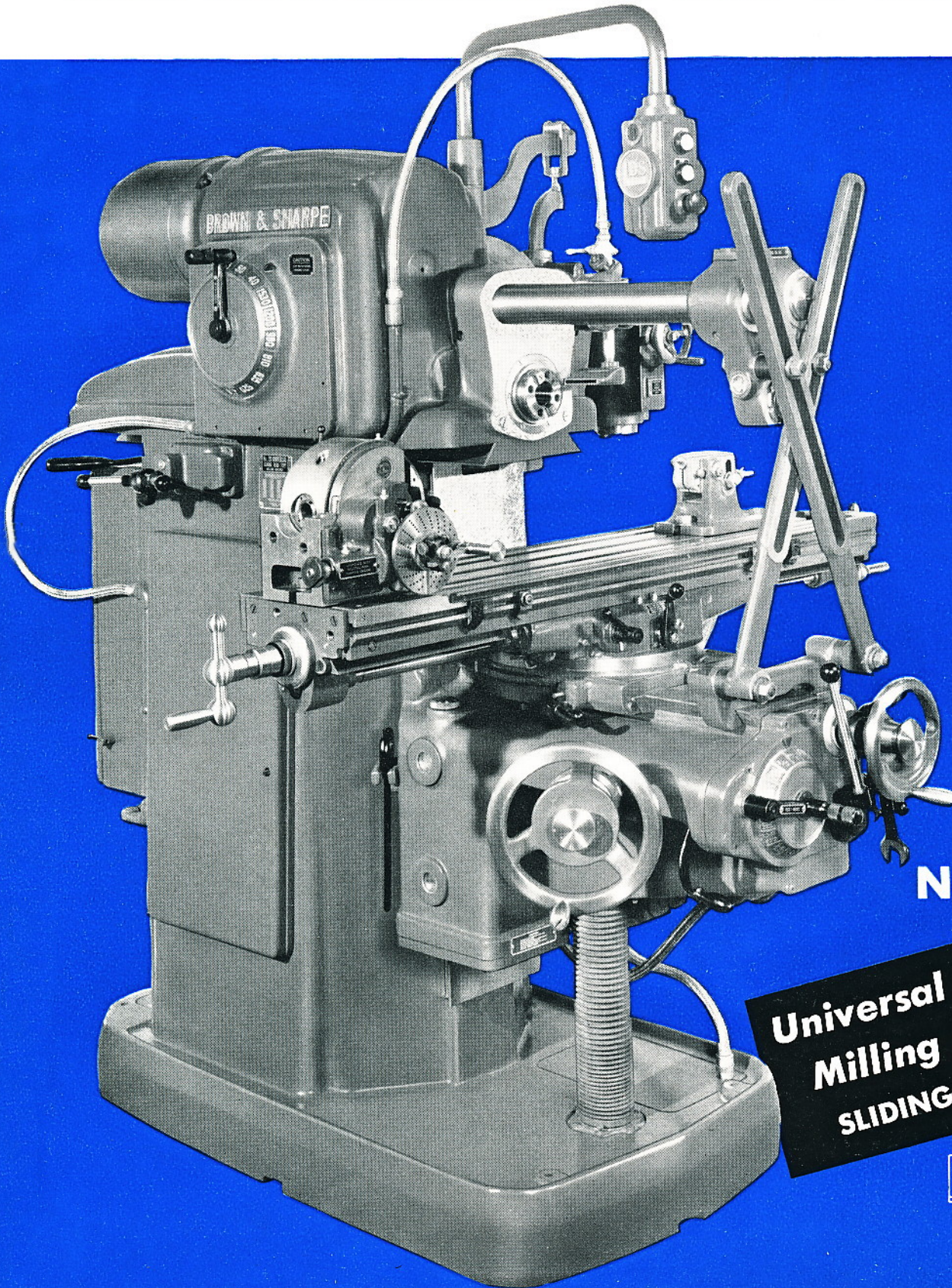


*Brown & Sharpe*

# "RANGEMASTER"<sup>®</sup>



**No. 20**

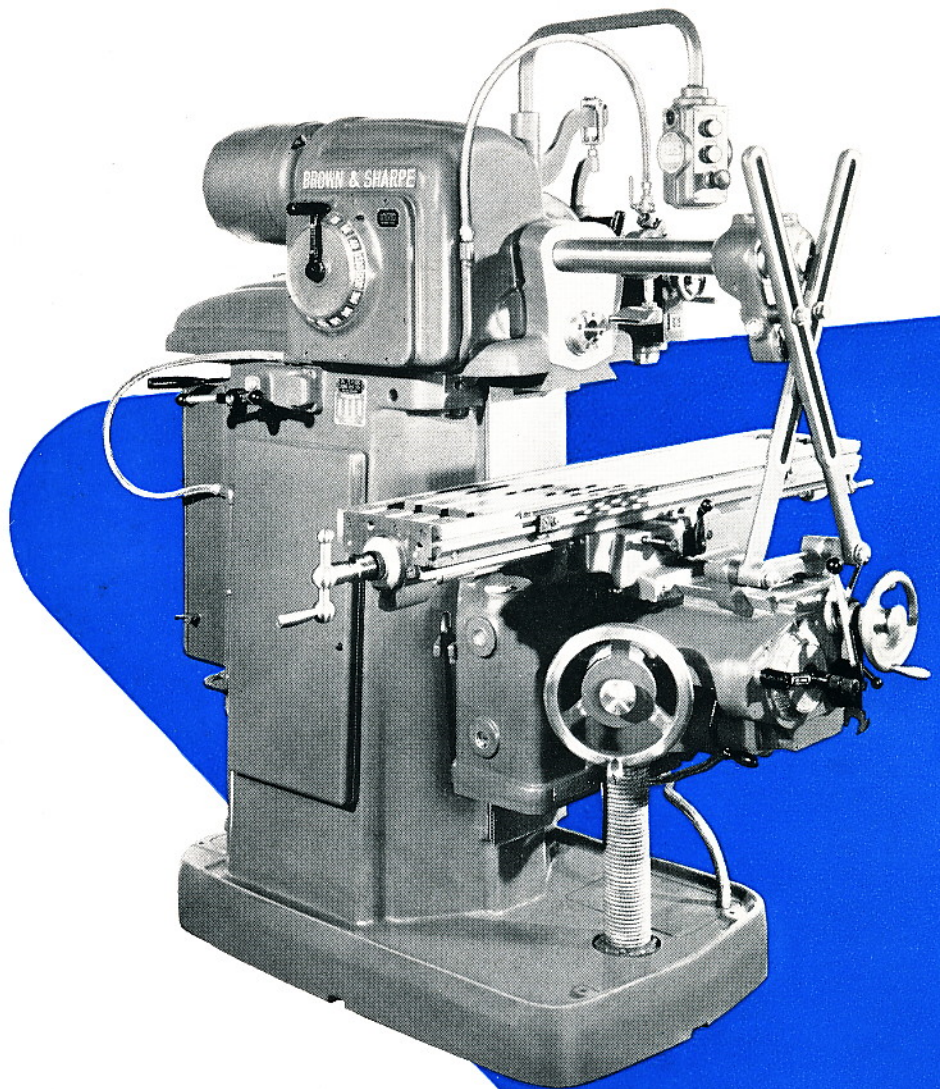
**Universal and Plain  
Milling Machines  
SLIDING-HEAD TYPE**

**B·S**

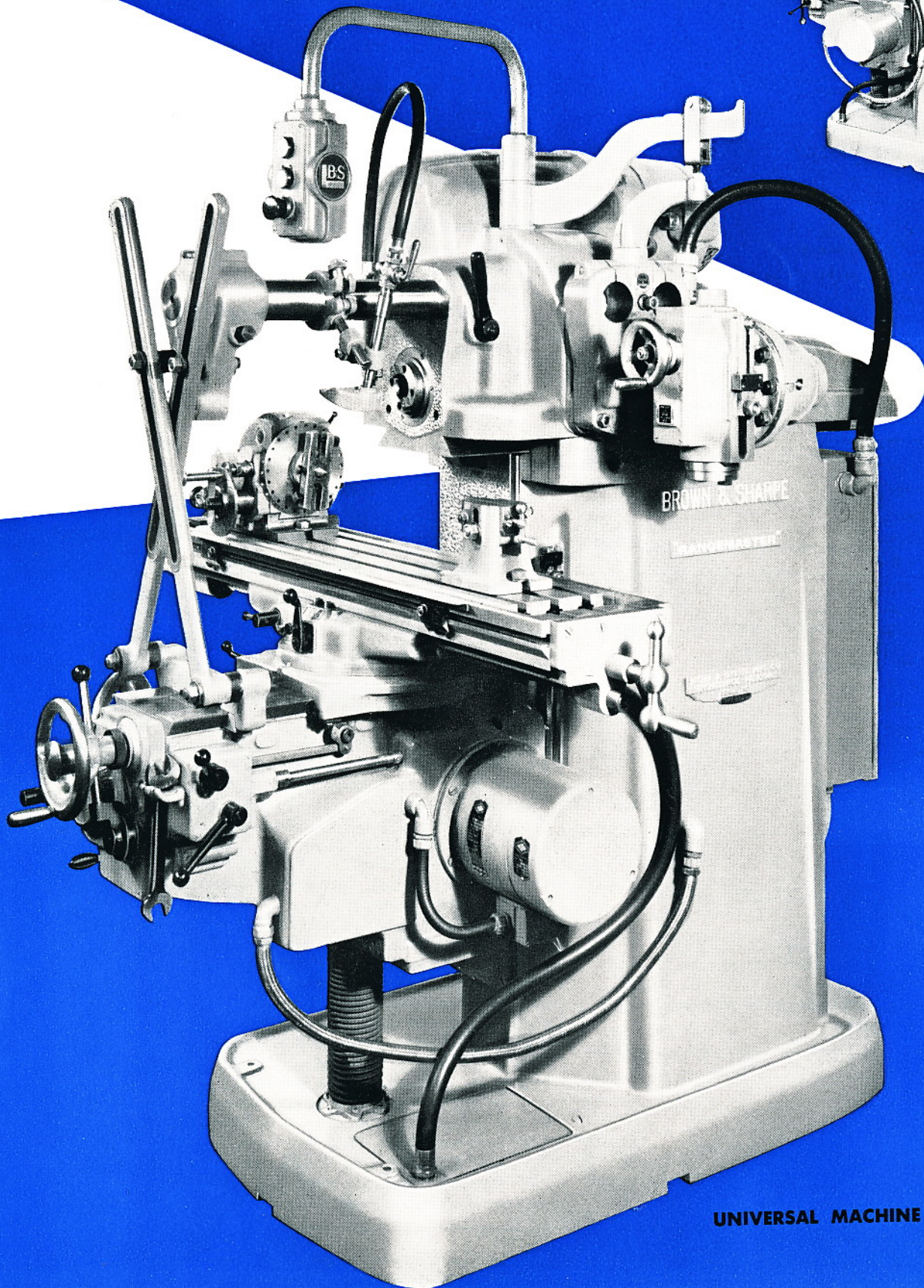
# The "RANGEMASTER"®

**T**HE extremely wide range and versatility of the "Rangemaster" is of value in many fields. Makers of metal patterns appreciate its work range. The ability to change quickly from horizontal to vertical and angular milling appeals to mold and die workers. Manufacturers of prototypes, where the part must be securely clamped and then machined on many surfaces in many different planes without disturbing the work, welcome this machine. Maintenance departments, toolrooms, experimental laboratories and others who have need for a really versatile milling machine with exceptionally wide work range find the "Rangemaster" a profitable investment.

The "Rangemaster's" many features result in extremely accurate machining, excellent finish and greatly reduced set-up time, especially on those jobs where a number of surfaces are milled.



PLAIN MACHINE



UNIVERSAL MACHINE

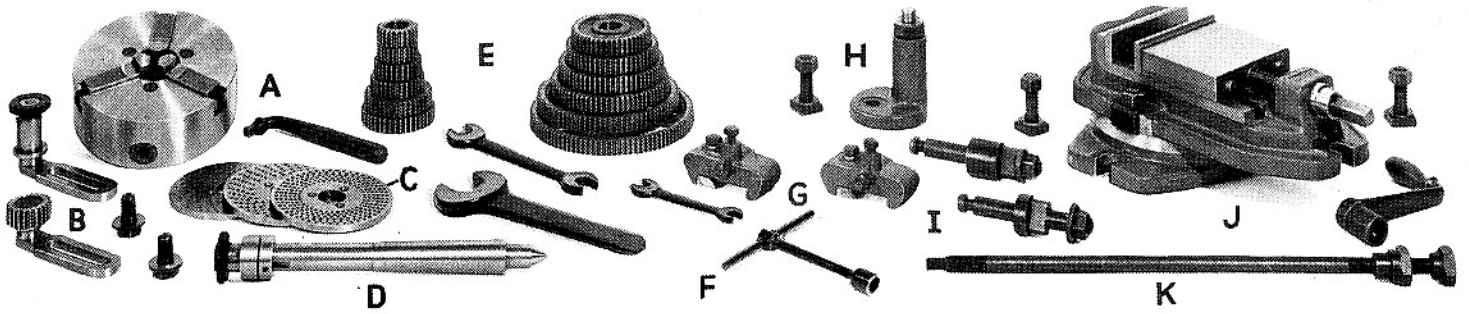
**SPECIFICATIONS**

# No. 20 Universal and Plain Milling Machines

## Sliding-Head Type

<p><b>CAPACITY</b></p> <p>Longitudinal feed ..... 28"                  Transverse feed ..... 12"                  Vertical feed ..... 20½"                  All above feeds automatic.                  Axial feed (hand) of Universal Milling Head ..... 3½"                  Transverse adjustment of Sliding Head ..... 22⅞"                  Distance, centerline of Universal Milling Head Spindle to column face ..... { Min. 2¼"                  ..... { Max. 24¼"                  Distance, centerline of main spindle to top of table                  Universal machine ..... { Min. 2¼"                  ..... { Max. 21⅝"                  Plain machine ..... { Min. 1⅞"                  ..... { Max. 22½"                  Centers (Universal Machine only)                  swing (diameter) ..... 10"                  take length ..... 33"                  Largest cutter accommodated with overarms in place, diameter ..... 10"</p>	<p><b>FAST TRAVEL</b></p> <p>Rate for longitudinal transverse and vertical table movements (with 60-cycle motor), per minute ..... 75"                  Overload release provided.</p>
<p><b>SLIDING HEAD</b></p> <p>Carries main spindle and Universal Milling Head.                  Transverse adjustment ..... 22⅞"</p>	
<p><b>UNIVERSAL MILLING HEAD</b></p> <p>Spindle has Milling Machine Standard taper hole, number ..... 40                  Number of speed changes ..... 18                  Range of speed in either direction, R.P.M. .... 80 to 3060                  Has Universal adjustment.                  Axial feed of spindle (hand) ..... 3½"</p>	
<p><b>COOLANT SYSTEM</b></p> <p>Capacity of tank (cast in base), gallons ..... 7                  Motor-driven centrifugal pump ..... B&amp;S No. 205</p>	
<p><b>MOTORS</b></p> <p>Spindle ..... 3 H.P.                  Table ..... ¾ H.P.                  Coolant pump ..... ¼ H.P.</p>	<p><b>ELECTRICAL CONTROLS</b></p> <p>Conform with Machine Tool Electrical Standards.</p>
<p style="text-align: center;"><b>UNIVERSAL SPIRAL INDEX CENTERS</b></p> <p style="text-align: center;"><i>(furnished with Universal Machine only, available at extra cost for Plain Machine)</i></p> <p>Swing 10" diameter; take 33" length. Headstock spindle mounted on super-precision antifriction bearings. Construction permits driving headstock with spindle set at any angle from 10° below horizontal to 5° beyond the vertical. Graduations on side of head show adjustment to ½°. Clamp securely maintains setting. Plain and differential indexing provide for all divisions to 382 and many beyond, using change gears and 3 index plates furnished. (Addition of 8 special change gears, furnished at extra cost, gives all divisions to 1008.) Table furnished lists set-up data for all divisions to 382. Index crank adjustable circumferentially to permit finding nearest hole in plate without rotating work or shifting driving dog. Index sector graduated to facilitate setting. Direct indexing provided by 24-hole plate on spindle nose and lever-operated locking pin, giving divisions of 2, 3, 4, 6, 8, 12 and 24. For direct indexing, worm is easily thrown out of mesh. Change gears furnished permit cutting spirals of all common leads from 2.500" to 149.31" when geared to headstock worm. Leads 1/40 of all leads within above range are obtainable by gearing directly to headstock spindle, and may be used in many cases where indexing in the usual manner is not required and where headstock spindle is horizontal. Table furnished shows gearing and angular settings for cutting spirals. Worm is hardened, with threads ground true to pitch and form after hardening. Ratio of worm wheel, 40:1. Front end of spindle threaded, 2¼"–4½" N.C., R.H.; No. 10 B&amp;S taper hole. Hole through, 1⅞" diameter. Footstock center has vertical adjustment by rack and pinion; can be set at an angle in vertical plane.</p>	
<p><b>MAIN SPINDLE</b></p> <p>Has Milling Machine Standard taper hole, number 40                  Hole through, diameter ..... 2¼"                  Mounted on roller bearings.                  Face mills bolted directly to spindle end.</p>	
<p><b>MAIN SPINDLE SPEEDS</b></p> <p>Number of changes ..... 18                  Range (with 60 cycle motor) in either direction, R.P.M. .... 40 to 1530</p>	
<p><b>TABLE</b></p> <p>Working surface ..... 50" x 10"                  Number of T-slots ..... 3                  Width of T-slots ..... 1⅞"                  Table of Universal machine swivels –                  Scale graduated to 50° each side of zero shows angular settings to ½°.                  Power feed can be used with table swivelled to 50° either side of zero.</p>	
<p><b>FEEDS</b></p> <p>Longitudinal ..... 28"                  Transverse ..... 12"                  Vertical ..... 20½"                  Number of feeds ..... 18                  Range (with 60-cycle motor), per minute ..... ½" to 20¼"                  Overload release provided.</p>	

Machines with dials graduated in millimeters, and with metric screws for longitudinal, transverse and vertical movements, and with metric dial and screw for Universal Head, can be furnished.



**STANDARD EQUIPMENT**

- \* A 7" 3-jawed self-centering chuck
- \* B Intermediate gear plate, and reverse gear and plate for headstock
- \* C Index plates for headstock
- \* D Differential indexing center
- \* E Change gears for headstock
- \* F Set of wrenches

- \* G 2 table stops
- \* H Center rest
- \* I Bolts for clamping braces to arbor yoke
- \* J No. 22 swivel vise furnished with Universal mach., No. 22 flanged vise furnished with Plain mach.
- \* K Draw-in bolt

**Not shown above —**  
 Arbor Yokes (2 furnished)  
 \* 10" universal spiral index centers  
 Instruction booklets and tables

\*Furnished with Universal machine only. Available at extra cost for Plain machine.

**WEIGHTS AND SHIPPING DATA**

Machine	Net Weight, Lbs. (Approx.)	Shipping Weight, Lbs. (Approx.)	Dimensions for Shipment, Inches	Space Occupied, Cu. Ft.
Universal	5350	Domestic — 5750	87 x 69 x 89	310
		Foreign — 6450	85 x 67 x 89	294
Plain	5100	Domestic — 5450	87 x 69 x 89	310
		Foreign — 5850	85 x 67 x 89	294

**ADDITIONAL EQUIPMENT**

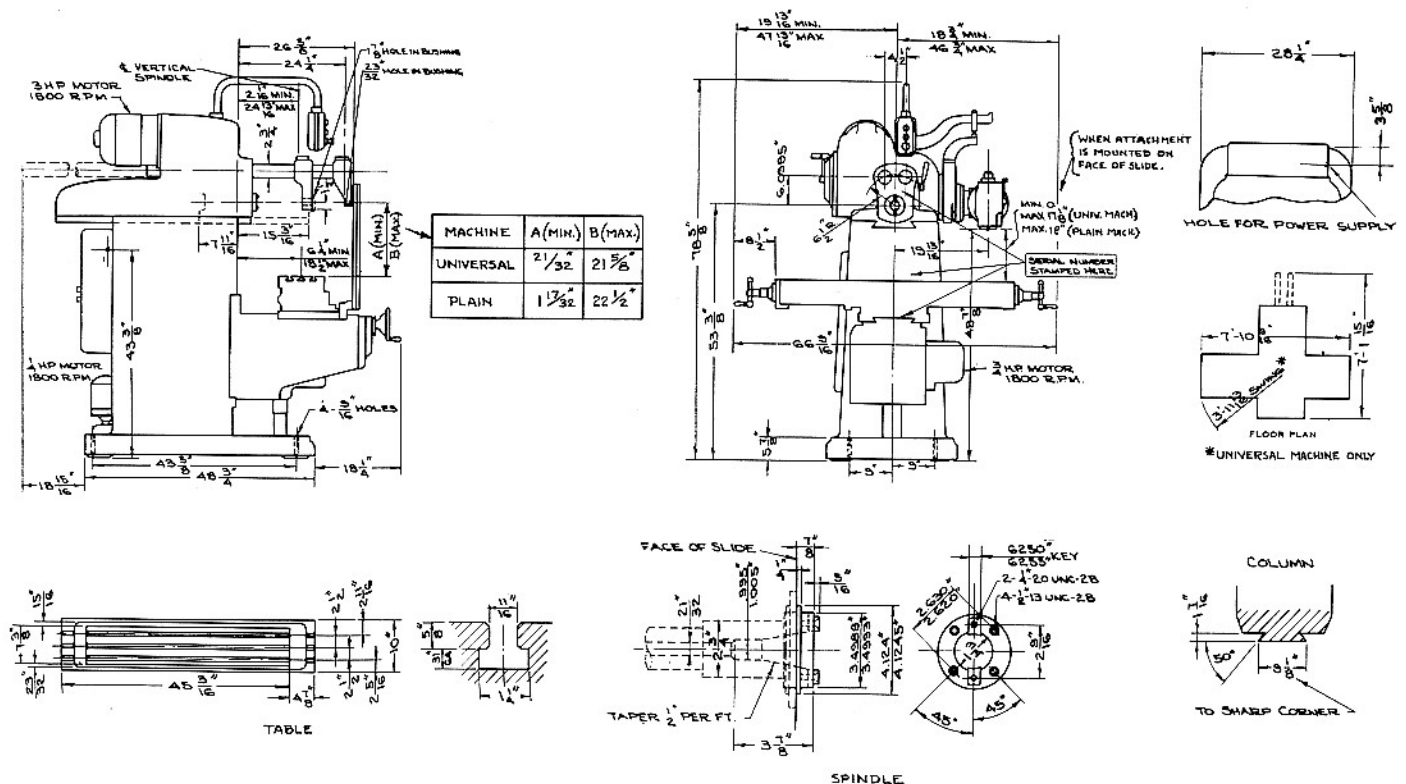
The following additional equipment is available for use on this machine at extra cost. Some of these items are briefly described on the last page of this circular.

Rotary Attachments  
 Index Centers  
 Slotting Attachment

Micrometer Table Setting Attachment  
 Scales and Verniers  
 Short Lead and Feed Reducing Attachment  
 Lamp Attachment

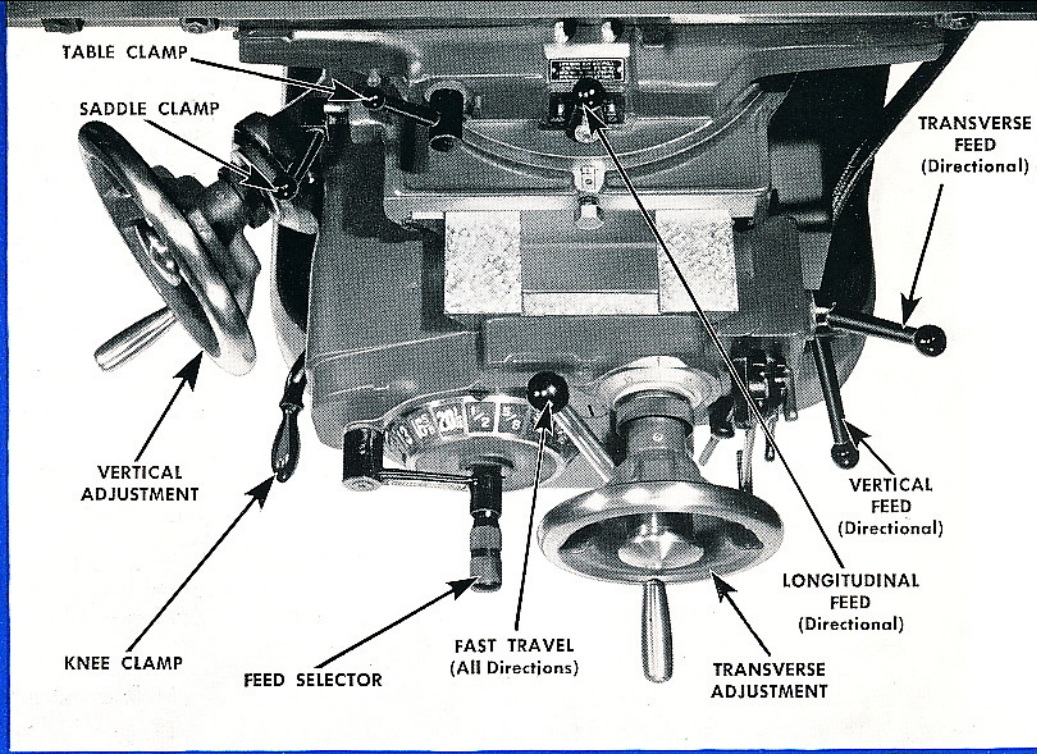
Change Gear Guard for Drive to Universal Spiral Index Centers  
 Fast Travel Trip Arrangement (for Plain mach. only)

**Machine Dimensions**





Spindle "Start", "Stop" and "Jog" buttons located on panel adjustable horizontally to most convenient operating position.



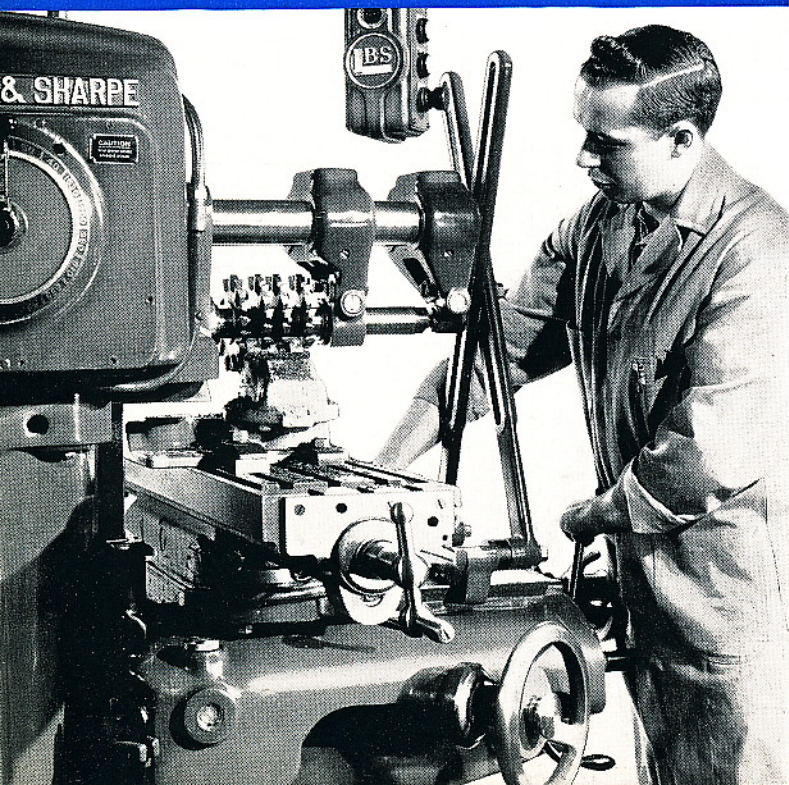
All operating controls and most set-up adjustments are easily reached from front of machine, the majority of them being grouped on the knee and saddle as illustrated above.

## All Controls Located for Maximum Ease of Operation

With the operator standing in the normal operating position at the front of the machine, all controls are manipulated with a minimum of effort. Longitudinal, transverse and vertical hand feed — power feeds in all directions — power fast travel in all directions — table, knee, saddle and overarm clamp levers — "start-stop" and spindle "jog" buttons (adjustable horizontally for position) — all these controls and the feed selector lever as well, are right at hand from the operating position.

All the feed control levers are so located that the operator can easily observe the work and cutter while he engages or disengages feeds. The feed control levers are all directional (independent of direction of spindle rotation); when the longitudinal feed engagement lever is turned to the right, the table feeds to the right, when the vertical feed engagement lever is moved to the upper position, the knee feeds up, etc.

The convenient grouping and ease of operation of these controls contribute to the economical production of quality work.



## Fast Travel Provided for All Table Movements

Table movement in any direction — longitudinal, transverse or vertical — can be instantly speeded-up to a fast travel rate of 75" per minute by means of a lever on the front of the knee, as illustrated at left. The original feed movement is resumed automatically when the lever is released.

For convenience in setting-up, the same lever also provides fast travel when the machine is stopped — that is, when neither the spindle nor table feed is operating. The direction of movement is determined by the feed control levers; and the movement in this instance is both started and stopped by the fast travel lever.

The table is driven at both fast travel and cutting feed by a constant-speed motor located on the right-hand side of the knee.

## Wide Ranges of Easily Selected Speeds and Feeds

Speeds and feeds are each selected by rotating a single lever, one turn in either direction giving a change in rate. Large figures on the open-faced dials show at a glance not only the rates engaged but the rates available as well.

### 18 Spindle Speeds — 40 to 1530 R.P.M.

This ample speed range meets a wide variety of milling requirements. The speed selector lever and dial are on the left side of the sliding head (see illustration); and a spindle jog button on the adjustable push-button station facilitates speed change. The location of the indicator finger permits the rate of speed engaged to be observed from the operating position at the front of the machine.

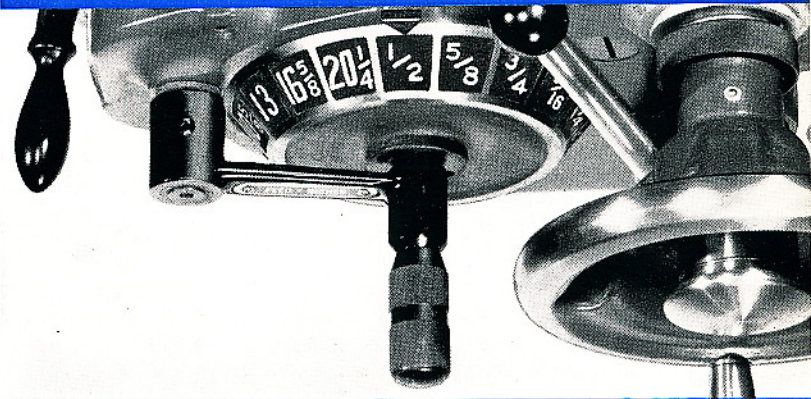
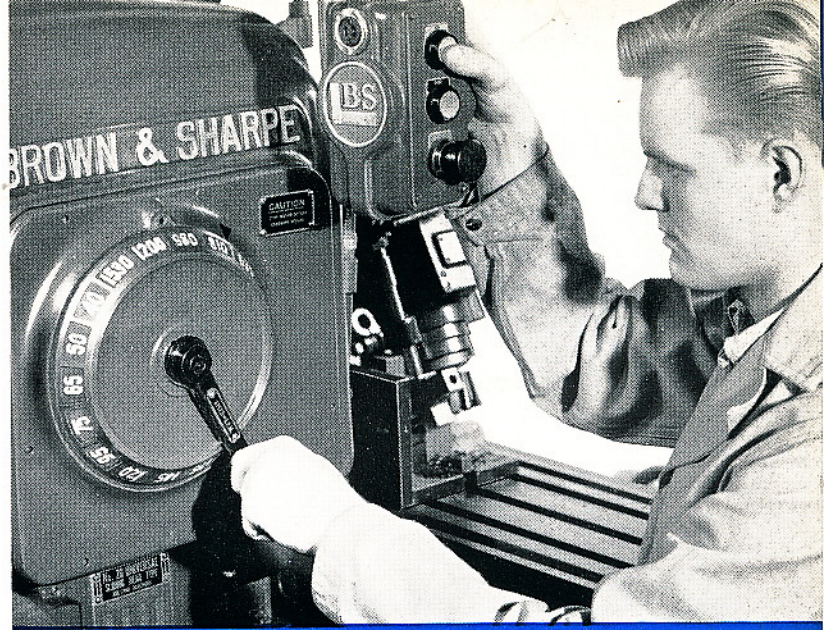
### 18 Feed Rates — $\frac{1}{2}$ " to $20\frac{1}{4}$ " per Minute

The desired feed rate is quickly obtained by means of the rotating lever and dial on the front of the knee, illustrated at right. Changing from fast to slow feed or vice versa requires only a few seconds; and the convenience and ease of feed selection prompts the operator to change to the most productive feed rate as frequently as conditions warrant.

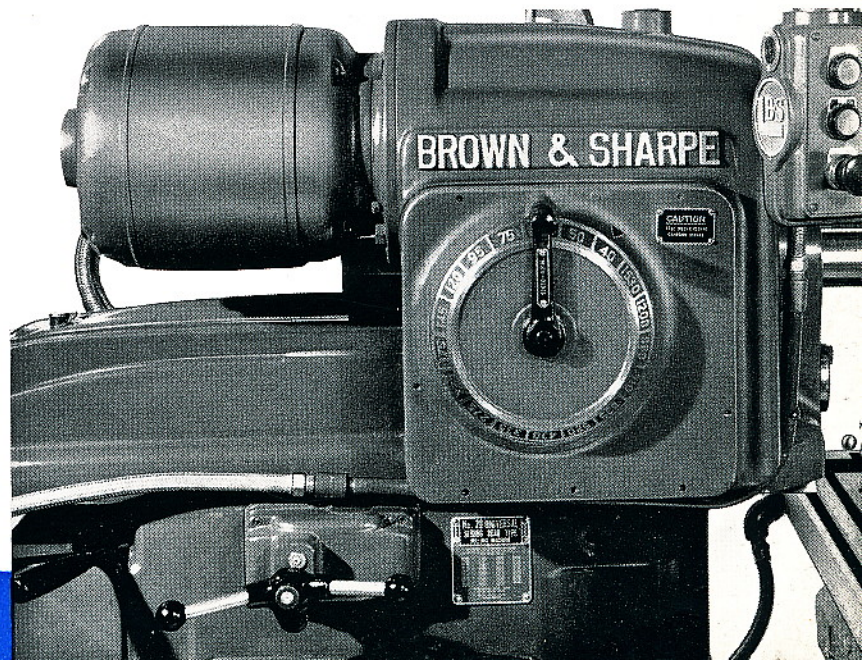
## Sliding Head Provides Extremely Rigid Cutter Support Over Exceptionally Wide Work Range

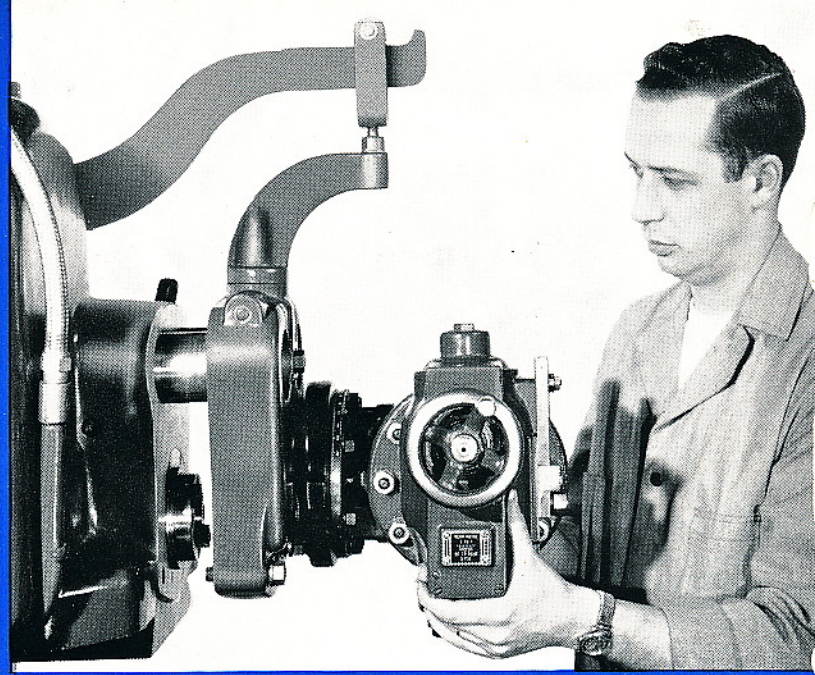
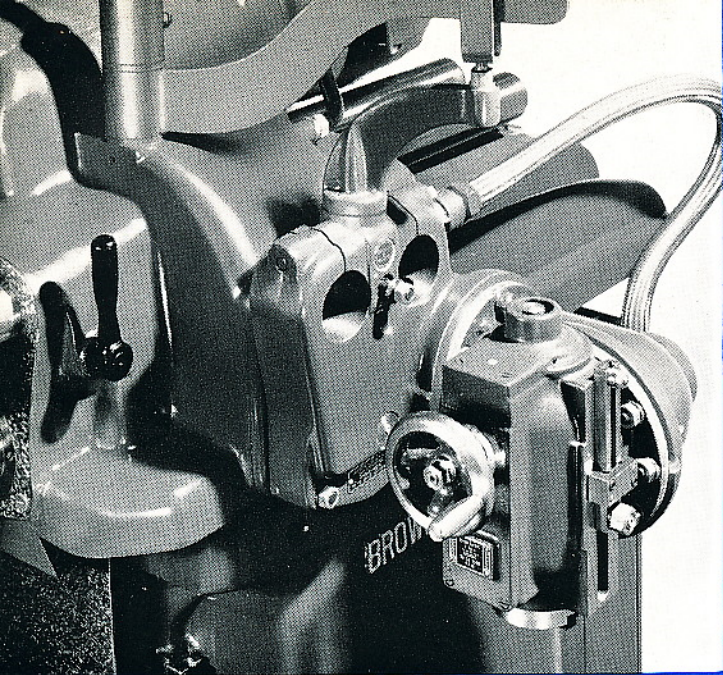
The Sliding Head which carries the spindle and its driving motor can be extended so that its face is up to  $15\frac{3}{8}$ " away from the machine column face. This permits the spindle nose to be brought out close to the cutter while adequate clearance is given to work or fixtures projecting over the table. As a result there is a considerable increase in rigidity of cutter support over that afforded with an ordinary milling machine. Because of this added rigidity there is an increase in work quality. With arbor deflection at a minimum, smaller diameter arbors and cutters can be used, thus reducing the expense of cutter equipment. Another obvious advantage of this Sliding Head is obtained when an end mill is being used in the nose of the horizontal spindle.

The exceptionally wide ways on which the Sliding Head is mounted provide extreme rigidity, give dependable accuracy and contribute to long machine life. A conveniently located lever on the left side of the machine column facilitates transverse adjustment while an adjacent lever permits the unit to be firmly clamped with a minimum of effort. Cuts up to the full capacity of the 3 H.P. spindle driving motor can be taken after the head is clamped.



In addition to the Universal Head furnished with the machine the No. 0 Slotting Attachment, available as an extra, can be firmly secured at the end of the Sliding Head, thus further increasing the machine's versatility. When desired, the Sliding Head can be retracted up to  $7\frac{1}{8}$ " back of the column face permitting the cutting tools in these units to be positioned close to the machine column.





## Completely Universal Milling Head Has 18 Speed Changes From 80 to 3060 R.P.M.

This Universal Milling Head is securely supported at the face of the sliding head. Its two swivels have full-circumference graduations to half-degrees, allowing the spindle to be accurately set to any desired angle in any plane. Drive is through the horizontal spindle from its 3 H.P. driving motor. The 2 to 1 ratio of its gearing gives this unit 18 spindle speeds from 80 to 3060 R.P.M., making it ideal for a wide range of work. In the vertical position, the spindle of the Universal Head lines up with the horizontal spindle, thereby enabling the full longitudinal table movement to be utilized.

As the spindle nose has a No. 40 Milling Machine Stand-

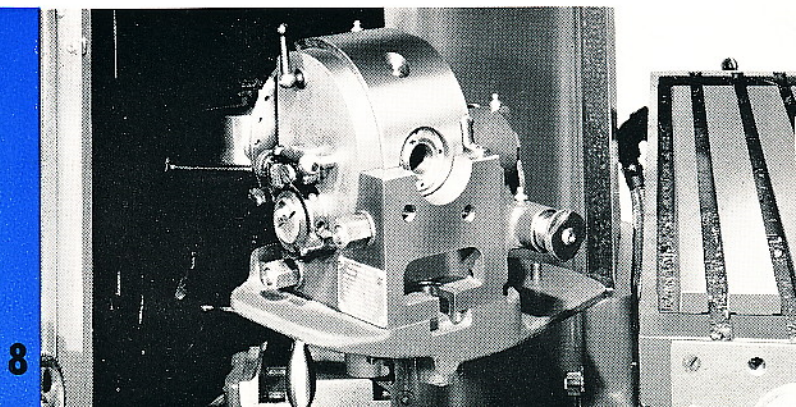
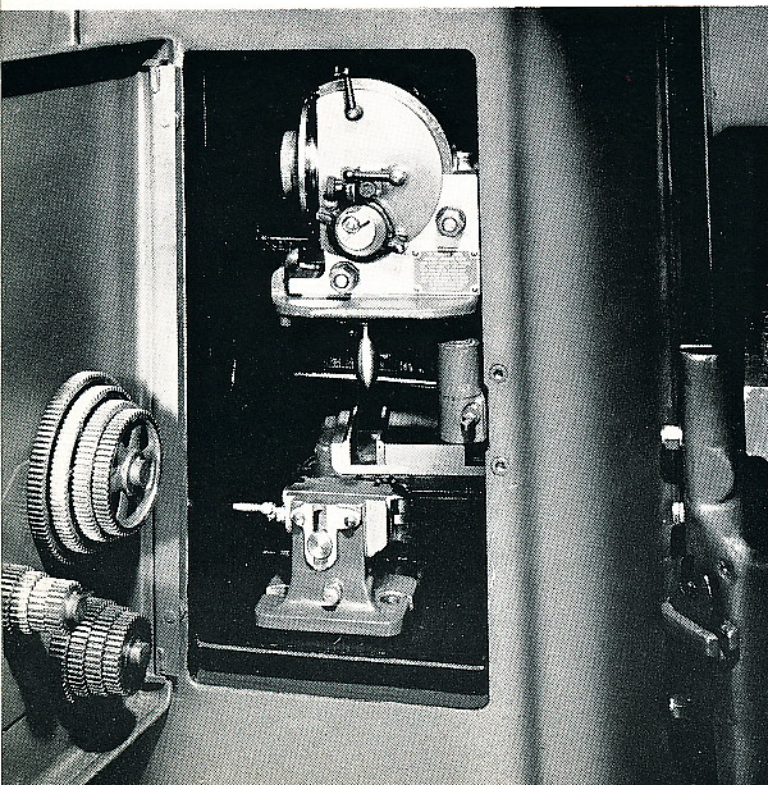
ard taper hole, cutter equipment is interchangeable with the horizontal spindle. Hand axial movement of the spindle up to  $3\frac{1}{2}$ " is provided by a conveniently located handwheel. A graduated dial at the rear of the handwheel indicates the axial movement to 0.001". An adjustable positive stop on the side of the head permits the use of gage blocks, etc. when it is desired to feed the spindle exact distances.

When not in use the Universal Head is easily swung, by means of the crane provided, to its storage position at the side of the machine where it is completely out of the way.

A draw-in bolt furnished for use in the Universal Head has a threaded end,  $\frac{5}{8}$ -11-UNC.

## Unique Storage Shelf Provided for Headstock

As illustrated, convenient storage is provided for the headstock of the Universal Spiral Index Centers (furnished with the Universal machine and available as an extra for the Plain machine). Out of the way within the column of the machine, the index centers are well protected. When it is desired to use the index centers, the storage shelf is swung out close to the machine table where it is a simple matter to move the headstock into position on the table.

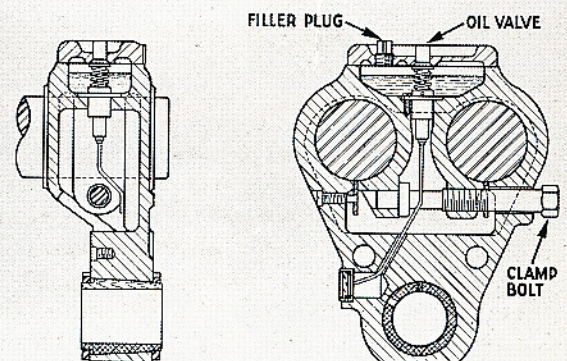
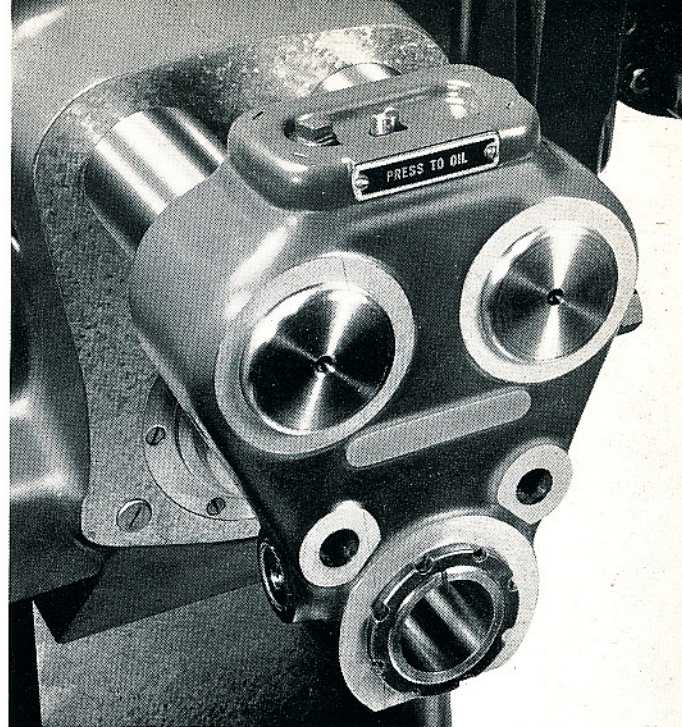




## Quickly-Adjusted Arbor Support Gives Accurate Fixed Alignment

The solid steel cylindrical double overarm guarantees fixed, accurate arbor alignment and the most rigid type of arbor support. The arm holes in the column are accurately bored to assure the overarms being parallel, making it easy to move the arbor yokes along the arms or to reverse them if desired. Both overarms are quickly clamped at both front and rear by a small movement of a single lever, located on the right side of the column within easy reach from the front of the machine.

Each of the sturdy aluminum arbor yokes is clamped evenly to both overarms by a single bolt. Each yoke has an adjustable bronze arbor bushing, which is lubricated by a manually-operated self-closing valve from an oil reservoir in the top of the yoke. A sight gage in the left side of the yoke provides a check on the lubrication.



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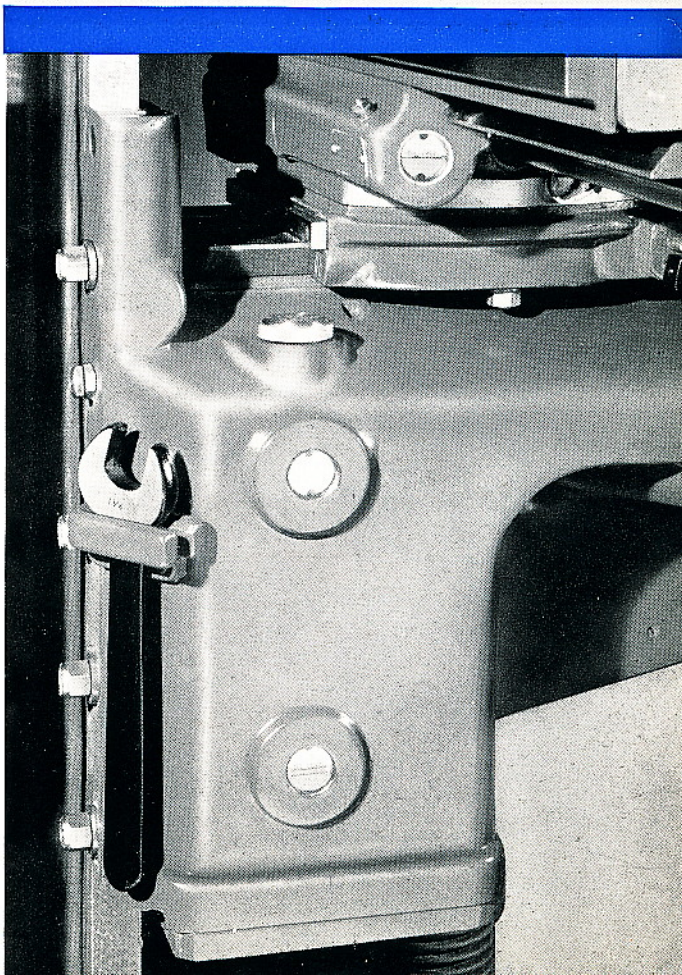
## Automatic Lubrication Provided for All Mechanisms Throughout Sliding Head, Knee and Table

All mechanisms throughout the sliding head, knee and table have complete automatic lubrication — a feature which both saves the operator's time and insures the long life of the machine.

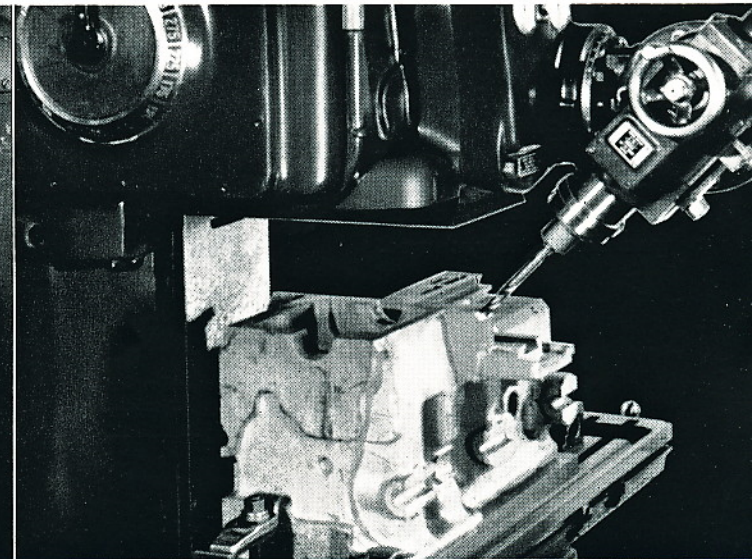
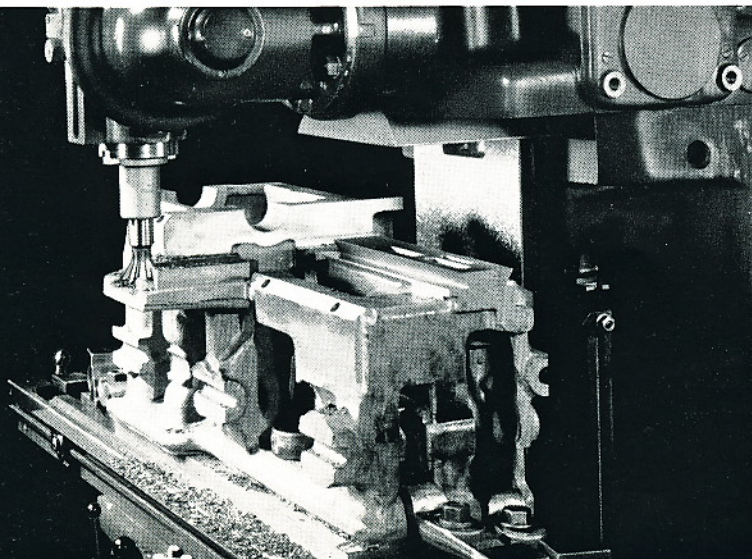
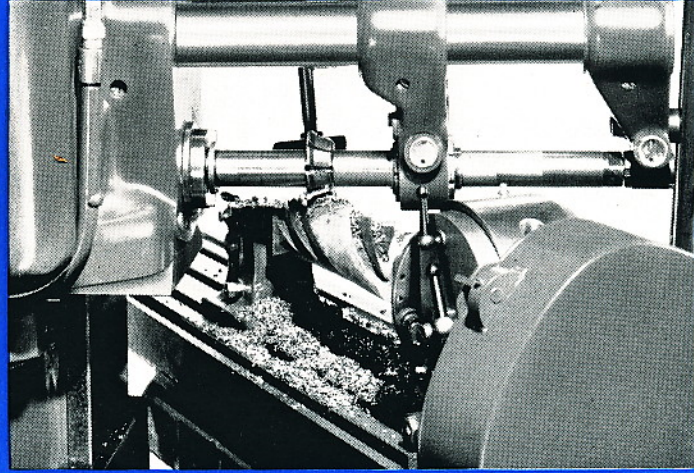
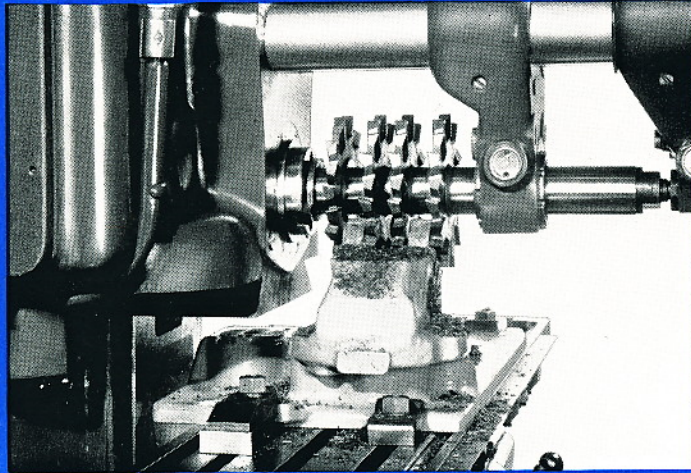
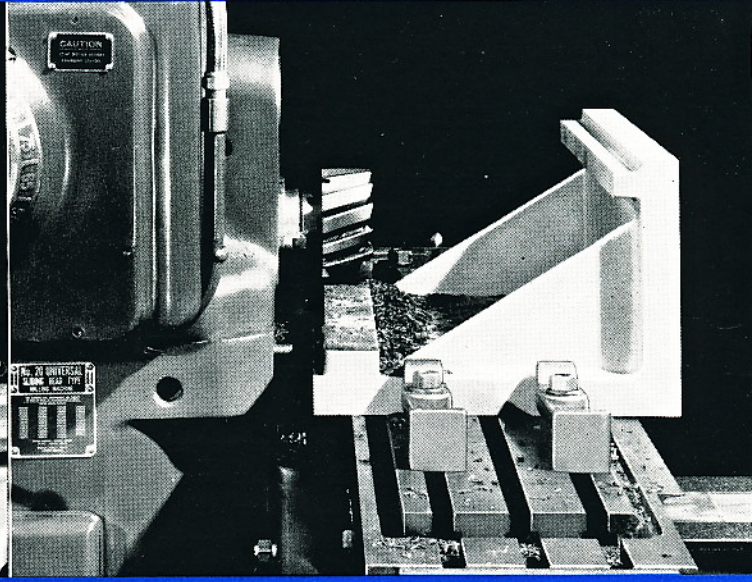
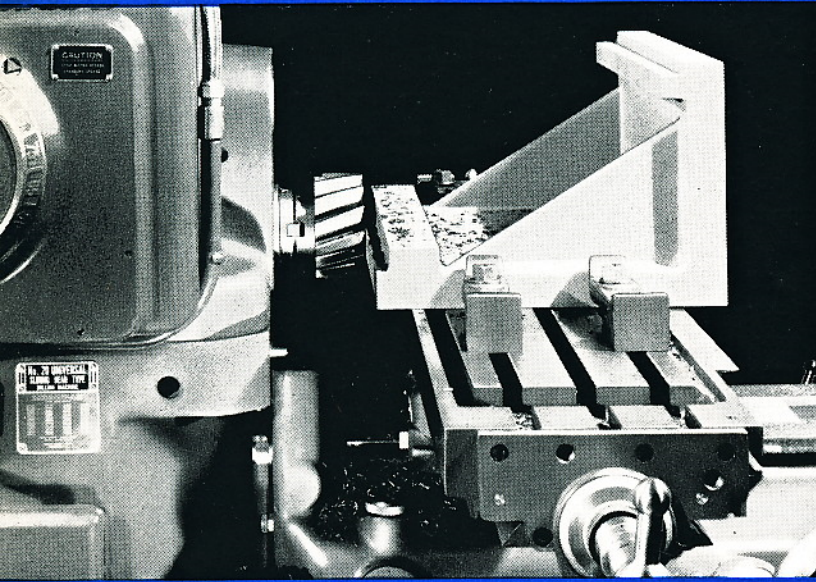
All gears and bearings (including spindle bearings) within the sliding head are oiled automatically by a plunger pump mounted in a reservoir in the sliding head. All knee mechanisms are oiled automatically by a plunger pump in the knee reservoir; and this pump also oils the bearing surfaces on the column and at the top of the knee. A third pump, actuated by movement of the longitudinal feed lever, sends oil from a reservoir in the saddle to all the table driving mechanisms and the table ways.

Sight gages show the oil level in the saddle and knee reservoirs; and sight indicators permit checking the operation of the pumps in the sliding head and knee.

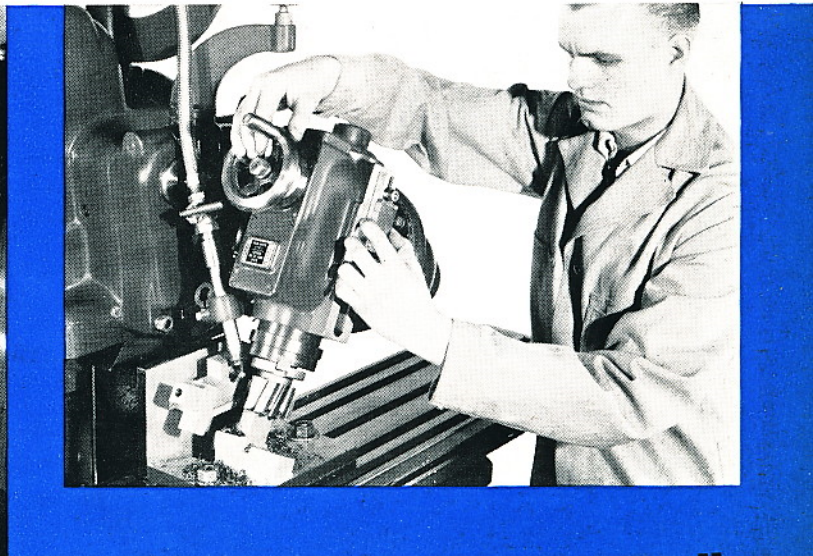
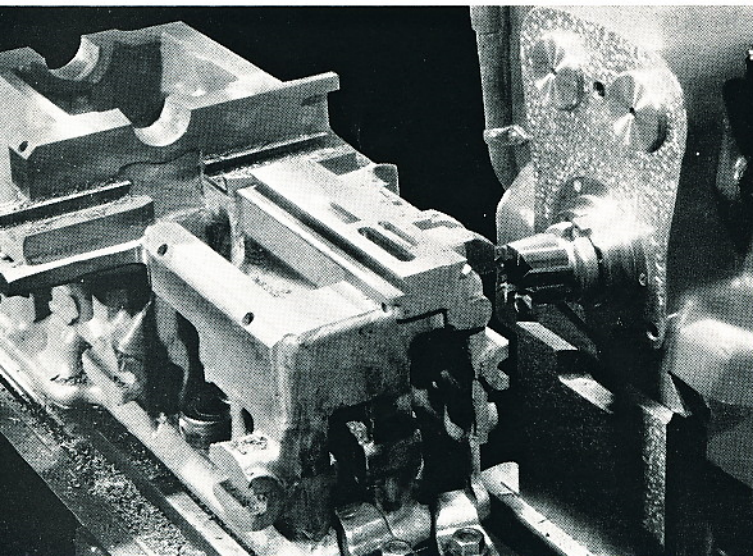
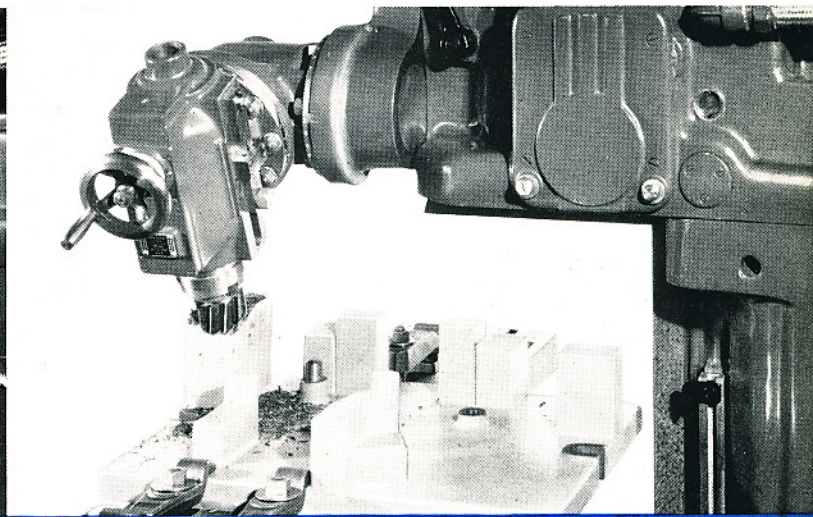
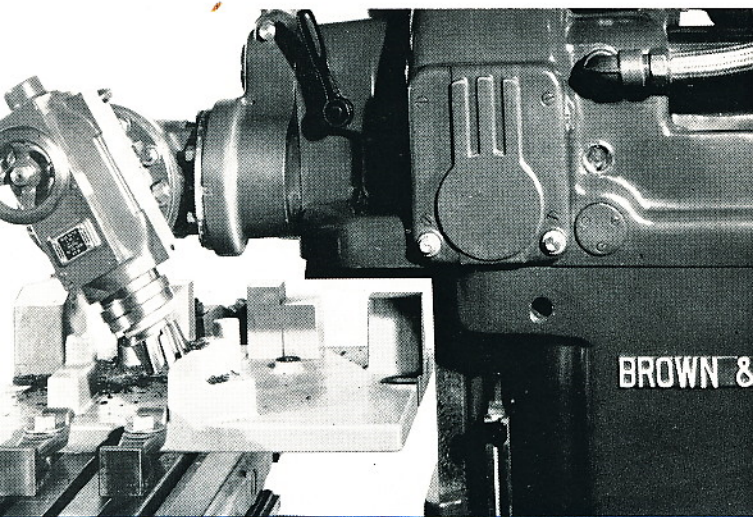
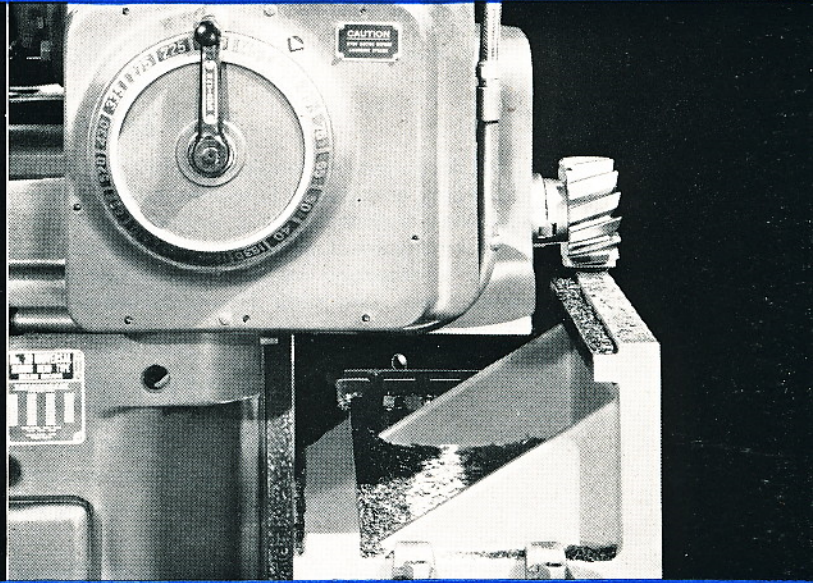
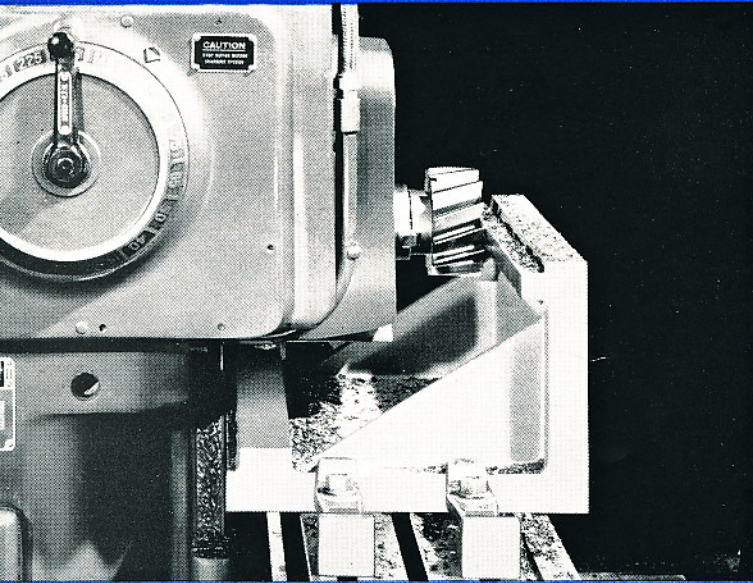
Sight gages and indicators as shown at right provide a check on automatic oiling systems for driving mechanisms and ways.



# The "RANGEMASTER" has



# extensive Range and Versatility



## OPTIONAL MECHANISM

Available, at extra cost, for Plain Machine Only. Must be applied to machine before shipment from our factory.

### Fast Travel Trip Arrangement

With this Arrangement, longitudinal fast travel can be made to stay engaged until tripped out by a dog-operated switch that energizes or deenergizes a solenoid in the Arrangement mechanism. The fast travel is engaged or disengaged by the regular fast travel engagement lever. Two table dogs furnished provide

for disengaging longitudinal fast travel in either direction. When the machine spindle is revolving, cutting feed is engaged simultaneously with disengagement of fast travel. When the machine spindle is not revolving, the table will stop when fast travel is disengaged.

## ADDITIONAL EQUIPMENT

Items furnished at extra cost. Detailed specifications on request.

(Other equipment listed on page 3)

When ordering equipment specify the size, style and serial number of machine.

### No. 0 Short Lead and Feed Reducing Attachment

This attachment permits obtaining much shorter leads than can be cut by using only the change gears furnished with the universal spiral index centers. It also provides the very slow rates of longitudinal table travel required for many operations such as milling with a fly cutter.

### No. 0 Slotting Attachment

The tool slide of this attachment can be set at any angle to 90° either side of vertical by a scale reading to half-degrees. Movement of the slide is adjustable from 0 to 3".

### Lamp Attachment

This attachment consists of a light mounted at the end of an adjustable arm fastened to the back of the spindle push-button panel. An electrical outlet is incorporated in the side of the panel for "plugging-in". The adjustable arm plus the movement of the pendent, on which the panel is mounted, permits locating the light in any desired position.

### Rotary Attachments 10" and 18" Hand Feed and 18" Power Feed

Used in connection with the Universal Milling Head, the Rotary Attachments make possible a variety of rotary milling operations such as milling segments of circles and circular slots. Furthermore, they are useful in die sinking, making templets and a wide variety of slotted work when used with the Slotting Attachment.

### No. 0 Change Gear Guard for Drive to Universal Spiral Index Centers

Completely enclosing the headstock gearing this hinged light metal guard allows ready use of the standard set of change gears.

