\frac{3}{16} \times \frac{3}{16}$ | 730-267-3 | 2.60 | $\frac{3}{8} \times 8$ | 730-450-3 | 22.26 |
| $\frac{3}{16} \times \frac{1}{2}$ | 730-268-3 | 2.09 | $\frac{3}{8} \times 10$ | 730-451-3 | 27.50 |
| $\frac{3}{16} \times \frac{3}{4}$ | 730-272-3 | 2.28 | $\frac{3}{8} \times 12$ | 730-454-3 | 31.87 |
| $\frac{3}{16} \times 1$ | 730-276-3 | 2.46 | $\frac{1}{2} \times \frac{1}{2}$ | 730-676-3 | 4.16 |
| $\frac{3}{16} \times 1\frac{1}{4}$ | 730-280-3 | 2.72 | $\frac{1}{2} \times \frac{1}{2}$ | 730-680-3 | 4.16 |
| $\frac{3}{16} \times 1\frac{1}{2}$ | 730-284-3 | 3.10 | $\frac{1}{2} \times \frac{3}{4}$ | 730-684-3 | 4.81 |
| $\frac{3}{16} \times 2$ | 730-288-3 | 3.73 | $\frac{1}{2} \times 1$ | 730-688-3 | 5.46 |
| $\frac{3}{16} \times 2\frac{1}{2}$ | 730-292-3 | 4.24 | $\frac{1}{2} \times 1\frac{1}{2}$ | 730-692-3 | 6.26 |
| $\frac{3}{16} \times 3$ | 730-296-3 | 4.94 | $\frac{1}{2} \times 2$ | 730-696-3 | 7.14 |
| $\frac{3}{16} \times 3\frac{1}{2}$ | 730-300-3 | 5.75 | $\frac{1}{2} \times 2\frac{1}{2}$ | 730-700-3 | 8.44 |
| $\frac{3}{16} \times 4$ | 730-304-3 | 6.58 | $\frac{1}{2} \times 3$ | 730-704-3 | 9.81 |
| $\frac{3}{16} \times 5$ | 730-308-3 | 8.73 | $\frac{1}{2} \times 4$ | 730-712-3 | 12.43 |
| $\frac{3}{16} \times 6$ | 730-312-3 | 11.13 | $\frac{1}{2} \times 5$ | 730-720-3 | 17.03 |
| $\frac{3}{16} \times 8$ | 730-309-3 | 15.86 | $\frac{1}{2} \times 6$ | 730-728-3 | 19.28 |
| $\frac{3}{16} \times 10$ | 730-310-3 | 19.57 | $\frac{1}{2} \times 7$ | 730-732-3 | 22.55 |
| $\frac{3}{16} \times 12$ | 730-311-3 | 25.50 | $\frac{1}{2} \times 8$ | 730-736-3 | 25.53 |
| $\frac{1}{2} \times \frac{1}{2}$ | 730-315-3 | 2.60 | $\frac{1}{2} \times 10$ | 730-740-3 | 33.09 |
| $\frac{1}{2} \times 1$ | 730-316-3 | 2.66 | $\frac{1}{2} \times 12$ | 730-744-3 | 37.17 |
| $\frac{1}{2} \times 1\frac{1}{2}$ | 730-320-3 | 3.36 | $\frac{3}{16} \times \frac{3}{16}$ | 730-748-3 | 4.16 |
| $\frac{1}{2} \times 2$ | 730-324-3 | 4.11 | $\frac{3}{16} \times \frac{1}{2}$ | 730-752-3 | 4.16 |
| $\frac{1}{2} \times 2\frac{1}{2}$ | 730-328-3 | 4.69 | $\frac{3}{16} \times \frac{3}{4}$ | 730-756-3 | 4.81 |
| $\frac{1}{2} \times 3$ | 730-332-3 | 5.45 | $\frac{3}{16} \times 1$ | 730-760-3 | 5.46 |
| $\frac{1}{2} \times 4$ | 730-336-3 | 7.52 | $\frac{3}{16} \times 1\frac{1}{2}$ | 730-764-3 | 6.26 |
| $\frac{1}{4} \times \frac{1}{4}$ | 730-340-3 | 2.60 | $\frac{3}{16} \times 2$ | 730-768-3 | 7.14 |
| $\frac{1}{4} \times \frac{1}{2}$ | 730-344-3 | 2.34 | $\frac{3}{16} \times 2\frac{1}{2}$ | 730-772-3 | 8.44 |
| $\frac{1}{4} \times \frac{3}{4}$ | 730-348-3 | 2.66 | $\frac{3}{16} \times 3$ | 730-776-3 | 9.81 |
| $\frac{1}{4} \times 1$ | 730-352-3 | 2.97 | $\frac{3}{16} \times 4$ | 730-784-3 | 12.43 |
| $\frac{1}{4} \times 1\frac{1}{2}$ | 730-356-3 | 3.73 | $\frac{3}{16} \times 5$ | 730-792-3 | 17.03 |
| $\frac{1}{4} \times 2$ | 730-360-3 | 4.49 | $\frac{3}{16} \times 6$ | 730-800-3 | 19.28 |
| $\frac{1}{4} \times 2\frac{1}{2}$ | 730-364-3 | 5.38 | $\frac{3}{16} \times 7$ | 730-804-3 | 22.55 |
| | | | $\frac{3}{16} \times 8$ | 730-808-3 | 25.53 |

See also pages 76 and 77

SAVES TIME — SAVES MONEY — MAKES SUPERIOR PARTS

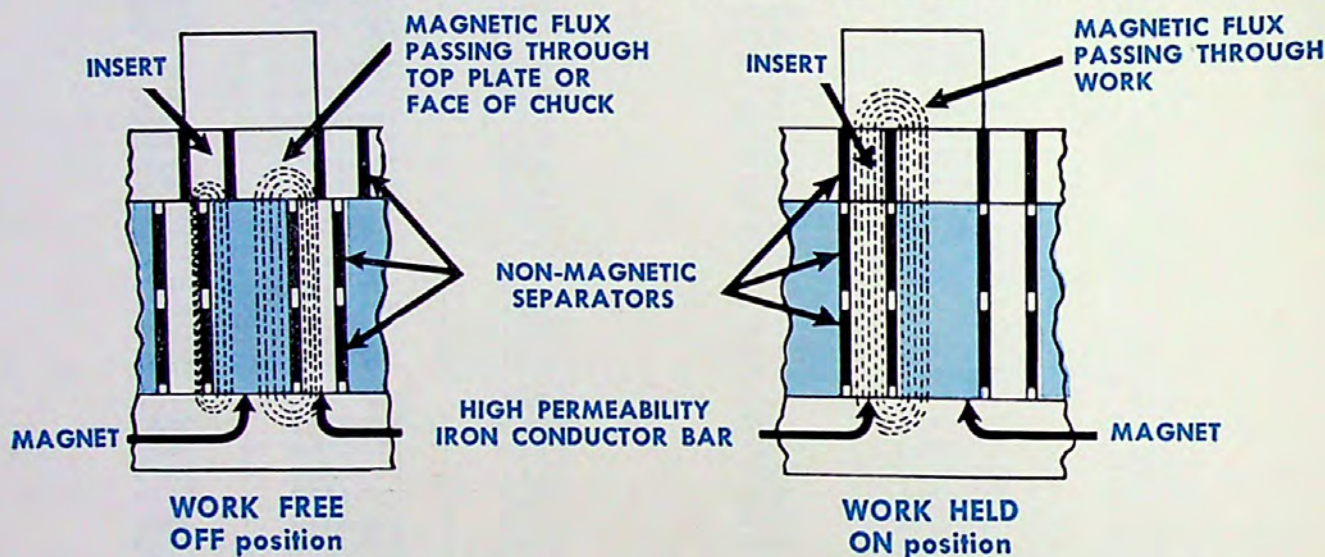
All sizes are 18" long

| Size, In. | Number Order by | Price, per Piece | Size, In. | Order by Number | Price, per Piece |
|------------------------------------|-----------------|------------------|------------------------------------|-----------------|------------------|
| $\frac{3}{16} \times 10$ | 730-812-3 | \$33.09 | $\frac{3}{4} \times 12$ | 730-1012-3 | \$56.60 |
| $\frac{3}{16} \times 12$ | 730-816-3 | 37.17 | $\frac{3}{4} \times 14$ | 730-1016-3 | 65.25 |
| $\frac{1}{2} \times \frac{1}{2}$ | 730-456-3 | 4.49 | $\frac{1}{16} \times \frac{1}{16}$ | 730-1020-3 | 7.85 |
| $\frac{1}{2} \times \frac{3}{4}$ | 730-460-3 | 5.38 | $\frac{1}{16} \times 1$ | 730-1024-3 | 7.85 |
| $\frac{1}{2} \times 1$ | 730-464-3 | 6.51 | $\frac{1}{16} \times \frac{1}{2}$ | 730-1028-3 | 10.69 |
| $\frac{1}{2} \times 1\frac{1}{2}$ | 730-466-3 | 7.47 | $\frac{1}{16} \times 2$ | 730-1032-3 | 13.39 |
| $\frac{1}{2} \times 2$ | 730-468-3 | 8.28 | $\frac{1}{16} \times 3$ | 730-1040-3 | 19.13 |
| $\frac{1}{2} \times 2\frac{1}{2}$ | 730-820-3 | 9.68 | $\frac{1}{16} \times 4$ | 730-1048-3 | 25.10 |
| $\frac{1}{2} \times 3$ | 730-472-3 | 11.01 | $\frac{1}{16} \times 5$ | 730-1056-3 | 31.00 |
| $\frac{1}{2} \times 4$ | 730-476-3 | 13.73 | $\frac{1}{16} \times 6$ | 730-1064-3 | 35.50 |
| $\frac{1}{2} \times 5$ | 730-477-3 | 18.98 | $\frac{1}{16} \times 7$ | 730-1068-3 | 41.68 |
| $\frac{1}{2} \times 6$ | 730-478-3 | 21.95 | $\frac{1}{16} \times 8$ | 730-1072-3 | 48.08 |
| $\frac{1}{2} \times 7$ | 730-824-3 | 24.60 | $\frac{1}{16} \times 10$ | 730-1076-3 | 55.86 |
| $\frac{1}{2} \times 8$ | 730-828-3 | 27.21 | $\frac{1}{16} \times 12$ | 730-1080-3 | 67.65 |
| $\frac{1}{2} \times 10$ | 730-832-3 | 33.75 | $\frac{1}{16} \times 14$ | 730-1084-3 | 80.52 |
| $\frac{1}{2} \times 12$ | 730-836-3 | 38.40 | $\frac{3}{8} \times \frac{3}{8}$ | 730-1088-3 | 7.85 |
| $\frac{5}{16} \times \frac{5}{16}$ | 730-844-3 | 5.57 | $\frac{3}{8} \times 1$ | 730-1092-3 | 7.85 |
| $\frac{5}{16} \times 1$ | 730-848-3 | 7.15 | $\frac{3}{8} \times \frac{1}{2}$ | 730-1096-3 | 10.69 |
| $\frac{5}{16} \times 2$ | 730-856-3 | 11.07 | $\frac{3}{8} \times 2$ | 730-1100-3 | 13.39 |
| $\frac{5}{16} \times 3$ | 730-864-3 | 15.25 | $\frac{3}{8} \times 3$ | 730-1108-3 | 19.13 |
| $\frac{5}{16} \times 4$ | 730-872-3 | 18.98 | $\frac{3}{8} \times 4$ | 730-1116-3 | 25.10 |
| $\frac{5}{16} \times 5$ | 730-880-3 | 24.29 | $\frac{3}{8} \times 5$ | 730-1124-3 | 31.00 |
| $\frac{5}{16} \times 6$ | 730-888-3 | 27.90 | $\frac{3}{8} \times 6$ | 730-1132-3 | 35.50 |
| $\frac{5}{16} \times 7$ | 730-892-3 | 31.87 | $\frac{3}{8} \times 7$ | 730-1136-3 | 41.68 |
| $\frac{5}{16} \times 8$ | 730-896-3 | 35.50 | $\frac{3}{8} \times 8$ | 730-1140-3 | 48.08 |
| $\frac{5}{16} \times 10$ | 730-900-3 | 41.60 | $\frac{3}{8} \times 10$ | 730-1144-3 | 55.86 |
| $\frac{5}{16} \times 12$ | 730-904-3 | 48.30 | $\frac{3}{8} \times 12$ | 730-1148-3 | 67.65 |
| $\frac{5}{16} \times 14$ | 730-908-3 | 54.70 | $\frac{3}{8} \times 14$ | 730-1152-3 | 80.52 |
| $\frac{3}{4} \times \frac{3}{4}$ | 730-482-3 | 5.57 | 1 x 1 | 730-540-3 | 8.10 |
| $\frac{3}{4} \times 1$ | 730-486-3 | 7.15 | 1 x $\frac{1}{2}$ | 730-544-3 | 10.97 |
| $\frac{3}{4} \times 2$ | 730-490-3 | 11.07 | 1 x 2 | 730-548-3 | 13.93 |
| $\frac{3}{4} \times 3$ | 730-494-3 | 15.25 | 1 x 3 | 730-552-3 | 20.74 |
| $\frac{3}{4} \times 4$ | 730-498-3 | 18.98 | 1 x 4 | 730-556-3 | 26.79 |
| $\frac{3}{4} \times 5$ | 730-502-3 | 24.29 | 1 x 5 | 730-560-3 | 33.14 |
| $\frac{3}{4} \times 6$ | 730-506-3 | 27.90 | 1 x 6 | 730-564-3 | 39.40 |
| $\frac{3}{4} \times 7$ | 730-912-3 | 31.87 | 1 x 7 | 730-568-3 | 45.54 |
| $\frac{3}{4} \times 8$ | 730-916-3 | 35.50 | 1 x 8 | 730-572-3 | 51.68 |
| $\frac{3}{4} \times 10$ | 730-920-3 | 41.60 | 1 x 10 | 730-576-3 | 61.50 |
| $\frac{3}{4} \times 12$ | 730-924-3 | 48.30 | 1 x 12 | 730-580-3 | 74.48 |
| $\frac{1}{16} \times \frac{1}{16}$ | 730-928-3 | 6.39 | 1 x 14 | 730-584-3 | 87.14 |
| $\frac{1}{16} \times 1$ | 730-932-3 | 7.66 | $\frac{1}{4} \times \frac{1}{4}$ | 730-588-3 | 10.55 |
| $\frac{1}{16} \times \frac{1}{2}$ | 730-936-3 | 10.36 | $\frac{1}{4} \times \frac{1}{2}$ | 730-592-3 | 13.39 |
| $\frac{1}{16} \times 2$ | 730-940-3 | 12.90 | $\frac{1}{4} \times 2$ | 730-596-3 | 16.19 |
| $\frac{1}{16} \times 3$ | 730-948-3 | 17.59 | $\frac{1}{4} \times 3$ | 730-600-3 | 22.85 |
| $\frac{1}{16} \times 4$ | 730-956-3 | 23.46 | $\frac{1}{4} \times 4$ | 730-604-3 | 29.50 |
| $\frac{1}{16} \times 5$ | 730-964-3 | 28.91 | $\frac{1}{4} \times 5$ | 730-608-3 | 36.25 |
| $\frac{1}{16} \times 6$ | 730-972-3 | 31.56 | $\frac{1}{4} \times 6$ | 730-612-3 | 42.89 |
| $\frac{1}{16} \times 7$ | 730-976-3 | 34.33 | $\frac{1}{4} \times 7$ | 730-616-3 | 49.68 |
| $\frac{1}{16} \times 8$ | 730-980-3 | 37.97 | $\frac{1}{4} \times 8$ | 730-620-3 | 56.35 |
| $\frac{1}{16} \times 10$ | 730-984-3 | 47.14 | $\frac{1}{4} \times 10$ | 730-624-3 | 69.60 |
| $\frac{1}{16} \times 12$ | 730-988-3 | 56.60 | $\frac{1}{4} \times 12$ | 730-628-3 | 85.69 |
| $\frac{1}{16} \times 14$ | 730-992-3 | 65.25 | $\frac{1}{4} \times 14$ | 730-632-3 | 95.24 |
| $\frac{3}{4} \times \frac{3}{4}$ | 730-510-3 | 6.39 | $\frac{1}{2} \times \frac{1}{2}$ | 730-636-3 | 14.22 |
| $\frac{3}{4} \times 1$ | 730-514-3 | 7.66 | $\frac{1}{2} \times 3$ | 730-640-3 | 28.37 |
| $\frac{3}{4} \times \frac{1}{2}$ | 730-996-3 | 10.36 | $\frac{1}{2} \times 4$ | 730-644-3 | 37.83 |
| $\frac{3}{4} \times 2$ | 730-518-3 | 12.90 | $\frac{1}{2} \times 5$ | 730-648-3 | 45.39 |
| $\frac{3}{4} \times 3$ | 730-522-3 | 17.59 | $\frac{1}{2} \times 6$ | 730-652-3 | 54.85 |
| $\frac{3}{4} \times 4$ | 730-526-3 | 23.46 | $\frac{1}{2} \times 8$ | 730-656-3 | 69.98 |
| $\frac{3}{4} \times 5$ | 730-530-3 | 28.91 | $\frac{1}{2} \times 10$ | 730-660-3 | 94.56 |
| $\frac{3}{4} \times 6$ | 730-534-3 | 31.56 | 2 x 2 | 730-664-3 | 30.70 |
| $\frac{3}{4} \times 7$ | 730-1000-3 | 34.33 | $2\frac{1}{2} \times 2\frac{1}{2}$ | 730-668-3 | 42.48 |
| $\frac{3}{4} \times 8$ | 730-1004-3 | 37.97 | 3 x 3 | 730-672-3 | 60.52 |
| $\frac{3}{4} \times 10$ | 730-1008-3 | 47.14 | | | |

See also pages 76 and 77

The many advantages of Permanent Magnet Chucks are recognized quite generally. They require no electricity and thus are portable and can be transferred easily from one machine to another or to a bench and one Chuck can serve several machines. They do not heat under any conditions and work can be left on them as long as desired. They are long lived. Permanent Magnet Chucks retain their energy indefinitely and they are safe. Magnetic force cannot fail due to power interruption or short circuit eliminating danger of the work being released or flying off.

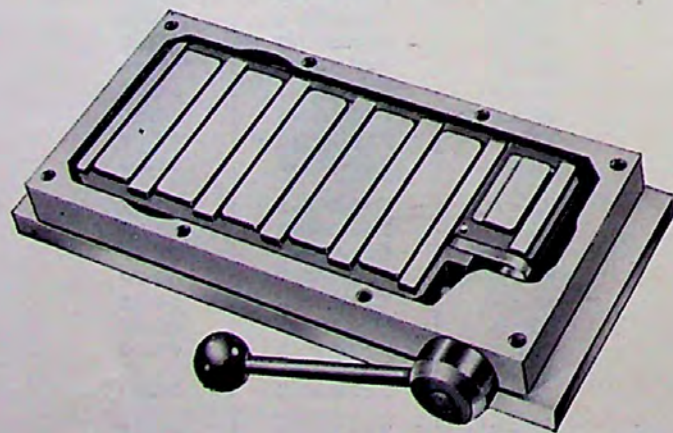
The Brown & Sharpe design provides exclusive additional advantages. The chucks are unusually low providing greatest machine capacity and they are extremely high-powered and surpassed by no other chuck in holding strength. The pole spacers also are close and the chucks can be used for comparatively small work pieces as well as large and they have full load holding power so that the chucks can be used safely with the entire work surface covered with work pieces.



When the lever is turned to OFF, the magnets, conductor bars and separators are positioned so that the magnetic flux completes its circuit through the top plate or face of the chuck and the work is free.

When the lever is turned to ON, the magnets, conductor bars and the non-magnetic separators line up so that the magnetic flux goes through the work holding it to the top plate or the face of chuck.

A single Permanent Rotary Magnet also is used for small permanent magnet holding tools. (See page 83)



Illustrations above show the simplicity of Brown & Sharpe Permanent Magnetic Chucks. A mere turn of a lever moves the internal movable member to ON and OFF positions.

Magnet Chucks... LOW AND POWERFUL

408, 510, 618, 824 and 1236 RECTANGULAR PERMANENT MAGNET CHUCKS—
Six outstanding new-plus features make three of these chucks outstanding in the magnetic chuck field.

- 1. Decreased Height**—provides additional work clearance on the machine.
- 2. Increased Holding Power**—25% to 75% increase in holding power depending upon conditions.
- 3. L-Type Back Rail**—This permits work locating edge to be trued in position more easily and eliminates need for spacing members between rail and work.
- 4. Larger Magnetic Area**—Chucks have added magnetic pole with correspondingly larger holding area.
- 5. Less Weight**—Weight has been reduced over 25%.
- 6. Longer Lever**—Length of the operating lever has been increased for ease of operation.

All these features are found in Chucks 510 to 824. They do not apply to 408 and 1236. For ease of operation Chucks 510 to 824 also are oil lubricated.

Certain small work and work with projections can be held conveniently through the use of Auxiliary Top Plates, Magnetic Chuck Parallels, or Magnetic V Blocks (see page 82).

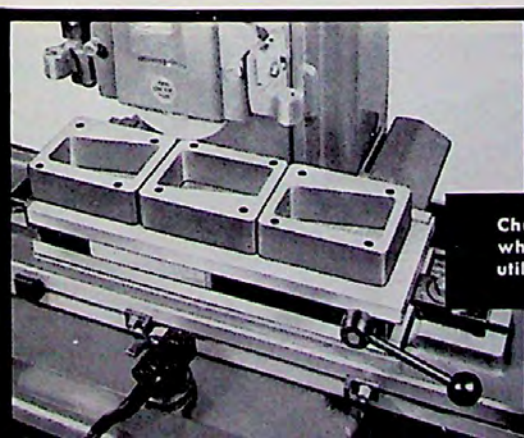
Two removable stop plates are furnished, one for the back and one for left-hand end; and also 2 clamps for holding chuck to a machine table.

Chucks can be furnished at extra cost with special features adapting them for climb milling operations. Such application should be taken up with factory.



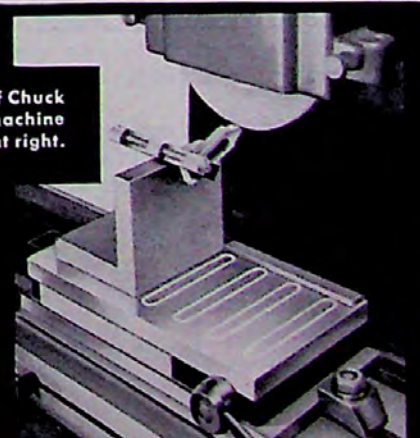
| No. | Working Surface, Inches | Magnetic Surface (Approx.), Inches | Height, Inches | Base, Inches | Over-all Length with Lever "On," Inches | Over-all Width including Lever, Inches | Net Weight, Lbs. | Shipping Weight, Lbs. | Order by Number | Price, Each |
|------|-------------------------|------------------------------------|----------------|--------------|---|--|------------------|-----------------------|-----------------|-------------|
| 408 | 4 x 8 | 3 x 6½ | 3¾ | 4 x 8 | 9¾ | 5½ | 26 | 31 | 745-408 | \$118.00 |
| 510 | 5½ x 10½ | 3¾ x 8½ | 2 | 5½ x 11 | 13¾ | 7¾ | 27¾ | 30¾ | 745-510-1 | 150.00 |
| 618 | 6 x 18 | 4¾ x 15½ | 2½ | 6 x 18 | 21¼ | 8½ | 70 | 75 | 745-618-2 | 210.00 |
| 824 | 8 x 24 | 6¾ x 21¾ | 2½ | 8 x 24 | 30½ | 11¼ | 150 | 160 | 745-824-1 | 375.00 |
| 1236 | 12½ x 36 | 9½ x 29¾ | 4¾ | 12½ x 36 | 42½ | 15½ | 445 | 525 | 745-1236 | 875.00 |

For sale only in the United States of America and its Territories



Note low working surface of Chuck with attendant increased machine capacity utilized in set-up at right.

Chucks have full load power even when entire work surface is utilized.



Accessories...

FOR USE ON RECTANGULAR PERMANENT MAGNET CHUCKS

510, 618 and 824 AUXILIARY TOP PLATES— Hold small pieces which cannot be held readily on the chucks. They consist of narrow steel strips alternating with non-magnetic spacing strips. The magnetic flux passes through the narrow steel strips and holds small pieces securely over the entire Auxiliary Top Plate.

Used in pairs on 618 and 824 chucks. Three plates can be used on the 1236 chuck. Plates are $2\frac{3}{4}$ " thick. Will hold smallest work; $\frac{3}{16}$ " wide or diameter and $\frac{1}{16}$ " thick.

| No. | Length, Inches | Width, Inches | For Use on Permanent Magnet Chuck No. | Order by Number | Price, Each |
|-----|-----------------|-----------------|---------------------------------------|-----------------|-------------|
| 510 | 7 $\frac{1}{2}$ | 3 | 510 | 745-510-90 | \$23.00 |
| 618 | 7 $\frac{1}{2}$ | 3 $\frac{3}{4}$ | 618 | 745-618-90 | 23.00 |
| 824 | 9 $\frac{1}{4}$ | 5 $\frac{1}{2}$ | 824 & 1236 | 745-824-90 | 28.50 |

Net Wt. 510—4 lbs., 618—5 lbs., 824—10 lbs.; Shipping Wt. 510—5 lbs., 618—6 lbs., 824—11 lbs.

124 MAGNETIC CHUCK PARALLELS— Hold work with projecting surfaces which cannot be held easily on a magnetic chuck. They are trued readily eliminating the delay of truing a large chuck surface, and can be used on Permanent Magnet Chucks except 255, and also on electro-magnetic chucks.

Parallels are made of alternating steel and non-magnetic brass spacing strips. The magnetic flux passes through the steel spacing strips holding the work securely to the parallels and the parallels to the chuck. Opposite sides are ground parallel and adjacent sides at right angles. Parallels can be used on all four sides but not on their ends. Available only in numbered matched pairs. Furnished in finished wooden case.

| No. | Length, Inches | Size, Inches | Net Weight, Lbs. | Shipping Weight, Lbs. |
|-----|------------------|--------------------------------|------------------|-----------------------|
| 124 | 3 $\frac{1}{16}$ | $\frac{7}{8}$ x $1\frac{1}{8}$ | 3 $\frac{1}{2}$ | 4 |

No. 745-124 Per Pair \$55.00

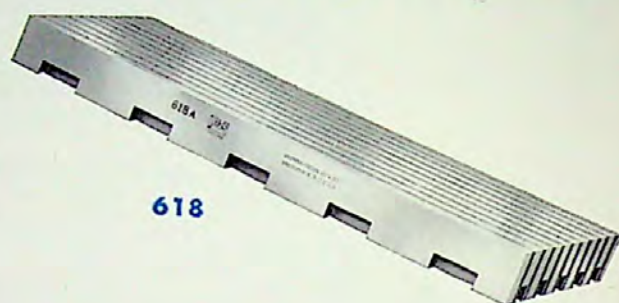
125 and 127 SEMI-FINISHED MAGNETIC CHUCK PARALLELS— Furnished in two sizes. Similar to finished parallels except that they are not finished to such close tolerances. They are specially suited for manufacturers who wish to finish parallels to conform to the holding requirements of a particular work piece.

| No. | Length | Size | Net Wt. Ea., Lbs. | Shipping Wt., Lbs. | Order by Number | Price, Each |
|-----|--------|---------|-------------------|--------------------|-----------------|-------------|
| 125 | 4" | 1" x 2" | 2 $\frac{1}{2}$ | 3 | 745-125 | \$15.00 |
| 127 | 6" | 1" x 3" | 5 $\frac{1}{4}$ | 5 $\frac{3}{4}$ | 745-127 | 30.00 |

755 and 756 MAGNETIC CHUCK V BLOCKS— Made of alternating steel and non-magnetic spacing strips. For use on permanent magnet and electro-magnetic chucks. Used singly or in pairs.

Blocks have 90° V slot accurately ground along $2\frac{1}{16}$ " length. Blocks are $1\frac{3}{4}$ " x $2\frac{1}{2}$ " x $2\frac{1}{16}$ ". Single Block, net wt. 2 lbs. 10 oz.—shipping wt. 3 lbs. Pair Blocks, net wt. 5 $\frac{1}{4}$ lbs.—shipping wt. 6 lbs.

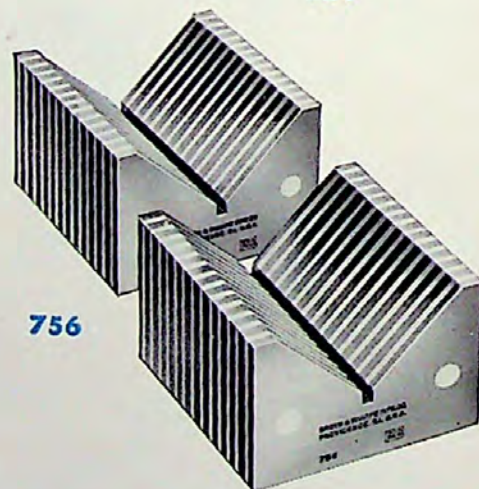
| | | |
|----------------|-------------|------------------|
| Single block | No. 745-755 | Each \$25.00 |
| Pair of blocks | No. 745-756 | Per Pair \$48.00 |



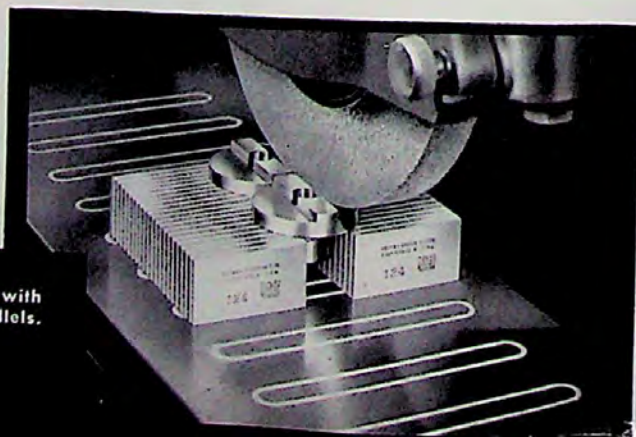
618



124



756

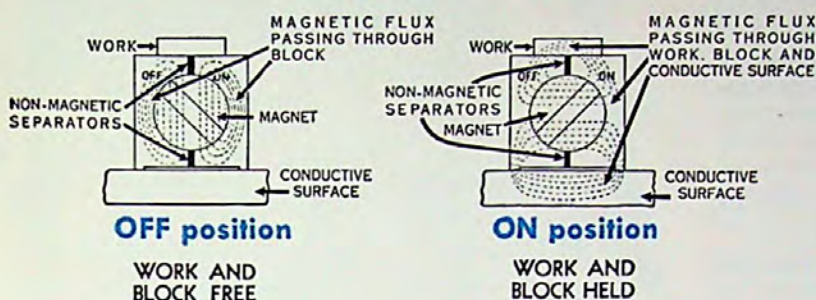


Note how easily work with offset is held on parallels.

Brown & Sharpe

Permanent Magnet Chucks...

WITH SINGLE ROTARY PERMANENT MAGNET



The advantages of Permanent Magnet Chucks in economy, simplicity, and convenience are available also with Chucks having a single rotary permanent magnet. These chucks simplify the holding of different types of work for tool-making, inspecting, polishing, and light machine operations. The simple control when turned ON holds work to the surface of the chuck. The holding power can be regulated by partially turning the control so that the work can be removed from the chuck or positioned on it.



255

255 RECTANGULAR PERMANENT MAGNET CHUCK—This chuck is convenient for holding small or thin work in toolmaking and manufacturing or for inspection purposes. It eliminates the necessity of cumbersome clamping devices for many jobs. Magnetic poles are spaced closely and small or thin iron or steel work can be held firmly on the chuck. It is suitable for wet or dry grinding.

When control is turned ON, work is held firmly on the chuck, and if the chuck rests on a magnetically conductive surface, it also is held firmly to this surface. The chuck can be used on its sides and ends as well as on its base, but it does not hold to a magnetically conductive surface when used on its sides. Holding power can be regulated by partially turning the control so that work can be removed or positioned on the chuck without fully releasing chuck from the conductive surface. Work surface and base are ground parallel and back end is ground square with working surface.

Two removable stop plates are furnished, one for the back and one for use on either side of the chuck. Plates may be adjusted vertically to suit the work. Furnished in finished wooden case.



412

412 RECTANGULAR TWO-LINE PERMANENT MAGNET CHUCK—This chuck has two line pole spacers and is useful for grinding small parts as well as for work of larger sizes. Many types of work can be laid end-to-end over the line spacers. Packing strips are not required even with small work. Strength of magnetic force can be controlled by partially turning handle. Top and bottom are ground flat and parallel. Chuck is suited for both wet and dry grinding.

Two clamps for holding chuck to a machine table and two removable stop plates are furnished—one for the back and one for the left-hand end.

| No. | Working Surface | Magnetic Surface | Over-all Width | Height | Over-all Length | Order by Number | Price, Each |
|-----|-----------------|------------------|----------------|---------|-----------------|-----------------|-------------|
| 255 | 2 7/8 x 5 1/4 | 1 3/4 x 5 1/4 | 2 13/16 | 2 13/16 | 6 1/4 | 745-255 | \$61.00 |
| 412 | 4 x 12 | 4 x 12 | 4 11/16 | 4 | 14 1/2 | 745-412 | 137.00 |

Net wt.: 255—10 lbs., 412—54 lbs. Shipping wt.: 255—11 1/2 lbs., 412—60 lbs.
For sale only in the United States of America, its territories and Canada.

Wet grinding group of parts of unusual shape which span one of the line pole spacers.

Brown & Sharpe



ROTARY

Permanent Magnet

5R, 7R and 9R ROTARY PERMANENT MAGNET CHUCKS—provide the same advantages as the Rectangular Chucks. They require no wires, electrical connections, switches, or auxiliary generators. They do not heat under any conditions and work can be left on them as long as desired. Also, there is no danger of work flying off because of power failure.

They are useful for cylindrical grinding machines, tool and disk grinders, polishing machines, and for light cuts on lathes.

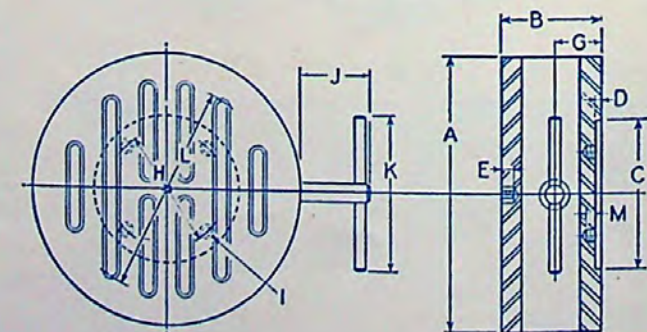
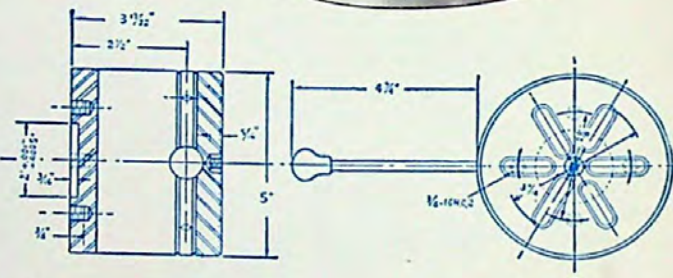
5R will hold work from $\frac{7}{8}$ " to 5" in diameter. Work is held securely or released when control ring is rotated 30° and the operating pin can be used in any one of 8 different holes in the control ring so that chuck can be operated in any position in which it may stop. Work as small as $\frac{7}{8}$ " in diameter can be held on this chuck.

With 7R and 9R the operating handle is inserted in either one of two operating sockets on opposite sides of the chuck and when turned to ON the chuck holds work securely and releases it when handle is turned 180° in opposite direction to OFF.

All three chucks are light and compact and may be rotated without vibration at reasonable spindle speeds.

A $\frac{1}{4}$ " #28 N.F.#2, R.H." tapped hole in the centers of the faces of the chucks provides for attaching a location button for centering work. The rims of 7R and 9R chucks are cut away in two places to accommodate clamps for clamping chucks to a machine table or work bench.

Backs of chucks are recessed and have 4 tapped holes for attaching spindle adapter plates. For Adapter Plates, see opposite page. Operating pin or handle is furnished.



| No. | Working Surface Diameter | Magnetic Surface Diameter (Approx.) | Diameter | Thickness | Order by Number | Price, Each |
|-----|--------------------------|-------------------------------------|----------|-----------|-----------------|-------------|
| 5R | 5 | 4 | 5 | 3 1/2 | 745-5 | \$204.00 |
| 7R | 7 | 6 1/4 | 7 | 3 | 745-7 | 215.00 |
| 9R | 9 | 7 | 9 1/4 | 3 3/8 | 745-9 | 225.00 |

For sale only in the United States of America and its territories.

Net Weight, Lbs.: 5R—17, 7R—24, 9R—47; Shipping Weight, Lbs.: 5R—22, 7R—30, 9R—55.

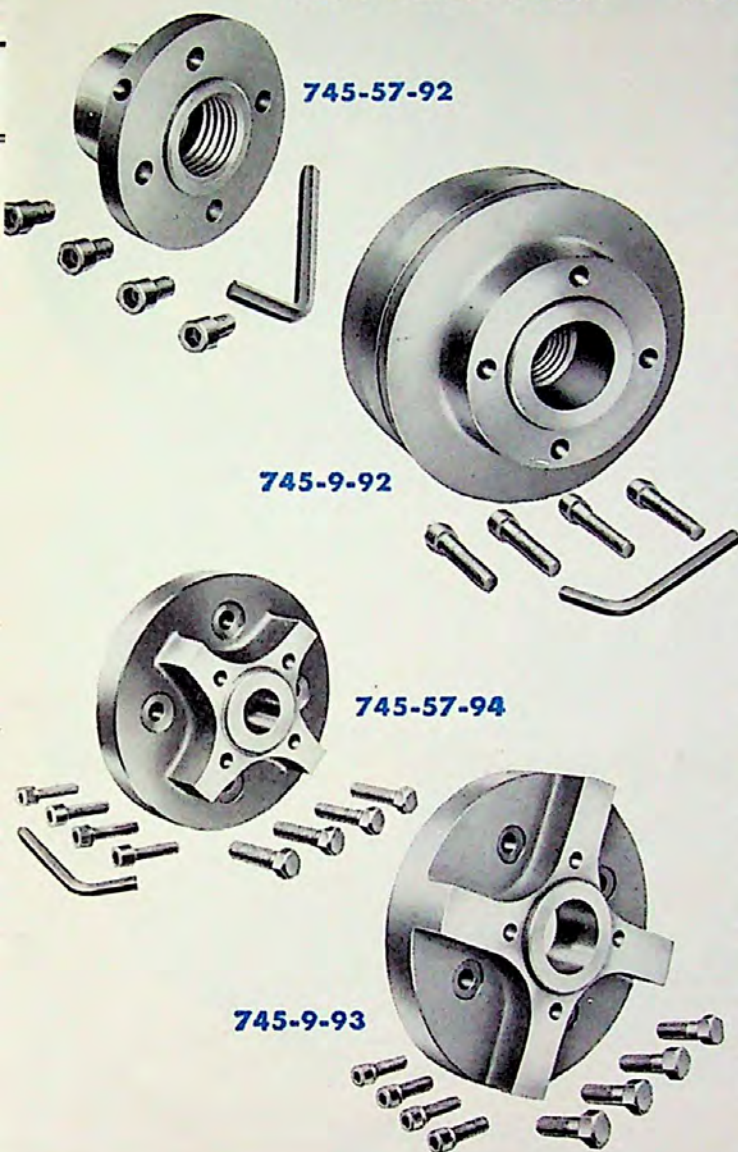
DIMENSIONS (Inches)

| No. | A | B | C* | D | E | G | H | I | J | K | L | M |
|-----|-------|-------|----|-----|-------|-------|-------|---------------------|-------|-------|-------|-------|
| 7R | 7 | 2 1/8 | 2 | 3/8 | 2 3/4 | 1 1/2 | 2 3/8 | 3/8 16 N.C.-2, R.H. | 2 1/2 | 5 1/4 | 6 | 3/8 |
| 9R | 9 1/4 | 3 3/8 | 3 | 1/4 | 3/8 | 1 3/8 | 4 | 3/8 14 N.C.-2, R.H. | 2 1/2 | 5 1/4 | 6 1/2 | 1 1/2 |

* Plus .001" or minus .0005".

Chucks, Pulleys and Adaptors...

TROUBLE-FREE — NO ELECTRICAL CONNECTIONS



MAGNETIC CHUCK ADAPTER FOR 5R and 7R ROTARY PERMANENT MAGNET CHUCKS. Adapts chucks for use on No. 1 Universal Grinding Machines up to and including serial No. 5722 and No. 13 Universal and Tool Grinding Machine up to serial No. 6325. Furnished with four hollow-head cap screws and one $\frac{5}{16}$ " hex. key.

Order by No. 745-57-92 \$21.00

MAGNETIC CHUCK ADAPTER PULLEY FOR 5R and 7R ROTARY CHUCKS. Similar to No. 745-9-92 Pulley shown at left. Adapts Rotary Chucks 5R and 7R for use on No. 13 Universal and Tool Grinding Machines commencing with serial No. 6325. Furnished with four hollow-head cap screws and one $\frac{5}{16}$ " hex. key.

Order by No. 745-57-93 \$23.00

MAGNETIC CHUCK ADAPTER PULLEY FOR 9R ROTARY CHUCK. Adapts Rotary Chucks commencing with serial No. 1788 for use on the following Universal Grinding Machines:—No. 2 serial No. 3971 to 5367 Inc.; No. 3 serial No. 2798 to 3327 Inc.; and No. 4 serial No. 1564 to 1805 Inc. Furnished with four hollow-head cap screws and one $\frac{5}{16}$ " hex. key.

Order by No. 745-9-92 \$46.00

MAGNETIC CHUCK ADAPTER FOR 5R and 7R ROTARY PERMANENT MAGNET CHUCKS. Adapts Rotary Chuck No. 5R, commencing serial No. 101 and Rotary Chuck 7R commencing serial No. 101 for use on No. 1 Universal Grinding Machines commencing serial No. 521-1-1. Furnished with four hollow-head cap screws, four hex. machine screws and one $\frac{5}{16}$ " hex. key.

Order by No. 745-57-94 \$46.00

MAGNETIC CHUCK ADAPTER FOR 9R ROTARY PERMANENT MAGNET CHUCKS. Similar to No. 745-9-93 Adapter shown. Adapts Rotary Chuck 9R, commencing serial No. 1788 for use on No. 1 Universal Grinding Machines commencing serial No. 521-1-1. Furnished with four hollow-head cap screws, four hex. machine screws and one $\frac{5}{16}$ " hex. key.

Order by No. 745-9-94 \$46.00

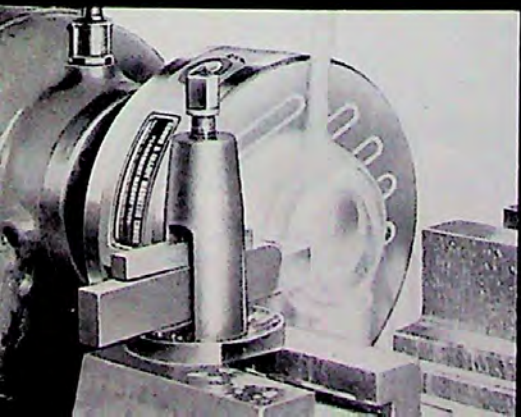
MAGNETIC CHUCK ADAPTER FOR 9R ROTARY PERMANENT MAGNET CHUCK. Adapts Rotary Chuck No. 9R, commencing serial No. 1788 for use with the following Universal Grinding Machines; No. 2 commencing serial No. 521-1-1; No. 3 commencing serial No. 521-3-1; and No. 4 commencing serial No. 521-4-1. Furnished with four hollow-head cap screws, four hex. machine screws, and one $\frac{5}{16}$ " hex. key.

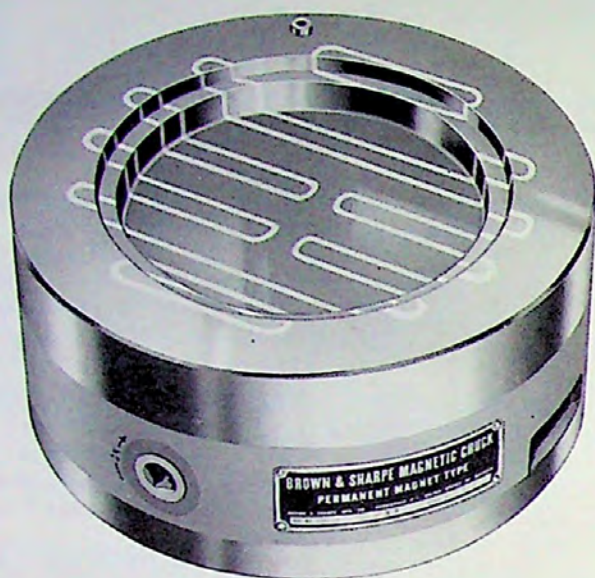
Order by No. 745-9-93 \$46.00

SPECIAL ADAPTERS—In ordering special adapters specify designation and size of spindle nose if A.S.A. Standard. If not standard, or if an A.S.A. Modified Standard, specify machine manufacturer's model and serial number.

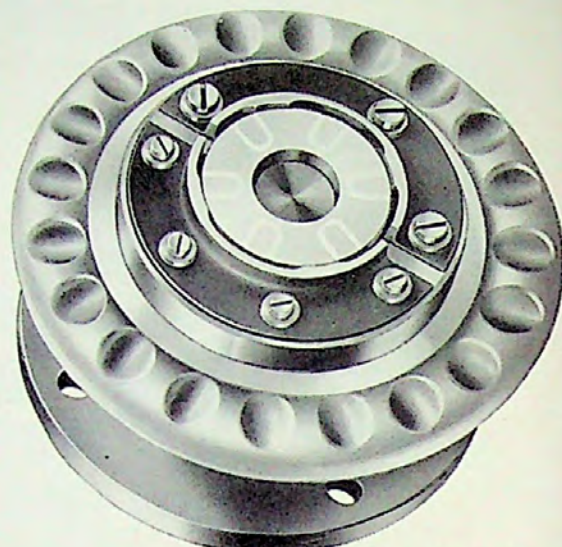
When ordering and requesting a quotation, the receipt of this information will eliminate unnecessary delay.

Rotary chucks are suited for both wet and dry grinding as well as light turning operations.

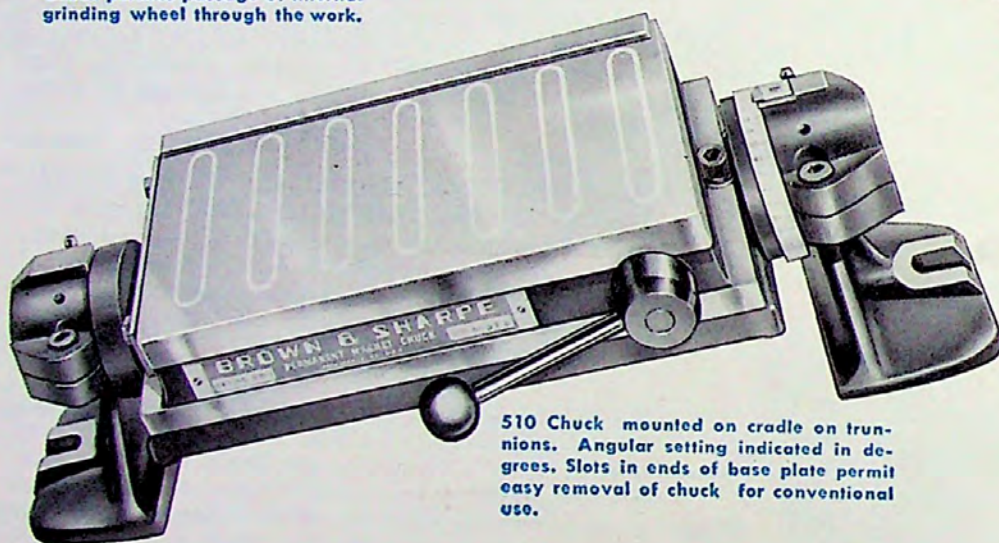




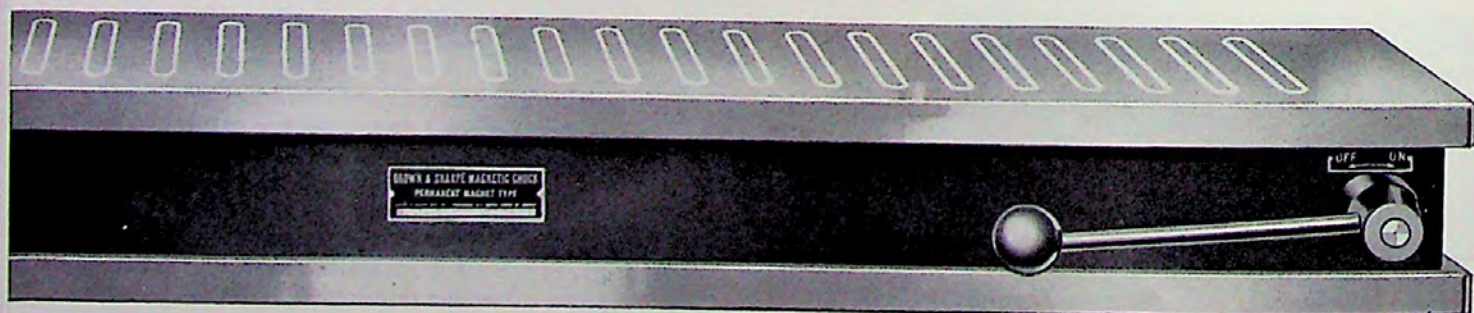
Recessed face of this Rotary Chuck permits passage of internal grinding wheel through the work.



Special chuck developed for grinding a part difficult to hold. The outer steering wheel type ring controls the magnetic force and the chuck also has two outer controlling rings which centralize the work.



510 Chuck mounted on cradle on trunnions. Angular setting indicated in degrees. Slots in ends of base plate permit easy removal of chuck for conventional use.



Large Rectangular Chuck 9" x 48" used for holding groups of parts in production grinding.

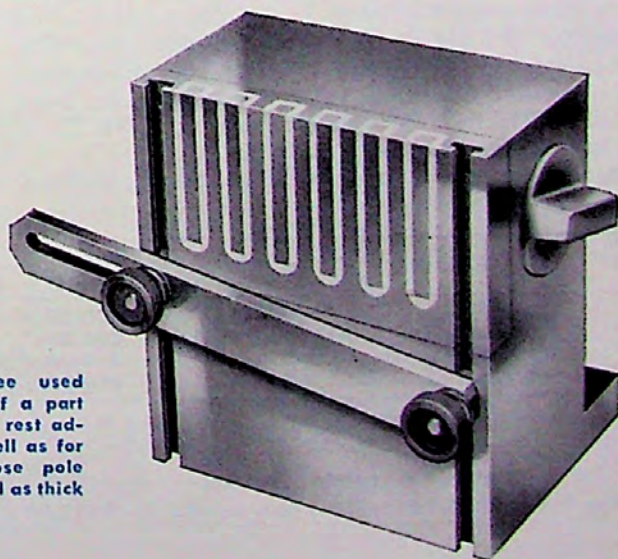
Permanent Magnet Chucks...

SIMPLIFY DIFFICULT HOLDING PROBLEMS

Frequently a Permanent Magnet Chuck can simplify an otherwise difficult holding problem, not only for actual machine operations but for testing, assembly, inspection and other bench work. The construction of these chucks and their operating advantages lend themselves to such special designs and unusual applications as suggested by examples shown on this and the preceding page. Our Engineering Department will be glad to answer questions on special applications upon request.



Large Rotary Chuck 16" in diameter. Chuck can be operated in any position by means of an operating pin inserted into any one of the holes of the control ring.



Permanent Magnet Knee used for grinding one side of a part square with the face. A rest adjustable for height as well as for angle is provided. Close pole spacing holds thin as well as thick pieces.

Brown & Sharpe

Bench Centers...

INSPECT CYLINDRICAL WORK EASILY AND ACCURATELY

These Bench Centers provide a simple, accurate means for holding cylindrical work for inspection purposes. The 18" size is especially attractive, at its low cost, for shops not requiring tests on long work.

The runout is shown by the dial indicator and work mounted on arbors can be checked axially for side runout or camming action. For tests to unusually close limits, the headstock and footstock centers may be lapped to the work.

The heavily ribbed bed is supported by a three-point bearing and the ways are cast integral and ground accurately. Headstock and footstock centers are steel, hardened and ground to an accurate taper fit. One is held in a fixed steel sleeve in the headstock and the other in a sliding sleeve, spring actuated in the footstock. For supporting heavy work the spring actuated center may be locked in position.

Alignment of headstock and footstock is maintained from the one reference surface which runs the entire length of the bed. Centers are furnished with or without *Dial Indicators. Dial Indicator furnished reads by half-thousandths, but indicators reading by ten-thousandths can be furnished to order.

A set of 4" Raising Blocks for increasing capacity of the centers can be furnished.



36"

CAPACITIES—2 sizes take work 18" and 36" in length; centers swing 8" in diameter.

HEADSTOCK AND FOOTSTOCK CENTERS—steel, ground and accurately fitted. No. 7 Brown & Sharpe Taper.

DIAL INDICATOR—supported by sliding rest; adjustable longitudinally on bed. Dial holding rod clamped at any height on post and used on either side. Rod may be set at any angle relative to base so that dial indicator point contacts work in most convenient position. Dial reads to half-thousandths; has white enamel face with widely spaced graduations for easy reading. Zero setting adjusted to any desired position.

BED—"U" cross section. Three-point bearing support. All parts movable on bed; locked in position by lever type clamps. Work support furnished.

WEIGHTS—18" Net, about 135 lbs. Shipping, about 170 lbs. Dimensions for shipment, 41" x 12" x 15". Space occupied, about 4.25 cubic feet. 36" Net, about 150 lbs. Shipping, about 215 lbs. Dimensions for shipment, 55" x 12" x 14". Space occupied, about 5 cubic feet.

If ordered with Indicator, add 10 lbs. to weights listed above.



18"

With 4" Raising Blocks, centers can be used for testing work up to 16" in diameter.

| Size | Furnished | Order By Number | Price, Each |
|------|-------------------|-----------------|-------------|
| 18" | Without Indicator | 763-18 | \$250.00 |
| 18" | With Indicator * | 763-18-1 | 300.00 |
| 36" | Without Indicator | 763-8 | 340.00 |
| 36" | With Indicator * | 763-8-1 | 390.00 |

*For Indicator furnished, see 7730, page 56, and Angular & Plain Base Stops, page 61.

SET OF 4" RAISING BLOCKS

Order by Number 763-9008-439 Price, per set of 2 \$110.00



Brown & Sharpe

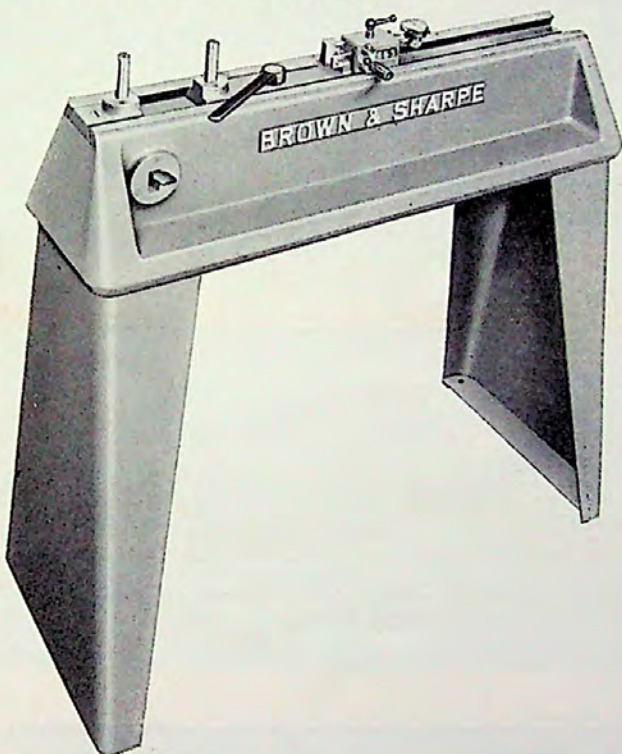
Spur Gear Testing Fixture

SIMPLE, DIRECT, ACCURATE & RELIABLE

Two different types of spur gear tests can be made on this fixture, one with the gears at a fixed center distance and the other with the gears held in mesh under pressure by a spring in the indicator carrier. Center distances are set accurately in thousandths by means of a scale and Vernier. The dial indicates in half-thousandths runout and variation of the gears. It also shows at a glance other common errors and enables their identification. A cam releasing device facilitates the removal of gears after testing and a lever arrangement at the left front permits the taper studs on which the gears are mounted to be unseated quickly.

The most common errors in spur gears are variation of center distance, tooth to tooth spacing (thick and thin), difference in shape, or pressure angle of teeth. Each of these errors may be identified by the nature of the movement of the indicator hand.

Steady travel of the indicator hand shows eccentricity or variation in center distance. A sudden movement from zero and a quick return during a small part of the revolution of the gear indicates a variation in tooth to tooth spacing (thick and thin teeth). Continued pulsing of the hand indicates pressure angle variation or a difference in tooth profile.



Furnished with 4 studs: 2, $\frac{5}{8}$ " diam.; and 2, $1\frac{1}{16}$ " diam.; and 4 bushings: 2, 1" diam., $\frac{5}{8}$ " hole; and 2, $1\frac{1}{2}$ " diam., $1\frac{1}{16}$ " hole.

| Distance Between Centers, Inches | | Length Over-all, Inches | Width Over-all, Inches | Order by Number | Price |
|----------------------------------|---------|-------------------------|------------------------|-----------------|----------|
| Maximum | Minimum | | | | |
| 29½ | 2 | 47¼ | 20½ | 791-1 | \$984.00 |

Net Weight 400 lbs.—Shipping Weight 500 lbs.

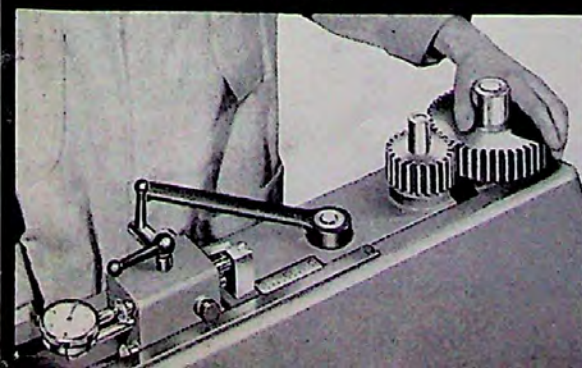
BUSHINGS

| Size, Inches | Hole Dia., Inches | Order by Number | Price, Each | Size, Inches | Hole Dia., Inches | Order by Number | Price, Each |
|--------------|-------------------|-----------------|----------------------|--------------|-------------------|-----------------|----------------------|
| 1 | $\frac{5}{8}$ | 291-1-40 | Price on Application | 2½ | $1\frac{1}{16}$ | 291-1-57 | Price on Application |
| 1½ | $\frac{5}{8}$ | 291-1-41 | | 2½ | $1\frac{1}{8}$ | 291-1-58 | |
| 1½ | $\frac{3}{4}$ | 291-1-42 | | 2½ | $1\frac{3}{16}$ | 291-1-59 | |
| 1¾ | $\frac{3}{4}$ | 291-1-43 | | 2½ | $1\frac{1}{2}$ | 291-1-60 | |
| 1¾ | $\frac{5}{8}$ | 291-1-44 | | 2½ | $1\frac{5}{8}$ | 291-1-61 | |
| 1¾ | $\frac{3}{4}$ | 291-1-45 | | 2½ | $1\frac{3}{4}$ | 291-1-62 | |
| 1¾ | $\frac{3}{4}$ | 291-1-46 | | 2½ | $1\frac{7}{8}$ | 291-1-63 | |
| 1¾ | $1\frac{1}{16}$ | 291-1-47 | | 2½ | $1\frac{1}{2}$ | 291-1-64 | |
| 1½ | $1\frac{1}{8}$ | 291-1-48 | | 2½ | $1\frac{3}{4}$ | 291-1-65 | |
| 1¾ | $1\frac{1}{8}$ | 291-1-49 | | 2½ | $1\frac{7}{8}$ | 291-1-66 | |
| 1¾ | $1\frac{1}{4}$ | 291-1-50 | | 2½ | $1\frac{1}{2}$ | 291-1-67 | |
| 1½ | $1\frac{1}{8}$ | 291-1-51 | | 2½ | $1\frac{3}{4}$ | 291-1-68 | |
| 1¾ | $1\frac{1}{8}$ | 291-1-52 | | 2½ | $1\frac{7}{8}$ | 291-1-69 | |
| 1¾ | $1\frac{1}{4}$ | 291-1-53 | | 2½ | $1\frac{1}{2}$ | 291-1-70 | |
| 1¾ | $1\frac{3}{8}$ | 291-1-54 | | 2½ | $1\frac{3}{4}$ | 291-1-71 | |
| 1¾ | $1\frac{1}{2}$ | 291-1-55 | | 3 | $1\frac{1}{8}$ | 291-1-72 | |
| 2 | $1\frac{1}{2}$ | 291-1-56 | | | | | |

STUDS

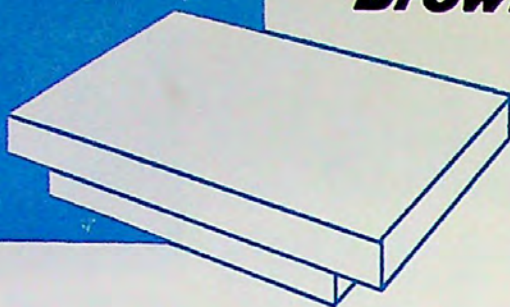
| Diameter, Inches | Order by Number | Price, Each |
|------------------|-----------------|----------------------|
| $\frac{1}{4}$ | 291-1-28 | Price on Application |
| $\frac{3}{16}$ | 291-1-29 | |
| $\frac{1}{2}$ | 291-1-30 | |
| $\frac{3}{8}$ | 291-1-31 | |
| $\frac{1}{2}$ | 291-1-32 | |
| $\frac{3}{8}$ | 291-1-33 | |
| $\frac{1}{2}$ | 291-1-34 | |
| $\frac{3}{8}$ | 291-1-35 | |
| $\frac{1}{2}$ | 291-1-36 | |
| $\frac{3}{8}$ | 291-1-37 | |
| $\frac{1}{2}$ | 291-1-38 | |
| $\frac{3}{8}$ | 291-1-39 | |

Here gears are under pressure. Main slide is free to move. Fixture is conditioned to test for runout, variation, and other common errors.

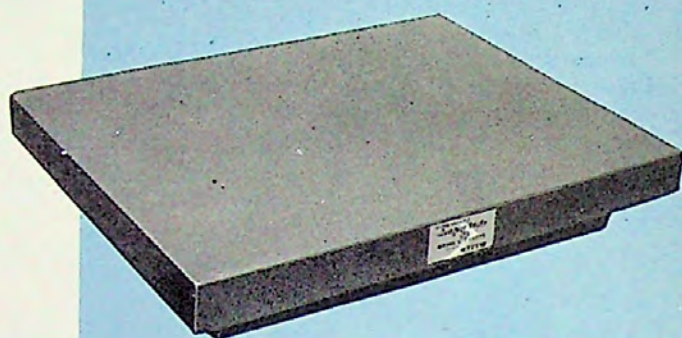


Brown & Sharpe

"Black Granite"



| Size, Inches | Ledges | Weight, Lbs. (Approx.) | Number | Price Each |
|-----------------|--------|---------------------------|---------|---------------|
| 12 x 18 | 2 | 87 | 701-108 | \$ 65.00 |
| 12 x 18 | 4 | 76 | 701-109 | 83.00 |
| 18 x 24 | 2 | 180 | 701-114 | 130.00 |
| 18 x 24 | 4 | 165 | 701-115 | 166.00 |
| 24 x 36 | 2 | 440 | 701-126 | 260.00 |
| 24 x 36 | 4 | 500 | 701-127 | 330.00 |
| 36 x 48 | 2 | 1100 | 701-150 | 529.00 |
| 36 x 48 | 4 | 1350 | 701-151 | 660.00 |
| 36 x 60 | 2 | 1800 | 701-153 | 743.00 |
| 36 x 60 | 4 | 2100 | 701-154 | 880.00 |
| 36 x 72 | 2 | 2700 | 701-156 | 940.00 |
| 36 x 72 | 4 | 3000 | 701-157 | 1058.00 |
| 48 x 60 | 2 | 2400 | 701-174 | 948.00 |
| 48 x 60 | 4 | 2900 | 701-175 | 1100.00 |
| 48 x 72 | 2 | 3600 | 701-177 | 1060.00 |
| 48 x 72 | 4 | 4200 | 701-178 | 1320.00 |
| 48 x 96 | 2 | 5900 | 701-184 | 1540.00 |
| 48 x 96 | 4 | 6600 | 701-185 | 1760.00 |
| 48 x 144 | 2 | 9600 | 701-193 | 2910.00 |
| 48 x 144 | 4 | 10400 | 701-194 | 3268.00 |

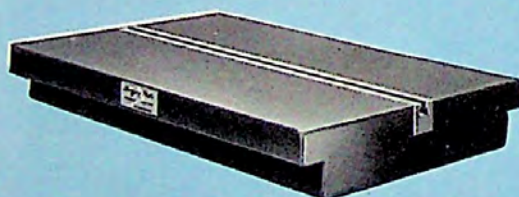


2-Ledge Type

4-Ledge Type

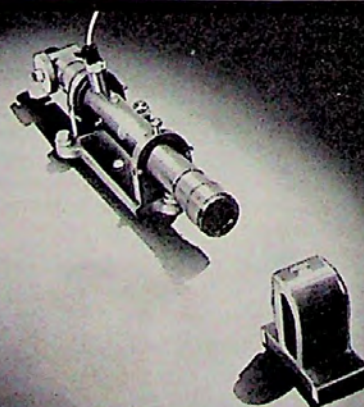


The 2-ledge plates are commercial accuracy; the 4-ledge plates are precision accuracy.



Plates with a steel T-Slot insert for precision instrument application, jigs, fixtures, etc., are available. Information on application.

Black Granite Surface Plates are checked and rechecked by the most precise method known. This method uses the celebrated Auto-Collimator which utilizes a beam of light to give readings of surface accuracy to within fifty millionths of an inch.



Surface Plates...

OFFER ENDURING PRECISION

These plates are created by skilled craftsmen who use the most modern methods devised for lapping super-hard granite to ultra-precision standards.

A special lapping process insures free movement of gage blocks and checking fixtures over the exceptionally smooth surface. Absence of embedded quartz particles allows the usage of delicate precision tools such as master gage blocks with no danger of lapping action on their bottom surfaces.

The mineral constituents of the special "Black Granite" are regular in size and shape, are very fine and compact, and are of uniform hardness. In a series of competitive tests made by the National Bureau of Standards, this same type of granite proved strongest (54,400 P.S.I.); most dense (3.024 true density); and least absorptive (.07%). The material has been normalized through the centuries by nature and will not warp or distort. The plates retain their original surface accuracy almost permanently.

If they are injured by a falling sharp object, there is no crater around the nick as with a metal plate and the non-

reflecting quality of the surface makes instruments easy to read even in bright sunlight. Plates can be washed with soap and water, naphtha, carbon tetrachloride or other cleaners. In fact, the wipe of a cloth is usually sufficient to clean the surface instantly. The material is least responsive to wide temperature changes, and is totally unaffected by body temperature and it cannot rust, corrode, stain, or discolor.

The economy of a Brown & Sharpe "Black Granite" Surface Plate is outstanding. Its cost is much less than for a hand scraped metal plate and maintenance costs are practically non-existent.

Freight charges on these plates are based on rate from Providence, Chicago, or Los Angeles, whichever is nearest to point of delivery.

Orders shipped freight collect. The difference between actual freight charge paid and the rate between point of delivery and Providence, Chicago, and Los Angeles (which ever is nearest) will appear as a credit on the invoice.

STANDS FOR "BLACK GRANITE" SURFACE PLATES

Stands are built sturdily to withstand three to six times the weight of the surface plate. They are fabricated with heavy gage angle iron and reinforced. Painted machine tool grey, they have either leveling screws or casters under the legs. Overall work height is 36".



| For Plate Size, Inches | Weight, Lbs. (Approx.) | Number | Price, Each |
|---------------------------|---------------------------|---------|----------------|
| 24 x 36 (2-ledge) | 80 | 701-308 | \$ 73.00 |
| †24 x 36 (2-ledge) | 80 | 701-312 | 98.00 |
| 24 x 36 (4-ledge) | 80 | 701-316 | 73.00 |
| 36 x 48 (2-ledge) | 160 | 701-320 | 82.00 |
| †36 x 48 (2-ledge) | 160 | 701-324 | 141.00 |
| 36 x 48 (4-ledge) | 160 | 701-328 | 82.00 |
| 36 x 60 (2-ledge) | 200 | 701-332 | 132.00 |
| 36 x 60 (4-ledge) | 200 | 701-336 | 132.00 |
| 36 x 72 (2-ledge) | 240 | 701-340 | 132.00 |
| 36 x 72 (4-ledge) | 240 | 701-344 | 132.00 |
| 48 x 60 (2-ledge) | 300 | 701-348 | 140.00 |
| 48 x 60 (4-ledge) | 300 | 701-352 | 140.00 |
| 48 x 72 (2-ledge) | 600 | 701-356 | 161.00 |
| 48 x 72 (4-ledge) | 600 | 701-360 | 161.00 |
| 48 x 96 (2-ledge) | 900 | 701-364 | 204.00 |
| 48 x 96 (4-ledge) | 900 | 701-368 | 204.00 |
| 48 x 144 (2-ledge) | 1100 | 701-372 | 286.00 |
| 48 x 144 (4-ledge) | 1100 | 701-376 | 286.00 |

† This stand has casters.

"Black Granite"

"BLACK GRANITE" TOOLMAKERS' FLAT is made of the same high quality "Black Granite" used for Brown & Sharpe "Black Granite" Surface Plates. It is a valuable addition to the equipment of toolmakers and others engaged in precision bench checking, layout work, etc.

| Size, Inches | Weight, Lbs. (Approx.) | No. | Price, Each |
|--------------|------------------------|-------|-------------|
| 8 x 12 | 15 | 701-4 | \$26.00 |

"BLACK GRANITE" PARALLELS of aged granite are especially valuable for precision inspection. Each matched pair is furnished in an attractive black leather cover, felt-lined, plywood case.

| *Size, Inches | Grade | Weight, Lbs. (Approx.) | No. | Price, Per Matched Pair |
|-----------------|------------|------------------------|---------|-------------------------|
| 1/2 x 1 x 6 | Commercial | .33 | 701-904 | \$27.50 |
| 1/2 x 1 x 6 | Precision | .33 | 701-954 | 38.50 |
| 3/4 x 1 1/2 x 6 | Commercial | .67 | 701-906 | 33.00 |
| 3/4 x 1 1/2 x 6 | Precision | .67 | 701-956 | 44.00 |
| 1 x 1 1/2 x 12 | Commercial | 2.0 | 701-908 | 44.00 |
| 1 x 1 1/2 x 12 | Precision | 2.0 | 701-958 | 55.00 |
| 1 x 2 x 12 | Commercial | 2.6 | 701-910 | 49.50 |
| 1 x 2 x 12 | Precision | 2.6 | 701-960 | 66.00 |
| 1 1/2 x 3 x 18 | Commercial | 9.0 | 701-912 | 99.00 |
| 1 1/2 x 3 x 18 | Precision | 9.0 | 701-962 | 137.50 |

*These dimensions are $\pm \frac{1}{32}$ ".

"BLACK GRANITE" STRAIGHT EDGES, are comparatively light and retain their original accuracy indefinitely. Each Straight Edge is furnished in an attractive black leather cover, felt-lined, plywood case.

| Size, Inches | Grade | Weight, Lbs. (Approx.) | No. | Price, Each |
|--------------|------------|------------------------|---------|-------------|
| 24 | Commercial | 15 | 701-704 | \$69.00 |
| 24 | Precision | 15 | 701-754 | 90.00 |
| 36 | Commercial | 24 | 701-706 | 90.00 |
| 36 | Precision | 24 | 701-756 | 149.00 |
| 48 | Commercial | 47 | 701-708 | 110.00 |
| 48 | Precision | 47 | 701-758 | 192.00 |
| 60 | Commercial | 60 | 701-710 | 165.00 |
| 60 | Precision | 60 | 701-760 | 278.00 |
| 72 | Commercial | 85 | 701-712 | 192.00 |
| 72 | Precision | 85 | 701-762 | 388.00 |

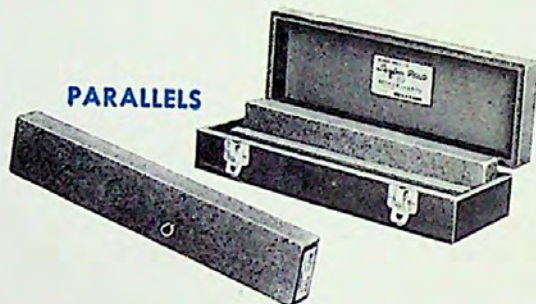
"BLACK GRANITE" ANGLE PLATES are precisely made for tool inspection. Tools and fixtures are clamped to them easily. Each plate comes in a black attractive leatherette covered, felt-lined plywood case.

| Size, Inches A x B x C | Weight, Lbs. (Approx.) | No. | Price, Each |
|---------------------------|------------------------|---------|-------------|
| 4 x 4 x 4 | 5 | 701-504 | \$29.50 |
| 4 x 6 x 6 | 8 | 701-506 | 42.00 |
| 5 x 8 x 8 | 24 | 701-508 | 71.50 |
| 6 x 6 x 6 | 17 | 701-510 | 59.50 |
| 6 x 9 x 12 | 65 | 701-512 | 105.00 |
| 9 x 9 x 9 | 54 | 701-514 | 110.00 |
| 12 x 12 x 12 | 130 | 701-516 | 194.00 |

- TOOLMAKERS' FLAT
- PARALLELS
- STRAIGHT EDGES
- ANGLE PLATES



TOOLMAKERS' FLAT



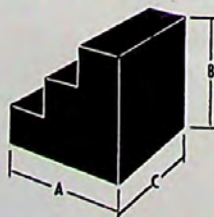
PARALLELS



STRAIGHT EDGES



ANGLE PLATES

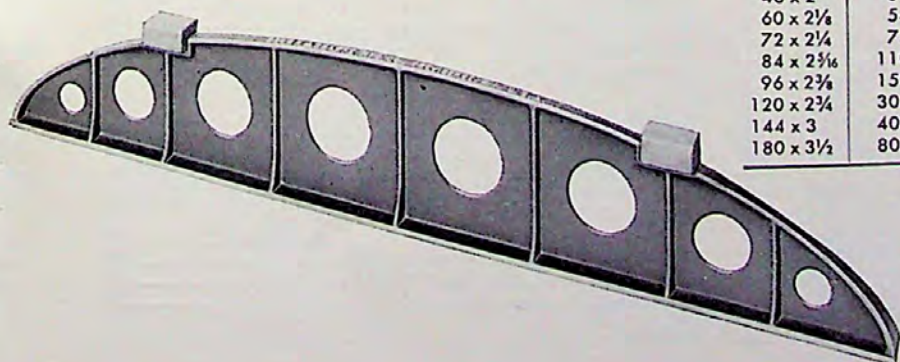
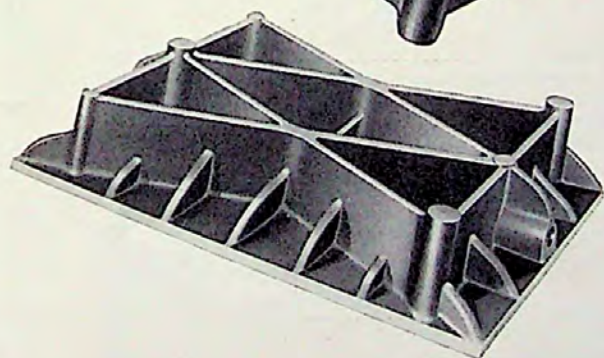


Cast Iron ...

The value of a surface plate or straight edge depends upon its accuracy and its retention of this accuracy through its material uniformity, rigidity, and resistance to wear. In Brown & Sharpe Cast Iron Surface Plate and Straight Edges the qualities essential to long lasting accuracy are developed to the fullest degree. Special, close grained cast iron is scraped skillfully to a true surface and this surface is supported by a net work of ribs carefully placed to provide strength and rigidity and the iron is given a special treatment to relieve strains and prevent distortion.

BROWN & SHARPE SURFACE PLATES provide true surfaces for reference purposes. Their accuracy has been proven through many years of use. The special scraping pattern produces 14 to 18 bearing spots per square inch of working surface resulting in small bearing areas and low surface friction. A wooden cover to protect the top surface of the plate and handles to facilitate moving it are furnished with each plate.

Deep heavy ribs form a triangular network that supports the accurate top surface. Note also the three point support.



● SURFACE PLATES ● STRAIGHT EDGES

| Size, Inches | Approx. Net Weight, Lbs. | Approx. Shipping Weight, Lbs. | Order by Number | Price, Each |
|--------------|--------------------------|-------------------------------|-----------------|-------------|
| 8 x 12 | 20 | 37 | 740-34 | \$72.00 |
| 9 x 14 | 30 | 45 | 740-40 | 82.00 |
| 10 x 15 | 40 | 55 | 740-46 | 90.00 |
| 10 x 30 | 115 | 165 | 740-48 | 185.00 |
| 10 x 50 | 225 | 350 | 740-50 | 300.00 |
| 12 x 12 | 40 | 56 | 740-54 | 86.00 |
| 12 x 18 | 64 | 93 | 740-56 | 130.00 |
| 12 x 24 | 116 | 157 | 740-58 | 173.00 |
| 12 x 36 | 185 | 255 | 740-60 | 260.00 |
| 14 x 14 | 56 | 76 | 740-66 | 118.00 |
| 14 x 18 | 70 | 115 | 740-68 | 152.00 |
| 14 x 21 | 93 | 140 | 740-70 | 178.00 |
| 15 x 30 | 177 | 245 | 740-72 | 270.00 |
| 16 x 16 | 70 | 110 | 740-74 | 154.00 |
| 16 x 48 | 355 | 510 | 740-76 | 465.00 |
| 18 x 18 | 100 | 150 | 740-80 | 195.00 |
| 18 x 24 | 150 | 188 | 740-82 | 260.00 |
| 18 x 36 | 255 | 360 | 740-84 | 390.00 |
| 20 x 30 | 225 | 325 | 740-86 | 362.00 |
| 24 x 24 | 210 | 275 | 740-90 | 346.00 |
| 24 x 36 | 330 | 470 | 740-92 | 520.00 |
| 24 x 48 | 525 | 725 | 740-94 | 690.00 |
| 24 x 60 | 810 | 1050 | 740-96 | 870.00 |
| 30 x 36 | 500 | 675 | 740-98 | 650.00 |
| 30 x 60 | 930 | 1345 | 740-100 | 1090.00 |
| 36 x 68 | 1600 | 2000 | 740-102 | 1480.00 |

Other sizes made to order

BROWN & SHARPE CAST IRON STRAIGHT EDGES have deep I beam cross sections; one flange serving as a "backbone" and the other as a testing surface. Vertical ribs give strength to the web. As straight edges usually are placed on the work, cored holes are placed in the web to lighten it without sacrificing strength.

Wooden blocks are provided for hand grips to eliminate distortion from the effect of the heat of the hands. Blocks, also, serve as supports when straight edges are not in use. A wooden cover to protect the scraped surface is furnished with each Straight Edge.

| Size, Inches | Approx. Net Weight, Lbs. | Approx. Shipping Weight, Lbs. | Order by Number | Price, Each |
|--------------|--------------------------|-------------------------------|--------------------|----------------------|
| 18 x 1½ | 5 | 15 | 772-18 | \$72.00 |
| 24 x 1¾ | 10 | 27 | 772-24 | 80.00 |
| 30 x 1¾ | 15 | 32 | 772-30 | 88.00 |
| 36 x 1¾ | 17 | 49 | 772-36 | 100.00 |
| 48 x 2 | 34 | 75 | 772-48 | 118.00 |
| 60 x 2½ | 54 | 120 | 772-60 | 150.00 |
| 72 x 2½ | 75 | 160 | 772-72 | 185.00 |
| 84 x 2½ | 110 | 230 | 772-84 | 230.00 |
| 96 x 2½ | 150 | 297 | 772-96 | 280.00 |
| 120 x 2½ | 300 | 565 | 772-120 | 400.00 |
| 144 x 3 | 400 | 810 | Made to order only | Price on application |
| 180 x 3½ | 800 | 1840 | Made to order only | Price on application |

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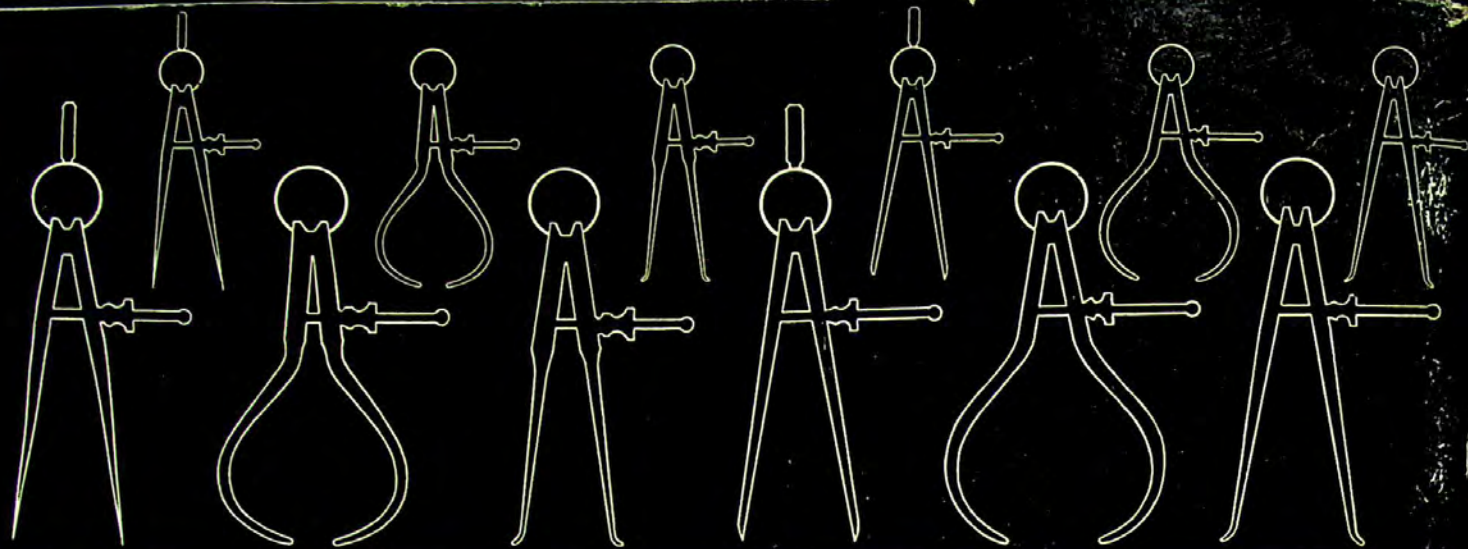
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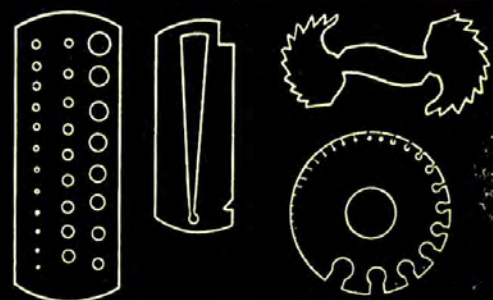
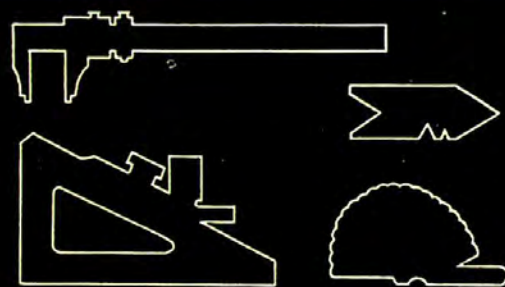
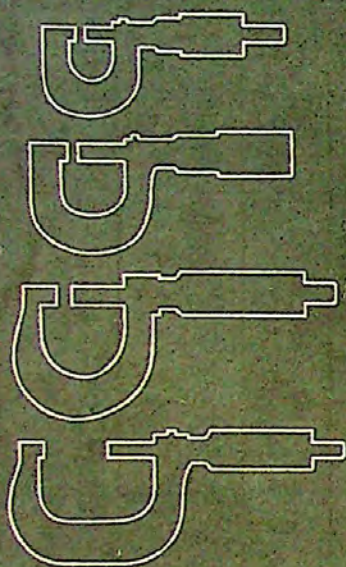
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