

new

addition to
the nation's
most
complete
line of
Surface
Grinding
Machines



Brown & Sharpe

612 MICROMASTER®

MAR '70

510 **now the** 612 **MICROMASTER®** 618 - 824 - 1024

— all the proven cost-saving capabilities of this famous family in a new Surface Grinding Machine with 6" x 12" work capacity

The economy, simplicity, versatility and precision capabilities that make B&S 510 the toolmakers' favorite are now available in the 612, a new machine with the expanded work capacity now required in many tool and die making operations. Every feature has been designed to deliver extra efficiency matched to the extra capacity.

The smoothness of spindle drive and table travel, together with structural stability, permit grinding full capacity work loads with assurance of precision sizing and flawless finish. All controls, for table

traverse, crossfeed and vertical feed, provide sensitive response to manual skills that saves operator time and effort.

The options offered, such as choice of wheel spindle and type of table traverse control, will meet varying needs and preferences. The full selection of auxiliary equipment available extends the 612 work range, and permits you to fit out the machine to meet your individual needs. Whatever combination you select, you can rely on B&S proficiency in Surface Grinder design for performance that pays off in faster, better work at lowest cost.

- Grinds work up to 6" wide by 12" long and 12½" high.
- Handwheel for table traverse permits sensitive, smooth control with minimum effort — table travels 12" with approximately one revolution.
- Optional lever for table traverse furnished at no extra cost — table travels 12" with approximately 130° lever movement.
- Wheel Spindle options offer choice of antifriction bearing unit with Oriflex or direct drive, or plain bearing unit with Oriflex drive.
- Crossfeed and Vertical Feed controls adjustable to .0002" (micrometer feeds available adjustable to .0001")
- "One shot" system provides positive lubrication for all mechanisms.

AUXILIARY EQUIPMENT

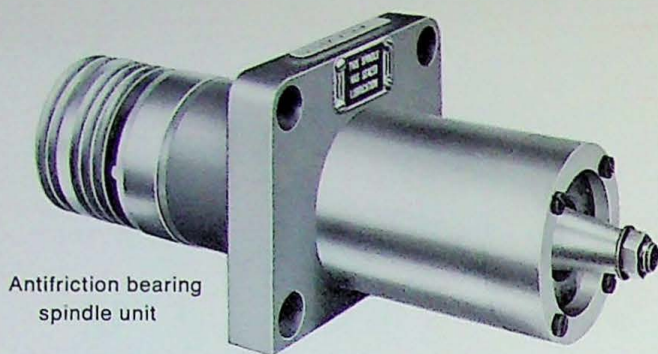
available to help you fit 612 capabilities to your specific needs

- Precision Grinding Vise • No. 101-5 Adjustable Vise • 4¾" Index Centers • Magnetic Chucks
- Magnetic Chuck Accessories • Magnetic V-Block • Exhaust Attachment • Wet Grinding Attachment
- High Speed Surface Grinding Attachment • Radius and Angle Wheel Truing Attachment
- Continuous Radius and Tangent Wheel Truing Attachment • Over-the-Wheel Truing Attachment
- 1" Wheel Sleeve • Mist Coolant Arrangement • Dust Guard and Work Illuminator
- 5" and 10" Sine Plates (Simple and Compound) • 5" Perma-Sines (Simple and Compound)
- Castered Base for use with Wet Grinding and Exhaust Attachments

1030 - 1224 1236



Optional lever control
for table traverse
furnished when specified



Antifriction bearing
spindle unit

Spindle Options

**meet any specification
with maximum efficiency**

Antifriction Bearing Unit

Superprecision, preloaded antifriction bearings support the wheel spindle at front and rear, and end thrust is taken in both directions. Sealed-in grease lubrication assures cool-running efficiency. No additional lubrication or adjustment is required. Since the seal also prevents entry of dirt, the spindle operates smoothly throughout a long, trouble-free service life.

Plain Bearing Unit

Available at extra cost, this spindle has bronze bearings fitted with minimum clearance. Radial play is virtually eliminated and spark-out time is negligible. Automatic lubrication is provided by a rotating pump unit integral with the spindle. The liberal flow of light oil, supplied by a constant level oiler from a reservoir in the spindle unit, maintains a low running temperature. A spring take-up automatically removes end play. For sidewheel grinding, a screw clamp serves as a positive lock.

ORIFLEX Drive

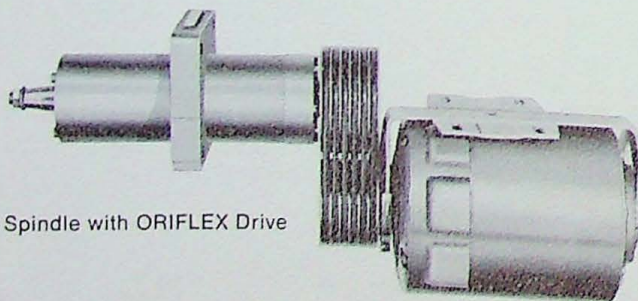
(available with either spindle unit)

The smooth, efficient ORIFLEX drive is an important factor in maintaining the flawless surface finish obtained with the 612 Surface Grinder. Full power is transmitted through 6 "O rings" (made to micrometer dimensions) from the 1 HP motor cradled in a vibration dampening mounting.

Direct Motor Drive

(available with antifriction bearing spindle only)

The optional Direct Drive delivers power to the spindle from an integral 1½ HP motor.



Spindle with ORIFLEX Drive

Table Traverse

**"performance-proved" for
smooth, accurate response
and effortless control**

The super-smooth performance of the 612 table traverse system reflects experienced engineering of every structural and operating component involved.

The table is mounted on the bed, eliminating the conventional carriage. It glides on precision ground and lapped steel rollers, the front rollers nested in a flat way and the rear rollers in a 90° V-way. This arrangement provides the extra stability of support that assures dependable accuracy in the side-wheel grinding of slots, forms, etc.

Unique positive drive eliminates backlash

Smooth table movement is further assured by the positive table drive design. The drive consists of a steel tape wrapped around a drum (360° contact) and fastened to each end of the table, effectively preventing backlash. Tension in the tape is adjusted by means of knurled nuts at each end of the table. Movement of the drum is controlled by the traverse handwheel (or optional lever) on the front of the machine.



Table glides on precision ground and lapped steel rollers.



Table traverse handwheel moves table approximately 12" with one complete revolution.



Optional lever control furnished in place of handwheel. Knob at left is used to apply any desired amount of "drag" to table movement.

Easy, efficient Handwheel control

The table movement is controlled by the traverse handwheel located at the left front of the machine. A table traverse of 12" requires approximately one revolution of the handwheel. The majority of jobs can be ground with only a slight movement. The efficient drum linkage and smooth table glide make the heaviest grinding cuts seem effortless.

Optional Lever traverse control

When preferred, a hand-operated lever can be furnished in place of the handwheel. It can also be easily adjusted to the most convenient position in relation to the work. A 12" traverse of the table is obtained with approximately 130° movement of the lever, and 2" of travel with 20° movement.

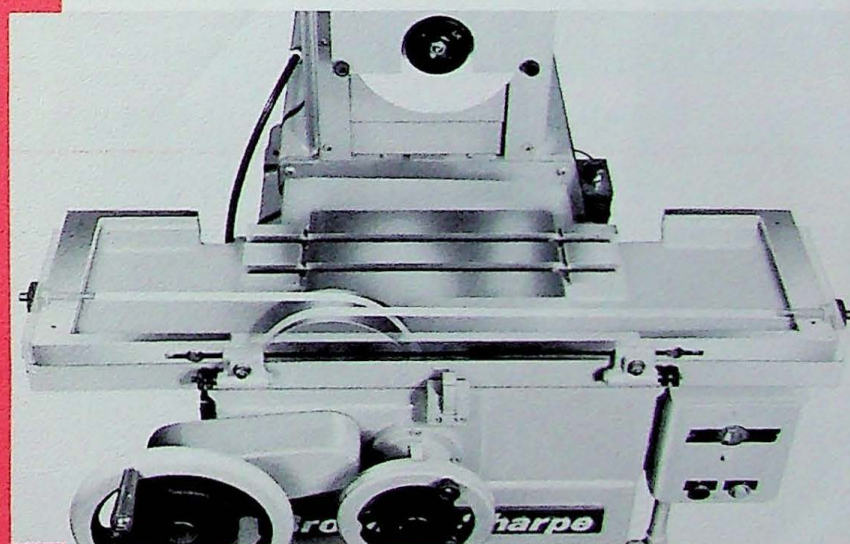
Adjustable table "drag"

A knob on the left side of the bed below the table can be turned to apply any desired amount of "drag" on the table movement. It is also used to lock the table in the proper position for wheel truing without moving the table dogs.

The adjustable, spring-plunger type table dogs operating against a positive stop can be set to limit table travel in either direction. When desired, the positive stop can be swung out of the way to allow table movement beyond the dogs.



Adjustable table dogs. Positive stop can be swung out of way when desired.



Phantom view of table drive. Steel tape makes 360° contact with handwheel operated drum.

Cross Feed and Vertical Feed Controls adjustable to .0002"

The close tolerance capabilities of the new 612 Surface Grinder are matched to the most critical requirements of contemporary tool making operations.

The massive Wheel Slide Upright, which affords rigid support for the smooth-running spindle, is moved transversely on precision ground V and flat ways to provide cross feed adjustments. The Wheel Spindle assembly rides in the long bearing surfaces on the spindle slide to provide smooth, accurate vertical adjustment.

The Cross Feed Handwheel, located on the front of the machine next to the table traverse control,



Vertical Feed and Cross Feed can be readily adjusted simultaneously.



has clear, widespaced graduations reading to .0002". The dial on the rim is adjustable and the graduations can be read both clockwise and counter-clockwise, a further aid to fast, precise cross feed adjustments.

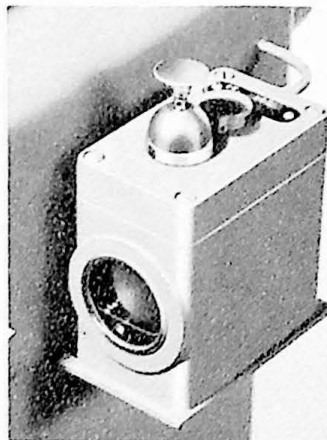
The Vertical Feed Handwheel, located at the upper right side of the Wheel Slide Upright, also has clearly incised graduations reading to .0002".

Designed for long service life—low maintenance

All moving parts of the 612 Surface Grinder are lubricated by a one shot oiler, mounted at the rear right side of the machine. The table ways, wheel-slide ways and upright ways are fully protected from dust and contamination to insure lasting accuracy and long service life.

A heavy fabricated steel base provides a rigid support for the upper members, contributing to precision performance. The area inside the base can be utilized as a handy storage compartment for attachments and accessories.

A push-button switch at the right front of the machine starts and stops the wheel spindle. An alternate switch with built-in 110-volt control is available as optional equipment.



(Upper left) Operator easily adjusts Cross Feed in conjunction with table traverse.

(Far left) Rim of the Cross Feed Handwheel is adjustable for convenience in set-up.

(Left) "One shot" Oiler.

B&S 612 MICROMASTER Surface Grinding Machine

* Available at extra cost. † Wheel sleeve to take wheels up to 1" dia. available at extra cost.

Wheel truing fixture • Wheel sleeve • Wheel sleeve puller • Grinding wheel • Wrench

Min. 12 $\frac{7}{8}$ " - 327.03 M/M
Max. 26 $\frac{7}{8}$ " - 682.62 M/M

Min. 11 $\frac{1}{4}$ " - 285.75 M/M
Max. 25 $\frac{1}{4}$ " - 641.35 M/M

MIN. 4" - 101.6 M/M
MAX. 8" - 203.2 M/M

MIN. 3 $\frac{1}{4}$ " - 82.55 M/M
MAX. 16" - 406.4 M/M

POWER SUPPLY

42 $\frac{1}{4}$ "
1073.15 M/M

18 $\frac{1}{2}$ "
469.9 M/M

1 $\frac{7}{16}$ "
36.5 M/M

2 $\frac{1}{16}$ "
59.53 M/M

20"

15 $\frac{5}{16}$ "
388.9 M/M

508 M/M

31 $\frac{3}{32}$ "
24.606 M/M

3 $\frac{1}{8}$ "
9.525 M/M

25 $\frac{1}{64}$ "
9.922 M/M

7 $\frac{1}{2}$ "
190.5 M/M

35 $\frac{3}{4}$ "
908.05 M/M

12"

304.8 M/M

6"

152.4 M/M

7"

177.8 M/M

13 $\frac{3}{8}$ "
34.9 M/M

2 $\frac{11}{32}$ "
59.53 M/M

24 $\frac{5}{16}$ "
617.54 M/M

29"

736.6 M/M

4 - 1 $\frac{1}{2}$ " DIA HOLES
12.7 M/M

83 $\frac{1}{2}$ "
2120.9 M/M

52 $\frac{1}{8}$ "
1323.98 M/M

53"

1346.2 M/M

11"

279.4 M/M

7 $\frac{9}{32}$ "
184.94 M/M

OUTLINE OF MACHINE

ADDITIONAL EQUIPMENT

Furnished at extra cost. Illustrated on page 9.

Precision Grinding Vise

A rugged, rigid-holding vise for close tolerance work, made of high grade tool steel. Completely hardened, with all work contacting surfaces precision ground. Sides and jaws are square and parallel within .0002". Unique cam arrangement holds down the movable jaw and prevents up-lift of workpiece as pressure is applied. V-slot in the movable jaw is accurately ground parallel to the base. The jaws are 2½" wide, 1" deep, and will accommodate work up to 4" long.

An auxiliary swivel base is also available. Complete description on request.

No. 101-5 Adjustable Vise

Mounted on a hinged base, this vise can be set and clamped at any angle in the vertical plane up to 90°. A dial graduated to degrees indicates the setting. Removable tongues in the base provide for aligning the jaws parallel to the table T-slot. The removable jaws, made of hardened and ground tool steel, are 4¼" wide, 1½" deep, and open 2". Distance from bottom of base to top of jaws with vise horizontal is 4¾".

Weights: net 23 lbs.; shipping 27 lbs. Dimensions for shipment 13" x 7" x 6".

4¾ Inch Index Centers

Permit exact indexing of common circumferential spacings and facilitate grinding of taps, reamers, formed cutters and similar work. Centers are accurately aligned by tongues which fit the table T-slots, and are quickly clamped in position by T-bolts.

A spring loaded locking pin and 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 numbers from 18 to 28. The worm wheel can be turned by the worm, or, when desired, the worm can be swung out of mesh and the wheel turned by hand. Ratio of worm wheel to worm, 75:1.

Centers swing 4¾". (Raising Blocks, also available, increase the swing to 8".) Reversible tongues fit T-slots ½" or ⅝" wide. Weights: net 12 lbs.; shipping 18 lbs. Dimensions for shipment 13" x 9" x 7".

Magnetic Chucks

The Rectangular Model Permanent Magnet Chucks illustrated provide a quick, easy means of holding a variety of ferrous parts for surface grinding; and also for bench work and inspection. The chucks use no electric current. No wiring is required. The special alloy magnets maintain their strong holding power indefinitely. The amount of holding power is controlled by an easily operated lever.

The No. 407 is a handy small Magnetic Chuck with close pole spacers especially suitable for holding small work pieces. The No. 612 is designed to accommodate larger work. A No. 510-4 Fine Mesh Chuck, designed for holding very small and thin pieces as well as larger work, is also available. Specifications of suitable Magnetic Chucks available are listed below.

No.	Working Surface, Inches	Magnetic Surface, Inches (Approx.)	Height of Chuck, Inches	Net Weight, Lbs. (Approx.)	Shipping Weight, Lbs. (Approx.)
407	4 x 7	3½ x 6½	1½	14½	18
510-1	5½ x 10½	3½ x 8½	2	27¾	30¼
510-4	5 x 10	5 x 8	2½	25	30
612	6 x 12	5¼ x 11¼	2¾	52	55

No. 750-4 Magnetic V-Block

For holding work in contact with V faces. Magnet holds block firmly on table and work piece on block. Block is accurately

ground and faces of V-groove hardened. Removable stop plate furnished for back end of block. V takes round stock to 1¼" diameter.

Working surface: 2½" x 5¼". Over-all width: 2½". Over-all length: 6¼". Height: 2½", 2½" or 3¼".

Magnetic Chuck Accessories

Auxiliary Top Plate For use on No. 510-1 chuck. Permits holding smaller work than can usually be held on chuck of this type. Plate is ⅝" thick. Length: 7½". Width: 3". Shipping weight: 5 lbs.

Chuck Parallels Used on Magnetic Chuck to hold work with projecting surfaces that cannot be held suitably on surface of Chuck. Opposite sides are ground parallel and adjacent sides at true right angles. Can be used on all four sides but not on ends. Available only in numbered matched pairs

Length: 3½". Size: ⅞" x 1⅞". Shipping weight: 4 lbs.

Chuck V-Blocks Used on surface of Magnetic Chucks, singly or in pairs. Blocks have 90° V slot accurately ground along 2½" length.

Length: 2½". Size: 1¼" x 2½". Shipping weight: 3 lbs.

High Speed

Surface Grinding Attachment

Slots and other surfaces which require the use of small grinding wheels can be rapidly and economically ground with this attachment. The attachment spindle runs at 15,000 RPM when driven from an Oriflex drive machine spindle, and at 18,000 RPM when driven from a direct-drive spindle.

The attachment fits on the machine spindle housing and can be used in almost any angular position around the spindle. In the lowest position, the maximum vertical distance between center of attachment spindle and top of table is 10¾". The spindle is mounted on two pairs of super precision ball bearings and is driven from a pulley mounted on the machine spindle. Provision is made for belt tension adjustment and for locking the spindle when changing wheel arbors.

Wheel Arbors and Grinding Wheels are furnished at extra cost (one wheel with each arbor). Stock sizes are listed below. It is strongly urged that this equipment be purchased from Brown & Sharpe, since close tolerance sizing and fine finish require an extremely accurate taper fit between wheel and arbor.

Wheel Arbors and Grinding Wheels

Furnished at extra cost

Arbor Number	Grinding Wheels Size, Inches Diam. x Thick. x Hole	Distance, Rear Face of Grinding Wheel to End of Attachment Spindle, Inches
2103*	½ x ¼ x ⅜	1½
2105*	½ x ¼ x ⅜	1¾
2107*	½ x ¼ x ⅜	1¾
2109	⅜ x ¼ x ¼	1¾
2111	1¼ x ⅜ x ⅝	1¾

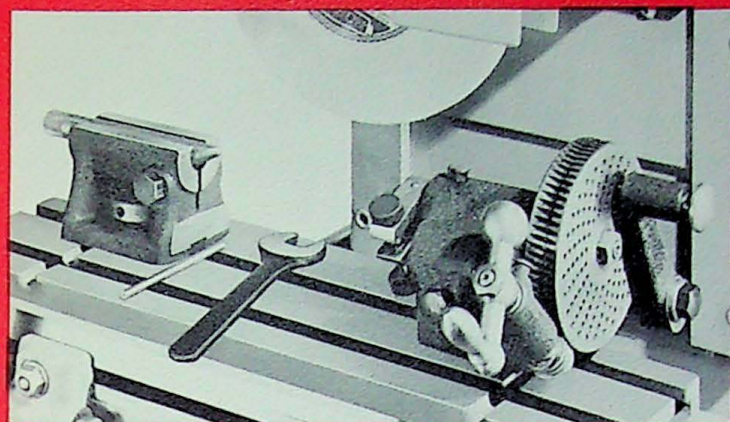
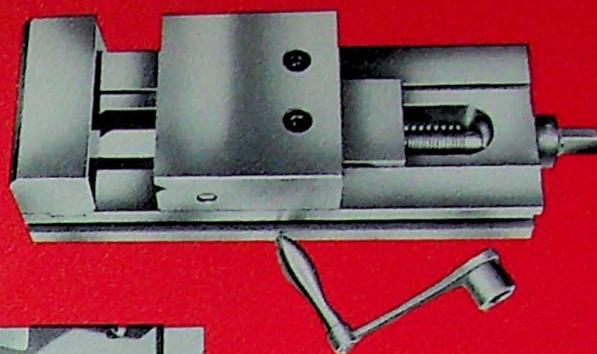
* Used with No. 2125 Collet (furnished at extra cost).

Mist Coolant Arrangement

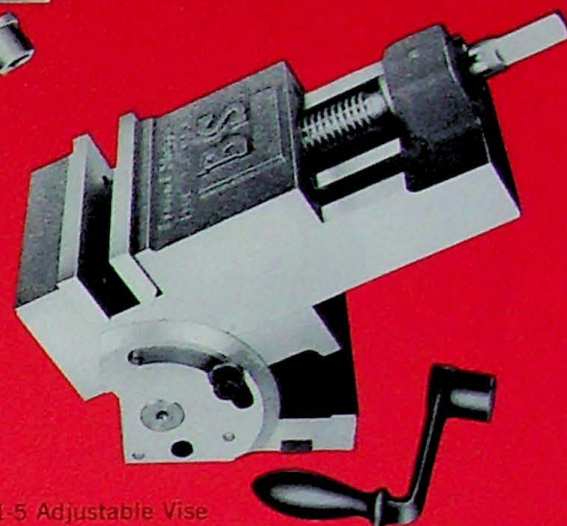
Combines compressed air with coolant to deliver a cooling mist that evaporates on contact with the work, without obscuring visibility. A solenoid valve connected to the machine's electrical system synchronizes the start of mist delivery with the start of the machine. The fineness of the mist, from spray to a virtual vapor, is controlled by a needle valve on the jet, where the mist is generated. There is no flooding, dripping or spurting.

Weights: net 14 lbs.; shipping 15 lbs. Dimensions for shipment 15" x 8" x 10".

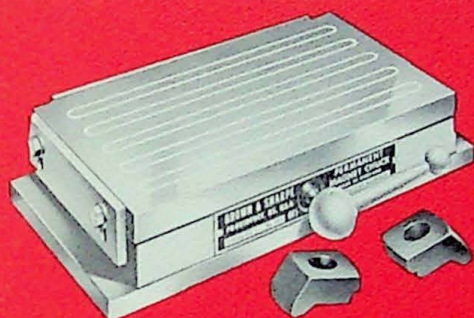
Precision Grinding Vise



4 3/4" Indexing Centers



No. 101-5 Adjustable Vise



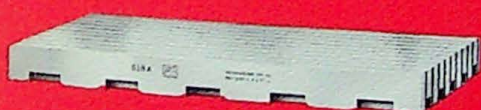
No. 407 Magnetic Chuck



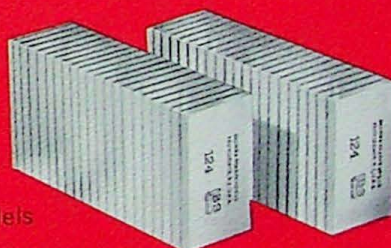
No. 612 Magnetic Chuck



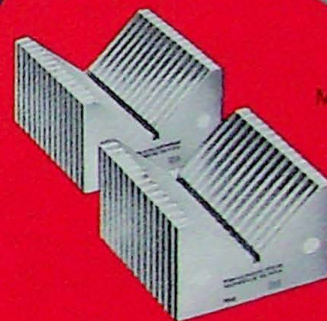
No. 750-4 Magnetic V-Block



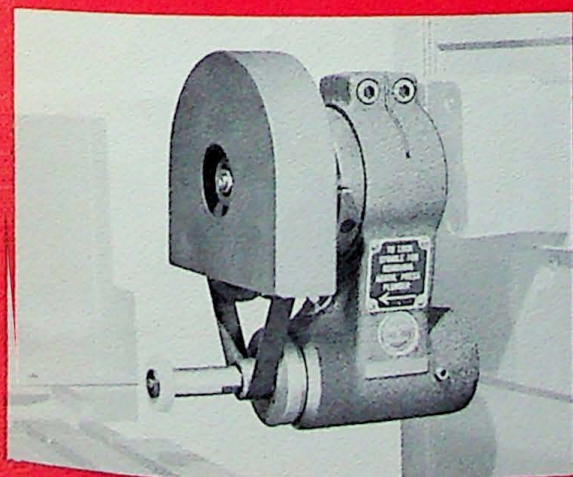
Auxiliary Top Plate



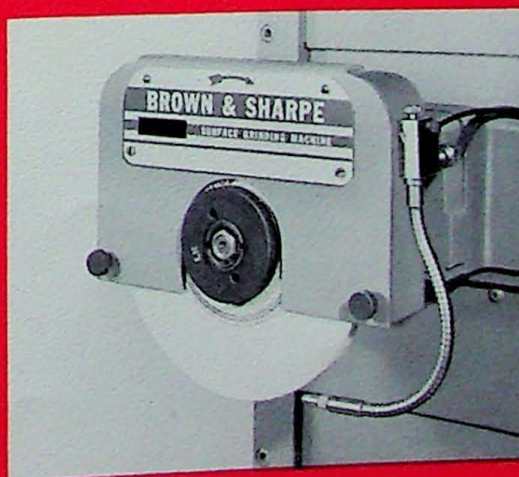
Chuck Parallels



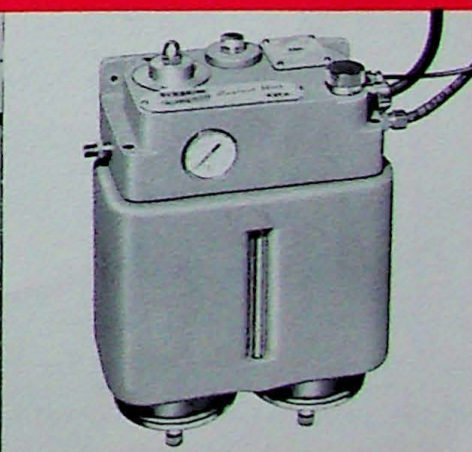
Chuck V-Blocks



High Speed Surface Grinding Attachment



Mist Coolant Arrangement



ADDITIONAL EQUIPMENT

Furnished at extra cost. Illustrated on page 11.

Exhaust Attachment

Removes grit and dust-laden air from the vicinity of the grinding operation, filters and discharges it well cleaned. Air is collected by the exhaust nozzle attached to the wheel guard and conveyed by suction through a flexible tube to the spiral separator mounted on the filter unit, which removes the heavier particles. The air then enters the expansion chamber and passes through viscous coated renewable filter pads, which trap the finer particles. Separating efficiency is approximately 96%. The separator fan is driven by a $\frac{1}{4}$ hp motor controlled by a starting switch with overload protection. The capacity of the attachment, with a 3600 RPM motor, is approximately 308 cu. ft. per minute. The floor space required is no more than that necessary for the table traverse. Approximately 14" of space is required behind the machine for the loop in the suction tube.

Weights: net 200 lbs.; shipping 275 lbs. Dimensions for shipment 24" x 30" x 40".

Wet Grinding Attachment

This motor-driven attachment equips the machine for supplying coolant to the grinding operation. The coolant tank fits conveniently at the rear of the machine, as illustrated. A $\frac{1}{8}$ hp motor-driven centrifugal pump supplies coolant to the wheel through a flexible tube and valve-controlled nozzle. A plug, receptacle, overload relay and wiring are included with the attachment.

An adjustable splash guard is attached to the regular wheel guard and the machine table is surrounded by guards that protect both machine and operator from coolant spray. Coolant flows from two channels in the back of the table to a trough added at the rear. From here it flows into a trough fastened to the side of the machine and thence through a flexible hose into the supply tank. The 18 gallon welded steel tank has a two plate removable baffle unit which promotes efficient settling.

Weights: net 112 lbs.; shipping 165 lbs. Dimensions for shipment, one box 25" x 19" x 22" and one box 51" x 24" x 8".

Continuous Radius and Tangent Wheel Truing Attachment

With one continuous movement of the diamond, this truing device forms accurate radii on grinding wheels, with accurate tangents at either or both sides of the radii. It forms convex radii up to $\frac{1}{2}$ ", with tangents to $\frac{5}{8}$ " in length in any direction, from parallel to the side of the wheel to 110° away from the side. It also forms concave radii from $\frac{1}{2}$ " to 1", having tangents up to $\frac{5}{8}$ " long in any direction, from 70° to 180° away from the side of the wheel. The angles of the tangents are independent of each other (on a concave shape having a radius over $\frac{3}{8}$ " the included angle must be 90° or more).

Concave radii larger than 1" can be formed with diamonds having longer holders than the one furnished. Concave radii $\frac{3}{8}$ " or less having the included angle of the tangents less than 90°, and all concave radii less than $\frac{5}{32}$ " require diamond tools other than the one furnished.

The attachment is not recommended for use where there is risk of coolant entering its bearings. A metal storage case is included with this equipment. Detailed specifications will be sent on request.

Radius and Angle Wheel Truing Attachment

Used for accurate and efficient shaping of wheels having radial or angular faces, this attachment is of particular value in operations that include grinding of lamination dies, flat

forming tools and similar work. It forms concave or convex outlines having radii up to 1", face angles up to 90° either side of zero, and numerous combinations of radial and angular shapes otherwise difficult to obtain.

The base of the attachment carries a swivel platen upon which is mounted a slide that can be moved longitudinally by handwheel. An upright, integral with the slide, holds the diamond tool and diamond tool setting gage; and the diamond tool (not furnished) may be set either parallel to the slide (for forming radii) or at right angles (for forming angular surfaces) and clamped in position by a locking screw.

For truing the wheel to the desired angle, the base of the attachment is graduated in degrees to 90° each side of two opposed zero marks, a clamp screw permitting the swivel to be locked in the desired angular position. The diamond is passed across the face of the wheel by running the slide back and forth by handwheel (diamond is located at right angle to position shown). For forming concave or convex outlines, the diamond point is located by means of the diamond tool setting gage (turned upward 180° from position shown), and the slide is adjusted longitudinally to the desired radius as indicated by a scale on the slide reading to 1" each side of zero by 64ths. The slide is locked in position by a clamping screw, and the diamond is passed across the wheel by swiveling the attachment on its base to produce the desired form.

Diamond (mounted) can be furnished at extra cost.

Weights: net 26 lbs.; shipping 35 lbs. Dimensions for shipment 14" x 9" x 11".

Over-the-Wheel Truing Attachment

With this attachment, wheel truing for the majority of routine grinding operations becomes a very simple operation. Many time consuming steps necessary in conventional truing methods, such as mounting the diamond carrier on the machine table, are eliminated. The diamond is always in position, close to the wheel and ready for immediate use. The workpiece remains undisturbed beneath the wheel during the truing operation.

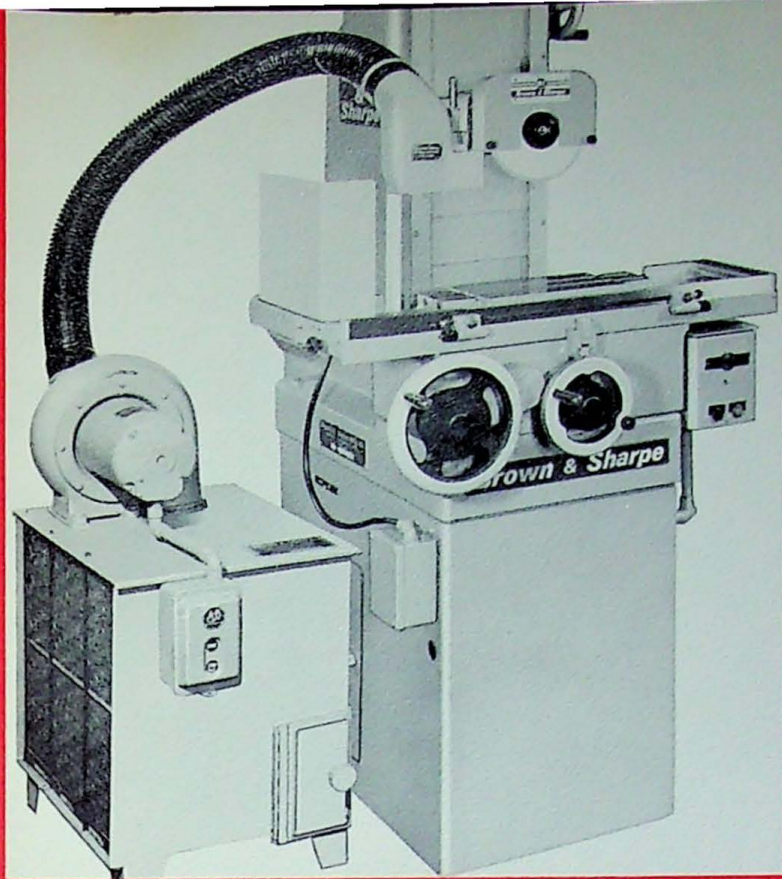
When truing the wheel, the stylus at the right hand side of the attachment is moved over the hardened template causing the diamond to pass across the top of the grinding wheel. The large ball knob makes it easy for the operator to move the stylus with a smooth sensitive motion.

The diamond is moved into the wheel by turning the knurled knob at the top. After the wheel is trued, the grinding wheel is moved down an amount equal to that trued off as indicated by the wide-spaced graduations on the scale at the top of the attachment. This brings the periphery of the grinding wheel into the same position with relation to the surface being ground as it was before the wheel was trued. The diamond, which contacts the wheel at an angle, can be turned to present a new point to the wheel when desired.

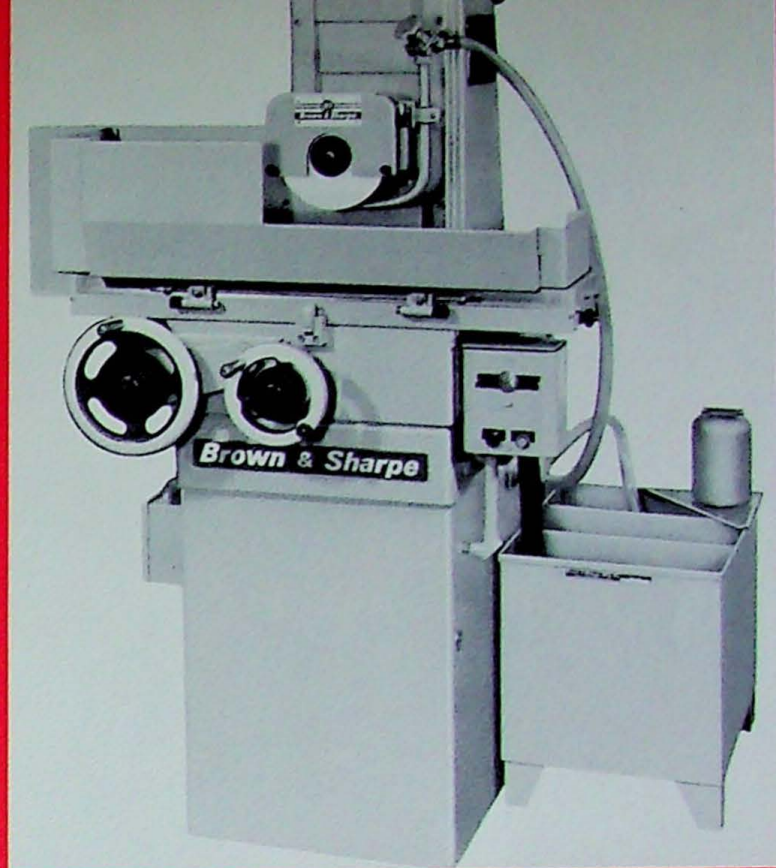
Dust Guard and Work Illuminator

When grinding forms, this attachment will provide a useful aid in checking the progress of the job. The beam of a 30-watt light, directed against a white reflecting sheet attached to the inner side of the dust guard, provides a sharply contrasted background against which the form can be viewed. The adjustable light can also be positioned to illuminate the work piece.

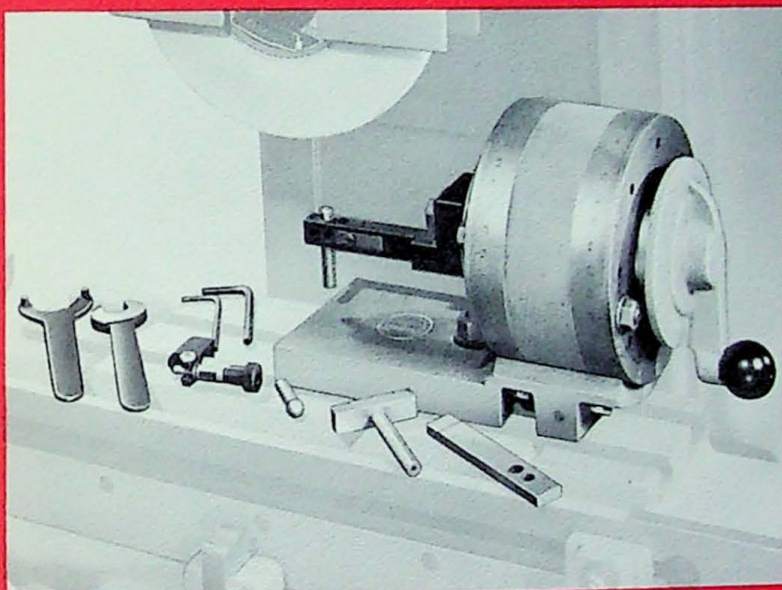
Included with this equipment is a swiveling light unit, a 30-watt lamp reflector, a supply of disposable background reflector sheets for the dust guard, one transformer 50 VA 240/480-120/240V, necessary electrical fittings and fasteners, etc., required to fit the attachment to the machine.



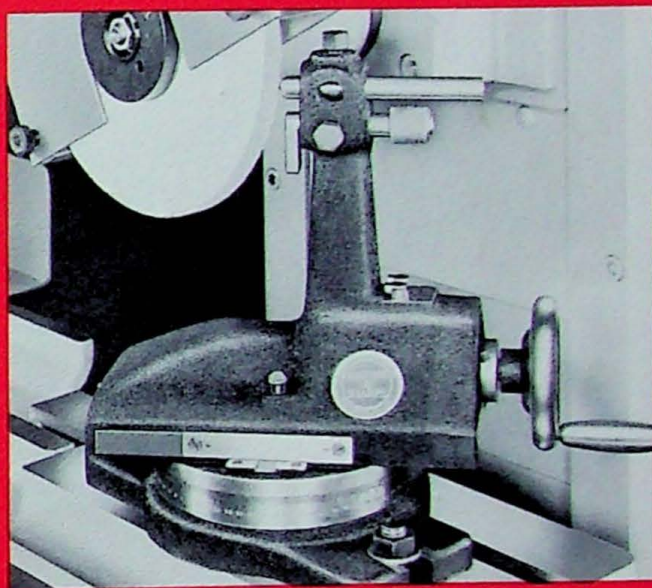
Exhaust Attachment



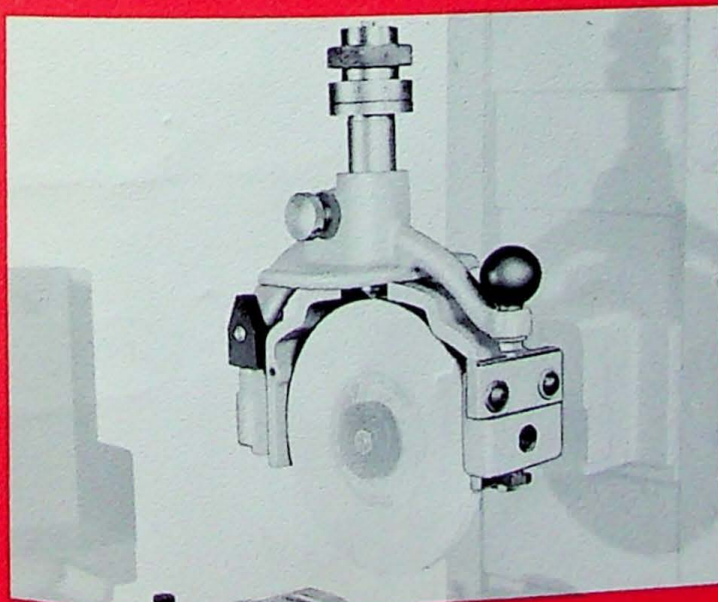
Wet Grinding Attachment



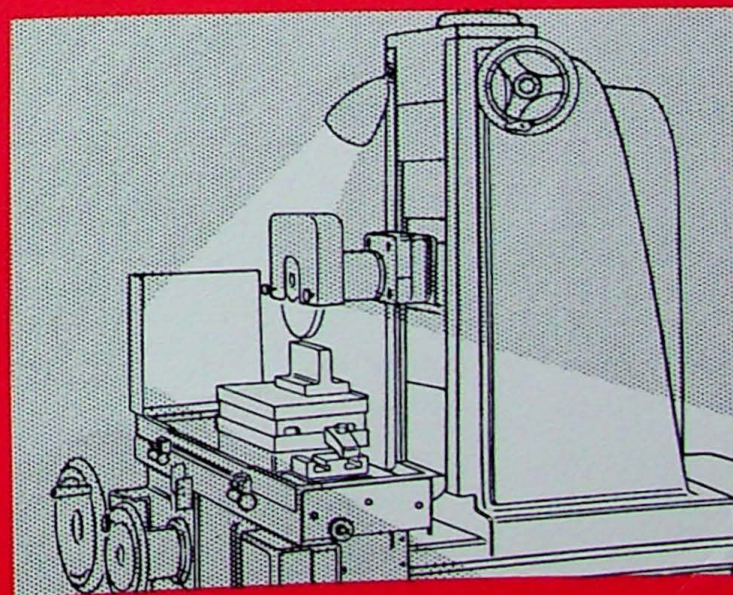
Continuous Radius and Tangent Wheel Truing Attachment



Radius and Angle Wheel Truing Attachment



Continuous Wheel Truing Attachment



Dust Guard and Work Illuminator

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