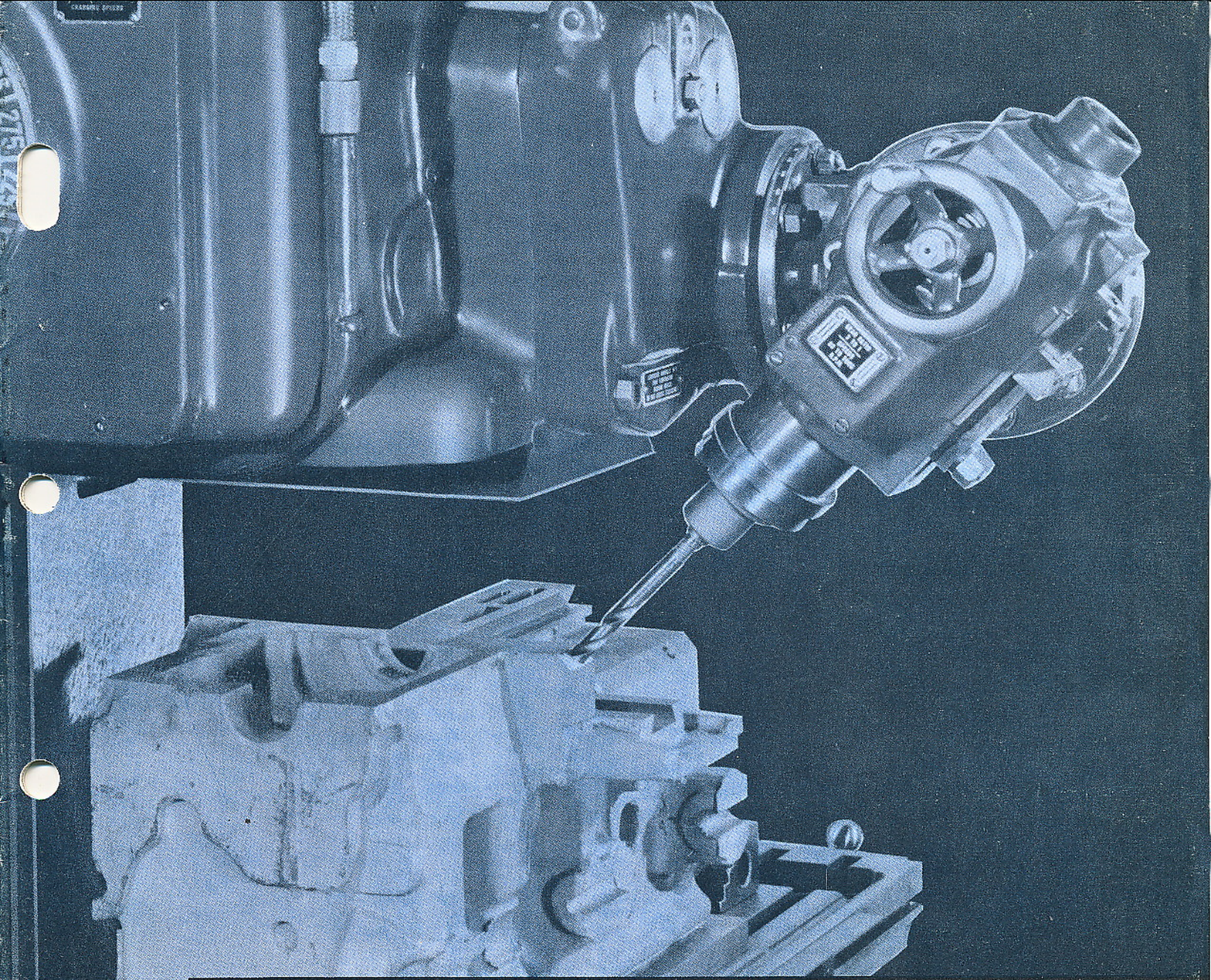


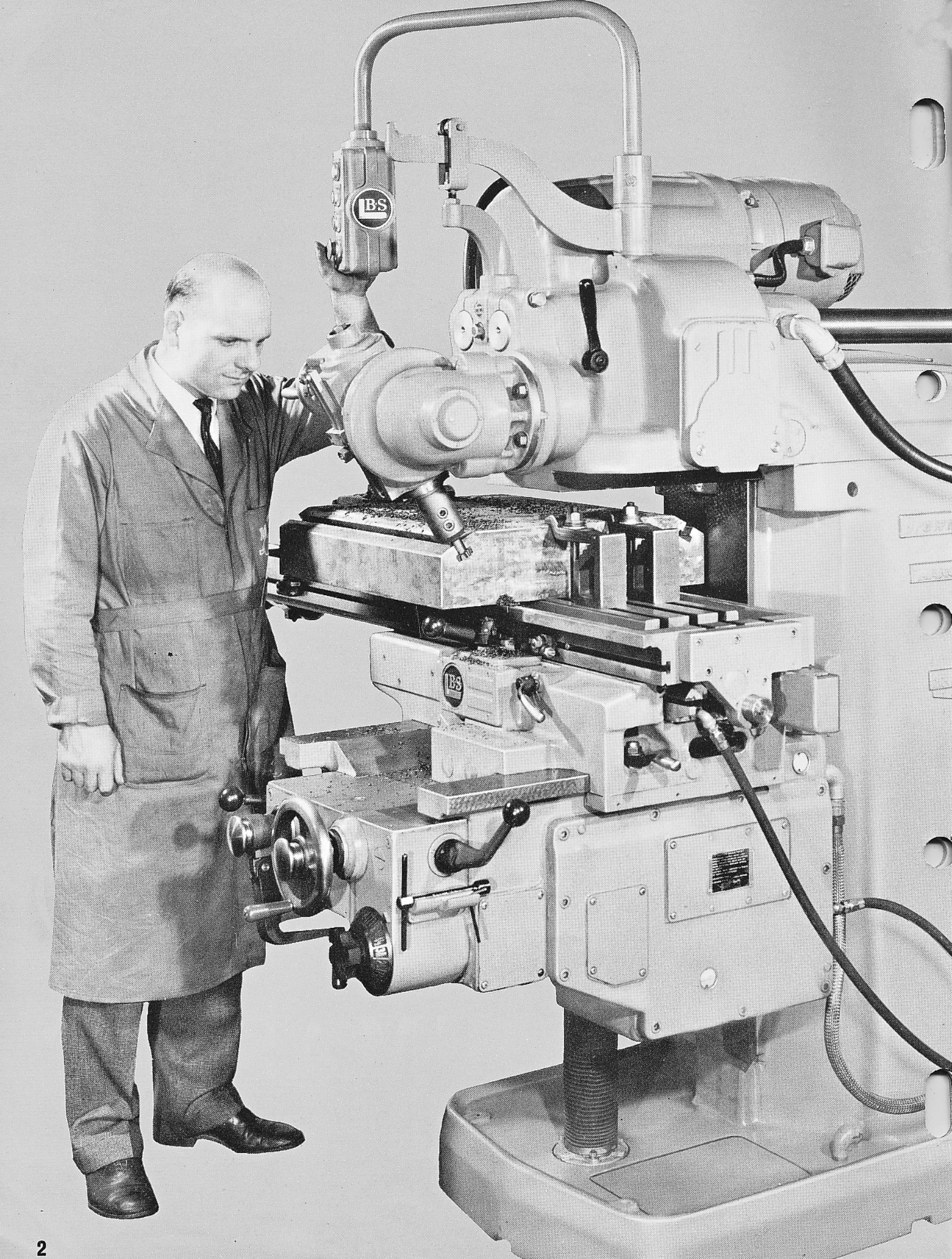
2 NEW! / *No. 20*

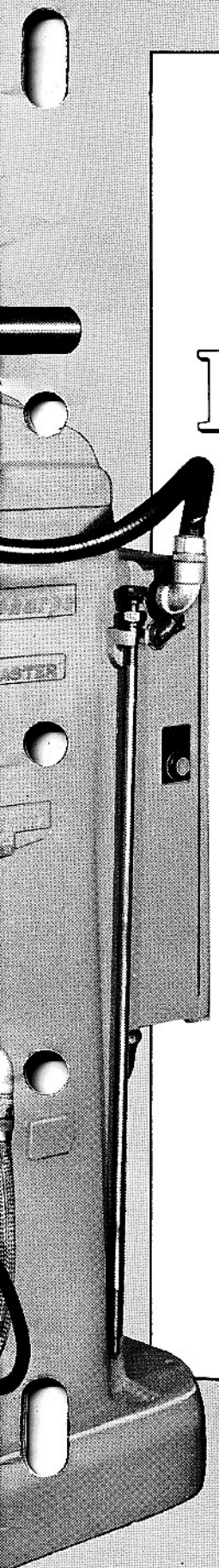
Brown & Sharpe

RANGEMASTER

Sliding Head Type

Universal and Plain Milling Machines





ALL

Brown & Sharpe

RANGEMASTERS

give you these big NEW advantages!

Range

New features and a wide selection of optional equipment give greater capacity on more jobs.

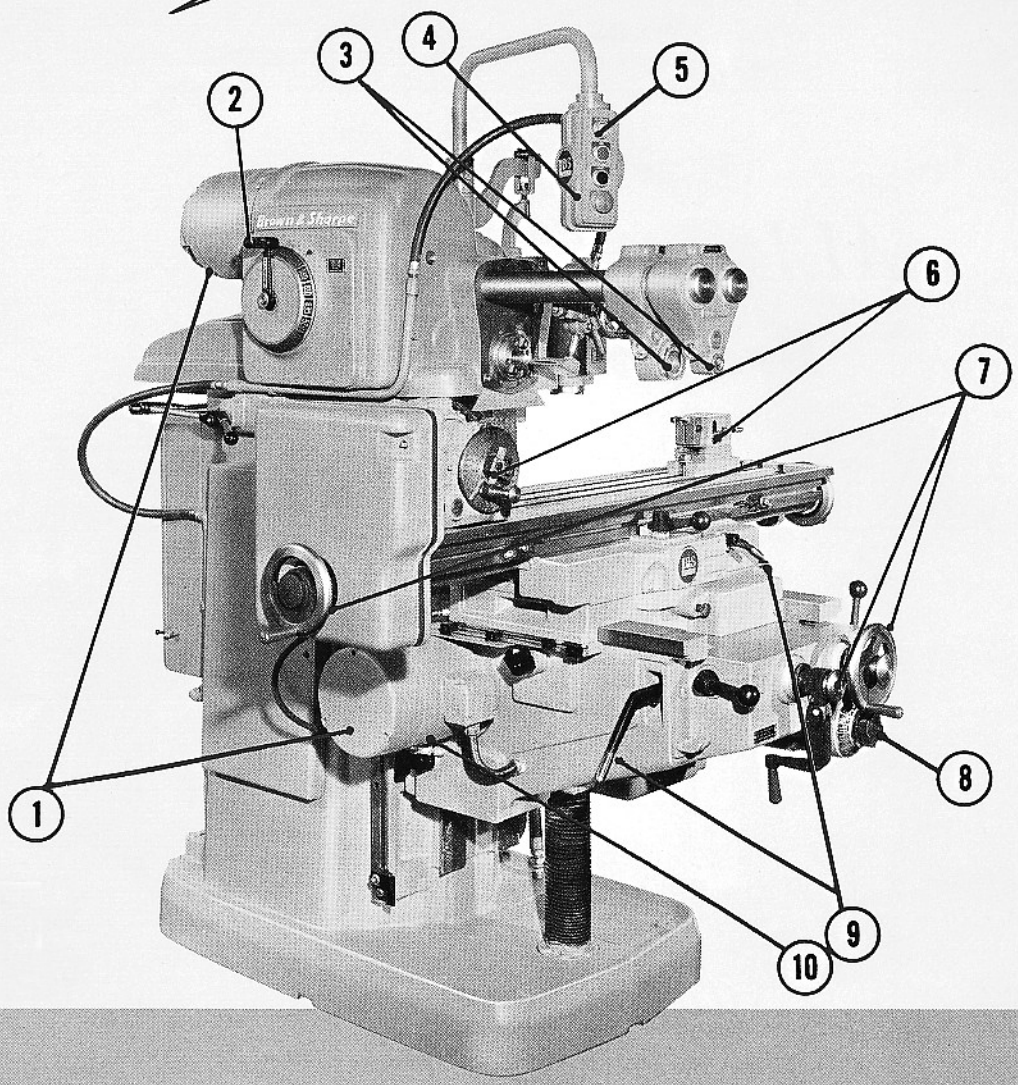
Accuracy

New rugged proportions give greater accuracy and more stock removal.

Low Cost

New standard "building-block" components are combined to meet specific needs at lower cost.

Brown & Sharpe RANGEMASTER



1 Individual drive motors provide direct application of power. The Dinabrake spindle drive motor assures quick spindle stopping.

2 A single lever selects all speeds. Speed changes can be made in either direction. Large figures on an open-faced dial make available speeds easily read.

3 Each arbor yoke has an adjustable bronze arbor bushing, oiled from a large reservoir at the top through a manually-operated spring-closed valve.

4 The pendant-type control station swivels horizontally to any convenient operating position. Push buttons control starting, stopping, spindle jog, and fast travel. This station also includes a plug in connection for a 110 volt work lamp.

5 A push button controls fast travel table movements which can be made with the spindle either running or stopped.

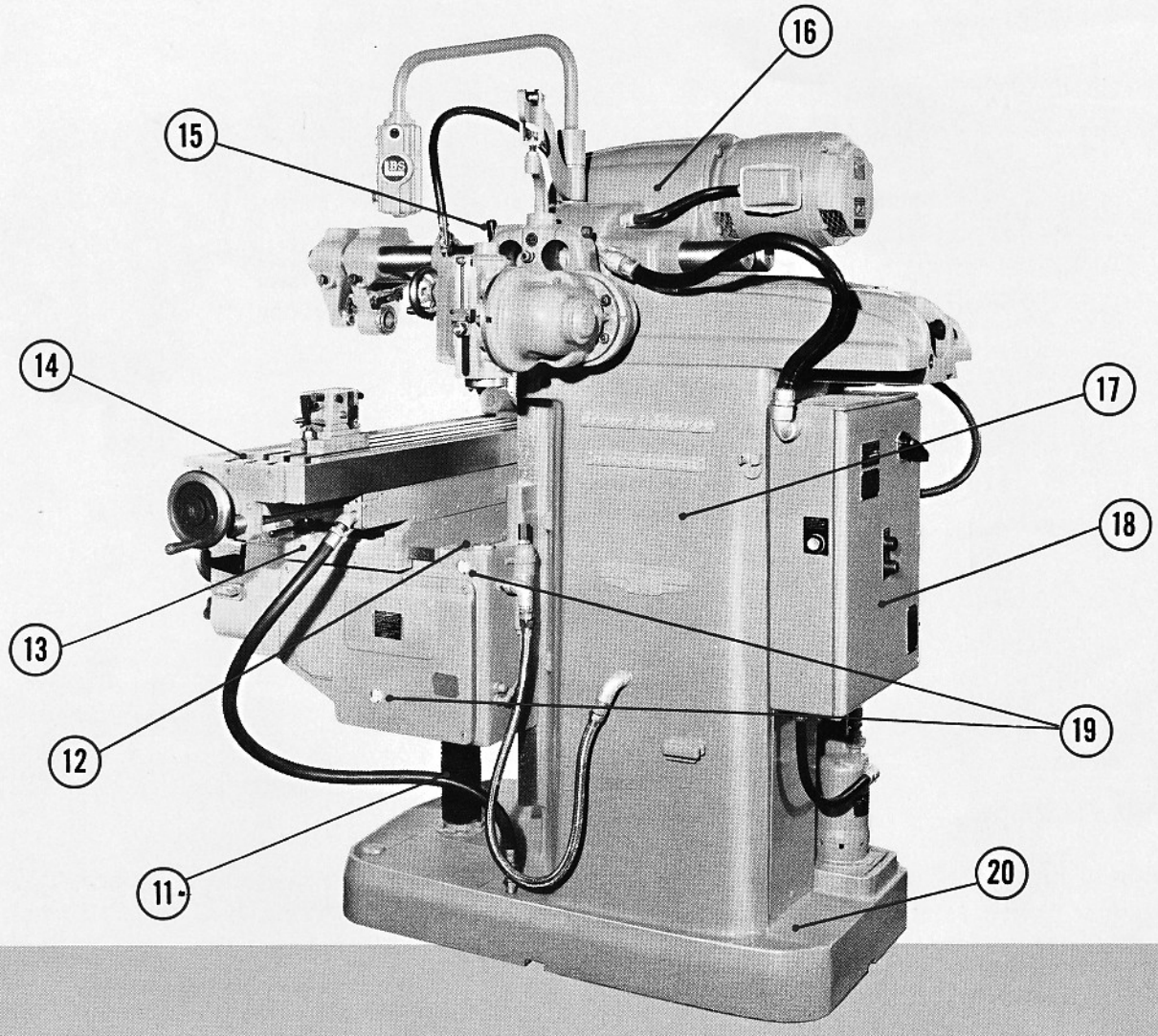
6 On the Universal Rangemaster, a unique design spiral indexing head permits a .67″ lead cut with standard equipment. An exclusive Brown & Sharpe feature protects the worm gear from damage.

7 The transverse and longitudinal handwheels and vertical handcrank are automatically disengaged when their respective functions are being performed by power. These handwheels have unique "release and turn" dials for quick zero setting, graduated to .001″ to facilitate accurate set-ups and work location. The knee elevating handcrank drops down out of the way when not in use.

8 Fingertip control dial quickly selects the rate of feed desired. One complete revolution of the dial covers the entire range of available rates.

9 The knee, saddle, and table are quickly clamped by conveniently placed levers for ease of operation.

10 A constant-speed motor on the knee provides power for all feed and fast travel movements independent of the spindle drive. An integral magnetic brake assures quick stopping of the table when the spindle is stopped.



11 The knee elevating screw is completely covered by a guard.

12 Solid construction at the top of the knee provides complete protection of the knee mechanisms and eliminates the necessity of sliding or telescoping guards.

13 The rugged, well braced saddle of the Plain Machine is supported by and moves transversely on oversized, widely spaced, precision scraped ways. The saddle of the Universal Machine swivels on the exceptionally large bearing area of the clamp bed.

14 The table is cast of semi-steel and has an unusually large working area. It is exceptionally deep and strongly ribbed to minimize deflections. The table has extra large coolant troughs to handle the maximum coolant flow.

15 This convenient lever quickly and easily clamps the overarms. The unique clamping mechanism equalizes the pressure on both overarms to maintain alignment.

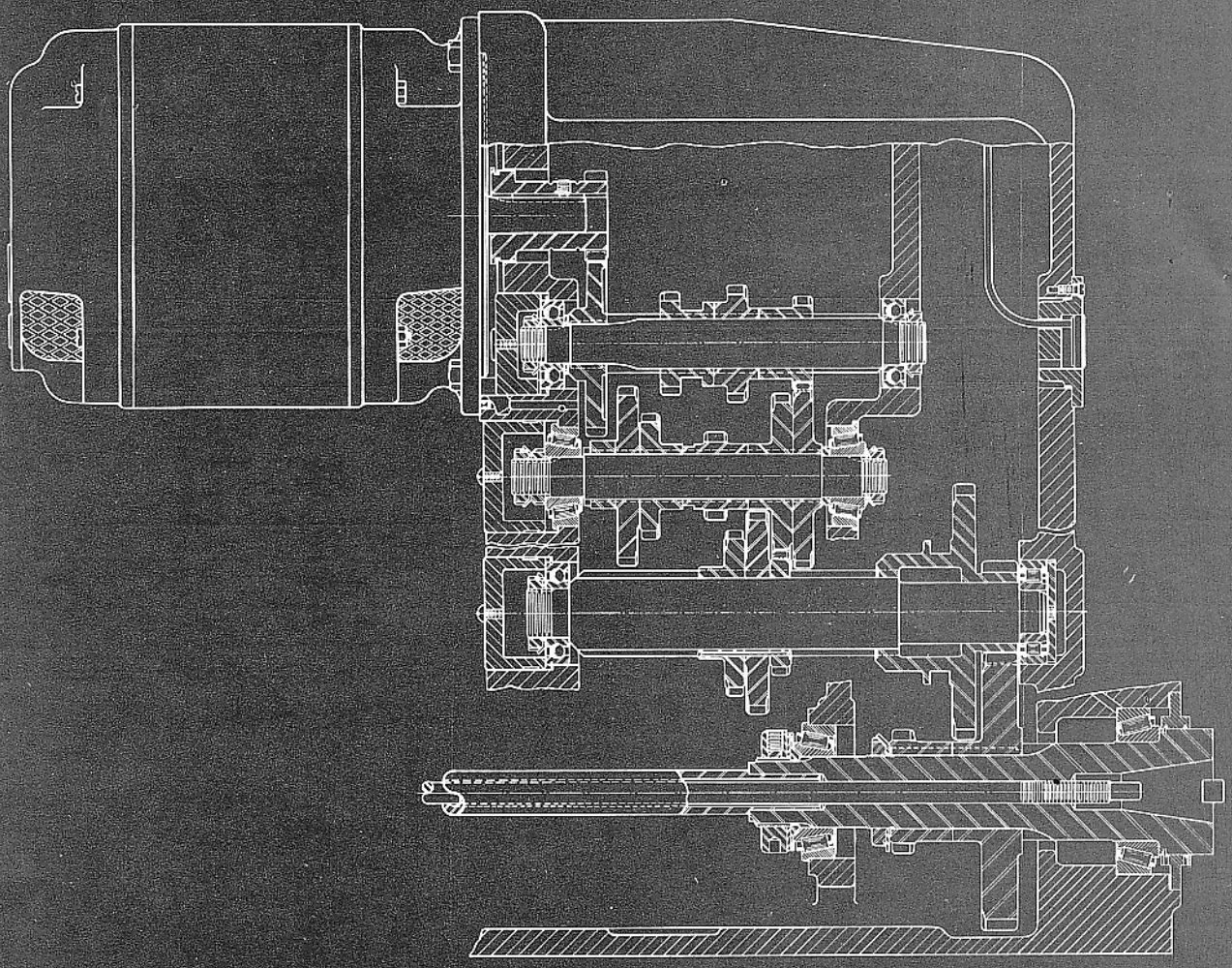
16 The sliding head design provides transverse adjustment of the horizontal and vertical spindles over the working area of the Rangemaster table, giving exceptional range and versatility.

17 The column and base is an integral unit cast of semi-steel. Thick walls with heavy internal cross bracing give exceptional rigidity and life long accuracy.

18 The electrical control compartment is located at a convenient height. The door is gasketed to prevent dust and water from entering the compartment for safety and long trouble-free life. A safety interlock prevents opening of the door until the power has been disconnected.

19 Clearly visible oil flow and level indicators are provided for the hydraulic and the automatic lubrication systems.

20 The exceptionally large coolant reservoir in the base has huge cleanout openings covered by removable plates and strainers.



INDEPENDENT ALL-GEAR DRIVES, ENGINEERED FOR SMOOTH, EFFICIENT, AND POWERFUL OPERATION

Current shop requirements demand more exacting machining of a wide variety of materials. The Brown & Sharpe Rangemasters fulfill these requirements with independent all-gear drives to provide maximum cutting efficiency.

Superior all-gear drives from individual constant-speed flange-type motors are provided for both the spindle and the table. Positive gear drives permit the full power of the motors to be utilized. These give simple and efficient application of power which is one of the Rangemasters' outstanding features.

The spindle motor, mounted on the rear of the sliding head, transmits power through precision shaved gears mounted on short, large-diameter shafts — ideal for heavy milling loads. All shafts are multiple-splined, hardened and ground to insure a positive drive. Precision antifriction bearings support all shafts to give an efficient, unusually smooth drive.

A brake-type motor mounted on the side of the knee provides power for both feed and fast table travel. This results in compactness and efficiency of power application to the table drives, and leaves the full power of the spindle motor available for driving the cutter. The feed case is a self-contained unit, mounted in the side of the knee with a cover which can be removed for preventive maintenance, inspection, or adjustments.

Both the spindle and the feed motors have brakes which stop them quickly. There is no possibility of the work-piece coasting into a stopped cutter.

FEATURES . . .

No. 20 Rangemaster
Universal and Plain

EXCEPTIONAL RANGE

Brown & Sharpe Rangemasters are not only designed for today's most complex milling of high precision, but also have the operating flexibility and capacity to meet tomorrow's standards.

The Rangemaster's unparalleled flexibility of operation is due to its sliding head and ability to be quickly changed from horizontal to vertical milling operations. This makes the Rangemaster especially useful in:

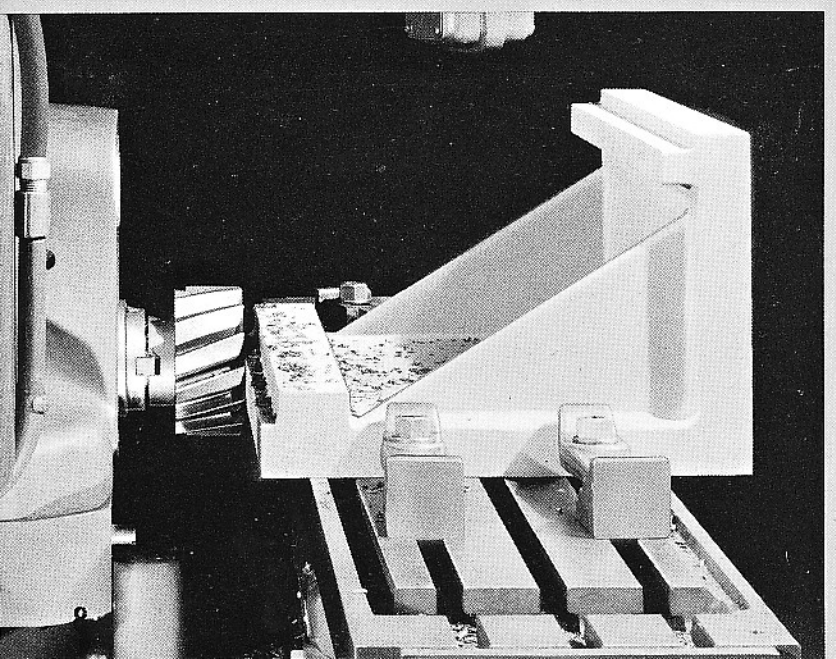
- Research and Development work
- Experimental laboratories
- Maintenance departments
- Metal pattern shops
- Tool and die shops

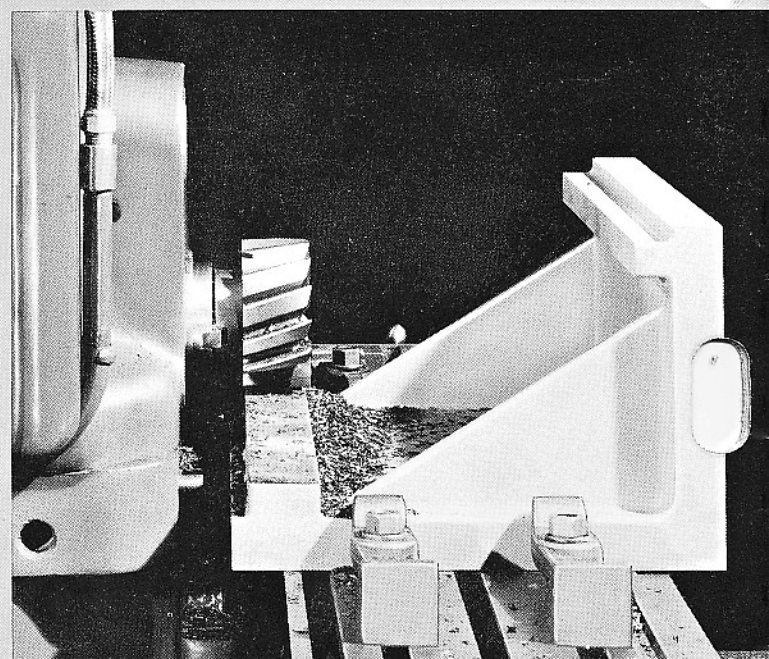
and other installations that have a need for an exceptionally versatile milling machine.

The Rangemaster has the advantage of performing a variety of machine operations in different planes at a single clamping of the work piece. This eliminates, or minimizes, the realignment or relocation of the work, which is time consuming and also introduces the possibility of errors.

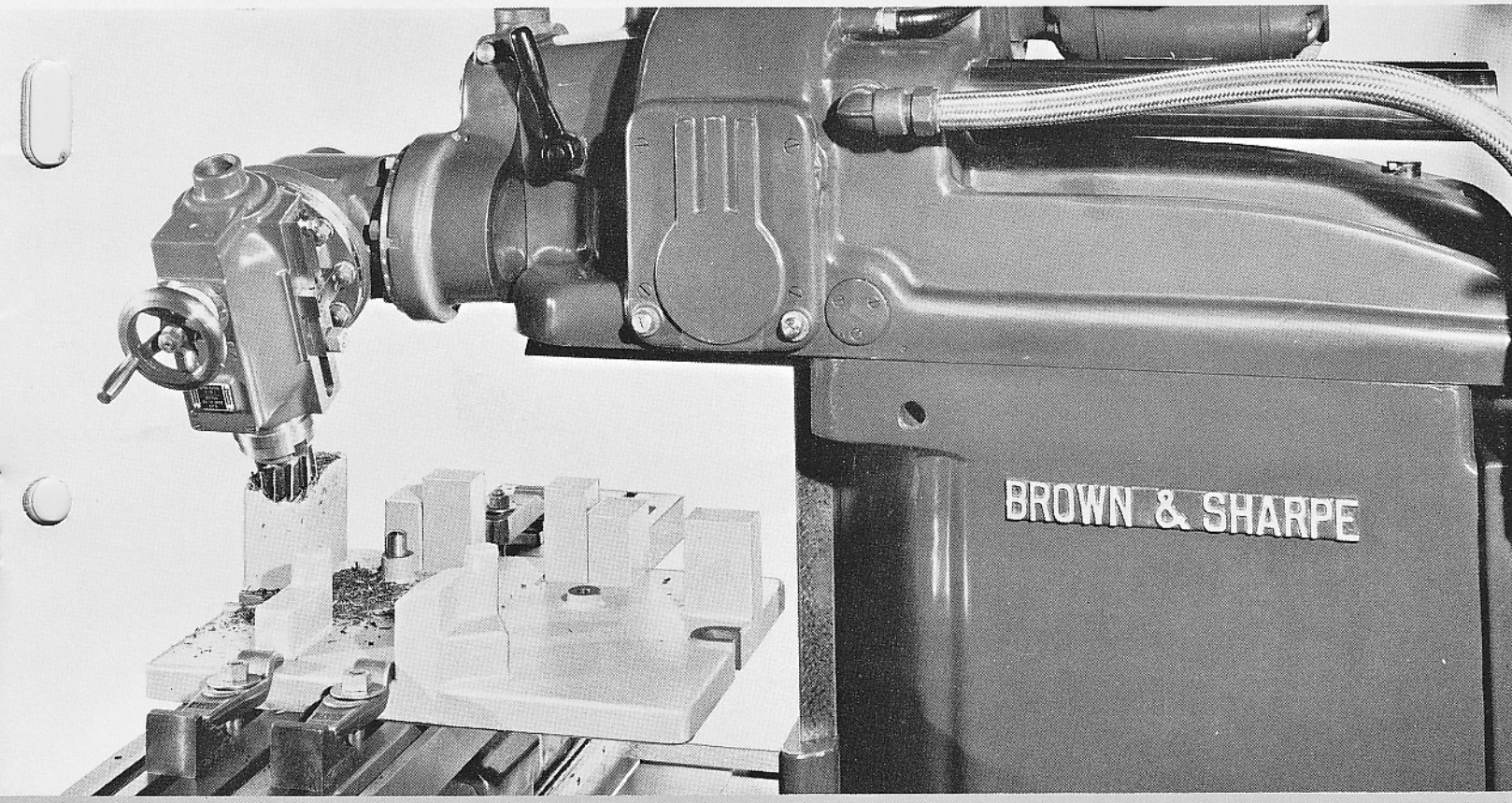
The sliding head, which carries the horizontal spindle and its driving motor, has 23″ transverse adjustments. The spindle face can be positioned out $15\frac{3}{16}$″ from the machine column. This permits cutter settings over large bulky work pieces. It can also be retracted $7\frac{1}{16}$″ back of the face of the column in order that the spindle of the Universal Milling Head, in operating position, can be adjacent to the machine column.

The Rangemasters are designed with high structural strength. The sliding head is mounted on exceptionally wide hand-scraped ways to provide maximum rigidity to withstand the forces of full capacity cuts. This wide bearing support assures accuracy of alignment throughout the full transverse adjustment of the sliding head over a long period of time.





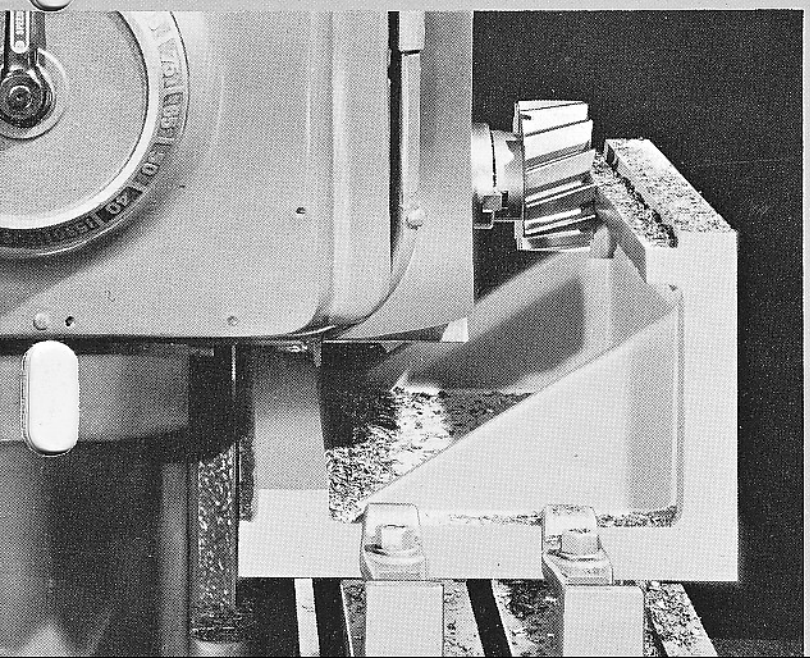
AND VERSATILITY

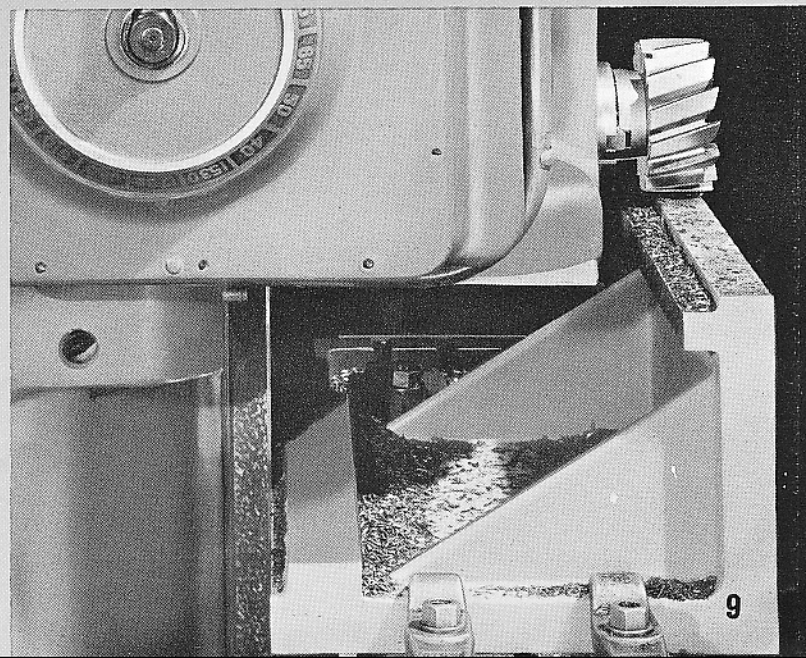


On the Rangemaster, it is possible to set the spindle face adjacent to the work piece, mount the cutters close to the nose of the spindle for a most rigid set-up. Arbor deflections are held to a minimum. Smaller diameter arbors and cutters can be used, reducing tooling costs.

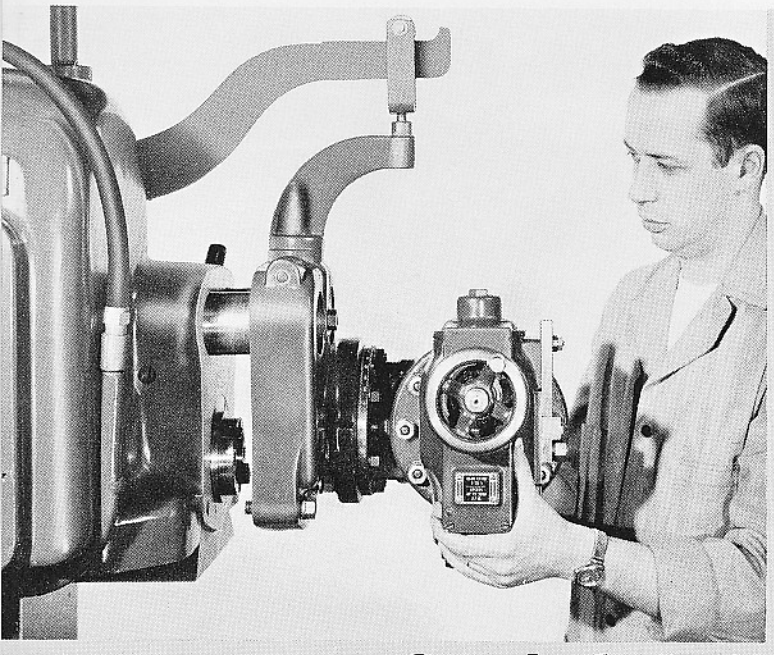
All controls are within easy reach at the operator position. A convenient lever, on the left side of the machine column, provides effortless transverse sliding head positioning adjustments. An adjacent lever permits the head to be firmly clamped.

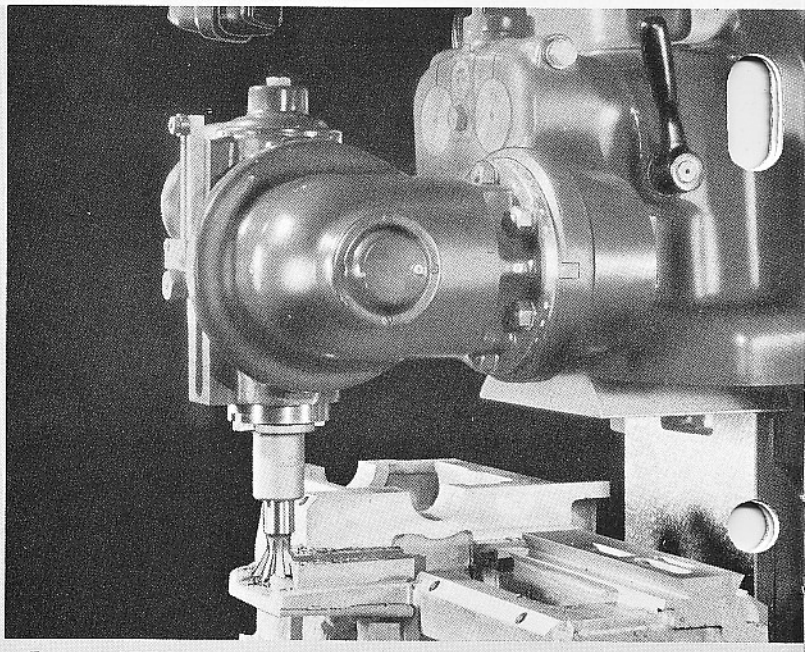
The Rangemaster has an exceptional range and capacity which makes it ideal for the machining of a wide variety of jobs as illustrated. After the work piece was positioned and clamped to the table, all milling operations were performed without disturbing the original clamping. Successive milling cuts were accomplished by moving the sliding head in combination with the normal table movements common to a knee type milling machine. This greatly reduces set-up time and increases machine productivity.





FLEXIBILITY





Completely Universal Milling Head

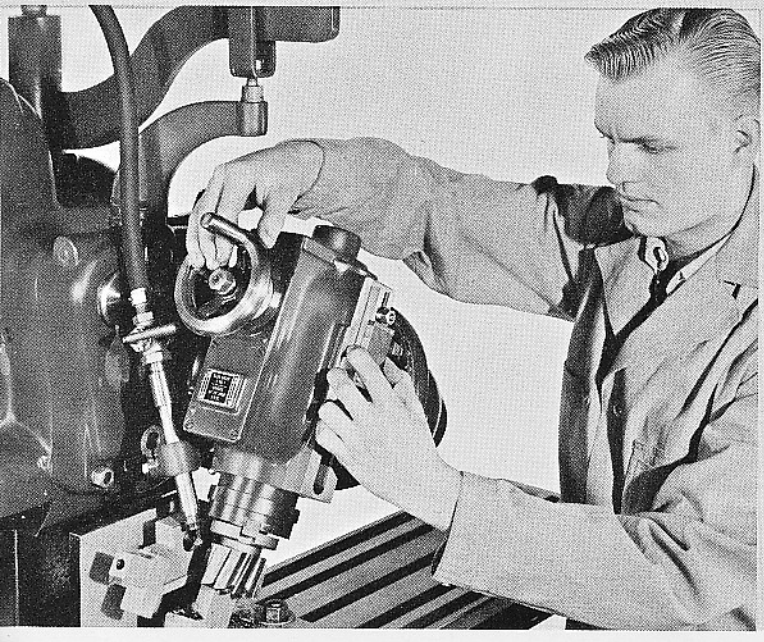
The Rangemaster, with its sliding head and Universal Milling Head, specializes in the precision machining of intricate and cumbersome work pieces. The Universal Milling Head is virtually indispensable in the toolroom where the nature of the work requires successive drilling, boring and other milling cuts. It gains for you all the advantages of a vertical milling machine for boring, drilling, and end milling.

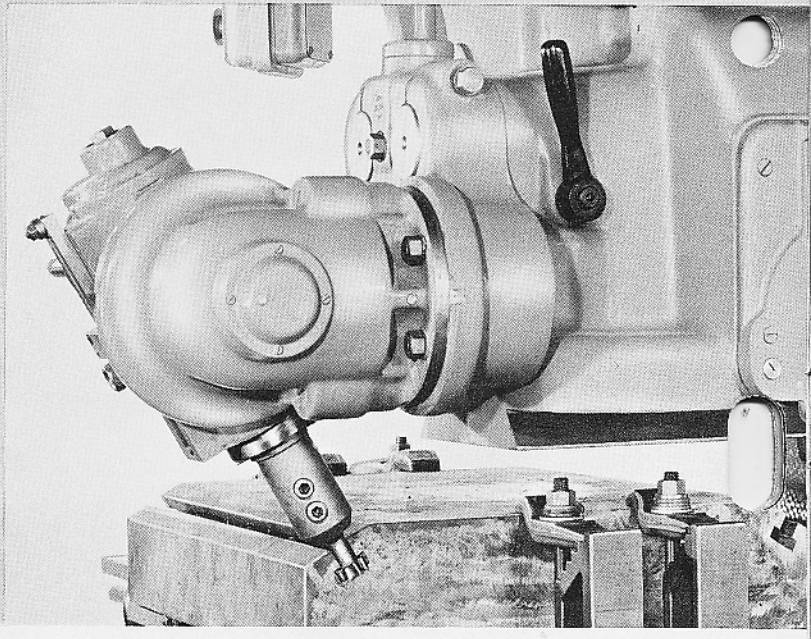
The Universal Milling Head is securely supported at the face of the sliding head. Its two swivels have graduations to half degrees around the full circumference, allowing the spindle to be accurately set to any desired angle in any plane. Drive is provided through the horizontal spindle from its 3 HP driving motor. The 2 to 1 ratio of its gearing gives 18 spindle speeds from 80 to 3060 RPM. This makes it ideal for a wide range of materials. In the vertical position, the spindle of the Universal Milling Head lines up with the horizontal spindle enabling the full longitudinal table movement in both directions to be utilized.

The spindle can be fed axially 3½″ in all angular head positions by a convenient handwheel. An adjustable dial with wide-spaced graduations, reading to 0.001″, permits fine axial adjustments.

An adjustable position stop on the side of the head permits the use of measuring blocks when it is desired to feed the spindle exact distances. This makes possible time-saving step-milling which speeds and simplifies the machining of small-lot work where cuts must be taken at several accurate depths.

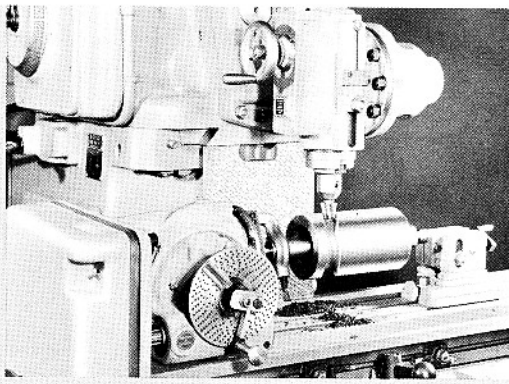
When not in use, the Universal Milling Head can be swung completely out of the way to its storage position at the side of the machine through the use of a conveniently mounted crane.

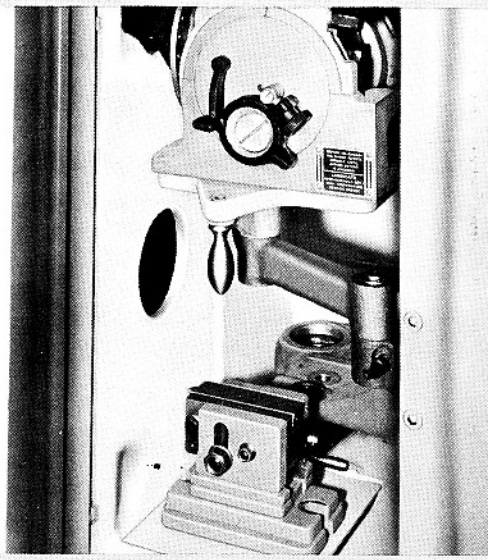




BUILT-IN ADVANTAGES

Universal Spiral Index Centers





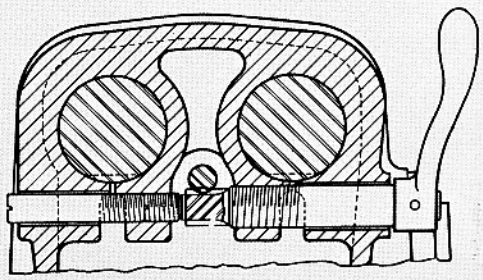
The Universal Rangemaster, with spiral index centers, allows you to perform helical milling jobs. The universal table swivels to any angle up to 50° either side of 0°. It is quickly and securely clamped. The table angle is readily set using an easy-to-read scale with black filled cut graduations reading to ½ degree of arc.

A unique design spiral indexing head permits cutting all common leads from 0.67″ to 149.31″ with standard equipment. It will accept work pieces up to 10″ in diameter and 30″ between centers. The indexing head permits indexing to all divisions to 382 and many beyond. The headstock can be driven with the spindle set at any angle from 10° below horizontal to 5° beyond the vertical. A splined shaft permits movement of the indexing head to the most desirable location on the table. An exclusive Brown & Sharpe feature protects the worm gear from damage.

This makes the Rangemaster especially useful in the machining of reamers, twist drills, milling cutters, special gears, and other parts which require the machining of equally-spaced gashes or helical flutes around the circumference of the work piece.

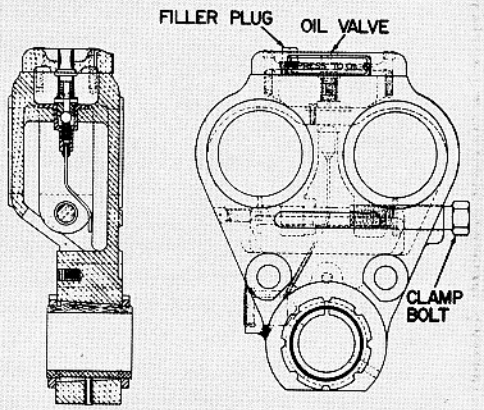
A convenient storage area is provided for the universal spiral index centers. The index centers are out of the way and well protected within the column of the machine. The storage shelf is swung out close to the machine table where it is a simple matter to move the headstock into position on the table.

Solid, Quickly-Adjusted Overarms



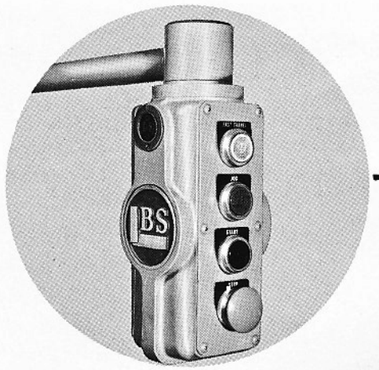
Two solid steel cylindrical overarms insure rigid arbor support and alignment. The overarms are maintained parallel by precisely bored arm holes in the sliding head. Arbor yokes are easily moved along the arms or reversed if desired. Both overarms are quickly and easily clamped by a single lever, located within easy reach of the operator. The illustrated clamping mechanism equalizes the pressure on the overarms to maintain alignment.

Rigid Arbor Yokes



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

OPERATING EASE



Fast Travel in All Directions

Longitudinal, transverse, or vertical table movement in any direction can be instantly shifted into fast travel by pressing a button on the pendant-mounted control station. The original feed movement is resumed automatically when the button is released. For convenience in setting-up, the same button also provides fast travel when the spindle drive and the table feeds are not operating. The direction of movement is both started and stopped by the fast travel button.

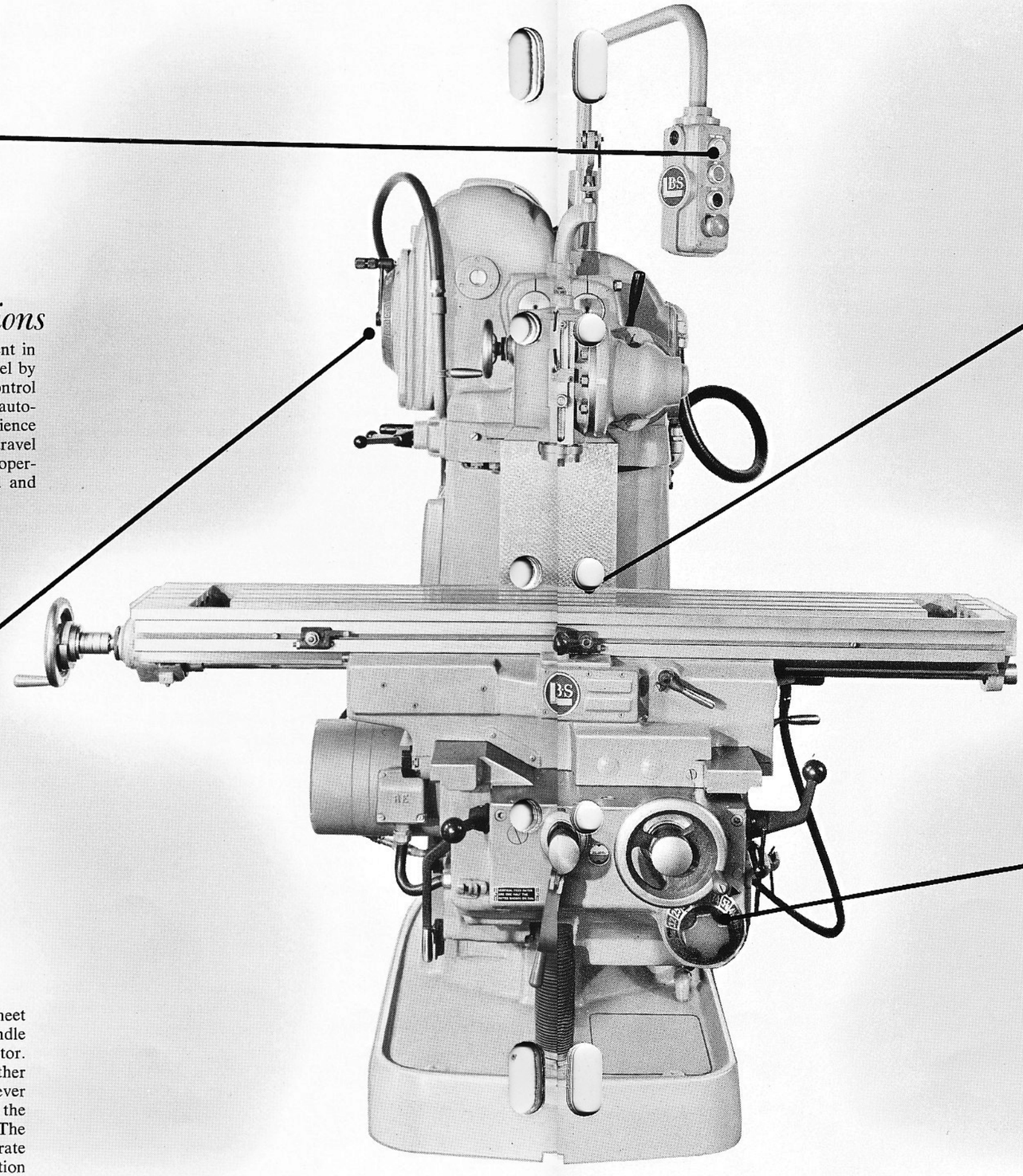
The time-saving fast travel rates are as follows:

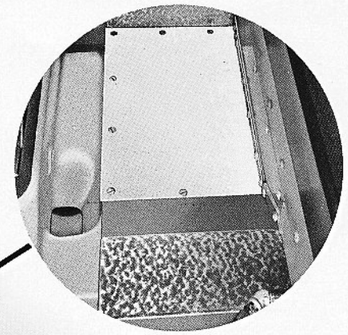
- Longitudinal @ 150″ per minute
- Transverse @ 150″ per minute
- Vertical @ 75″ per minute

Quick Selection of Speeds

The operator has a wide choice of spindle speeds to meet a large variety of milling jobs. The range of the spindle speeds varies with the power of the spindle drive motor.

Speeds are selected by rotating a single lever in either direction to the desired rate. A single turn of the lever gives a speed change. A large open-faced dial shows the operator the rate engaged and the rates available. The location of the dial and indicator finger permits the rate of speed engaged to be read from the operating position at the front of the machine.





Built-in Operating advantages

Quick efficient manipulation with less effort and operator fatigue is characteristic of all Brown & Sharpe Dynamasters.

The completely enclosed knee top eliminates sliding or telescoping guards and protects the ways and knee mechanisms. Chips and coolant are quickly removed from the top of the knee through the convenient built-in chute.

Control grouping, fast table travel, smooth-working mechanisms, and easy-to-set adjustments provide a milling machine with extremely light and sensitive handling characteristics. The operating ease and large working capacity, combined with the inherent accuracy, make these Rangemaster machines of outstanding utility in the tool shop or on production lines.

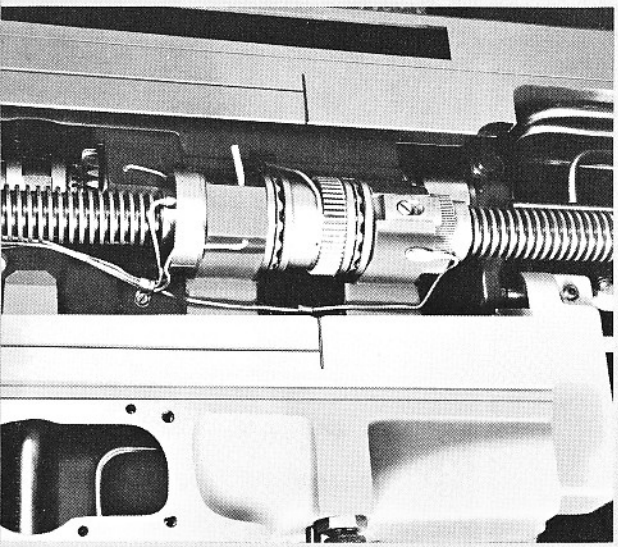
Effortless Selection of Feeds

Changing from one feed to another is so easily accomplished that the operator is prompted to change to the most productive feed rate as often as conditions warrant.

This finger-tip control hydraulically changes the feed drive gears and can be turned in either direction to the desired feed rate.

The operator has a wide choice of 18 feed rates. The longitudinal and transverse feed rates may be varied from ¼″ to 32″ per minute. The vertical feed rate may be varied from ⅛″ to 16″ per minute.

EFFICIENCY



Exclusive Climb Milling Feature

This feature permits you to gain all the profit-saving advantages of climb milling through an exclusive Brown & Sharpe automatic climb milling arrangement.*

Climb milling in either direction up to the capacity of the driving motors is made possible by the elimination of backlash from the table drive. This is accomplished by a mechanism which axially separates two table screw nuts. This mechanism operates such that the horizontal forces of the climb milling cut in the direction of table travel are at all times against the solid metal of the saddle. The mechanism is released automatically when the table moves in fast travel. It also automatically disengaged during hand table movement to retain the machine's sensitive handling characteristics.

The operator is never required to engage or disengage the climb milling mechanism, thus eliminating the dangers of attempting to climb mill while the mechanism is released.

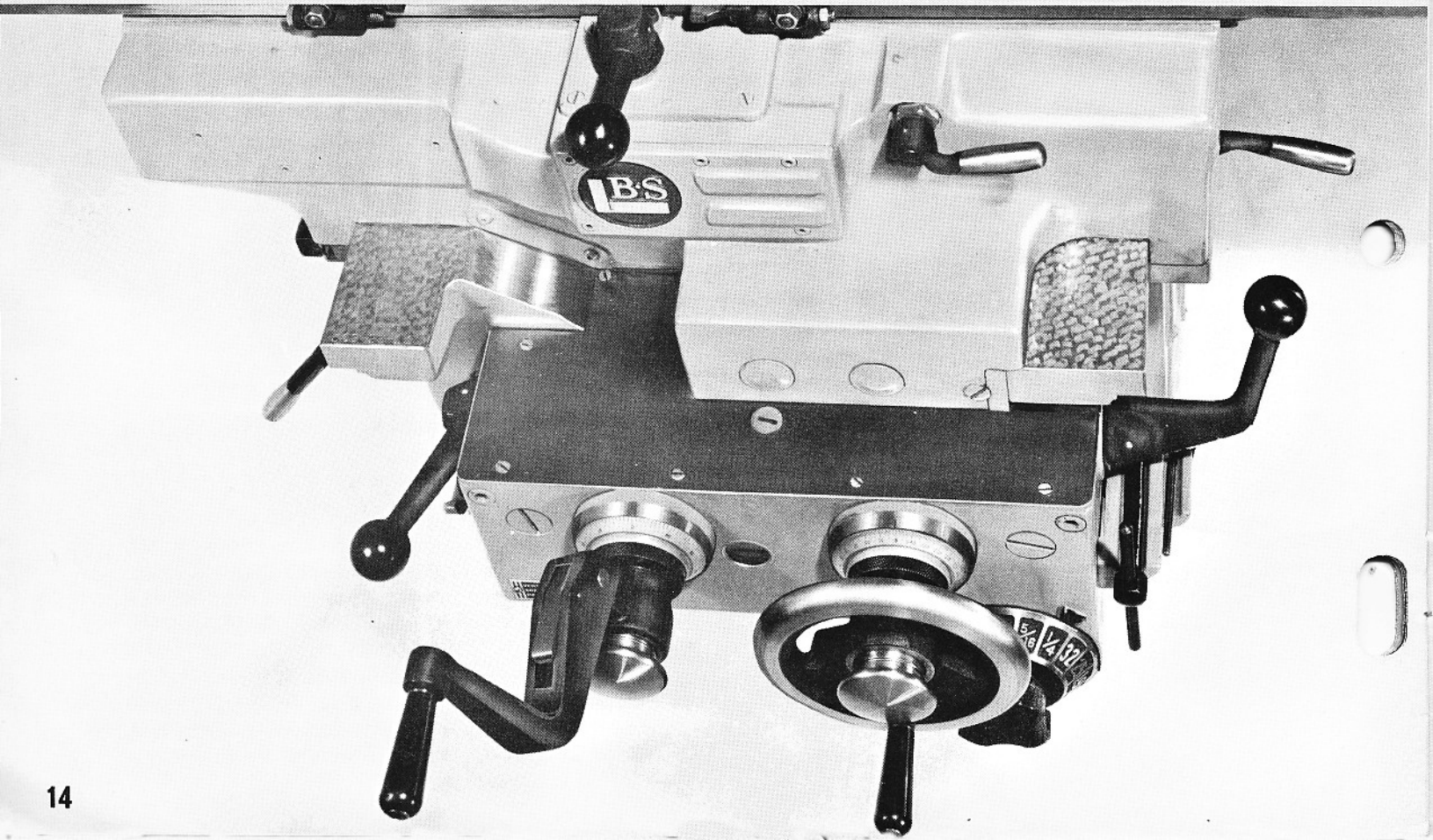
**The Rangemasters are available with or without the climb milling feature.*

Conveniently Grouped Controls

The Rangemasters have been designed especially for rapid set-ups, efficient operation, and operating ease.

The convenient grouping of controls combined with the smooth-working adjustment mechanisms provides quicker manipulation with less effort and creates a machine of outstanding efficiency in both set-up and operation.

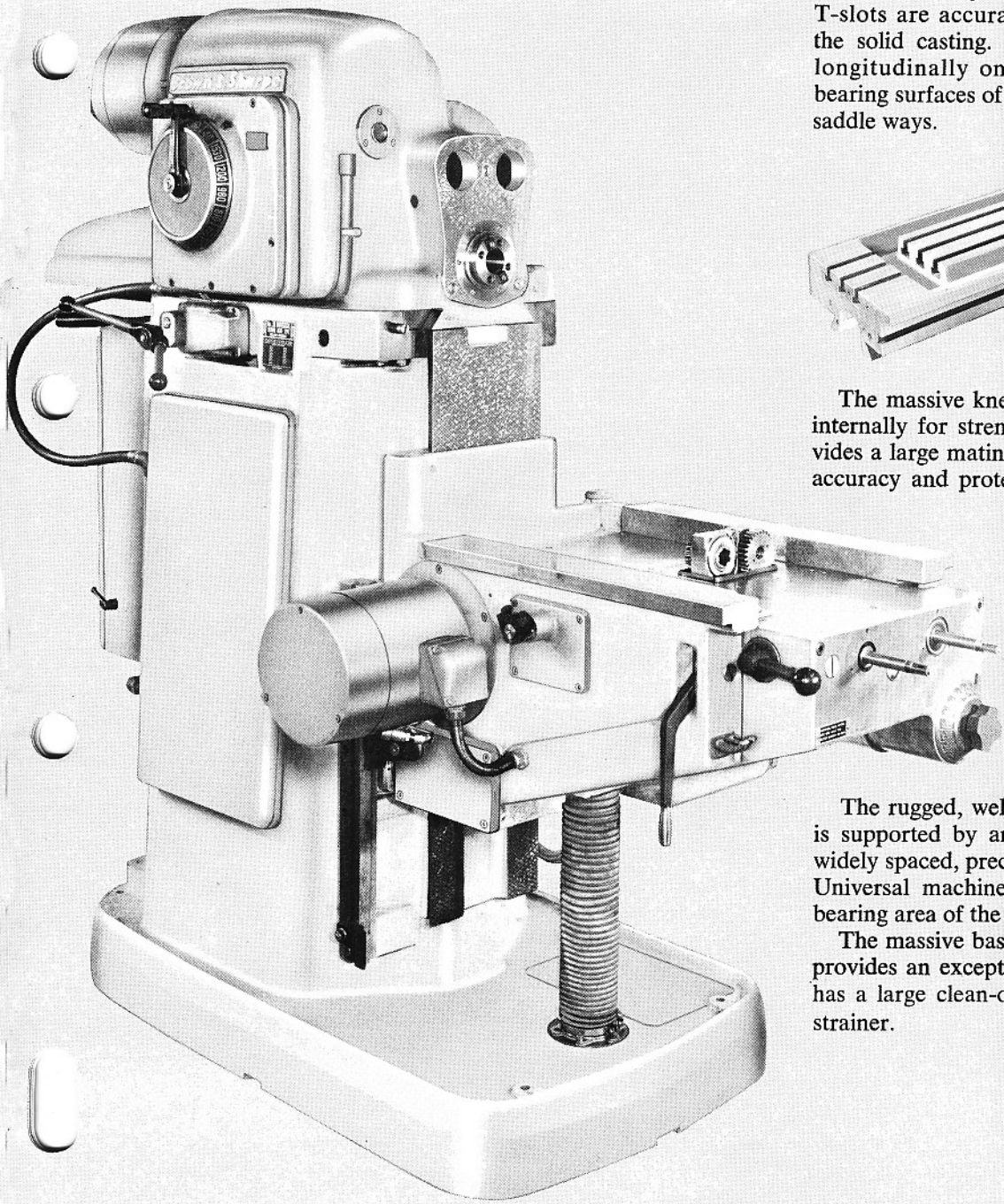
All operating controls and most set-up adjustments are easily reached from the front of the machine, the majority of them being grouped on the knee and saddle. Unique "release and turn" dials give fast zero settings on feed handwheels. Longitudinal, transverse, and vertical power feeds are each engaged by separate levers. These levers are directional and are independent of the direction of spindle rotation. They are easily reached, and are located so that the operator can watch the work and cutter while engaging and disengaging feeds.



STRUCTURAL MEMBERS

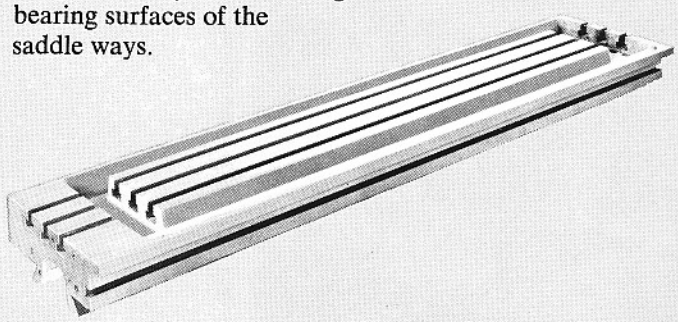
The Rangemaster's inherent accuracy starts with its massive structure.

High grade cast iron (class 40) is used in the castings for the Rangemasters. Fully stabilized, they are designed for the high structural strength and rigidity that are characteristic of all Brown & Sharpe Rangemasters.



The column and base are cast as an integral piece. The well-proportioned column has thick walls and heavy internal cross bracing which give exceptional rigidity and life long accuracy. Additional stiffness and resistance to working stresses, far beyond the capacity of the driving motors, is provided by a wide, solid face. This column face is hand-scraped and checked to Brown & Sharpe standards of accuracy. The top of the column has extremely wide dovetail ways to support and accurately guide the sliding head.

The table is cast of semi-steel and has an unusually large working area. T-slots are accurately milled from the solid casting. The table moves longitudinally on the long broad bearing surfaces of the saddle ways.

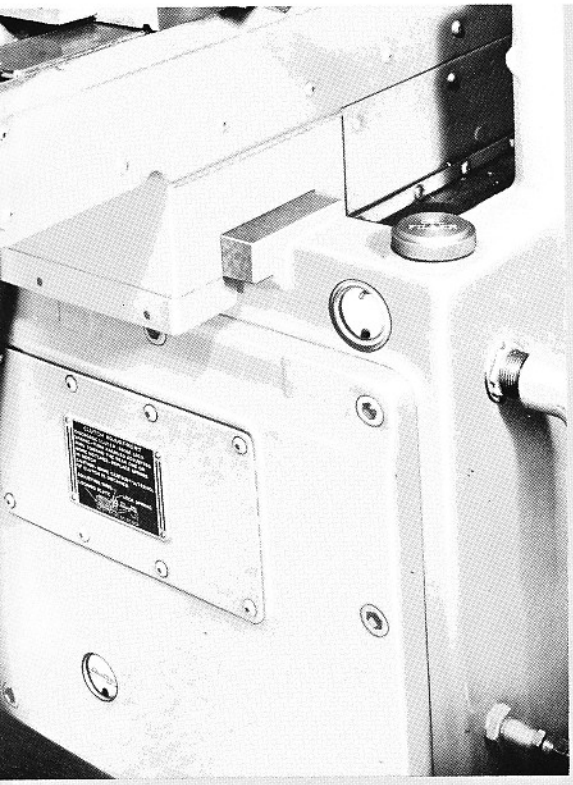


The massive knee is well-proportioned and is braced internally for strength and rigidity. Its high back provides a large mating surface with the column increasing accuracy and protecting the bearing surfaces. The top of the knee is solidly constructed to protect the knee mechanisms from chips and prevent coolant from contaminating the lubricating oil. The underside of the knee is completely enclosed to eliminate any possibility of oil leaking.

The rugged, well braced saddle of the Plain machine is supported by and moves transversely on oversized, widely spaced, precision scraped ways. The saddle of the Universal machine swivels on the exceptionally large bearing area of the clamp bed.

The massive base is also used as a coolant tank. This provides an exceptionally large coolant reservoir which has a large clean-out opening covered by a removable strainer.

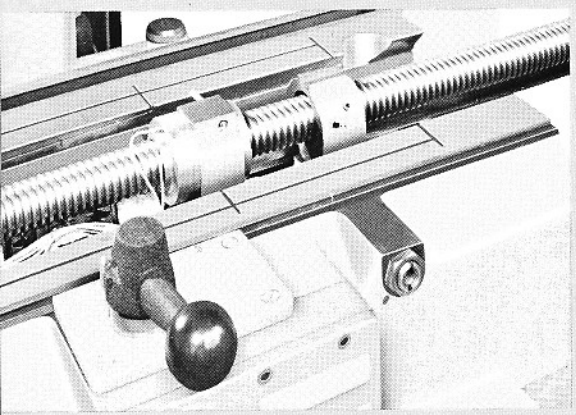
MAINTENANCE ECONOMY



Automatic Metered Lubrication

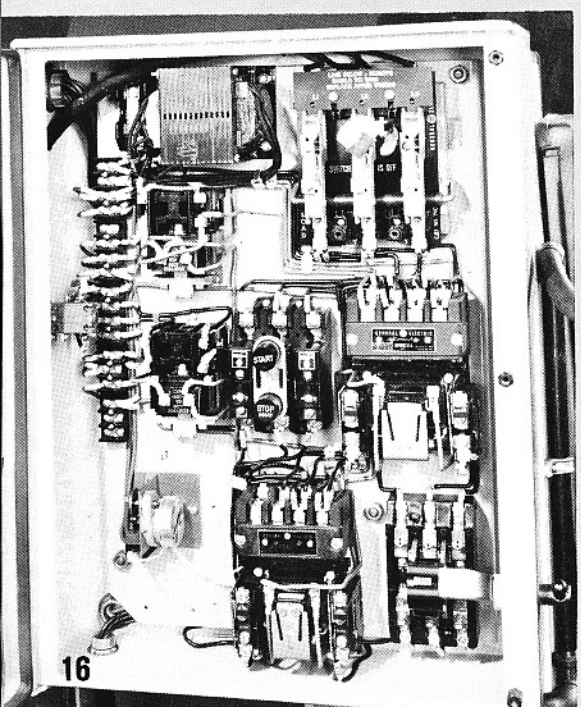
The entire machine automatically receives the proper amount of lubrication!

Automatic metered lubrication is provided for the knee mechanisms, the vertical ways, the table feed screw, and the saddle and table ways. The feed case gears in the knee run in a bath of oil. The gear train in the sliding head is oiled by a continuous stream of oil from an independent pump. Clearly visible liquid level and flow sights indicate that the levels are within the proper operating limits and that the lubricating pumps are functioning. This reduces routine maintenance to little more than a glance. Machine wear is reduced to an absolute minimum assuring efficiency of operation and long machine life.



Heavy Duty Feed Screws

Power is transmitted from the saddle to the table in a unique manner through the table feed shaft and a large diameter table lead screw which has neither keyways nor splines. This unusually efficient method preserves the accurate fit between the table feed screw and the feed nut. The transverse and vertical feed screws are also without keyways or splines.



Built-in Protection

Safety

The electrical controls compartment is located at a convenient height for ease of servicing. It is dust-tight and water-tight for a long maintenance-free life. The gasketed cover has a safety interlock which automatically disconnects power when it is opened. The cover allows easy access to the magnetic switches, the overload relays, control relays, and the internal wiring. For safety, the control voltage distributed throughout the machine does not exceed 115 volts a.c.

Overload Protection

All Rangemasters are equipped with mechanical and electrical overload protection devices.

The Feed and Fast Travel transmissions are protected by mechanical releases which are automatically re-engaged when the overloads are removed. Overload protection to all driving motors is provided by individual overload relays. Low voltage and under voltage protection is provided by magnetic starters.

OPTIONS

34″ Table Travel Option

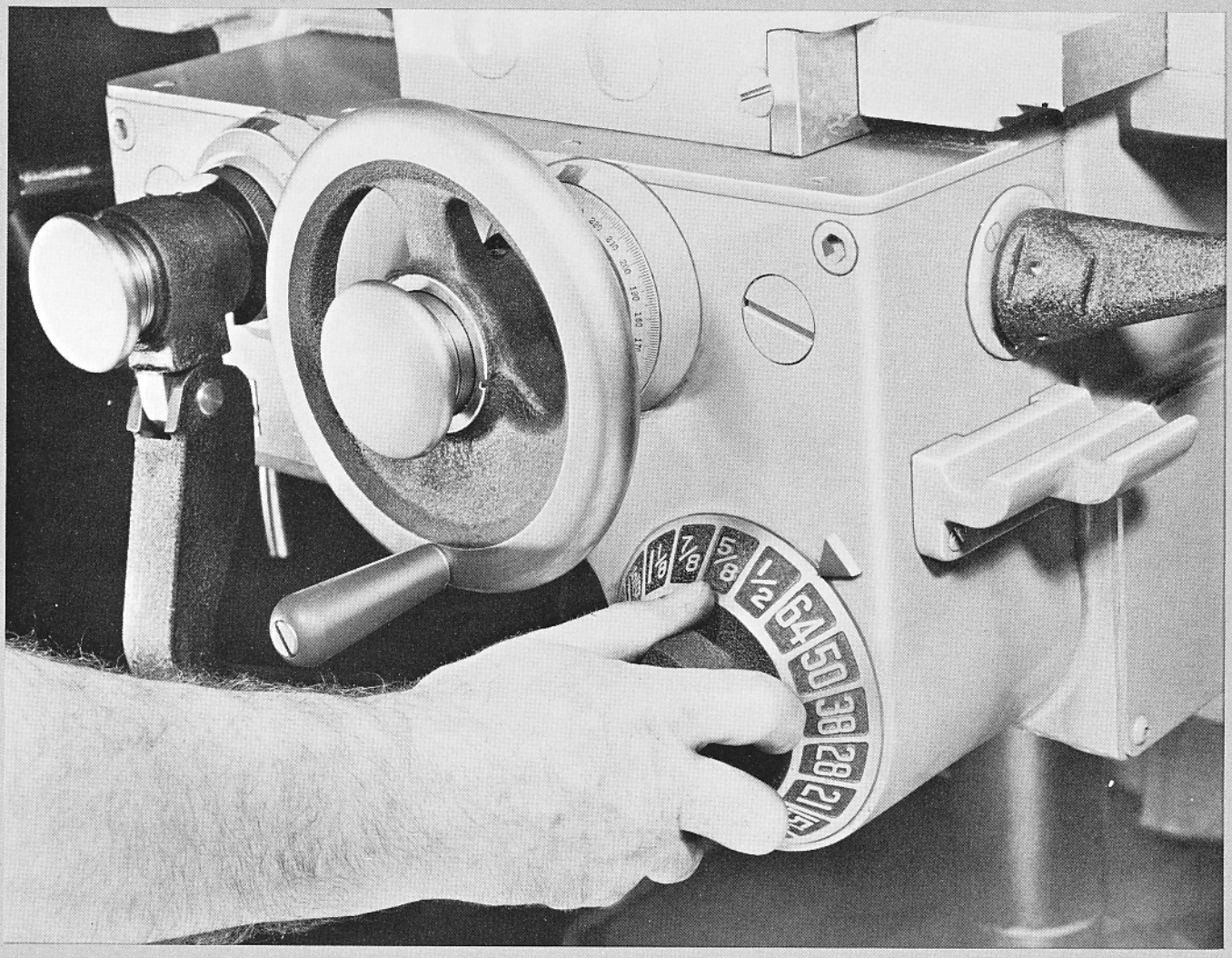
This option permits you to obtain additional physical capacity from your Rangemaster by providing a larger table and an extended table travel.

With an extra 78 square inches of table work area and an additional 6 inches of table travel, you can mill longer cuts.

Optional Feed Ranges

This option provides the feed rates needed to efficiently mill aluminum, copper, magnesium, their alloys, and other non-ferrous materials.

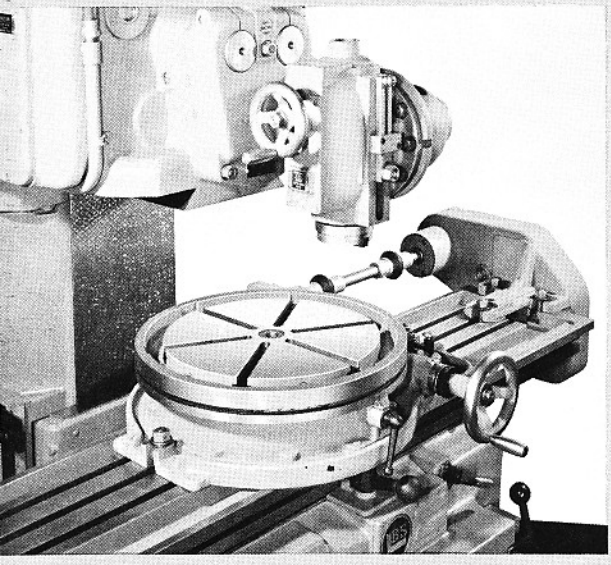
The feed control knob quickly selects the rate of feed. The operator has a wide choice of 18 feed rates for the longitudinal, transverse, and vertical feeds. The longitudinal and transverse can be varied from ½″ to 64″ per minute. The vertical feed can be varied from ¼″ to 32″ per minute.



ACCESSORIES

Brown & Sharpe offers a wide range of accessories to increase the performance and versatility of the Rangemasters. They are all crafted to the high standards of quality you have come to expect of Brown & Sharpe equipment. These standards of excellence result from the skill of its craftsmen and from over a century of experience in the manufacture of pace-setting machine tools.

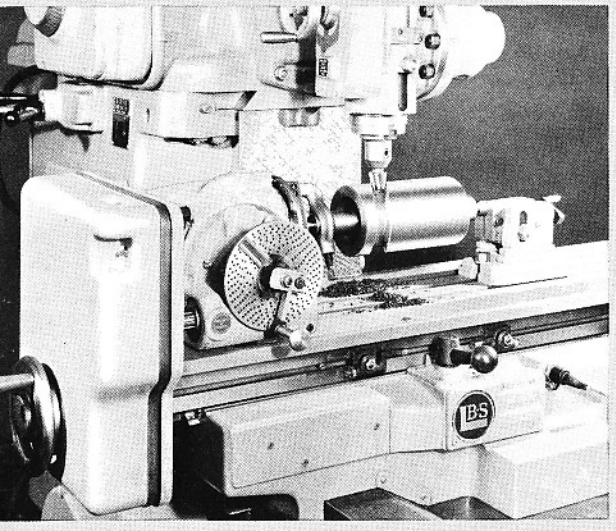
Rotary Attachments
10″ and 18″ Hand Feed and 18″ Power Feed



These attachments are husky in design and of broad utility. They permit indexing as well as circular milling operations. They are rotated by a worm and wheel having means of compensation for wear. A handwheel on the worm shaft provides for hand operation and for setting-up. The worm can be disengaged and the table turned by hand. The circumference of the table is graduated to half-degrees, and an adjustable index finger permits readings to be taken from the nearest graduation at all settings. Fine adjustment is provided by a dial on the worm shaft.

The 18″ Rotary Attachment, Power Feed, has automatic as well as hand rotation, and is driven in either direction from the reversible table feed shaft of the machine. The fine-adjustment dial shows table settings to 2 minutes. On the Hand Feed Rotary Attachments, the dial reads to 5 minutes on the 10″ Attachment and to 2 minutes on the 18″ Attachment. A circular covering these Attachments in detail is available on request.

Indexing Attachments furnished as extras for use with 18″ Rotary Attachments, both hand and power feed, give all divisions to 100, all even numbers to 134 and many other numbers to 372.



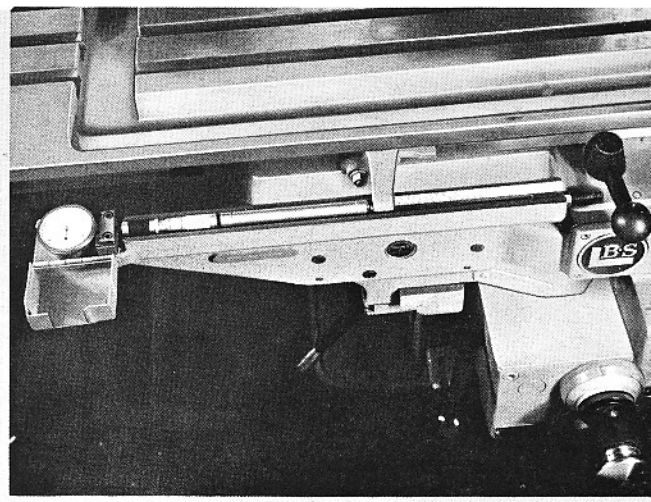
*Universal Spiral Index Centers**

The Brown & Sharpe Universal Spiral Index Centers permit indexing all divisions to 382 and many beyond, cutting spirals of common leads, and a variety of other operations. A 24-hole plate on the spindle nose provides for direct indexing. The spindle can be set and clamped rigidly at any angle from 10° below horizontal to 5° beyond the vertical by graduations reading to half-degrees, and driven at any setting within these limits. The footstock center has a vertical and angular adjustment. The Universal Spiral Index Centers for this machine can swing work pieces 10″ diameter and up to 30″ between centers. Detailed specifications available on request.

**Furnished as standard equipment with the Universal Rangemaster.*

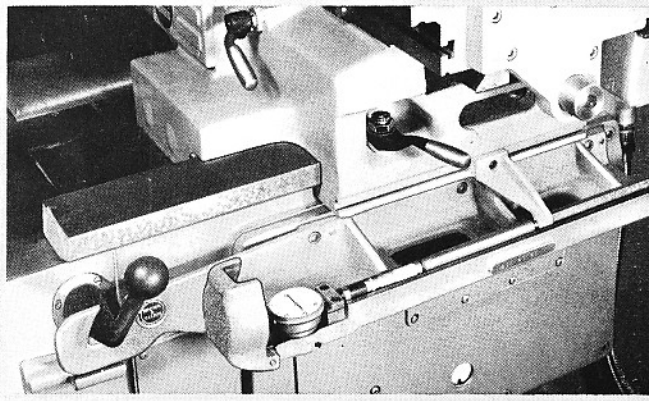
Micrometer Table Setting Attachment—Longitudinal

This attachment facilitates the positioning of the milling machine table longitudinally to close limits. The attachment includes a set of four measuring rods, a micrometer head, a dial indicator, a bracket, and an adjustable stop. The bracket, which fastens to the front of the saddle, has a V-groove for supporting the measuring rods and micrometer head, and carries a dial indicator at one end. The adjustable stop can be moved along the table T-slot to the desired position.



Micrometer Table Setting Attachment—Transverse

This attachment aids in the transverse positioning of the milling machine saddle and table. It is similar to the Longitudinal Table Setting Attachment and is used in the same way. The attachment includes a set of four measuring rods, a micrometer head, a dial indicator, a bracket, and an adjustable stop. In this case, the bracket for this attachment is fastened to the right side of the knee.

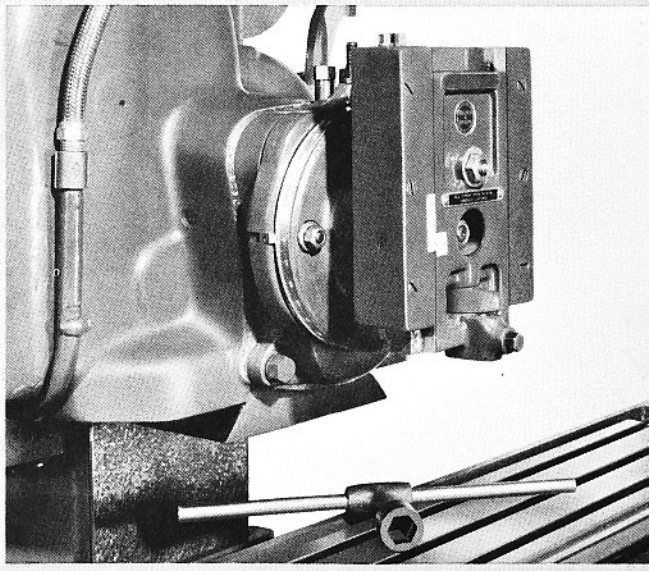


Slotting Attachment

This attachment can perform a wide variety of slotting jobs. It is particularly useful for making square or rectangular holes, keyways, and templates. The versatility of this attachment makes it especially useful in tool and die shops.

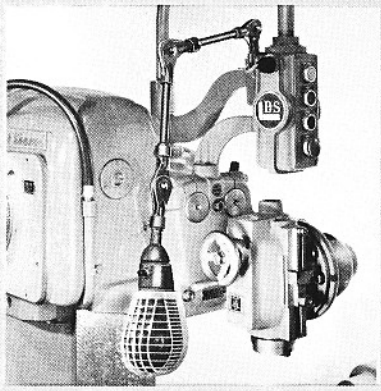
It is secured to the spindle face by two bolts and quickly clamped to the overarms by one bolt. Provision has been made for crane handling for safety and convenience.

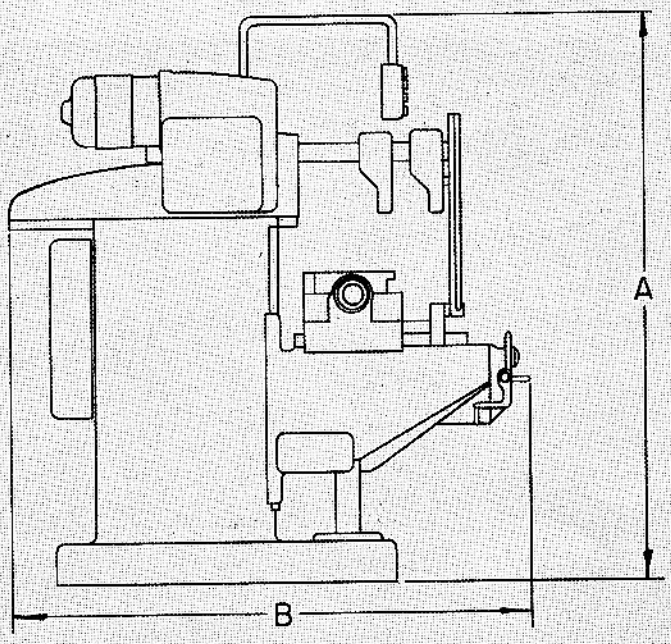
The tool slide can be set at any angle to 90° either side of vertical. It has an easy-to-read scale reading to half-degrees. Angular settings are secured firmly from the front by three bolts. Vertical movement of the slide is adjustable from 0 to 3″ and is easily set for the desired travel. Slotting tools are quickly and easily clamped or released.

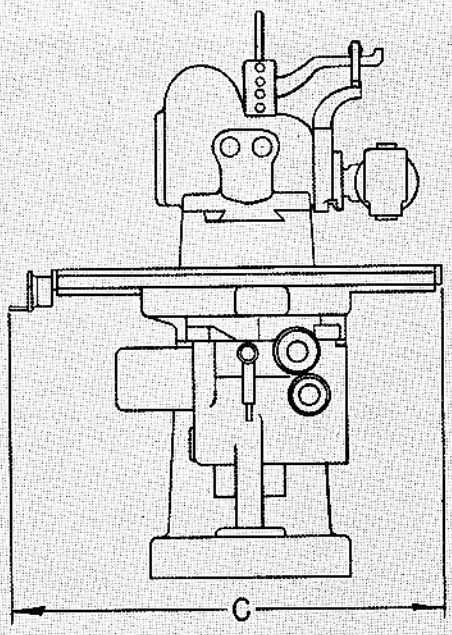


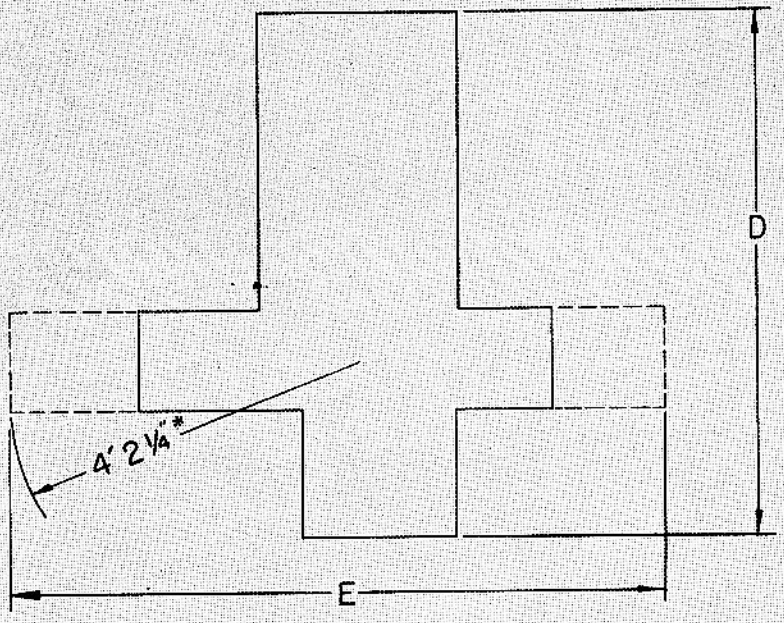
Lamp Attachment

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









**Universal Rangemaster only*

Floor Plan

Dimensions				
A	**B**	**C**	**D**	**E**
82 5/8 IN.	91 1/2 IN.	66 IN.	93 1/2 IN.	95 IN.

2 NEW! No. 20 RANGEMASTER SPECIFICATIONS

	UNIVERSAL OR PLAIN
TABLE:	
Working surface*	54⅜"x13"
FEEDS:	
Longitudinal travel*	28"
18 rates	¼ to 32 IPM
Transverse travel	12"
18 rates	¼ to 32 IPM
Vertical travel	21¼"
18 rates	⅛ to 16 IPM
FAST TRAVEL:	
Longitudinal	150 IPM
Transverse	150 IPM
Vertical	75 IPM
SPINDLE SPEEDS:	
Number of speeds	18
Speed range	40 to 1530 RPM
SLIDING HEAD:	
Carries main spindle and Universal Milling Head	
Transverse adjustment	22⅞"
UNIVERSAL MILLING HEAD:	
Has Milling Machine Standard Taper Hole	No. 40
Number of speeds	18
Speed range	80 to 3060 RPM
Axial feed of spindle (hand)	3½
MOTORS:	
Spindle (Dinabrake)	3 HP
Feed (Magnetic-brake type)	1 HP
Pump	⅛ HP
SADDLE (Universal Machine only) Swivels each side of 0	50°
CLIMB MILLING MECHANISM:	optional
LUBRICATION:	automatic

	UNIVERSAL	PLAIN
UNIVERSAL SPIRAL INDEX CENTERS	Swing 10" dia. — up to 30" between centers	
SHIPPING DATA:		
Net weight	5950 lbs.	5700 lbs.
Gross weight		
Domestic	6600 lbs.	6350 lbs.
Export	7100 lbs.	6850 lbs.
CASE DIMENSIONS:		
Export	85"x71"x93"	85"x71"x93"

**Machines are also available with table 60⅜" long and 34" table travel (with climb milling feature).*

Products

Brown & Sharpe

PROVIDENCE 1, RHODE ISLAND
U.S.A.

MILLING MACHINES

Plain • Universal • Vertical • Omniversal
Rangemaster • Manufacturing Type

GRINDING MACHINES

Plain • Universal • Surface • Face
Cutter and Tool • Universal and Tool

SCREW MACHINES

Automatic • Automatic Forming and Cutting-Off
Automatic Chucking • Hand

TURRET DRILLING MACHINES

Manual • Semi-Automatic
Automatic Tape-Controlled

PRECISION TOOLS and GAGES
ELECTRONIC MEASURING EQUIPMENT
JOHANSSON GAGE BLOCKS

CUTTING TOOLS

High Speed Steel • Nelco Carbide

ARBORS, COLLETS and ADAPTERS
SCREW MACHINE TOOLS

PERMANENT MAGNET CHUCKS

Rectangular • Rotary

VISES

Plain • Flanged • Swivel
Toolmakers' Universal

HYDRAULIC PRODUCTS

Pumps • Valves • Power Units

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