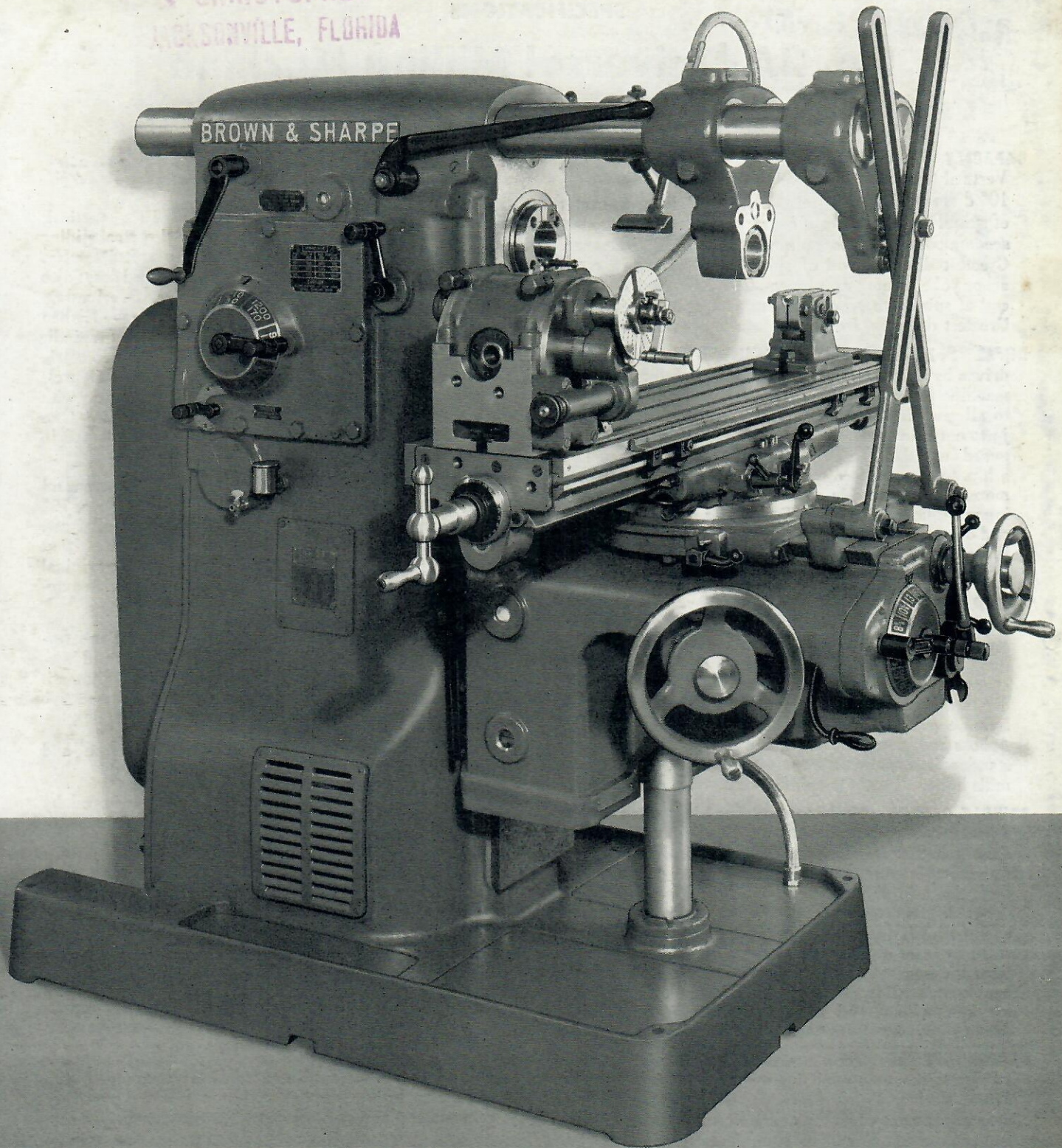


J. & CHRISTOPHER CO.
JACKSONVILLE, FLORIDA



BROWN & SHARPE
No. 2A
UNIVERSAL MILLING MACHINE
STANDARD TYPE

SPECIFICATIONS

No. 2A Universal Milling Machine Standard Type

CAPACITY Longitudinal feed, 28". Transverse feed, 10". Vertical feed, 16 $\frac{1}{2}$ ". All feeds automatic. Centers swing 10" diameter; take 26" length. Vertical distance, center of spindle to under side of overarms, 5 $\frac{3}{4}$ ". Largest cutter accommodated with overarms in place, 12 $\frac{3}{8}$ " diameter. Greatest distance, end of spindle to bushing in outer arbor yoke without arm braces, 27 $\frac{1}{8}$ ". Greatest distance, end of spindle to arbor bushing with arm braces, 23 $\frac{1}{2}$ ". Greatest distance, face of column to arm braces, 26 $\frac{3}{4}$ ".

DRIVE Spindle and table have individual drives. Spindle driven by 5 h.p. constant-speed motor enclosed in base of machine, through chain and sprockets (without clutch) to all-gear drive mechanism in column. Means of adjustment provided for tightening driving chain. Chain guard furnished. Table driven in feed and fast travel by $\frac{3}{4}$ h.p. totally-enclosed constant-speed flange-type motor mounted on right side of knee. Motors started by moving machine starting lever. Same lever stops both motors and operates spindle brake. Table motor also controlled independently by fast travel lever to provide power fast travel with spindle stopped.

SPINDLE Special alloy steel. Has standardized end, hardened and ground. No. 50 Milling Machine Standard taper hole. Hole through, 1 $\frac{1}{8}$ " diameter. Spindle mounted on three roller bearings, two at front and one at rear. Means of adjustment provided. Power applied directly back of front spindle bearings at all speeds. Spindle gear mounted on splines hobbled in spindle. Arbors and adapters held in spindle by draw-in bolt of standardized construction with clamp nut at rear. Face mills bolted directly to spindle end.

SPINDLE SPEEDS 16 changes of speed in approximately a geometric progression, 30 to 1200 r.p.m. in either direction. Changes made in two series by sliding gears controlled from left side of machine by a single rotating lever and a back gear lever. One revolution of lever in either direction gives change in speed. Direct-reading open-faced dial indicates speed in use. Mechanical reverse by lever on left side. Neutral position of reverse lever disengages drive. All gears in speed train are of heat-treated alloy steel, ground on tooth form, with multiple splines. All shaft-supporting bearings from driving sprocket to cutter are antifriction.

ARBOR SUPPORT Double overarm, solid steel. Clamped rigidly at two points by single lever from front of machine. Rack and pinion construction permits easy end-wise adjustment of either overarm or of both together, by crank at left side of column. Two arbor yokes furnished, inner and outer. Each arbor yoke has adjustable bronze bushing for supporting arbor. Diameter of hole in bushings: inner arbor yoke, 2 $\frac{1}{8}$ "; outer, $\frac{33}{32}$ ". Each bushing oiled from reservoir in yoke through manually-operated valve controlled by plunger. Adjustable arm braces furnished; can be used with either yoke in outer position.

TABLE Heavy and deep. Dimensions, including end plates and channels, 51 $\frac{1}{2}$ " x 10". Working surface, 50" x 10". Three T-slots, $\frac{11}{16}$ " wide. Table driven by feed screw of large diameter, without spline. Power transmitted by auxiliary shaft. Power feed can be used with table set to 50° either side of zero. Table clamp provided. Mechanism prevents engaging longitudinal power feed when

table is clamped. Provision for driving 18" Rotary Attachment directly from table feed shaft.

FEEDS Longitudinal, 28"; transverse, 10"; vertical, 16 $\frac{1}{2}$ "; all automatic. All gear-driven. Alloy steel sliding gears with multiple splines in feed case unit assembly. Antifriction bearings support all shafts in feed case; also used largely throughout rest of feed drive. Overload release provided. Drive automatically reengaged when overload is removed. Feeds independent of spindle speeds. 18 changes of feed in practically a geometric progression from $\frac{1}{2}$ " to 20 $\frac{1}{4}$ " per minute (with 60-cycle motor). Changes made by single rotating lever with direct-reading open-faced dial, at front of knee. One revolution of lever in either direction gives change in feed.

FAST TRAVEL Provided for longitudinal, transverse and vertical table movements in either direction. Rate, 75" per minute (with 60-cycle motor). Available at all times, in direction of feed engaged. Obtained by lever at front of knee. When lever is released, table resumes its original feed movement. Overload release provided. Drive automatically reengaged when overload is removed.

HAND ADJUSTMENTS Longitudinal, transverse and vertical hand adjustments provided. Transverse and vertical handwheels and longitudinal handcrank automatically disengaged when control levers engage respective power drives.

ADJUSTABLE DIALS For longitudinal, transverse and vertical adjustments. Graduated to .001".

SADDLE Swivels on clamp bed. Is rigidly clamped by bolts sliding in circular slot. Graduated to show angular settings to $\frac{1}{2}$ °.

KNEE Well-proportioned for strength and rigidity. Has stout transverse ribs. High back gives long bearing on column. Clamped from front by single lever. One-piece elevating screw, completely guarded. Sliding covers protect transverse feed screw and gears.

COLUMN Cast in one piece. Hollow, with thick walls and rigid internal bracing. Lower part fitted as compartment for motor. Integral base has rim and strainers for returning spilled coolant to tank.

COOLANT SYSTEM Tank cast in base; capacity, 8 gallons. Has large clean-out openings in top, covered by removable plates and strainers. $\frac{1}{4}$ h.p. motor-driven centrifugal pump starts and stops with machine spindle motor; can be stopped separately by switch on side of column.

AUTOMATIC LUBRICATION Entire spindle driving mechanism automatically lubricated by plunger pump. Sight indicator on side of column shows operation of oiling system. Pump in saddle actuated by movement of table longitudinal feed lever sends metered oil from reservoir in saddle to the table driving mechanisms, table ways, and bearing surfaces at top of knee. Sight gage shows oil level in saddle reservoir. Feed and fast travel gear case mechanisms automatically lubricated by plunger pump from reservoir in knee. All other knee mechanisms and vertical bearing surfaces on column receive intermittent flow of oil supplied automatically by same pump.

Sight indicator on side of knee shows operation of lubricating system.

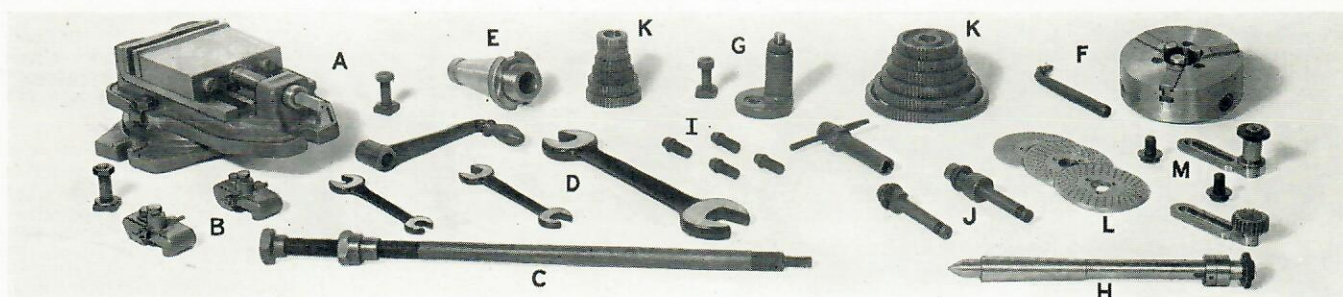
ELECTRICAL CONTROLS Conform with Machine Tool Electrical Standards. Magnetic switches and overload relays mounted on panel in compartment in right side of column; protected by hinged cover. Controls operate on 110 volts with 60-cycle current and on a lower voltage with 50-cycle current, regardless of voltage of power supply. Equipment includes clutch solenoid in side of knee for disengaging feed drive when spindle is stopped. Spindle motor, table motor, clutch solenoid and transformer for control system protected by overload relays. Coolant pump has manual starter which provides overload protection.

UNIVERSAL SPIRAL INDEX CENTERS Swing 10" diameter; take 26" 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 thrown out of mesh by knurled knob. Change gears furnished permit cutting spirals of all common leads from 2.50" 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 to worm wheel, 40:1. Front end of spindle threaded, 2¼"-4½"-N.C., r.h.; has No. 10 B&S taper hole. Hole through, 1½" diameter. Footstock center has vertical adjustment by rack and pinion; can be set at an angle in vertical plane.

WISE Swivels horizontally. Graduations in degrees on base permit setting at any angle. Clamped by two bolts. Has removable jaws of tool steel, hardened and ground. Jaws are 6½" wide, 1½" deep and open 3½".

FLOOR SPACE At right angles to spindle, 89". Parallel to spindle 108".



STANDARD EQUIPMENT

- A No. 23S swivel vise
- B 2 table stops
- C Draw-in bolt
- D Set of wrenches
- E No. 52½ chuck adapter
- F 7" 3-jawed self-centering chuck
- G Center rest
- H Differential indexing center

- I 4 holding screws for attaching adapters etc. to spindle end
- J Bolts for clamping braces to Arbor Yoke
- K Change gears for headstock
- L Index plates for headstock
- M Intermediate gear and plate, and reverse gear and plate for headstock

Not shown above —
 Spindle driving motor
 Table driving motor
 10" universal spiral index centers
 Electrical controls and wiring*
 Instruction booklets and tables

WEIGHTS AND SHIPPING DATA	Net Weight, Lbs. (Approx.)	Shipping Weight, Lbs. (Approx.)	Dimensions for Shipment, Inches	Space Occupied, Cu. Ft.
Machine fitted with motors*	4840	Domestic — 5275 Foreign — 5375	76 x 62 x 67 76 x 37 x 67	183 109

*Due to the design of the machine and type of electrical control used, this machine is only furnished equipped with motors and controlling equipment complete.

— Additional Equipment —

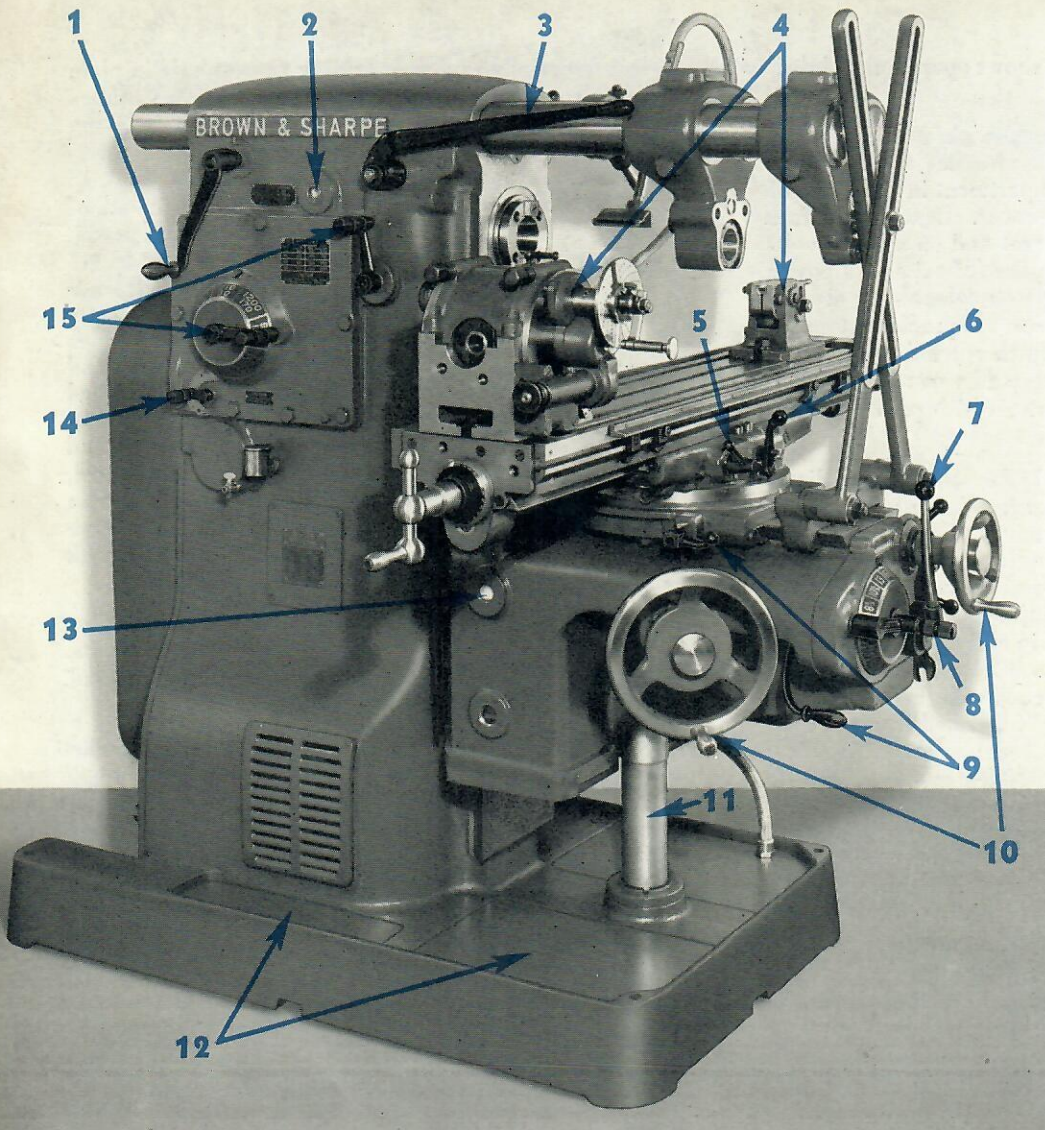
The following additional equipment is available for use on this machine at extra cost. Detailed specifications furnished on request.—

Vertical Milling Attachments
 Compound Vertical Milling Attachment
 Universal Milling Attachments
 (Regular and High Speed)
 Rack Milling Attachment
 Rack Indexing Attachment
 Slotting Attachment

Scales and Verniers
 Rotary Attachments
 Index Centers
 Attachment Crane
 Micrometer Table Setting Attachment
 Short Lead and Feed Reducing Attachment
 Standard Set of Cutters and Arbors

Change Gear Guard for Drive to Universal Spiral Index Centers

FEATURES



1 Crank provides easy adjustment of overarms, either singly or both together.

2 Sight indicator shows flow of oil for automatic lubrication of gears and bearings in column.

3 Adjustable starting lever; operates spindle brake for quick stopping.

4 Universal spiral index centers, rigid and highly accurate. Location of headstock gives maximum operating convenience.

5 Table clamp lever. Longitudinal power feed is locked out when table is clamped.

6 Longitudinal feed control lever; directional.

7 Lever gives power fast travel in any direction of feed engaged, with spindle and feed drive either running or stopped.

8 Single lever selects all feed rates. One turn in either direction gives change in feed. Dial shows rate engaged.

9 Knee is clamped by single lever from operating position. Saddle clamp is equally convenient.

10 Transverse and vertical adjustment handwheels (and longitudinal handcrank as well) are disengaged automatically when respective power feed is engaged. Adjustable dials read to .001".

11 One-piece knee elevating screw; covered by telescopic guard.

12 Coolant reservoir in base has large clean-out openings in top, covered by removable plates and strainers.

15 Rotating lever and back gear lever for speed changes in two series. Dial shows speed engaged.

14 Spindle reverse lever; disengages drive when in neutral position.

13 Sight indicator in automatic oiling system for knee mechanisms and vertical ways. Saddle and table ways also oiled automatically.

Quick Set-up

Clamps, adjustments and feed selector easily reached from front.

Easy Operation

Note convenience of operating controls. All feed control levers are directional.

Efficient Drive

The 5 h.p. spindle motor drives the spindle only. Feed and fast travel driven by $\frac{3}{4}$ h.p. motor on knee.

Low Maintenance

—Through extensive use of antifric-tion bearings — automatic lubrication — careful design — backed up by skilled workmanship and rigid inspection.

16 Single lever clamps overarms evenly at both front and rear.

17 Arbor yokes have adjustable bronze arbor bushings, valve-lubricated from reservoirs at top.

18 Provision for driving Rotary Attachment from table feed shaft.

19 Single, directional feed control levers — transverse (upper) and vertical (lower) — start, stop and reverse respective feeds.

20 Constant-speed motor on knee provides power for all feed and fast travel movements, independent of spindle drive.

21 Magnetic controls for motors are mounted in compartment behind hinged cover.

22 Spindle motor enclosed in column. Louvered door gives ventilation and easy access.

23 Motor-driven centrifugal coolant pump.

