

CHAPTER III

Optional Mechanism and Additional Equipment

(Furnished at Extra Cost)

Various items of additional equipment available as extras are described and illustrated in this chapter. Instructions are also given on their set-up and use.

These extras include an Exhaust Attachment, Wet Grinding Attachment, Castered Base (for use with Wet Grinding and Exhaust Attachments), Magnetic Chucks, 4 $\frac{3}{4}$ Inch Index Centers, High Speed Surface Grinding Attachment, No. 1 Adjustable Vise, No. 2 Adjustable Swivel Vise, No. 21 Flanged Vise, Over-The-Wheel Truing Attachment, Radius and Angle Wheel Truing Attachment and Continuous Radius and Tangent Wheel Truing Attachment.

Exhaust Attachment

This Attachment removes grit and dust-laden air from the region of the grinding operation and separates out the foreign matter, leaving the air well-cleaned. It is readily moved from one machine to another, and is recommended for all dry grinding operations as a means of providing the necessary protection to the operator and machine. The Attachment is shown complete in Fig. 13.

The motor-driven fan on the separator tank draws the air at high speed through a flexible pipe from an adjustable exhaust nozzle attached to the wheel guard and blows it into a spiral separator, where the heavier particles are removed by centrifugal force. The air then passes slowly out through two viscous-coated renewable filter pads which remove the remaining finer particles. The separator chamber is emptied through the vertical sliding gate at the right front of the tank, while the filter pads are released for replacement by lifting out the two vertical rods which hold them in position.

For most efficient dust removal, adjust the position of the exhaust nozzle on its supporting stud so as to keep the nozzle close to the work.

The $\frac{1}{4}$ h.p. fan motor is controlled by a starting switch having overload protection, and is designed to be connected directly to the power line. However, if the grinding machine is fitted with the receptacle used with the Wet Grinding Attachment, the Exhaust Attachment can be equipped with a plug and cable for plugging into the receptacle.

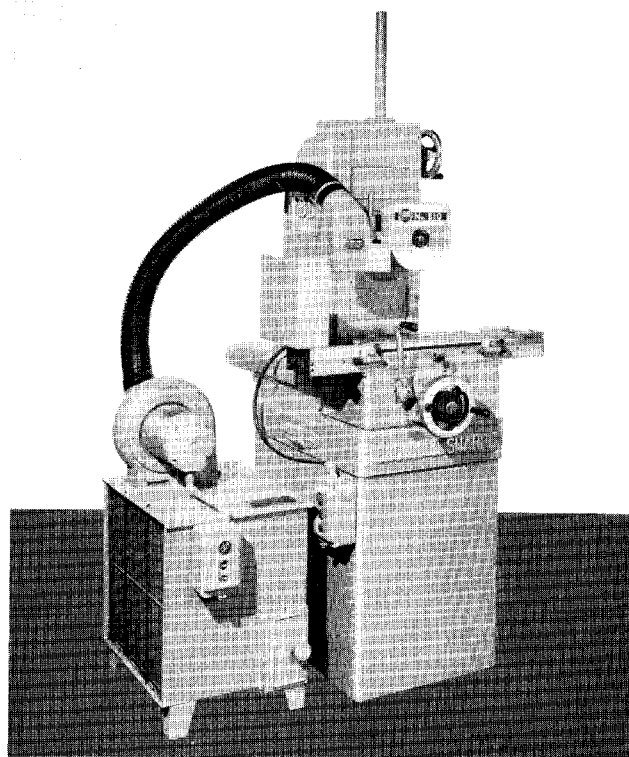


Fig. 13. Exhaust Attachment.

**Exhaust Nozzle
for Use with Central Plant Exhaust System**

The Exhaust Nozzle (Fig. 14) offers a convenient means for connecting the machine to a central exhaust system. A special stud is included for attaching the nozzle to the wheel guard of the machine and permits adjusting the position of the nozzle. A flexible pipe with a 4" hole is used for connecting to exhaust system.



Fig. 14. Nozzle for connection to plant exhaust system.

Wet Grinding Attachment

The Wet Grinding Attachment starts and stops independent of the machine Spindle motor. The attachment pumps starter and receptacle are located on the left side of machine next to the wheel spindle starter. (Fig. 15).

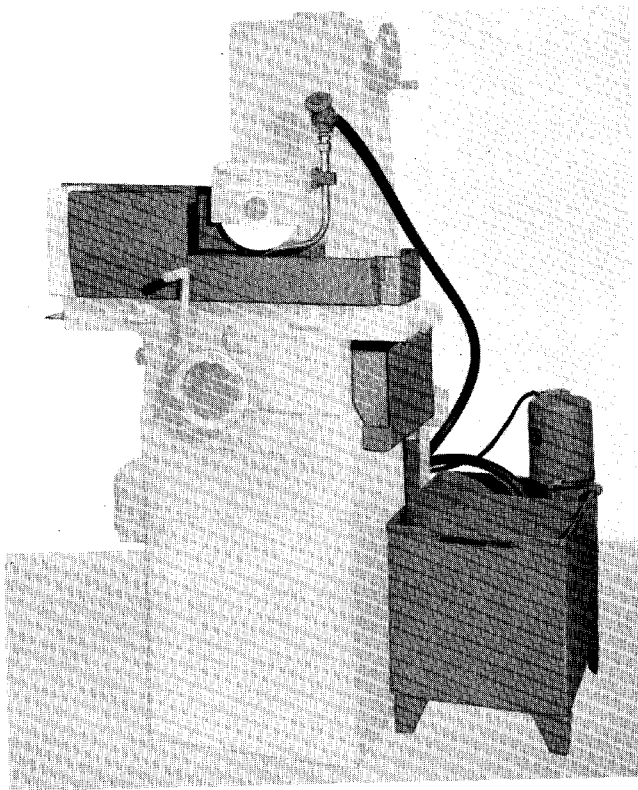


Fig. 15. Wet Grinding Attachment.

Wet Grinding Attachment Coolant is supplied to the wheel through a nozzle and flexible piping for a $\frac{1}{4}$ H.P. Motor driven centrifugal pump mounted in the supply tank. (Fig. 15). A plug, receptacle, overload relay and wiring are included.

The working surface of the table is surrounded by a two-piece overlapping adjustable rear guard, a guard for the right-hand end, a one-piece front guard and the deflector at the left end of the table.

Coolant collects in the table channels and is delivered to a trough in the bed at the rear of the table which then discharges into a trough fastened on the side of the machine and going to the supply tank through a flexible hose. The 18 gallon floor-type tank is of welded steel construction and has a two-plate removable baffle unit which provides for efficient setting.

Castered Base

for Use with Wet Grinding and Exhaust Attachments

The castered base or dolly (Fig. 16) provides a ready means of moving the coolant tank or separator tank to other machines or to a convenient place for emptying and cleaning. It is sturdily constructed of heavy steel, is equipped with ball bearing casters and fits into the corners formed by the feet of the tank, raising the feet about $\frac{1}{4}$ " off the floor to permit free movement.

It measures $19\frac{1}{2}$ " long, $15\frac{1}{2}$ " wide and $3\frac{7}{8}$ " high.

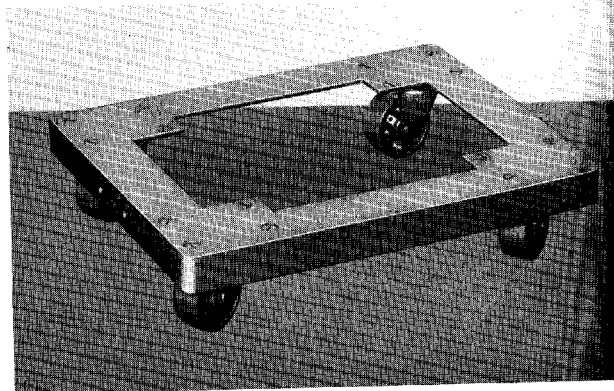


Fig. 16. Castered Base.

Magnetic Chucks

The Brown & Sharpe Nos. 510 and 407 Rectangular Model Permanent Magnet Chucks provides a quick, easy means of holding a variety of ferrous work for surface grinding. A 180° movement of the control lever (see Fig. 17)

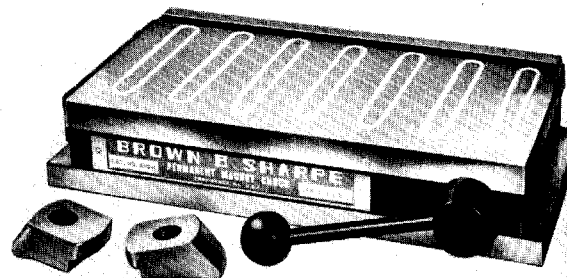


Fig. 17. No. 510 Brown & Sharpe Permanent Magnet Chuck

turns the chuck on or off; and since the chuck does not use electric current, it can be left turned on for as long as desired without heating. Auxiliary top plates are available to permit holding smaller work than can usually be held on a magnetic chuck.

For highest accuracy in grinding work parallel, the top surface of the chuck should be ground each time the chuck is mounted on the machine. Be sure that the chuck is turned on before doing this, and remove only the minimum amount of metal required to grind the entire top surface.

The chuck should not be subjected to excessive heat, shocks or blows, and the top should be kept free from pits and scratches. Regrind the top surface occasionally if necessary, as a smooth surface is essential for grinding work parallel.

Two removable stop plates are furnished with each chuck, one for the back and one for the left-hand end. These stop plates may be adjusted vertically to suit the work.

Wet grinding is preferable to dry grinding if the machine is equipped for this in order to reduce the possibility of distortion in the top plate which might be caused by heat from the grinding.

The No. 407 chuck is $1\frac{11}{16}$ " high with a working surface $4" \times 7"$. The No. 510 chuck is 2" high and has a working surface of $5\frac{1}{8}" \times 10\frac{1}{8}"$. Brown & Sharpe Permanent Magnet Chucks are for sale only in the United States of America and its Territories unless purchased with a new machine as original equipment.

Electromagnetic chucks and controlling equipment together with a Rectifier are also available. Information on application.

4 $\frac{3}{4}$ Inch Index Centers

These Index Centers (Fig. 18) permit accurate indexing of the more common circular divisions, facilitating the grinding of taps, reamers, formed cutters and similar work. The centers are clamped in position by T-bolts and are aligned by tongues which fit the table T-slots.

A spring-loaded locking pin on an adjustable arm, together with six rows of holes in the face of the combined index plate and worm wheel, provide for indexing all divisions from 2 to 14 and all even-numbered divisions from 18 to 28. The index plate can be turned by the worm, or the worm can be thrown out of mesh and the index plate turned by hand. To disengage the worm, loosen the adjacent clamp screw and swing the worm downward.

In using the Index Centers for sharpening formed cutters or similar work having radial tooth faces (see Fig. 18), first turn the cross feed handwheel to bring the centers in line with the

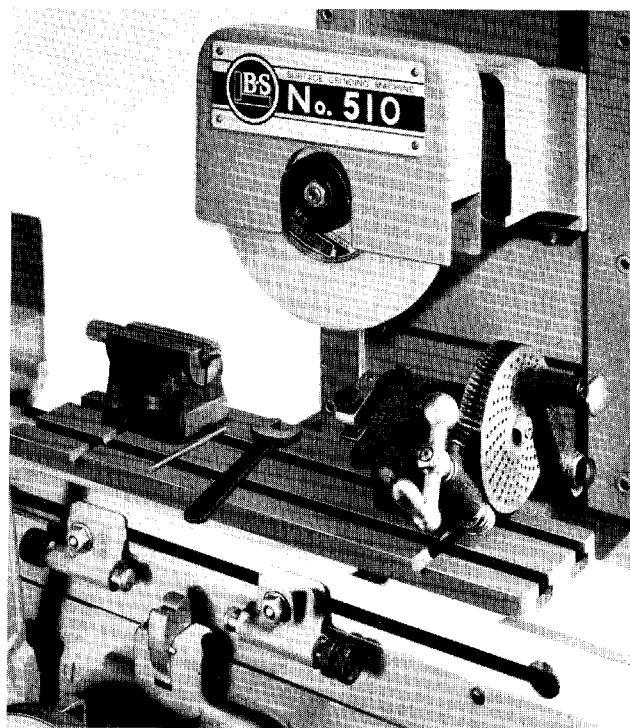


Fig. 18. 4 $\frac{3}{4}$ Inch Index Centers.

face of the grinding wheel. Then, with the work mounted between centers, disengage the index pin and turn the worm to feed the face of a tooth into the grinding wheel, feeding the work a small amount and running the table back and forth by hand in successive steps until that tooth is properly sharpened. Next loosen the index pin arm, insert the pin in a hole in the proper circle and securely clamp the arm.

In sharpening the rest of the teeth where a considerable amount of stock is to be removed from each tooth face, feed the work to the grinding wheel by means of the worm to take the necessary number of successive cuts on each face until the index pin enters the proper hole. In case the grinding wheel requires dressing before all of the teeth are sharpened, readjust the position of the index centers relative to the grinding face of the wheel after dressing the wheel. Moving the Spindle Slide upright to bring the Grinding Wheel into contact with the face of the last tooth ground is generally efficient. After sharpening the remainder of the teeth a final adjustment of the Spindle Slide Upright may be necessary for required accuracy, after which a light finishing cut all around will compensate for errors due to wheel wear.

The centers as illustrated in Fig. 18 swing work up to $4\frac{3}{4}"$ diameter. Used with raising blocks (available at extra cost) the centers swing work up to $8\frac{1}{4}"$ diameter.

Centers have reversible tongues for T-Slots $\frac{1}{2}"$ or $\frac{9}{16}"$ wide.

High Speed Surface Grinding Attachment

Slots and other surfaces which do not permit the use of a wheel of large diameter can be ground with this Attachment. The Attachment spindle is mounted on super-precision ball bearings and is belt-driven from a pulley mounted on the spindle of the machine.

As shown in Fig. 19 the Attachment body fits onto the machine spindle sleeve in place of the wheel guard and can be used in practically any angular position around the machine spindle. With the Attachment spindle in the lowest position, the maximum vertical distance between center of Attachment spindle and top of machine table is 8".

To install the Attachment, remove the grinding wheel and wheel guard from the machine and slip the Attachment body onto the spindle sleeve. Then put the belt on the Attachment spindle driving pulley, put the pulley inside the sheet metal belt guard and slip the guard and pulley into working position together. Fasten the pulley in position with the machine spindle nut, slip the belt onto the Attachment spindle and fasten the belt guard in position by tightening the clamp screw on the collar at the right rear of the guard. Finally, bring the Attachment spindle to the desired angular position

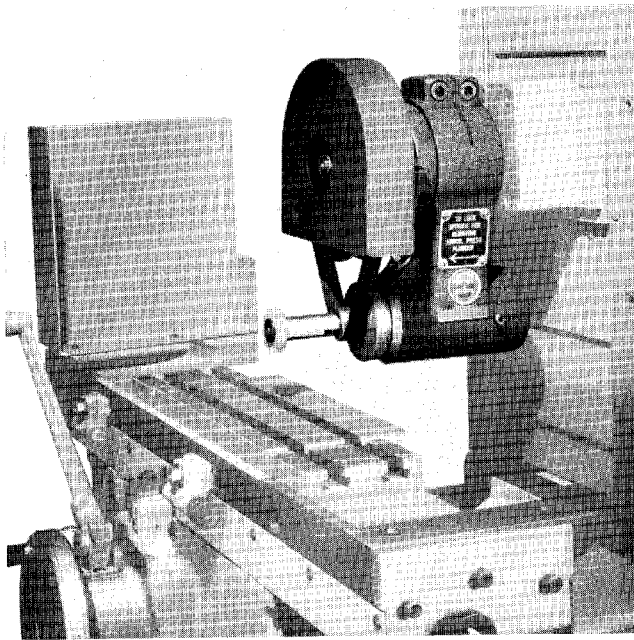


Fig. 19. High Speed Surface Grinding Attachment. Wheel arbors and grinding wheels are furnished at extra cost.

around the machine spindle, turn the large knurled shoulder behind the belt guard to adjust the belt tension, and clamp both of these adjustments by tightening the rear hollow-head screw at the top of the Attachment body. Make sure that the other hollow-head screw is also tight before grinding.

The sight feed oiler should be kept vertical for all positions of the Attachment spindle. If the spindle is swung upward to the left of vertical move the oiler to the left side of the Attachment, where a plugged tapped hole is provided. Use a high-quality spindle oil having a viscosity of 100 S.S.U. at 100° F., and adjust the oiler for a rate of feed of three drops per minute.

A variety of wheel arbors and grinding wheels are available at extra cost. The exacting limits and fine finish demanded of this equipment require extreme accuracy in the taper fit between spindle and wheel arbor; therefore we strongly recommend that all wheel arbors be furnished by us to assure the utmost in precision and finish.

In changing wheels or arbors, a spring-loaded plunger in the front of the Attachment body above the spindle can be pushed in to hold the spindle from rotating. Make sure that the spindle hole and arbor shank are perfectly clean before inserting an arbor, and seat the arbor firmly in the spindle. Keep in mind that the arbors have a left-hand thread. Never put a cold arbor in a warm spindle; for when the arbor expands (or the spindle cools and contracts), the taper fit will be so tight that removal of the arbor will be difficult.

No. 1 Adjustable Vise

The vise proper is mounted on a hinged base and can be set and clamped at any angle in the vertical plane up to 90°, a dial graduated to degrees indicating the setting. Removable tongues in the base provide for aligning the jaws parallel to the table T-slot.

The removable jaws are of tool steel, hardened and ground, $4\frac{1}{8}$ " wide and $1\frac{1}{16}$ " deep, and open 2". Distance from bottom of base to top of jaws with vise horizontal is $4\frac{7}{16}$ ".

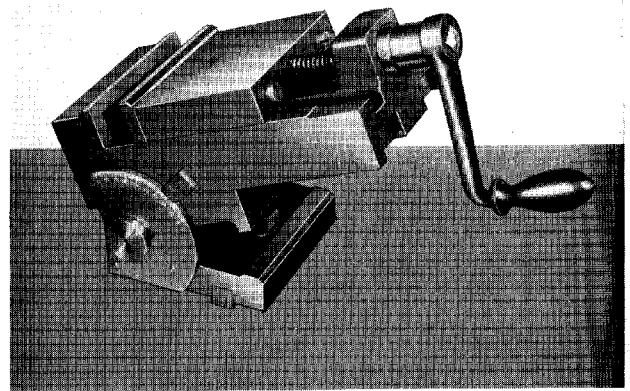


Fig. 20. No. 1 Adjustable Vise.

No. 2 Adjustable Swivel Vise

As illustrated in Fig. 21, this vise can be clamped to the table with the jaws at any horizontal angle to the table T-slots. The jaws can also be tilted in a vertical plane to any angle up to 45° each side of horizontal. The latter

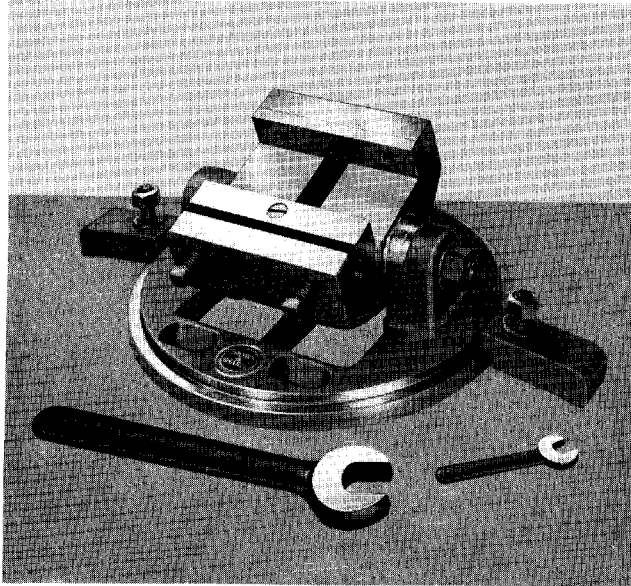


Fig. 21. No. 2 Adjustable Swivel Vise.

setting is indicated by a scale graduated in degrees and is clamped by the nut at the right.

The hardened tool steel jaws are 5" wide, 1" deep and open 2¾". The movable jaw is opened and closed by the two screws at the front. With the jaws horizontal, the distance from bottom of base to top of jaws is 4".

No. 21 Flanged Vise

This vise can be clamped at right angles or parallel to the wheel spindle.

The removable jaws are of tool steel, hardened and ground, 4⅛" wide and 1⅛" deep, and open 2". Distance from bottom of base to top of jaws is 2⅜".

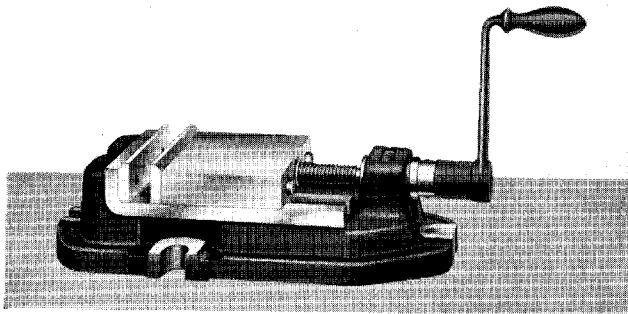


Fig. 22. No. 21 Flanged Vise.

Over-The-Wheel Truing Attachment

The Over-The-Wheel Truing Attachment greatly reduces the time required for wheel truing. It can be used on the majority of everyday jobs where *extreme* accuracy is not required. With this Attachment the diamond remains close to the wheel, ready for immediate use and the work-piece remains undisturbed beneath the wheel.

Before using the Attachment the top of the template on the right-hand side (beneath the ball handle) must be made parallel to the top of table. This is done by using a dial indicator mounted on the machine table and moving the Spindle Slide Upright transversely. Any adjustment necessary is made by means of the two screws upon which the template rests.

To start the initial truing, the scale at the top of the attachment is turned to read zero. The knurled screw at the front is then loosened, the diamond brought into contact with the wheel, and the diamond carrier clamped. The ball handle at the right of the attachment is then moved back and forth with the stylus beneath it in contact with the template. This moves the diamond across the wheel to true it.

After the initial truing of the wheel, the operation of this Attachment is extremely rapid. The

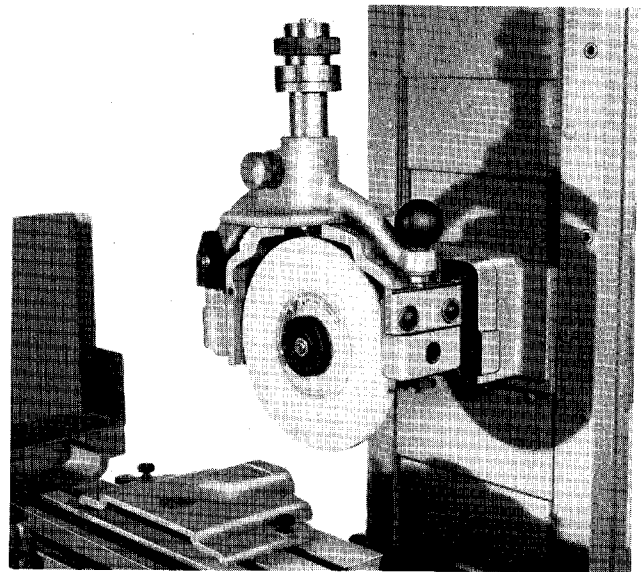


Fig. 23. Over-the-Wheel Truing Attachment shown with wheel guard cover removed.

diamond is fed into the wheel by turning the knurled knob at the top of the Attachment. Then the diamond is passed across the wheel by moving the ball handle. After the wheel is trued, the wheel is lowered an amount equal to that trued off the wheel as indicated on the scale at the top of the attachment. This brings the grinding surface of the wheel into the same position with relation to the surface being ground as it was before the wheel was trued.

Included with this attachment are (1) a special wheel guard and cover, (2) a coolant nozzle and bracket for use when the attachment is used with a Wet Grinding Attachment.

The diamond (approximately one carat) is available at extra cost.

Radius and Angle Wheel Truing Attachment

This Attachment provides a ready means of forming wheels with accurate convex or concave outlines up to 1" in radius and face angles up to 90° either side of zero, and permits combinations of radial and angular shapes to be developed.

The base of the Attachment carries a swivel platen upon which is mounted a slide which can be moved longitudinally by handwheel. A gib and adjusting screw provide means of compensating for wear in the slide. The base is keyed for accurate alignment.



Fig. 24. Shaping a radial contour with Radius and Angle Wheel Truing Attachment. The slide is clamped at the required radius, the diamond tool is set by the gage just below it and the slide is swiveled to form the wheel.

To form concave or convex outlines, clamp the diamond tool (diamond not furnished) in the upright parallel to the slide as shown in Fig. 24, locating the diamond point by means of the diamond tool setting gage (turned upward 180° from the position shown). Adjust the slide by handwheel to the desired radius as shown by the scale on the slide, setting the slide to the right of center to form a convex shape on the wheel and to the left of center to form a concave shape. Tighten the clamping screw on the back of the slide (not visible in illustrations) to lock the adjustment, and pass

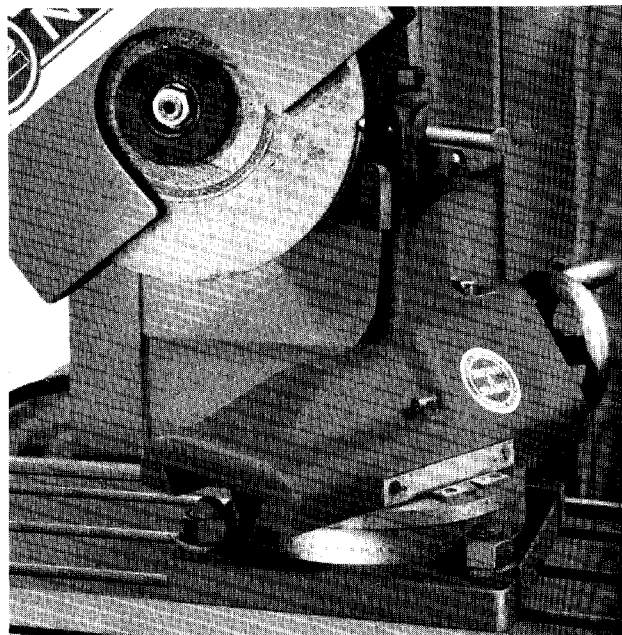


Fig. 25. Forming an angle. The swivel platen is clamped at the required angle and the slide is operated by the handwheel to true the wheel. In both cases the diamond is advanced by hand feed of the machine table.

the diamond across the wheel by swiveling the Attachment on its base.

To true a wheel to an angle, swivel the slide to the desired setting as indicated in degrees by the scale on the base and tighten the clamp screw in the front of the base. Clamp the diamond tool in the upright at right angles to the slide (see Fig. 25) and pass the diamond across the wheel by running the slide back and forth by handwheel.

In either case, to obtain the desired shape adjust the height of the spindle head to bring the center of the spindle horizontal with the diamond point.

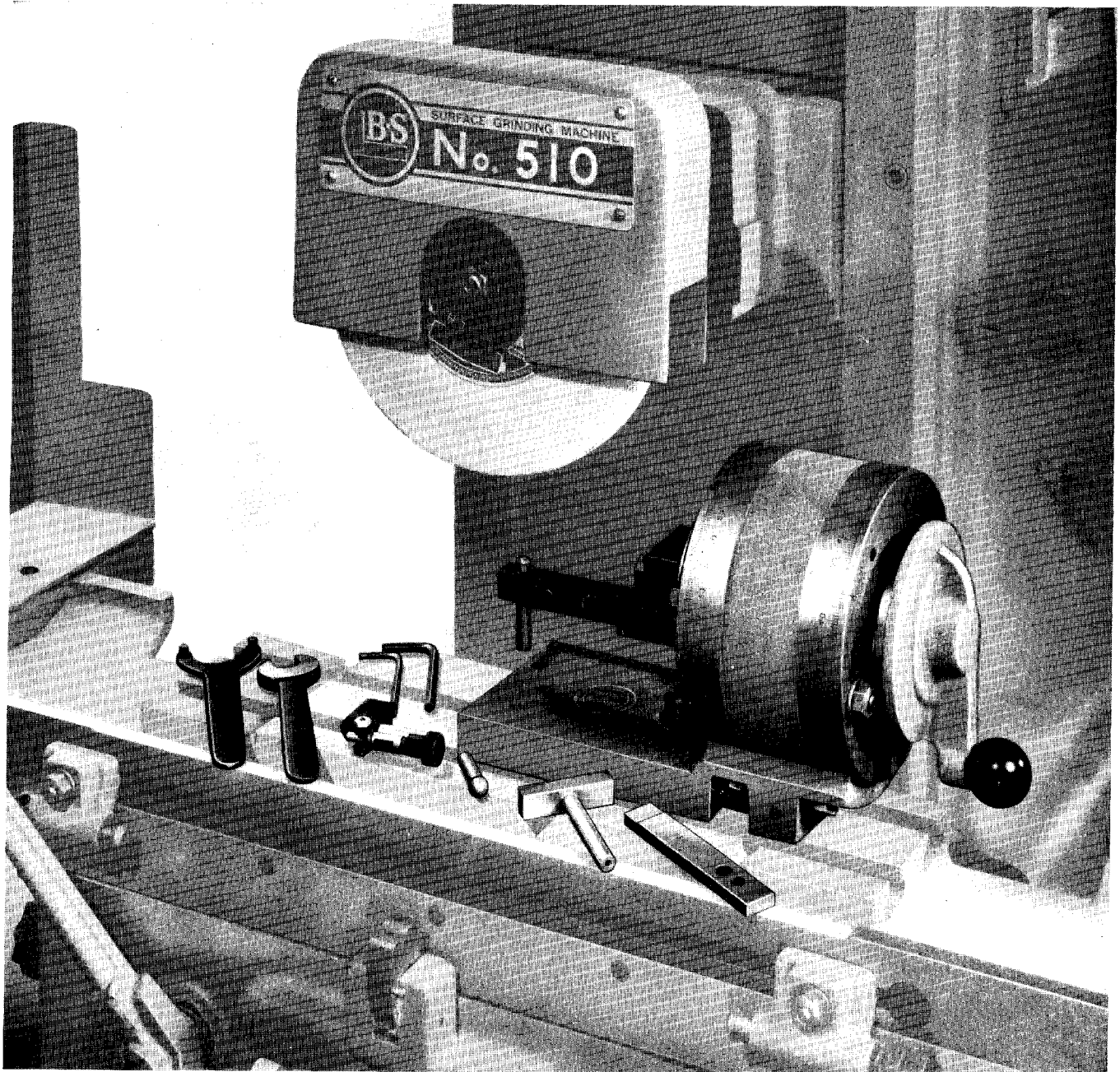
Continuous Radius and Tangent Wheel Truing Attachment

This attachment (Fig. 26) is designed to form, with one continuous movement of the diamond, accurate radii on grinding wheels with accurate tangents at either or both sides of the radii. Convex radii up to 1/2", with tangents to 5/8" in length in any direction from parallel to the side of the wheel to 110° away from the side, can be formed; concave radii from 1/32" to 1" (larger radii with diamonds having longer holders than one furnished), having tangents up to 5/8" long in any direction from 70° to 180° away from the side of the wheel, can also be formed. The angles of the tangents are independent of each other (on a concave shape having a radius over 3/8" the included angle must be 90° or more).

Concave radii less than $\frac{5}{32}$ " and all concave radii $\frac{3}{8}$ " or less having the included angle of the tangents less than 90° , require diamond tools other than the one furnished.

The attachment is firmly clamped to the machine table by a single T-bolt. Accurate alignment is assured by two reversible tongues for T-slots $\frac{1}{2}$ " or $\frac{9}{16}$ " wide. These tongues are easily removed when the attachment is to be used on a magnetic chuck. Detailed specifications furnished on request.

Fig. 26. Continuous Radius and Tangent Wheel Truing Attachment and its equipment (including diamond, mounted). An attractive metal case is furnished for the attachment and its equipment.



Sine Plates

The Brown & Sharpe Inspection Sine Plates offer reliable means for establishing precise angles for surface grinding, for tool making, for inspection—for work wherever precision angular settings are required. With an overall accuracy within .0002" all over, they give angular settings gage block accuracy.

Simple and Compound Sine Plates are available in 5" and 10" sizes. The 5" size working surface is 3½" x 6" and the 10" size working surface is 6" x 11".

Sine plates are furnished with side and end plates, held in place by knurled-head screws and have tapped holes in their sides, ends and top for the application of clamps or other holding devices.

Lower hinge on compound plates (Fig. 27) can be furnished on opposite end if desired at no extra cost.

The Brown & Sharpe No. 510 Permanent Magnet Chuck can be used with either 10" Sine Plate by adding two bolt holes to the base of chuck. When ordering chuck for this purpose so specify.

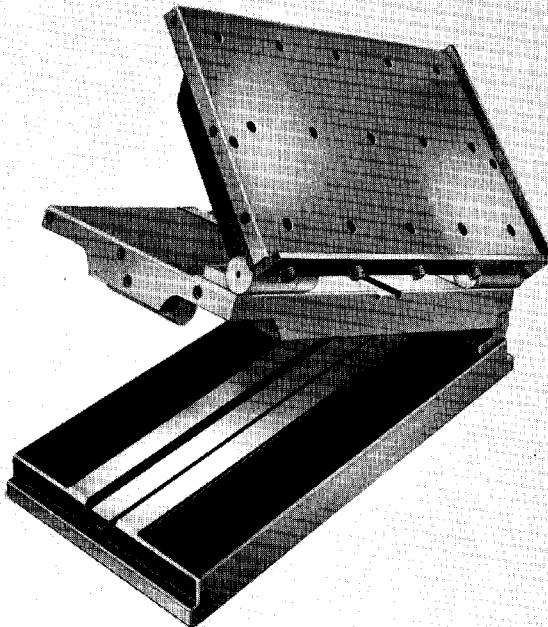


Fig. 27. Compound Sine Plate.

Perma-Sines Plates Permanent Magnet Sine Plates



Fig. 28. Compound Perma Sine.

The Simple and Compound Perma-Sines are available in the 5" Size, both plates having a working surface 6" x 6".

With an overall accuracy within .000,2" all over, they give angular settings gage block accuracy.

No electric connections are needed and the holding power is turned on or off by the turning of the lever.

The Compound Plate (Fig. 28) is superbly suited for complex angles.

Perma-Sines are furnished with both end and side plates, held in place by knurled-head screws.

Lower hinge on compound plates can be furnished on opposite end if desired at no extra cost.