SPECIFICATIONS

CINCINNATI

Cincinnati
DIAL TYPE
MILLING MACHINES

THE CINCINNATI MILLING MACHINE CO., CINCINNATI, OHIO, U. S. A.

Cincinnati

DIAL TYPE MILLING MACHINES

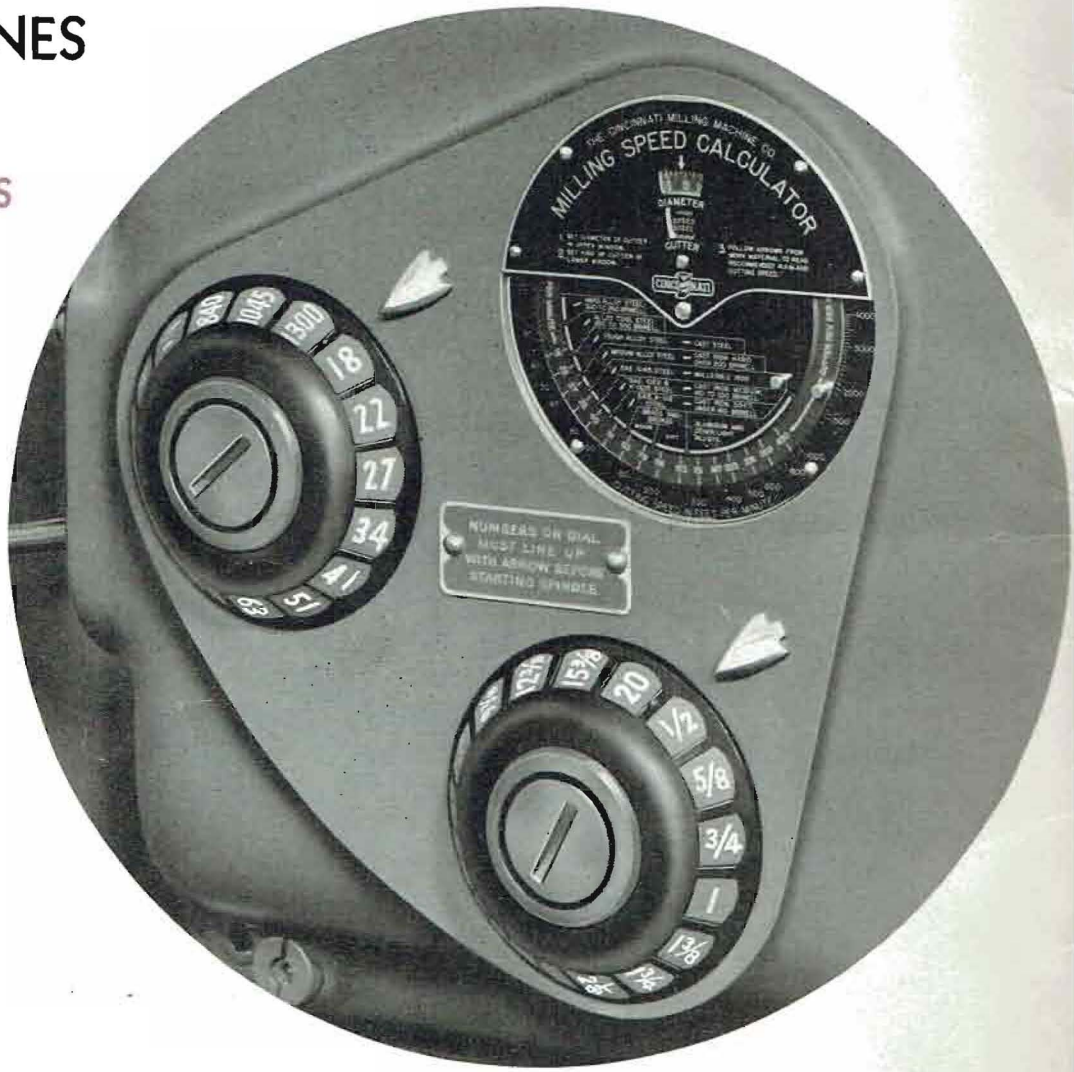
BUILT IN THREE SIZES
Nos. 2, 3 and 4

•

THREE STYLES
Plain, Universal and Vertical

•

Medium Speed and High-Speed



● CINCINNATI Dial Type Milling Machines, briefly illustrated and described in this booklet, offer possibilities for higher production in metal working shops of almost any size. Here are the ways in which the Dial Types will help your shop:

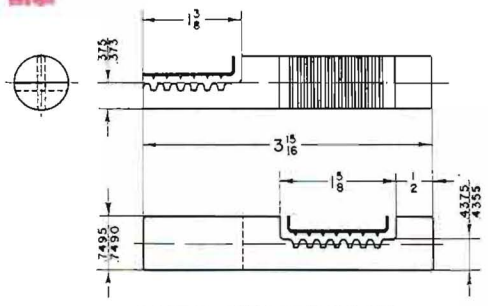
● They're quickly set up; more producing hours available during the day; less nonproductive hours required for setting up different jobs.

● They're easy to operate; and that means the elimination of production lag towards the end of the day. It means a higher daily production with no increase in labor or overhead costs; wider latitude in the physical abilities of your milling machine operators; more satisfied operators.

● They have adequate spindle speeds and feeds for milling a wide variety of materials.

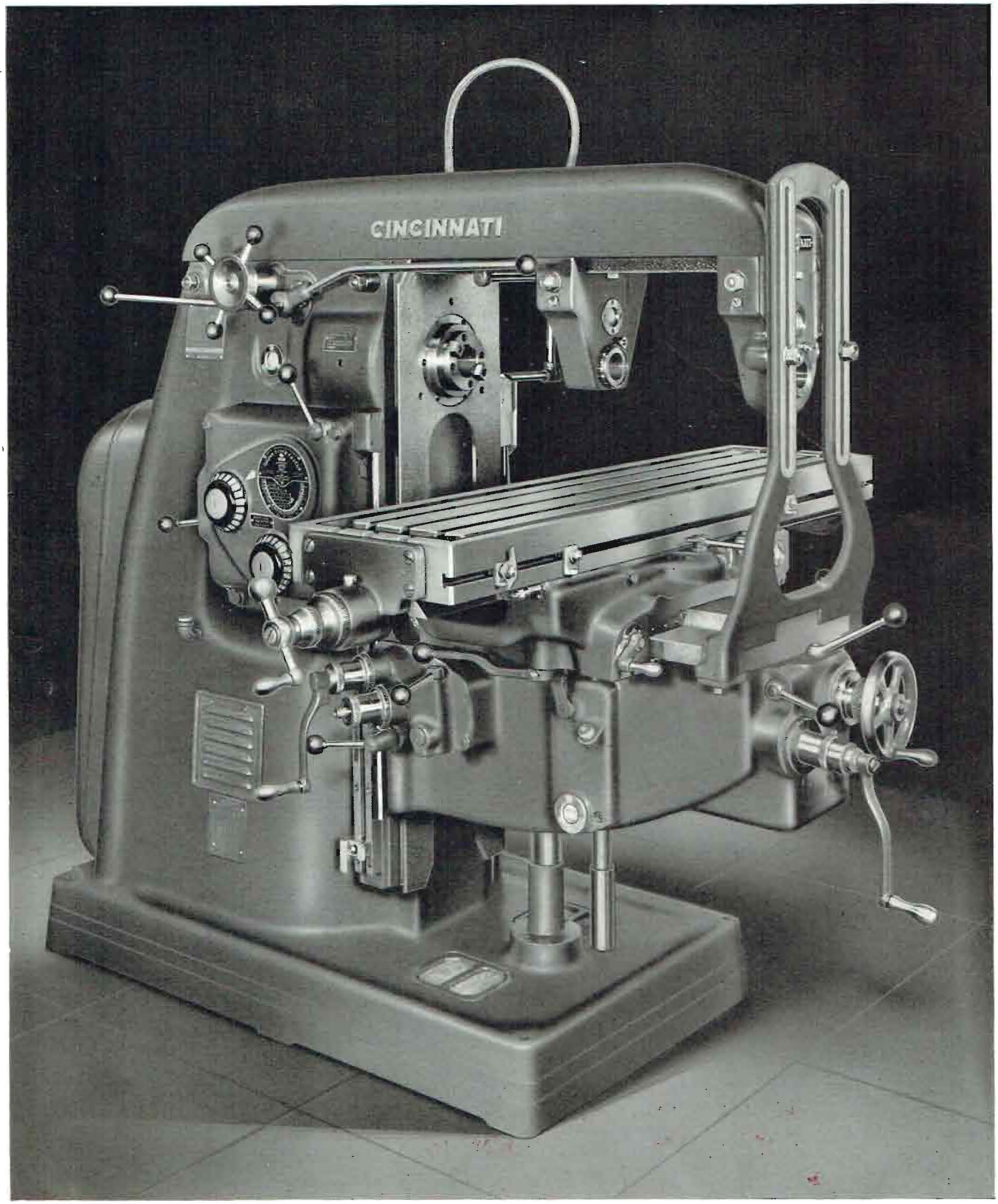
● They're accurate, not only as a fine machine but also in producing your milled parts more accurately. When the work is adjusted to the cutter, the depth of cut equals the adjustment; no more or no less.

● They're durable, and when production is needed most, they're on the job.

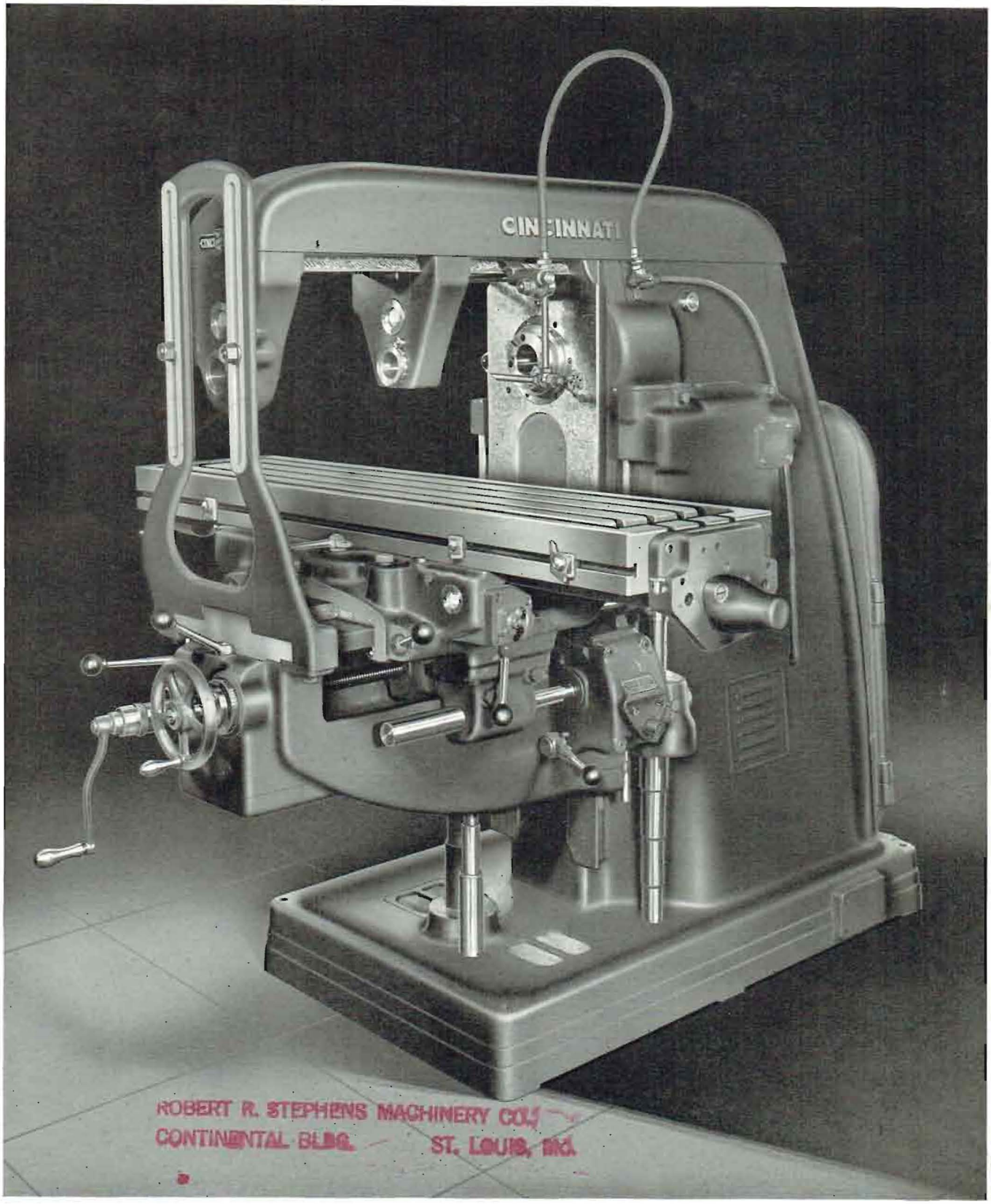


COVER ILLUSTRATION

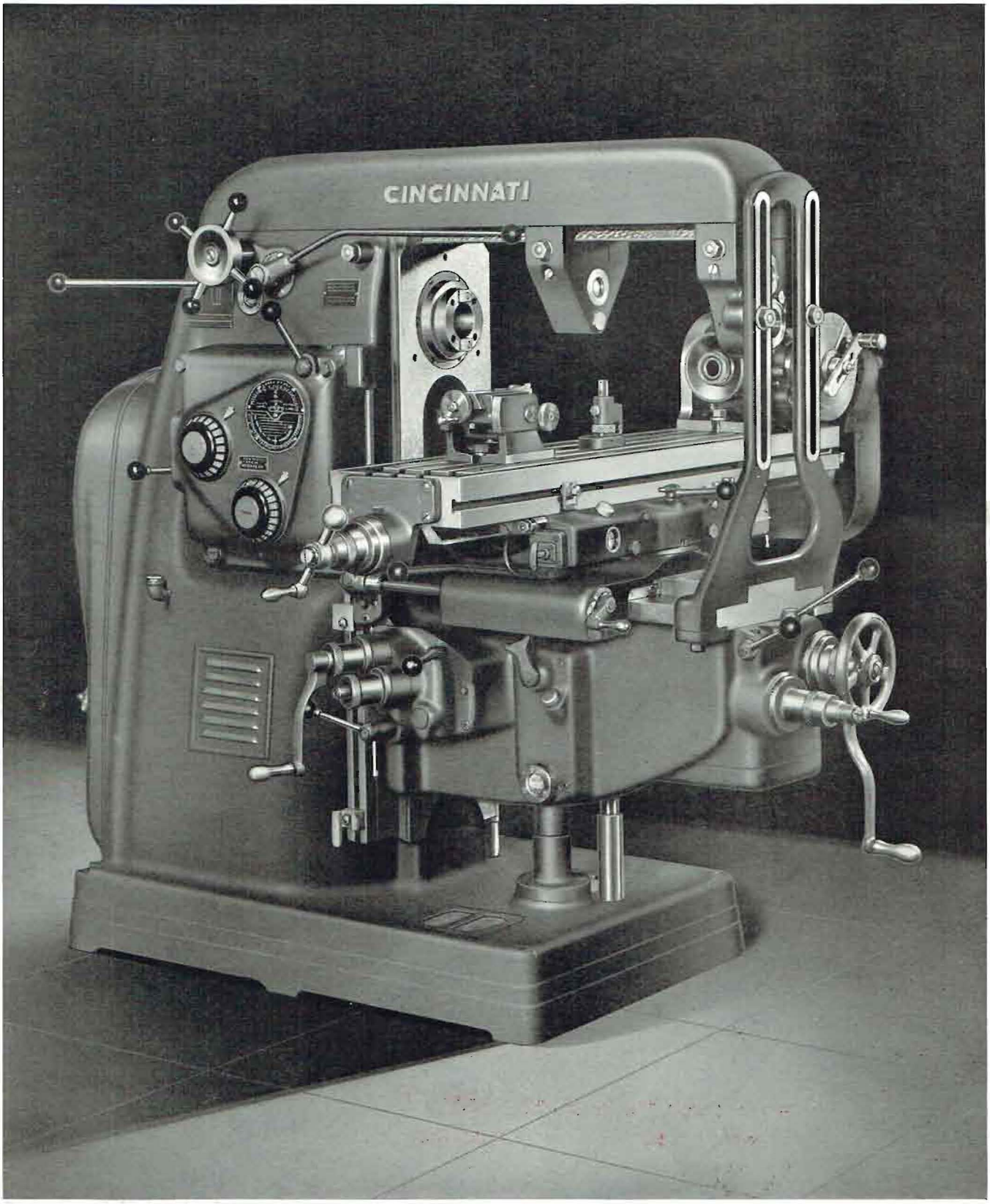
A four-operation job of milling two flats and two sets of rack teeth on rear control racks. (Sketch of the part shown here.) Production rate for first and second operations about 30 per hour, for third and fourth operations, about 35 per hour.



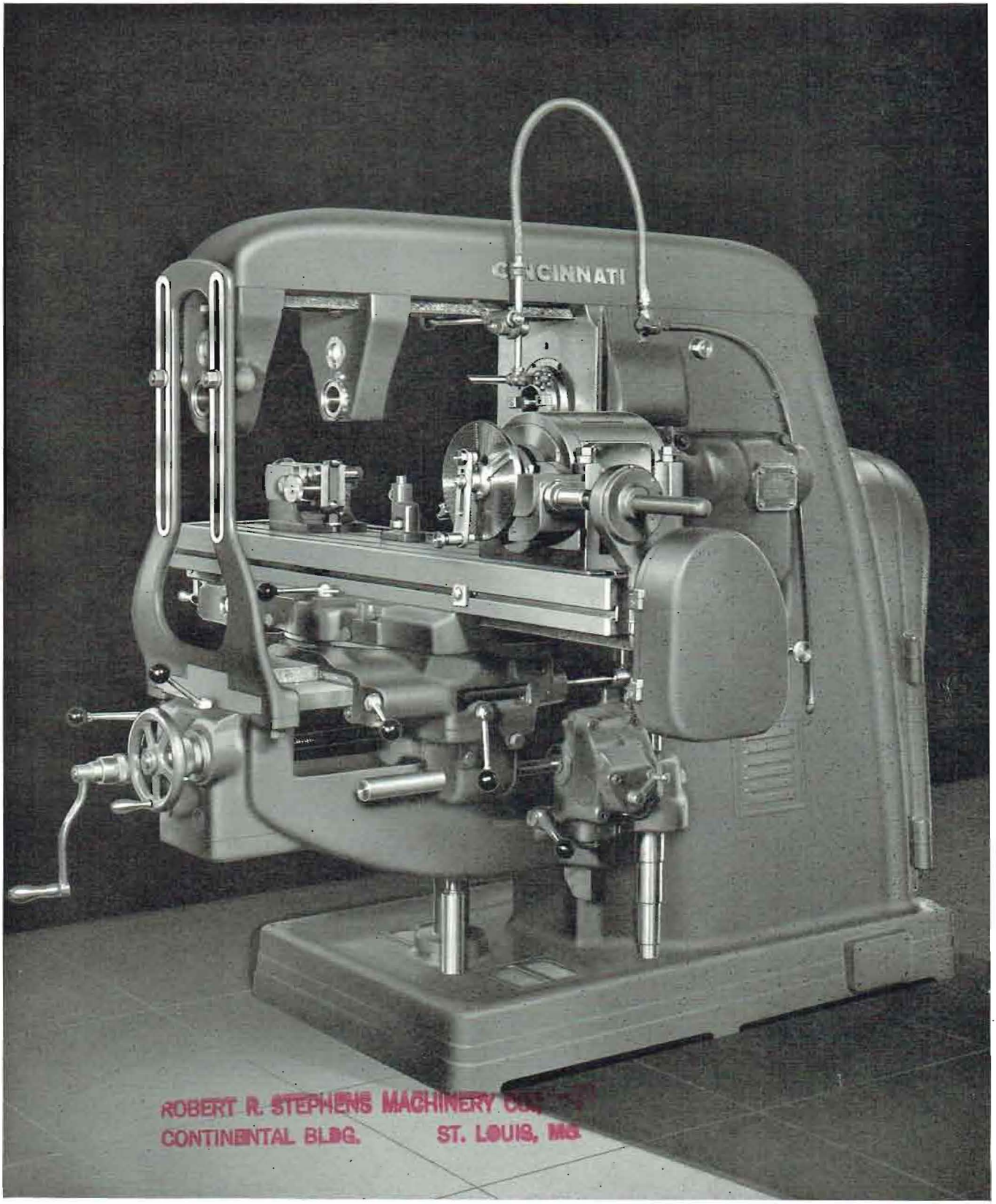
CINCINNATI No. 3 PLAIN HIGH-SPEED DIAL TYPE



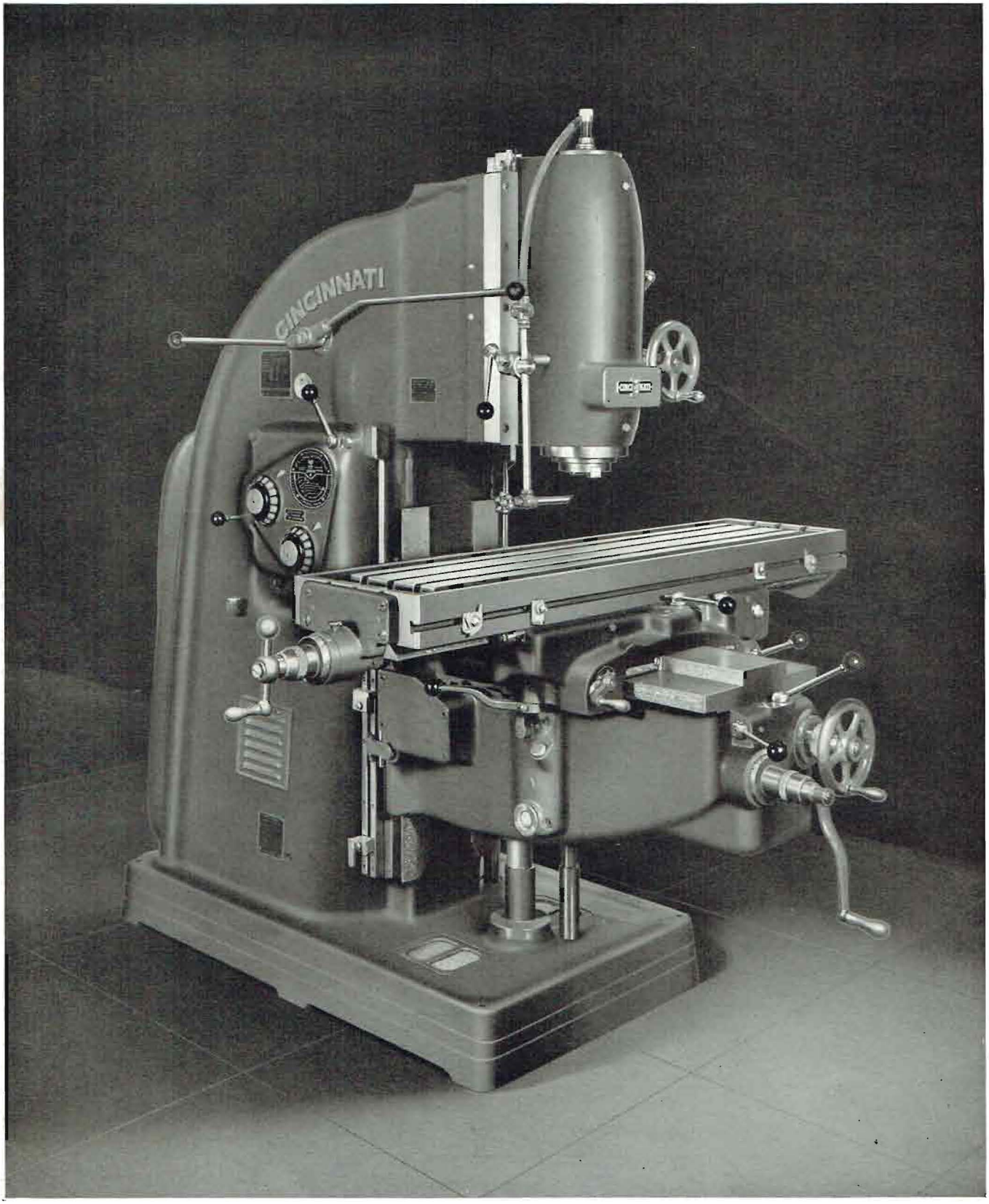
CINCINNATI No. 3 PLAIN HIGH-SPEED DIAL TYPE



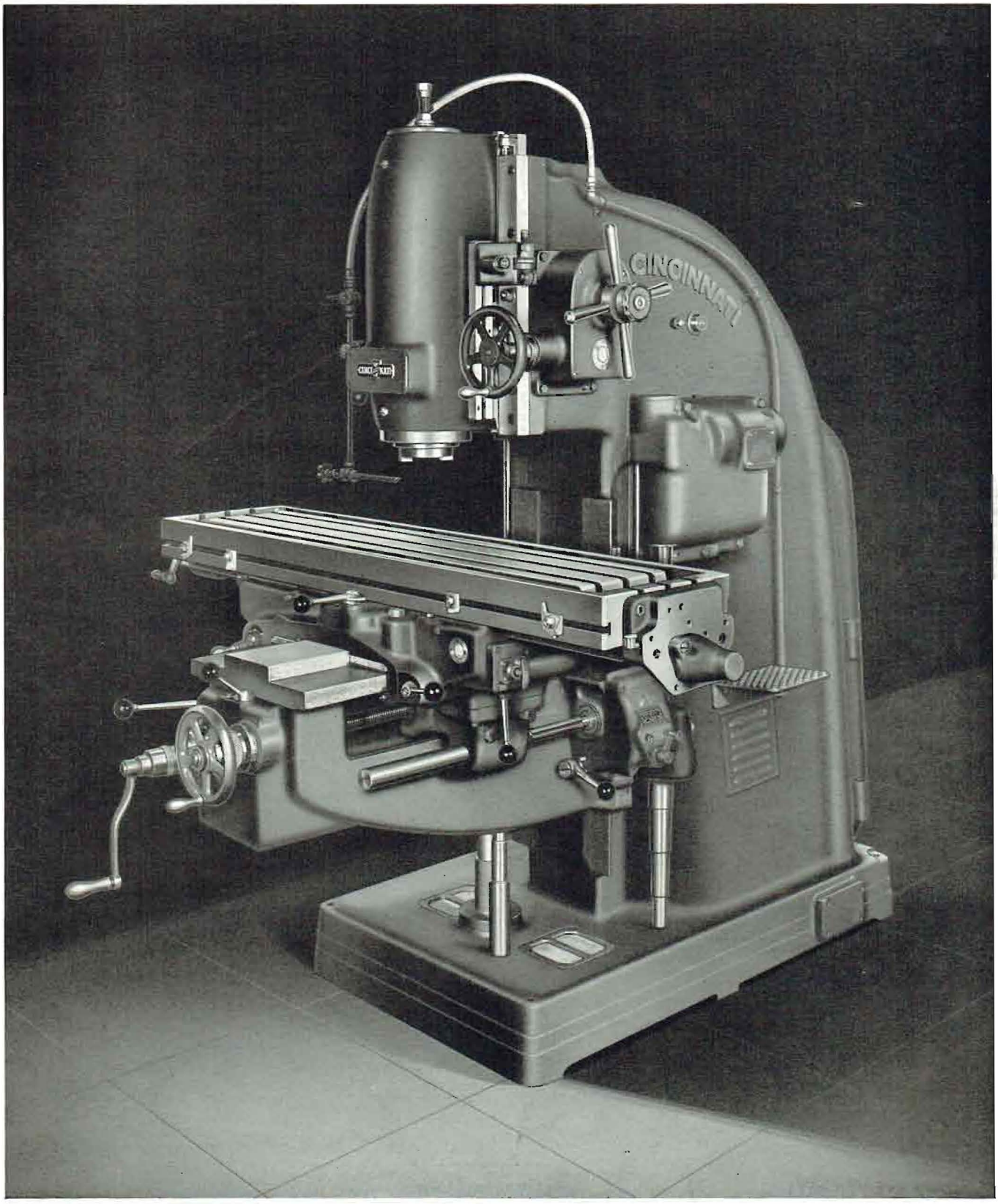
CINCINNATI No. 2 UNIVERSAL HIGH-SPEED DIAL TYPE



CINCINNATI No. 3 UNIVERSAL HIGH-SPEED DIAL TYPE



CINCINNATI No. 3 VERTICAL HIGH-SPEED DIAL TYPE



CINCINNATI No. 3 VERTICAL HIGH-SPEED DIAL TYPE

HIGHLIGHTS OF DESIGN

and Accruing Benefits

1. **Power Speed and Feed Changes At Front and Rear Working Positions.** Controlled with single lever. Without walking, speeds and feeds may be changed to suit the job and cut.

2. **High Spindle Speeds and Feeds.** Many kinds of materials, from tough steel to aluminum, may be milled at correct speeds and feeds. (Medium speed machines also available.)

3. **Power Feeds: Longitudinal, Cross, Vertical.** Engaged by single independent, directional controls; simplify operation for new men.

4. **Duplicate Set Of Control Levers At Operator's Rear Working Position.** When work-piece obscures cutter, operator may manipulate machine from rear of table; reduces spoilage.

5. **Power Rapid Traverse: Longitudinal, Cross, Vertical.** Minimizes "cutting air"; saves time.

6. **Power Feed and Power Rapid Traverse To Vertical Head.** May be obtained for vertical machines. Handy for die work, boring, etc.

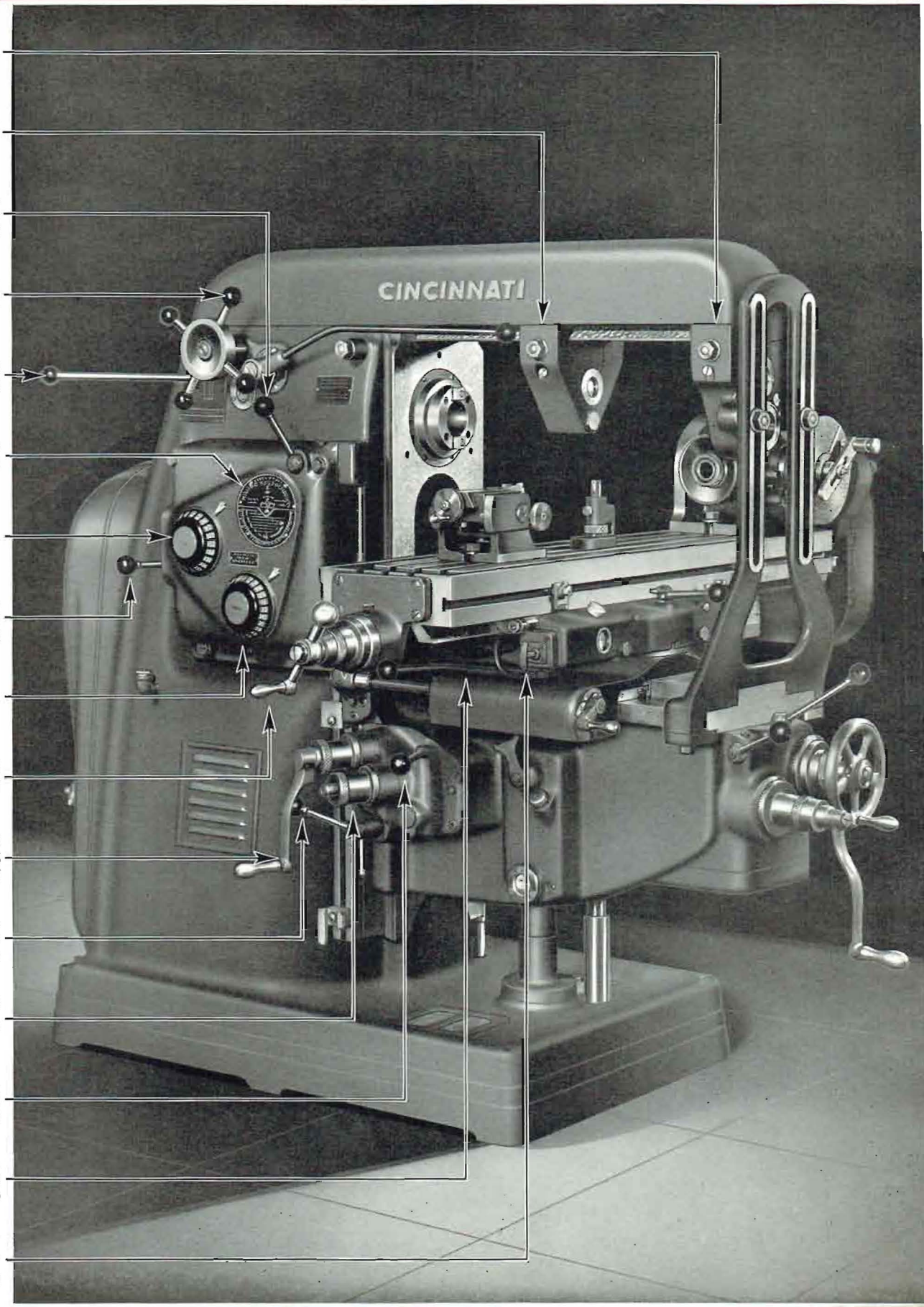
7. **Touch-Control Starting and Stopping.** Light touch of starting lever, front or rear, starts or stops spindle drive. Hydraulic mechanism engages clutch spool, relieving operator of majority of starting and stopping effort.

8. **Smooth, Streamlined Design.** Easy to keep clean.

9. **Pull-Out Quick-Adjusting Micrometer Dials.** Easy to set for hand adjustments; no thumbscrews to lose.

10. **Automatic Motor Cut-Out Switch.** If operator forgets to shut off power, motor automatically stops when hinged cover at rear is opened.

TURN TO PAGE 12 FOR TEN ADDITIONAL HIGHLIGHTS


OUTER ARBOR SUPPORT
INNER ARBOR SUPPORT
REAR CONTROL POWER RAPID TRAVERSE
PILOT WHEEL OVERARM ADJUSTMENT
STARTING LEVER
SPEED CALCULATOR
SPEED DIAL
REAR CONTROL POWER SPEED AND FEED CHANGE
FEED DIAL
HAND TABLE ADJUSTMENT
REAR HAND CROSS ADJUSTMENT
REAR DIRECTIONAL CONTROL—POWER VERTICAL FEED
REAR HAND VERTICAL ADJUSTMENT
REAR DIRECTIONAL CONTROL—POWER CROSS FEED
REAR DIRECTIONAL CONTROL—POWER TABLE FEED
OIL SHOT LUBRICATING PUMP (Universal Machines)
CINCINNATI

HIGHLIGHTS OF DESIGN

and Accruing Benefits (Concluded)

11. **Speed Calculator.** For determining the correct spindle speed . . . lengthens cutter life.

12. **One-Piece Overarm Brace.** It clamps to top of knee; increases rigidity of machine for heavy cuts. Short arbors can be used with braces.

13. **Rugged Proportions of Principal Casting.** Dampen out vibrations; withstand heavy loads.

14. **Heavy, Multiple Disc Clutches.** Heavy duty multiple disc starting clutch starts spindle drive instantly; plenty of reserve power for pulling the heaviest load; heavy duty multiple disc brake stops spindle instantly . . . safer for the operator.

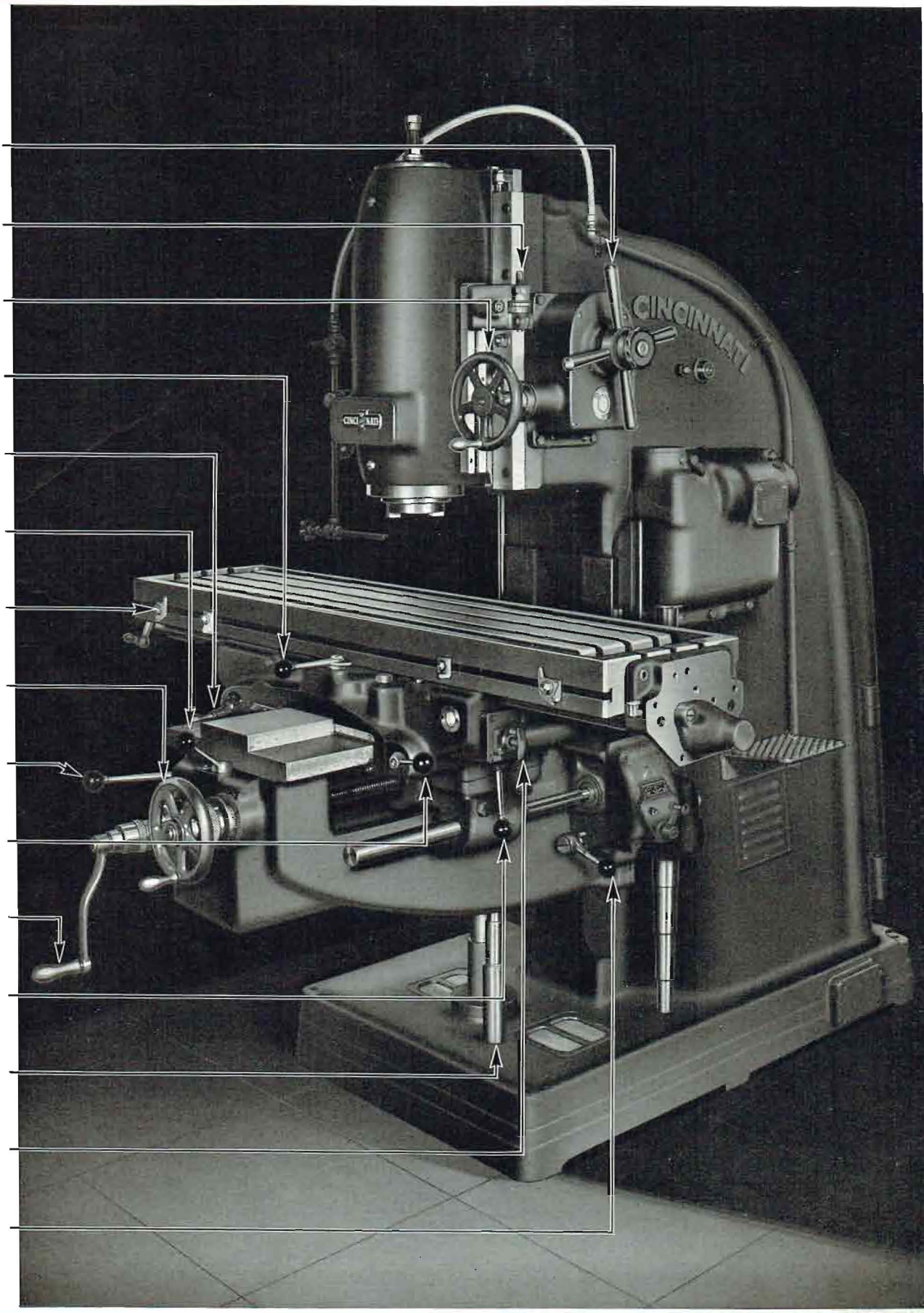
15. **Simple, Effective Lubrication.** Principally automatic; prolongs machine life-span; daily requirements can be handled very quickly.

16. **Rectangular Overarm.** Solid and rigid straight-edge alignment of overarm and arbor supports with centerline of spindle.

17. **Hand Cranks Automatically Disengaged When Released.** Safer for the operator.

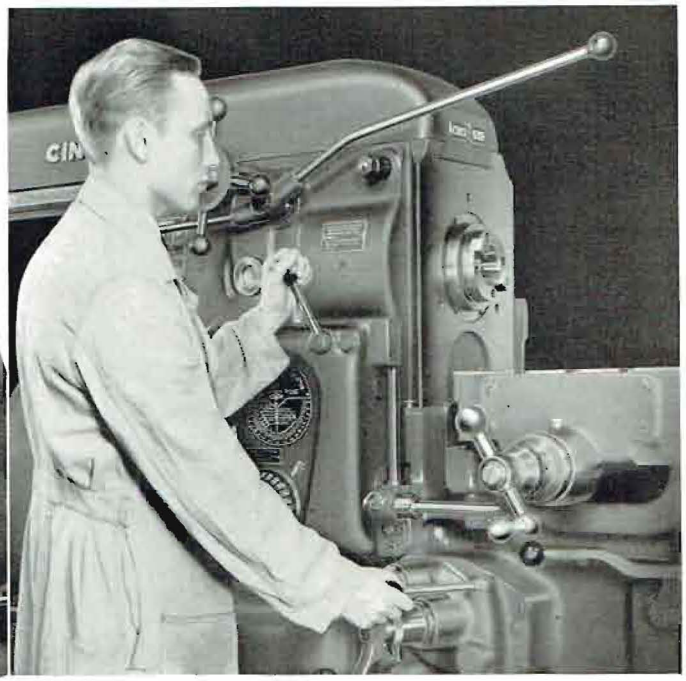
18. **Enclosed Dividing Head Driving Mechanism.** Safer for the operator. Provides leads of 2.5″ to 100″. (Leads from .010″ to 1000.″ with special attachment.)

19. **Dividing Head.** Powerfully built, withstands heavy cuts, exceptionally accurate.


COARSE HAND VERTICAL HEAD ADJUSTMENT
POSITIVE MICROMETER STOP
FINE HAND VERTICAL HEAD ADJUSTMENT
FRONT DIRECTIONAL CONTROL—POWER TABLE FEED
FRONT CONTROL POWER SPEED AND FEED CHANGE
FRONT DIRECTIONAL CONTROL—POWER CROSS FEED
TABLE DOGS
FRONT HAND CROSS ADJUSTMENT
FRONT DIRECTIONAL CONTROL—POWER VERTICAL FEED
FRONT CONTROL POWER RAPID TRAVERSE
FRONT HAND VERTICAL ADJUSTMENT
SADDLE CLAMP
COOLANT RETURN TUBE
OIL SHOT LUBRICATING PUMP (Plain and Vertical Machines)
KNEE CLAMP
CINCINNATI

RECTANGULAR OVERARM WITH PILOT WHEEL CONTROL

Pilot wheel control cuts down the effort of moving the overarm when changing cutters or arbors. It's convenient, too, for the overarm clamping nuts are near the pilot wheel, at a normal height to apply leverage on the wrench.

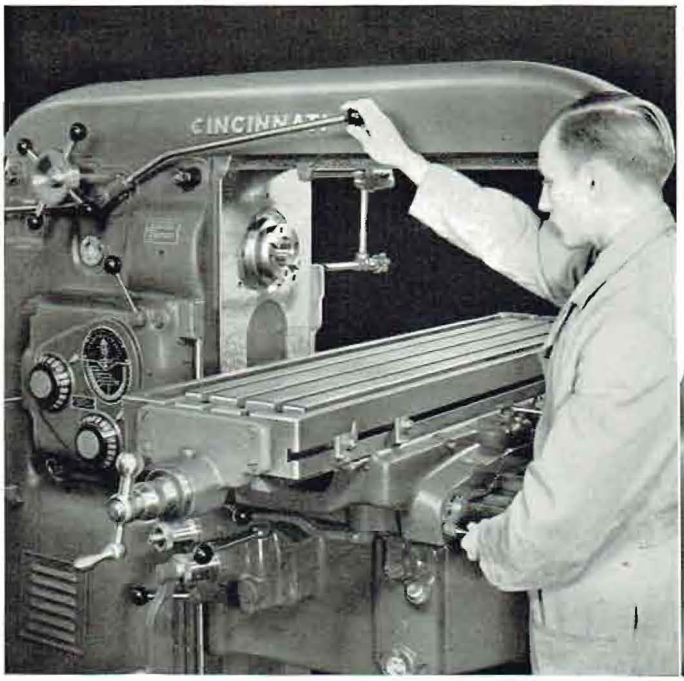


POWER RAPID TRAVERSE CONTROL AT THE REAR

Engaging the table rapid traverse from the rear working position. Without moving a step, he can also engage the cross and vertical rapid traverse. These handy rear controls, duplicating all those in front of the machine, allow him to make the necessary manipulations from the rear of the table when the work obscures the cutter.

POWER RAPID TRAVERSE CONTROL AT THE FRONT

Engaging the power table rapid traverse from the normal front working position. As soon as the rapid traverse lever (in his right hand) is released, the table travel immediately changes to a feed rate. Power vertical and cross rapid traverse may be engaged in a similar manner, greatly reducing the time required to adjust the work to the cutter.



POWER SPEED AND FEED CHANGES AT THE FRONT

He changes speeds and feeds without walking; without effort; and one lever does both jobs. A mere touch of the starting lever instantly stops the spindle. Then with a flip of the speed-feed change lever, the dial clicks around, and when the desired reading lines up with the arrow, he's all ready to go. The machine does the work of shifting gears, he merely swivels a lever and starts and stops the spindle drive.

POWER SPEED AND FEED CHANGES AT THE REAR

When it's more convenient to work from the rear of the table, there's a duplicate speed-feed change lever right at his elbow. No need to trudge around to the front of the machine to change speeds or feeds. He gets more done, and does it easier, the Dial Type way.

PULL-OUT QUICK ADJUSTING MICROMETER DIALS

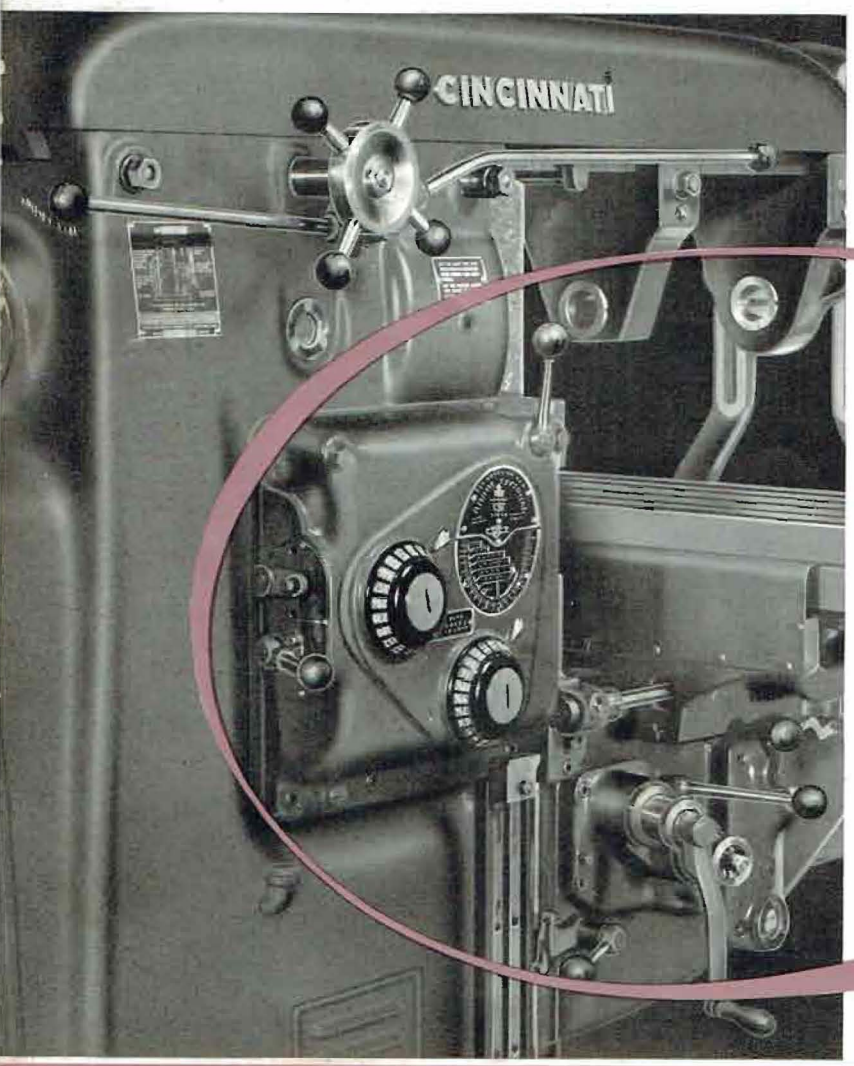
He doesn't have to add or subtract mentally when adjusting the work to the cutter. Just pull out the dial, rotate it to match the zero mark with the starting line, and then start the adjustment from zero. There's no "play" or looseness to throw the dial marks out of register with the zero line; the clutch teeth take care of that. Cross, vertical and table hand adjustments, front and rear, have these dials.

Easy to Operate

Because the Dial Type Millers are easy and convenient to manipulate, the operator finds it easy to turn out more work without additional effort. Here are the factors which contribute to this unusual ease of operation:

First of all, it's no effort to change speeds or feeds, and it may be done while standing either at the front or rear of the table. In any case, the machine does the actual work of shifting gears; while the operator merely swivels a small lever. There's no clashing or "dead ending" of gears, for the shifting mechanism slides them in and out of mesh in perfect coordination. While the shifting lever is engaged, say in the "feed" position, the large, easy-to-see feed dial clicks around to the various readings. Incidentally, it requires only a few seconds for a complete revolution. As soon as the lever is released, the dial stops, and the proper gears are in mesh to produce the feed indicated by the arrow.

Engaging or disengaging the main drive clutch requires no more effort than a light touch on the starting lever. Here again, the machine does most of the work. A hydraulic mechanism engages the clutch spool, reducing the effort of starting to a small fraction of the conventional design.



COMPLETE DUPLICATE REAR CONTROLS

The convenient arrangement of rear controls. All within reach, without walking or stretching.

DESCRIPTION

Convenient to Operate

All control levers are easy to reach—easy to engage. Power feed levers for all feed movements—table, cross, and vertical—are independent directional controls. Hand adjustments are provided with anti-friction bearings for easy and accurate adjustment of the work to the cutter.

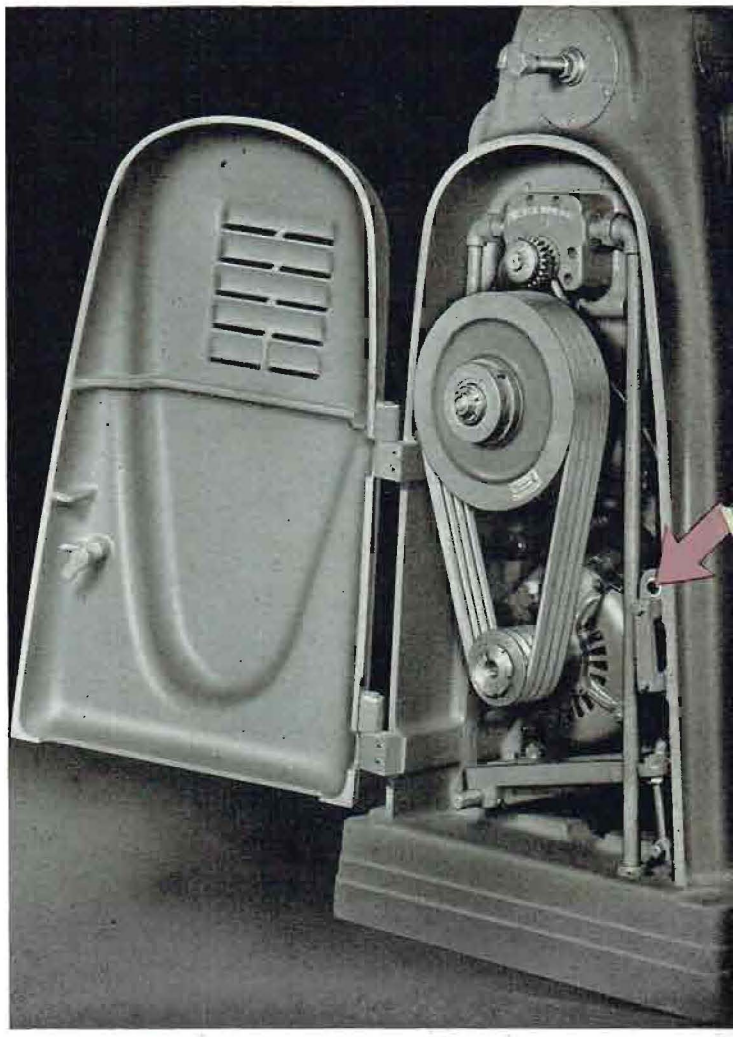
SPEED AND FEED LEVER

One lever changes spindle speeds and feeds. This lever is located at the front of the saddle. A similar lever is located at the rear working position.

Horizontal machines are equipped with duplicate power and hand controls at the operator's rear working position (behind the table at the left-hand side of the column). With this arrangement, the work never obscures the operator's view of the cutter, for he can work from the front or rear as the job requires. Quite naturally, spoilage drops to a new low.

Safe to Operate

Dial Types are safe, too. There are no exposed rotating parts; hand cranks and handwheels automatically disengage when released; a built-in switch automatically stops the motor as soon as the hinged cover at the rear is opened; when the spindle drive is disengaged, a multiple disc brake automatically and instantly stops the spindle.

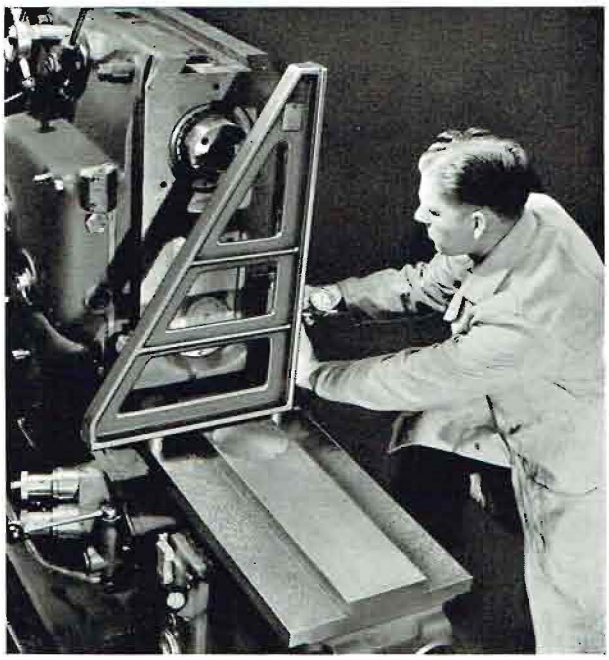


STANDARD V-BELT DRIVE, ACCESSIBLE COOLANT PUMP

When the hinged cover is opened, the motor automatically stops; an important factor in safety.

Accurate Results

Several factors contribute to the better than average accuracy which may be obtained. Liberal proportions of the principal castings, plus the rigid double row precision anti-friction bearings for the spindle (self-compensating at the rear for temperature changes), fulfill the basic requirements for accurate results. Wide bearing surfaces on top of the knee, with narrow center guide construction, promote smooth cross adjustment of the saddle. All flat bearing surfaces are hand scraped to accurate gages. The ample length of knee bearing on the column prevents the knee from sagging, assures milled surfaces that are flat and parallel to the table. Pull-out micrometer dials provide a simplified method of setting the dials before adjusting the work to the cutter.



CONSTANT VIGILANCE

Many accuracy tests during assembly assure accurate machines which will do accurate work.

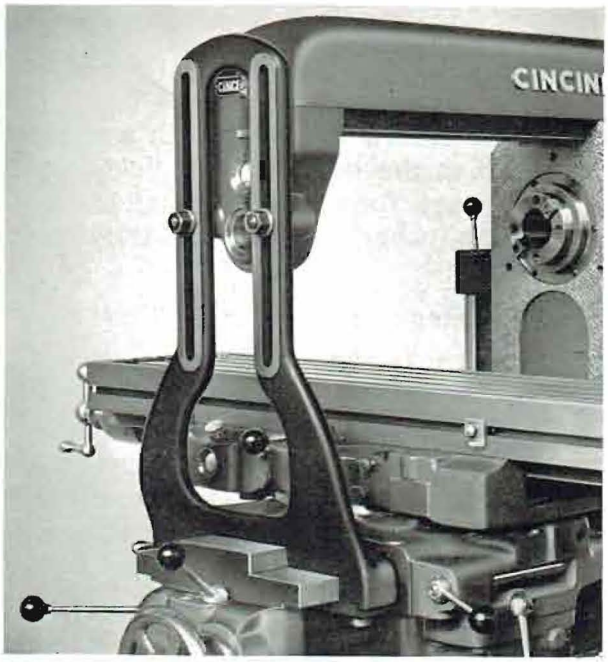
Rigid Construction

Dial Type Milling Machines are designed for miscellaneous milling operations, and quite naturally they also handle the heavy stock removal jobs in their stride . . . a cost-reducing asset for both tool room and production work.

Notice the sturdy proportions of the principal castings, shown to advantage in the several views of the complete machine throughout this booklet. The column has the smooth lines so essential to a rigid and substantial supporting element. It looks massive, and the generous thickness of walls and heavy ribs substantiate the appearance. The overarm of the horizontal machines is unusually heavy, constituting a rigid support for the outer end of the arbor.

A one-piece overarm brace ties the knee to the overarm for those extra heavy cuts. It clamps to the top of the knee, forming the most effective arrangement for increasing rigidity. Then, too, short arbors can be used with this new brace, since it may be clamped right next to the front of the saddle.

Note the ample proportions of the knee, saddle, and table castings. The knee bearing on the column and saddle bearing on the knee are exceptionally wide, while the table has plenty of depth in addition to underneath surface-plate ribbing. These are the proportions that resist twisting and deflections; withstand the complex strains created by the cutting action.



OVERARM BRACE FOR EXTRA HEAVY CUTS

One-piece brace rigidly ties knee to overarm; adds strength to withstand those extra heavy cuts.

MASSIVE VERTICAL HEAD

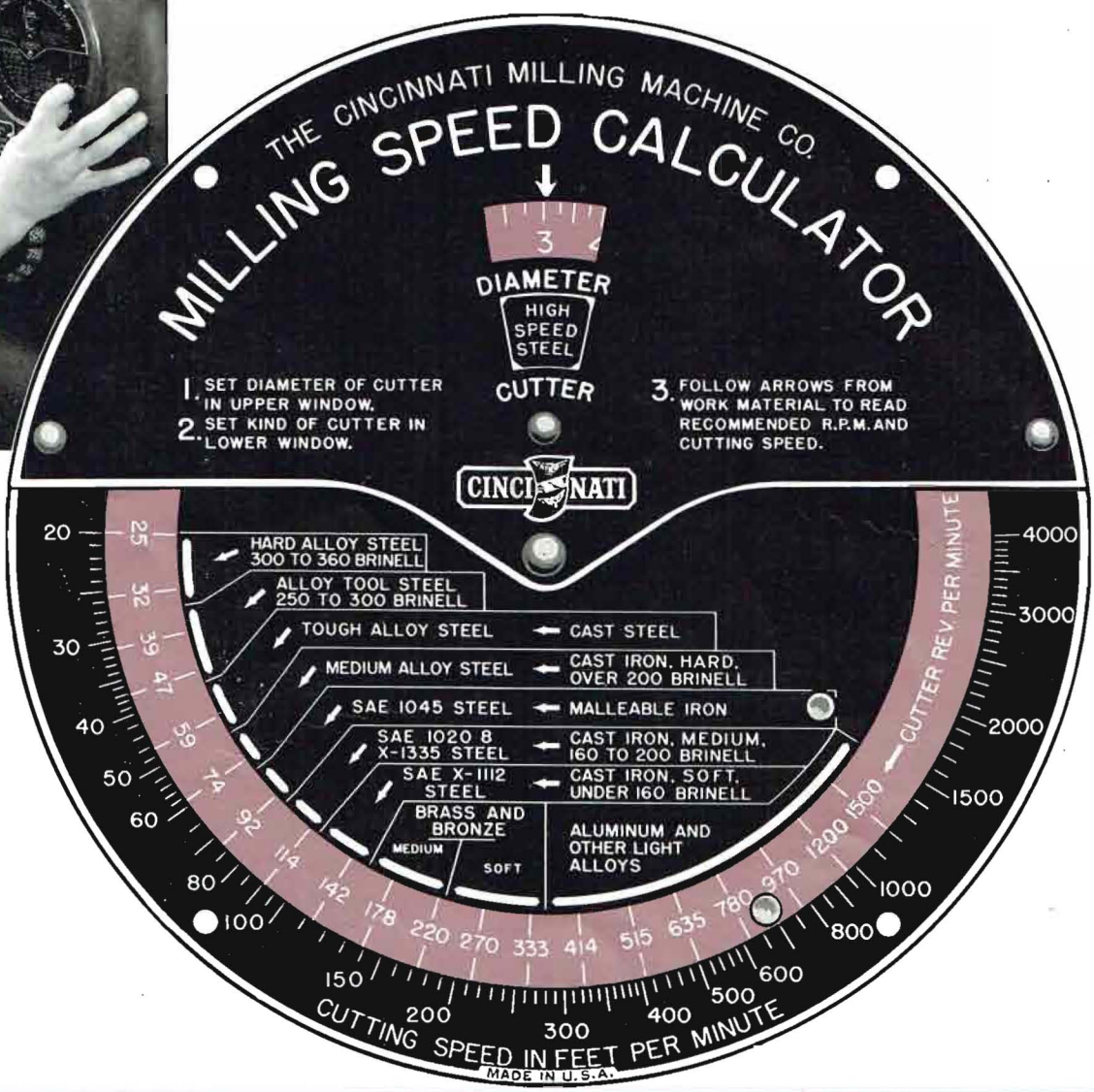
Rear view of the No. 3 Vertical Dial Type. Massive proportions of upper part of column add plenty of reserve strength for heavy face milling operations.

The Correct Speed

Each Dial Type Miller is now equipped with a speed calculator which enables the operator to quickly determine the correct speed for the job at hand. No mental gymnastics; no paper work. Just take the three known factors:

1. Diameter of cutter
2. Cutter material
3. Work material

Set the two dials on the speed calculator to indicate the first two of these factors, and from the third, read the answer. Then, with the power speed change lever, change the spindle speed to the correct r.p.m.—both exclusive Dial Type features!



● The Speed Calculator has the same spindle speeds as the speed dial. Calculator illustrated is actual size as used on No. 2 High-Speed Dial Type.

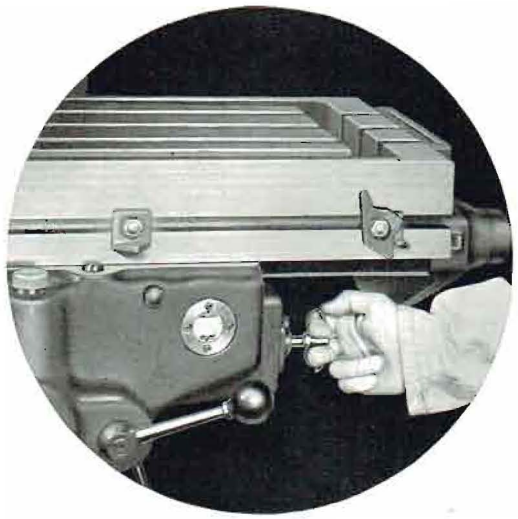
The setting here is for a 3" diameter high-speed steel cutter. Opposite the material to be milled (follow the arrow) will be found the correct spindle speed and the corresponding cutting speed of the cutter. For example, SAE 1045, spindle speed 92 r.p.m.; cutting speed, 72 feet per minute.

Long Useful Life-Span

CINCINNATI Dial Type Milling Machines have many features and design characteristics that keep them young in performance when they become old in years.

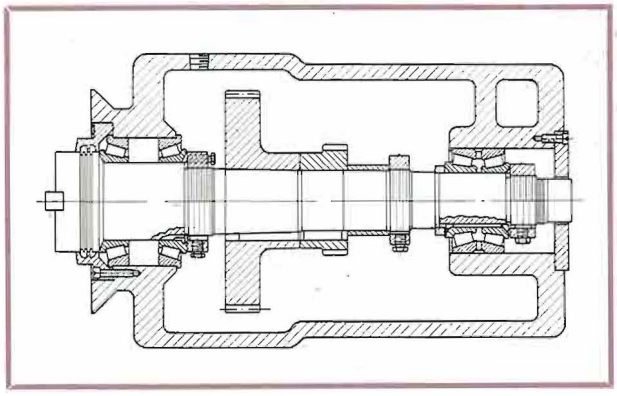
Lubrication is a relatively simple procedure. All parts within the column are automatically lubricated by a pump and splash system; all parts within the knee are likewise automatically lubricated by a pump and splash system; while all parts within the saddle and housing are lubricated by a pressure oil-shot system. High-grade materials are used throughout; high content chrome-nickel steels for the gears and shafts, Meehanite metal for all iron castings. Heat-treatments for gears, spindles, and shafts employ the latest scientific equipment. Test after test—an inspection after each operation on every part—assures no faulty workmanship. Adjustments can be taken care of by the average operator.

All these factors combine to minimize maintenance expenditures. And when you must turn out the work quickly, the Dial Types are on the job and ready to go at a moment's notice.



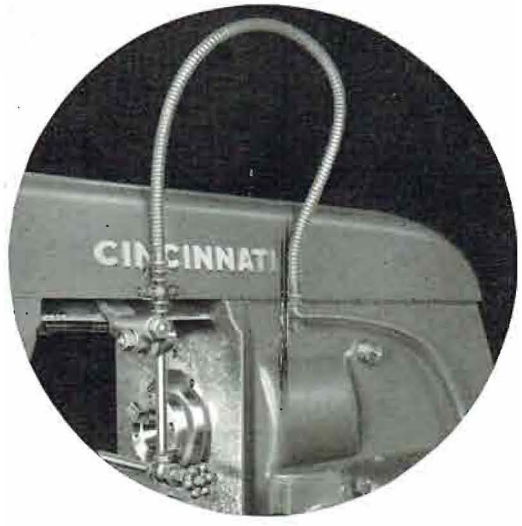
PLENTY OF OIL
WHERE IT'S NEEDED

Pressure oil-shot system for the saddle and table parts. No hard-to-find oil holes for the operator to overlook; with a few strokes of the plunger, the oil-shot pump takes care of all the saddle-housing-table bearing surfaces.



RIGID, LONG-LIFE SPINDLE MOUNTING

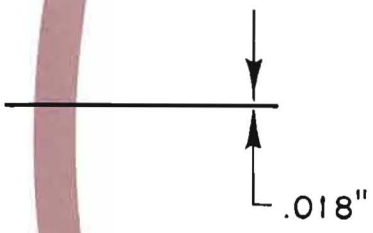
Double rows of precision anti-friction bearings, automatically lubricated, rigidly support the spindle.



PLEASING APPEARANCE
TO THE LAST DETAIL

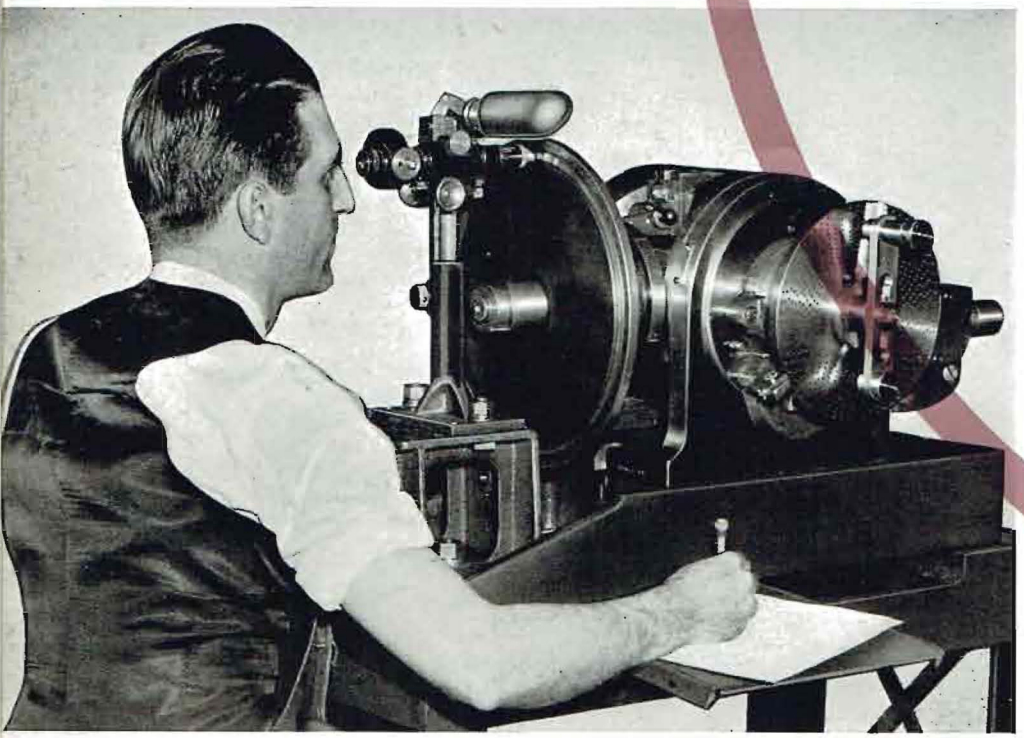
Coolant is conveyed to the cutter through armored metal braid hose and flexible copper tubing.

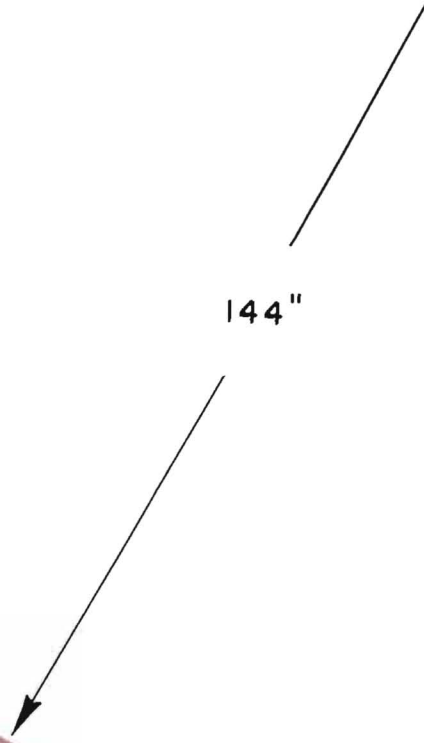
A Picture of Cincinnati Dividing Head Accuracy



ACTUAL ACCUMULATIVE ERROR IN INDEXING DIVIDING HEAD MUST NOT EXCEED .0015"

Checking the indexing accuracy of a CINCINNATI Dividing Head by means of an Optical Micrometer and a circular scale graduated in degrees. Each Dividing Head receives this test.

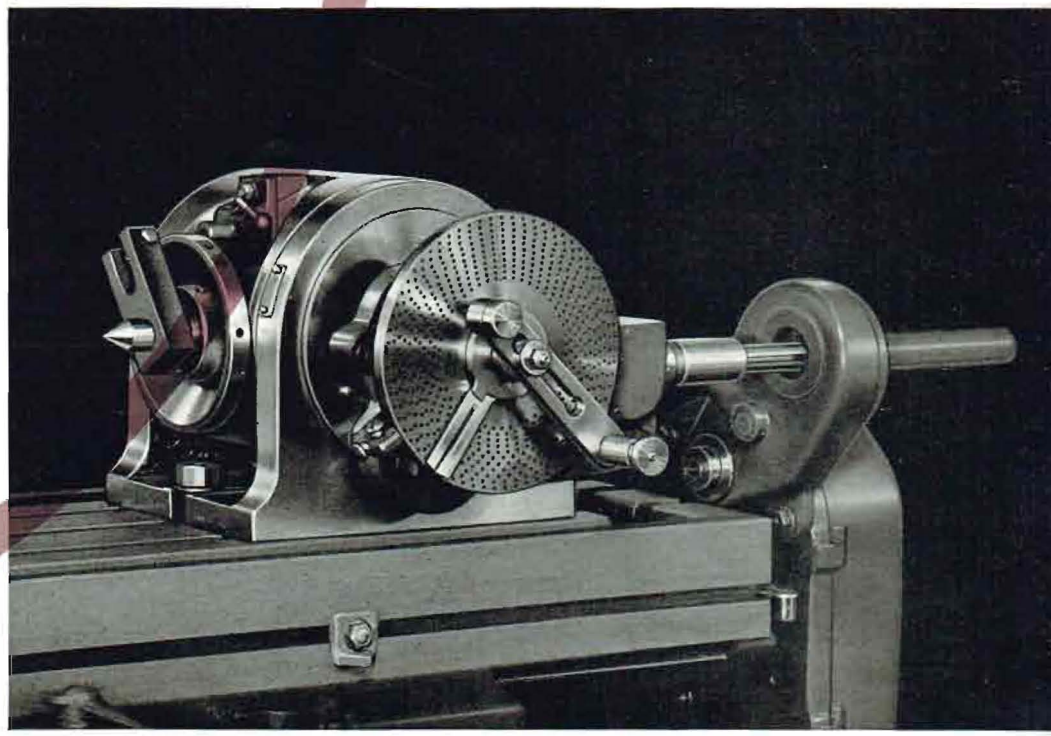




This circle and the intersecting line at the left graphically illustrate CINCINNATI Dividing Head accuracy. The line, a wire .018″ in diameter, contrasted with a 12-foot diameter circle, represents to a true scale the maximum allowable accumulative error in standard CINCINNATI Dividing Heads. Actually, the wire is but $\frac{1}{25410}$ of the circumference of the circle! This is precision indexing.

Every CINCINNATI Dividing Head is thoroughly checked to give you a precision instrument of the highest order. Accuracy is built in at the start.

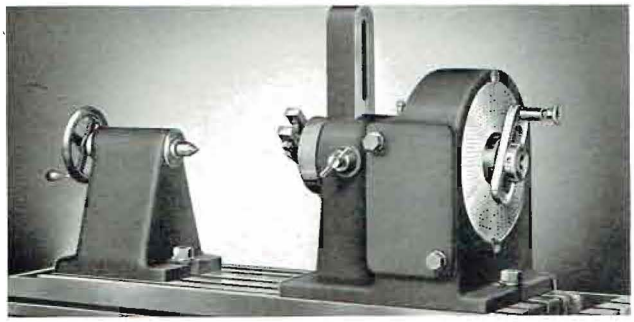
Fine materials, correct design, and special manufacturing facilities, combined with the workmanship of skilled craftsmen, are definitely responsible for the close accuracy and fine performance of CINCINNATI Dividing Heads.



A CINCINNATI Universal Dividing Head is supplied as standard equipment with all Cincinnati Universal Milling Machines. The use of the Dividing Head equipped with the Wide Range Divider (supplied at extra cost—see page 26) enables you to quickly select divisions from 2 up to 400,000 without the use of change gears or additional index plates.

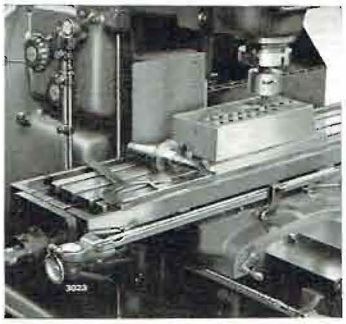
ATTACHMENTS AND ACCESSORIES

SUPPLIED AT EXTRA COST



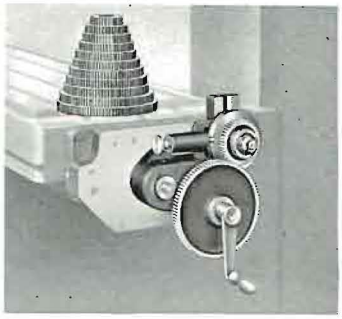
PLAIN INDEX HEAD . . .
built with 12″ and 16″ swing for ordinary gear cutting and similar work that is machined by being indexed between centers. It indexes three and five divisions—and all even numbers from 4 to 50, inclusive.

●Publication No. M-1031



PRECISION MEASURING EQUIPMENT . . .
helps you space holes accurately to very close limits. Simple . . . fast . . . ideal for jig boring when holes are relatively close together.

●Publication No. M-624-1

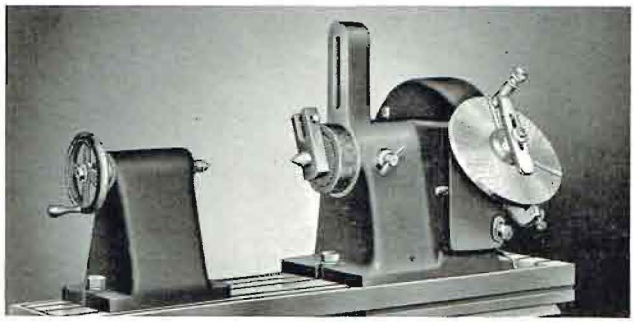


RACK INDEXING ATTACHMENT . . .
used with rack milling attachment. It is connected to the leadscrew at end of table, and consists of indexing and locking plate with change gears. Different combinations of gears enable racks of different pitches to be machined.

●Publication No. M-920

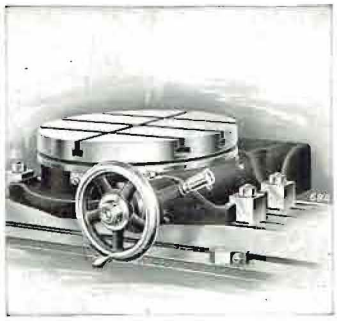
RACK CUTTING ATTACHMENT . . .
for cutting racks, ordinarily used in connection with rack indexing attachment. Vise included; takes work up to 5⅜″ wide by 34″ long.

●Publication No. M-920



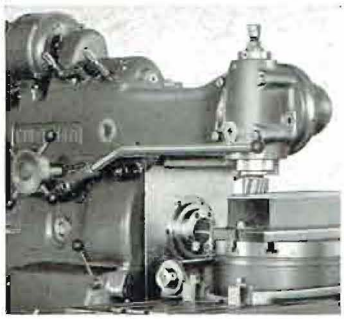
GEAR CUTTING ATTACHMENT . . .
for all classes of spur gear cutting and similar work requiring a high degree of accuracy. Spiral milling head consists of this same attachment with driving shaft for connecting to machine leadscrew.

●Publication No. M-1031



16″ CIRCULAR MILLING ATTACHMENT . . .
Hand feed is illustrated. Has 16″ diameter table. Circumference graduated in degrees to facilitate angular settings.

●Publication No. M-1035-1



MOTOR DRIVEN UNIVERSAL ATTACHMENT . . .
mounted on special overarm for milling bevels, flats and angles; milling slots in jigs, fixtures, moulds, dies and patterns. Overarm can be used for regular arbor support.

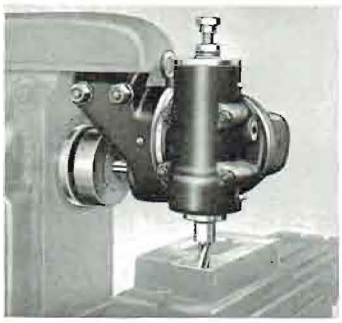
●Publication No. M-1213

INDEXING EQUIPMENT . . .
for circular milling attachment. Indexing plates same as standard or high number plates used with the Universal Dividing Head.

●Publication No. M-1035-1

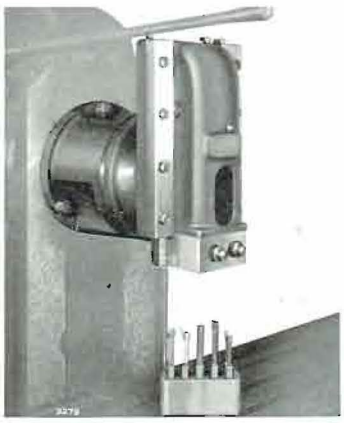
20″ AND 24″ CIRCULAR MILLING ATTACHMENTS . . .
Power feed is shown. Built with 20″ and 24″ diameter tables. Dogs for automatic throwout are provided. Table of attachment is graduated in degrees to facilitate angular settings. Easy to set up. Gives you the equivalent of a rotary table miller.

●Publication No. M-1035-1

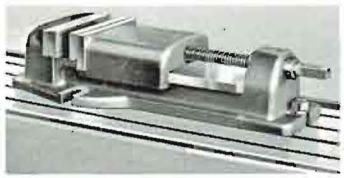


HIGH-SPEED UNIVERSAL MILLING ATTACHMENT . . .
has high speeds for small to medium size cutters. Swivels to any angle in a plane parallel to the face of the machine column, or 90° in a right angle plane. Cross range, 7 inches, plus cross range of machine. Can be equipped at extra cost with quill hand feed device and quick change adapter.
●Publication No. M-803-1

SEMI-HIGH SPEED VERTICAL ATTACHMENT . . .
will help you key seat, die sink, mill T slots and work of similar character. Swivels through 360 degrees. Spindle speeds 1½ times speeds of *High-Speed* Dial Types and 2 times speeds of Medium Speed Dial Types.
●Publication No. M-963

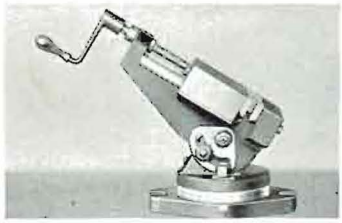


SLOTTING ATTACHMENT . . .
For your operations where a slotter is not available; for keywaying, die and tool work. Tool slide can be set any angle through 360 degrees. Stroke from 0″ (zero) to 4″. Set of slotting tools supplied at extra cost.
●Publication No. M-919-1

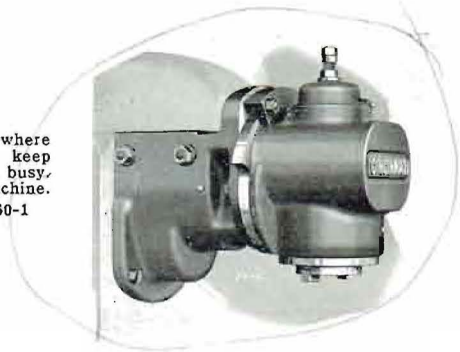


Nos. 3 and 5 PLAIN VISES . . .
used on Plain Machines. Depth, width and opening of jaws: No. 3—1⅝″ x 6⅛″ x 4″; No. 5—2½″ x 8⅝″ x 7″.
●Publication No. M-1013

Nos. 3 and 5 SWIVEL VISES . . .
used with Universal Millers. Can be converted into plain vise by removing swivel base. Depth of jaws, etc., same as corresponding size of plain vises.
●Publication No. M-1013



TOOL MAKER'S UNIVERSAL VISE . . .
for general tool room work. Can be swiveled in vertical position up to and including 90 degrees—360 degrees in a horizontal position.
●Publication No. M-988



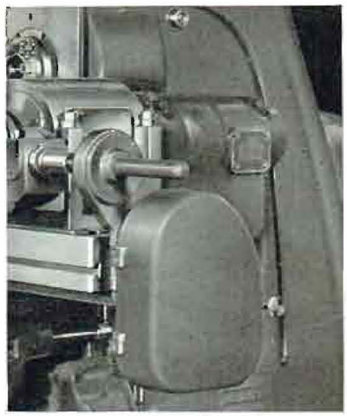
HEAVY VERTICAL ATTACHMENT . . .
is ideal for your face milling where there is not enough work to keep a Vertical Milling Machine busy. Spindle speeds same as machine.
●Publication No. M-960-1

RAISING BLOCKS . . .
give increased range to your Dividing and Index Heads. Height of blocks, 2″ to 3″.
●Publication No. M-644-1

RIGHT ANGLE PLATE . . .
for setting up Dividing Head or small fixtures at right angles to table T slots. Equipped with suitable tongue strips to fit table T slots.
●Publication No. M-644-1

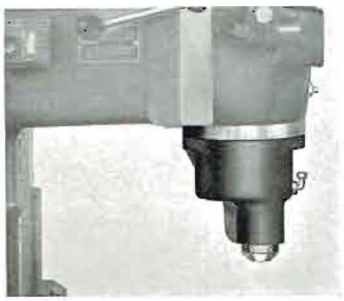
HIGH NUMBER INDEXING ATTACHMENT . . .
for regular dividing and plain and spiral heads. Three special index plates. Indexes all numbers up to and including 200; all even numbers and those divisible by 5 up to 400. You can apply them to your old Dividing Head.
●Publication No. M-987-1

UNIVERSAL SPIRAL ATTACHMENT . . .
for milling spirals of any angle on a Plain Miller, or angles greater than 45 degrees on a Universal. Mills in horizontal, angular or vertical plane. Spindle speeds same as machine.
●Publication No. M-804-1

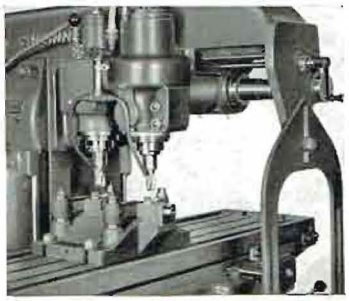


ENCLOSED DRIVING MECHANISM FOR SPIRAL HEADS AND DIVIDING HEADS . . .
Spirals can be milled advantageously on Plain Machine equipped with Universal Spiral Milling Attachment and Universal Dividing Head equipped with standard enclosed driving mechanism. Equipment includes set of change gears. Lead range, 2½″ to 100″. The open type driving mechanism is also available.
●Publication No. M-1016-1

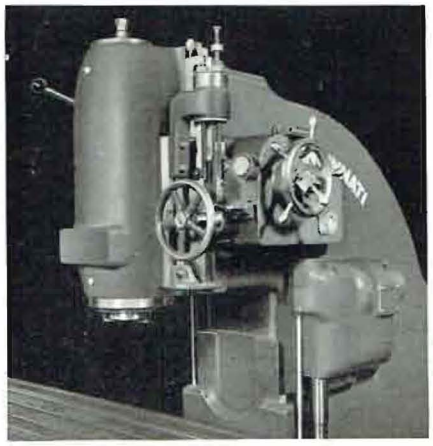
QUICK CHANGE ADAPTER, ARBORS AND COLLETS . . .
enable you to replace one cutter with another in 20 seconds or less. Now, many operations can be done with one setting of work.
●Publication No. M-985



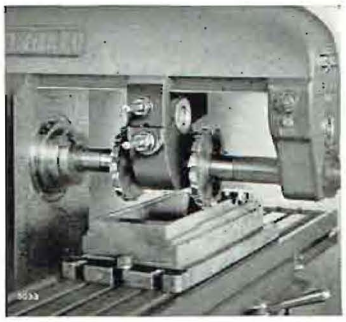
HIGH-SPEED ATTACHMENT . .
for Vertical and Horizontal machines. Used for die work and profiling operations on metal patterns; also model and experimental work. Spindle speed 1.6 times spindle speed of *High-Speed* Dial Types and 3.4 times spindle speed Medium Speed Dial Types.
●Publication No. M-858



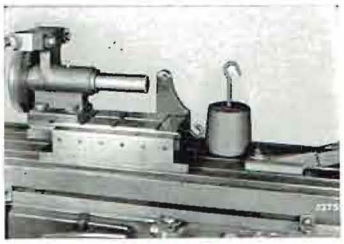
SPECIAL TWO-SPINDLE VERTICAL MILLING ATTACHMENT . .
for milling channels in aero-engine baby rods, etc. Outer spindle has both horizontal and vertical adjustment for lining up with inner spindle. Depth of cut is controlled by knee adjustment.



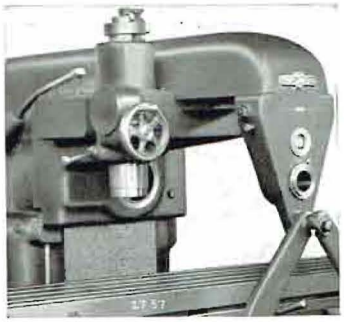
FOUR-POSITION TURRET STOP FOR VERTICAL MILLERS . . . POWER FEED AND RAPID TRAVERSE TO VERTICAL HEAD . . .
provides you with a faster, easier, more accurate method of boring, die-sinking and step-milling.
●Publication No. M-1002



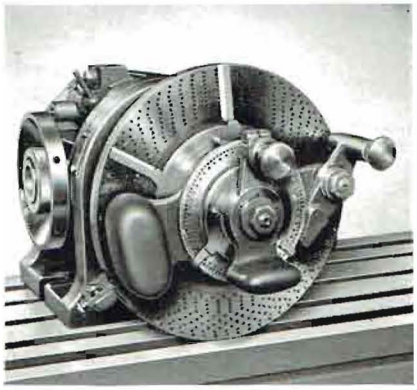
CAP-TYPE ARBOR SUPPORT . . .
mounted between slotting cutters, allows you to quickly and easily remove the arbor without disturbing the setting of the cutter gang.



CAM MILLING ATTACHMENT—POWER OR HAND FEED . . .
for milling face cams 16″ in diameter and cylindrical cams 8″ in diameter. The change from face to cylindrical cam milling is readily made by turning the worm wheel at right angles to milling machine spindle.
●Publication No. M-857-1



KEYWAY MILLING ATTACHMENT . . .
for rounding out the ends of keyways. Mounted on face of column and supported by overarm. Quill adjustment and fixed stops provide fast, accurate method for positioning cutter to depth.



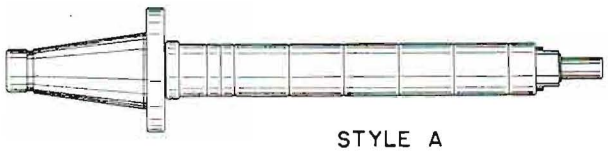
WIDE RANGE DIVIDER . . .
with Cincinnati Universal Dividing Head, gives you a rapid selection of divisions from 2 to 400,000 and any angle at intervals of six seconds without the use of change gears or additional index plates. Keyways, slots and holes can be quickly spaced in angular relationship to each other. Can be used for indexing bevel or spiral gears. Your present Cincinnati Head can be rebuilt and equipped with the Wide Range Divider at low cost.
●Publication No. M-972-1

CUTTER COOLANT PUMP . . .
Individually motor driven, including ¼ h.p. motor, starter, and piping. May be easily installed on your machine.
●Publication M-958

ARBORS—No. 50 SERIES TAPER

For Cincinnati Plain and Universal Dial Type Milling Machines

(Complete Tabulation in Publication M-926-1)



STYLE A

STYLE B

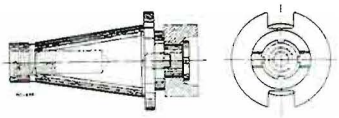
INCH SIZES

Diameter	Style	Usable Length of Cutter Space	Diameter of Bearing Collar	Keyway		Code Name	Catalog Number
				Width	Depth		
⅞	A	10	.....	.....	.....	TENAR	50- ⅞A10
1	A	12	.....	¼	1/32	ARTWA	50-1 A12
1	A	15	.....	¼	1/32	ARBAA	50-1 A15
1	A	18	2⅛	¼	1/32	ATARB	50-1 A18-4
1	B	24	2⅛	¼	1/32	ARBFA	50-1 B24-4
1¼	A	12	.....	5/16	1/16	ARBCO	50-1¼A12
1¼	A	15	.....	5/16	1/16	AROGU	50-1¼A15
1¼	A	18	2⅛	5/16	1/16	ARBRU	50-1¼A18-4
1¼	B	18	2⅛	5/16	1/16	BETAR	50-1¼B18-4
1¼	B	24	2⅛	5/16	1/16	ONARB	50-1¼B24-4
1½	B	18	2⅛	⅜	1/32	HAFAR	50-1½B18-4
1½	B	24	2⅛	⅜	1/32	FORAR	50-1½B24-4
1½	B	30	2⅛	⅜	1/32	ARBTY	50-1½B30-4
1½	B	36	2⅛	⅜	1/32	ARGOB	50-1½B36-4
2	B	24	2¾	½	1/16	*ARJYN	*50-2 B24-5
2	B	30	2¾	½	1/16	*TUBAR	*50-2 B30-5
2	B	36	2¾	½	1/16	*ARCOD	*50-2 B36-5

*Note—Two suitable bushings for 2¾″ diameter bearing collars are included in the price of these arbors.

SHELL END MILL ARBORS—Style C

For Cincinnati Plain, Universal and Vertical Dial Type Milling Machines



Diameter Range of End Mills	Stud Diameter	Code Name	Catalog Number
1¼—1½	½	SHEMA	50- ½C⅛
1¾—2	¾	SEMCO	50- ¾C⅛
2¼—2½—2¾	1	SHEPU	50-1 C⅛
3—3½	1¼	SHEHI	50-1¼C⅛
4—4½—5	1½	SHEBY	50-1½C⅛
5½—6	2	SEMOR	50-2 C⅛

Chrome nickel heat-treated screws for holding shell end mill on arbor are furnished with all arbors.

Wrenches are furnished with arbors 1¼C⅛, 1½C⅛ and 2C⅛.

QUICK CHANGE ADAPTER, ARBORS AND COLLETS

For Cincinnati Plain, Universal and Vertical Dial Type Milling Machines

QUICK CHANGE ADAPTER, COMPLETE. CATALOG No. NS-H5. Code Name—ADACO.
Complete equipment consists of:
Nut, Special Key, Stop Lug, Spanner Wrench, Stop Lug Screw, Ring, Four Ring Screws, Socket Wrench.

QUICK CHANGE
SHELL END MILL ARBORS

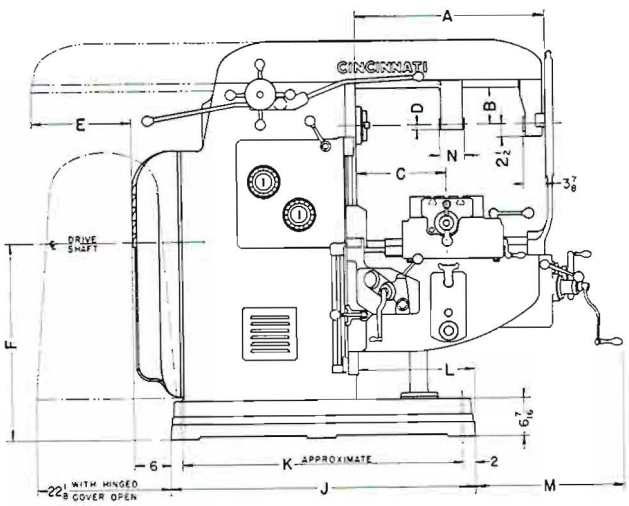
Diameter Range of End Mills	Stud Diameter	Code Name	Catalog No.
1¼—1½	½	ARABB	50- ½″ FC ⅝″
1¾—2	¾	ARDUI	50- ¾″ FC ⅝″
2¼—2½—2¾	1	ARSHE	50-1″ FC ⅞″
3—3½	1¼	ARTTA	50-1¼″ FC ⅞″
4—4½—5	1½	ARICK	50-1½″ FC ⅞″
5½—6	2	AREMI	50-2″ FC ⅛″

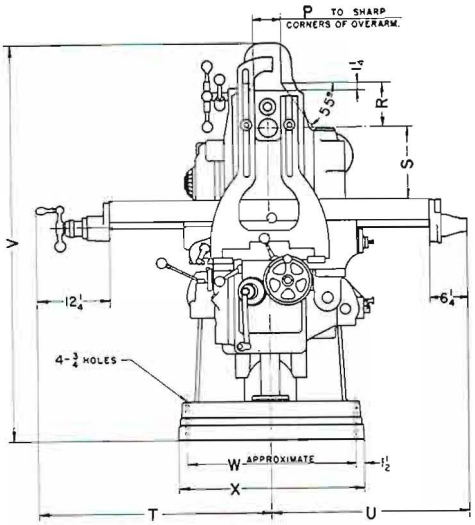
QUICK CHANGE COLLETS
(Includes Draw-in Bolt)

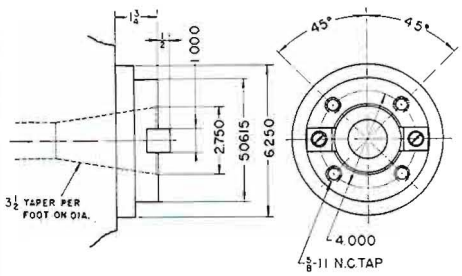
Inside Taper	Code Name	Catalog No.
No. 7 B.&S.	COQUI	50-NS—FEB 7
No. 9 B.&S.	COSEM	50-NS—FEB 9
No. 10 B.&S.	COSBE	50-NS—FEB 10
No. 11 B.&S.	COTTO	50-NS—FEB 11
No. 2 Morse	CORIC	50-NS—FEM 2
No. 3 Morse	COROB	50-NS—FEM 3
No. 4 Morse	CODDE	50-NS—FEM 4

SPECIFICATIONS FOR CINCINNATI PLAIN

DIMENSIONAL DRAWING







SPINDLE NOSE

STANDARD FLANGED END WITH NO. 50 SERIES TAPER

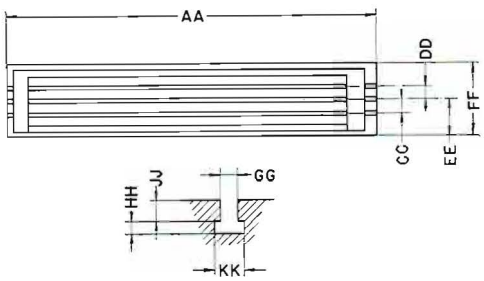
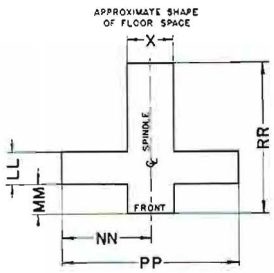


TABLE AND T-SLOT



FLOOR PLAN

PC-336

Size of Machine	A	B	C Min.	C Max.	D	E	F	J	K	L	M	N	P	R	S Min.	S Max.	T Min.	T Max.		Size of Machine
No. 2	30¼	6⅛	9 1/16	19⅞	⅞	16½	32 1/16	50¼	46¼	19	26 1/16	4	4½	7⅜	0	19 3/16	22 1/16	50 1/16	.....	No. 2
No. 3	33½	7⅜	10 11/16	23 1/16	1 1/16	18¾	33 1/16	59	55	20¾	27½	4 1/16	6	8⅝	0	20 1/16	23¼	57¾	.....	No. 3
No. 4	38¼	7⅜	11¼	25⅞	1 1/16	22½	33 1/16	59	55	20¾	32 1/16	4 1/16	6	8⅝	0	20 1/16	27¼	69¾	.....	No. 4

Size of Machine	U Min.	U Max.	V	W	X	AA	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	RR	Size of Machine
No. 2	20⅝	49⅛	64 1/16	27½	30½	52 1/16	2 1/16	2 1/16	6	12¼	1/16	31/64	⅞	1¼	22 1/16	19 1/16	50 1/16	99 1/16	99 1/16	No. 2
No. 3	23¼	57¾	70 1/16	29½	32½	62½	3¼	3¼	7½	15¼	1/16	⅝	1	1 1/32	27¾	17 1/16	57¾	115½	111¼	No. 3
No. 4	27¼	69¾	70 1/16	29½	32½	78½	3¼	3¼	8	16¼	1/16	⅝	1	1 1/32	30⅞	19 1/16	69¾	139½	119⅞	No. 4

HIGH-SPEED DIAL TYPE MILLING MACHINES

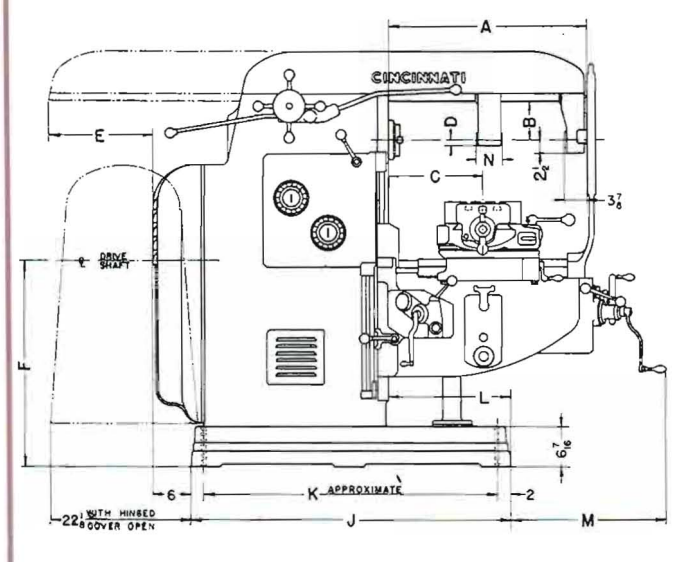
GENERAL SPECIFICATIONS (MODEL ER)

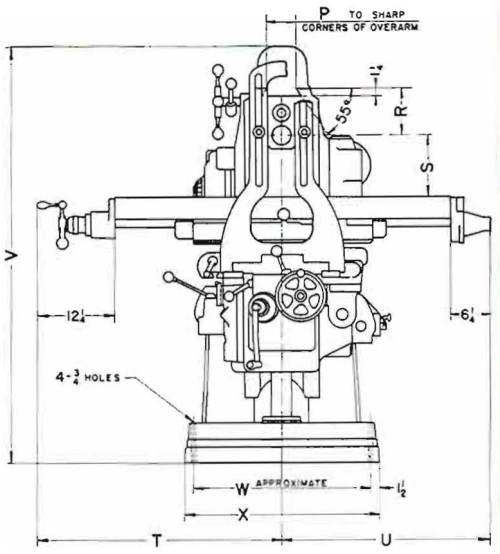
	No. 2 Plain	No. 3 Plain	No. 4 Plain
TABLE			
Working surface	52 11/16"x12 1/4"	62 1/2"x15 1/4"	78 1/2"x16 1/4"
Size over all	52 11/16"x12 1/4"	62 1/2"x15 1/4"	78 1/2"x16 1/4"
T-slots (number and size)	Three—11/16"	Three—11/16"	Three—11/16"
Distance between T-slots	2 1/16"	3 1/4"	3 1/4"
RANGE			
Longitudinal	28"	34"	42"
Cross	10"	12"	14"
Vertical	19"	20"	20"
Maximum distance from centerline of spindle to top of table	19 1/16"	20 1/16"	20 1/16"
Minimum distance from centerline of spindle to top of table	0"	0"	0"
FULL WIDTH			
Column to brace	30 1/4"	33 1/2"	38 1/4"
Column to inside of outer arbor support bushing—with brace in place	26 3/8"	29 3/8"	34 3/8"
OVERARM—Rectangular			
Distance from under-side to centerline of arbor	6 1/8"	7 3/8"	7 3/8"
ARBOR SUPPORTS—Self-oiling. (See standard equipment list page 37)			
Number	2	2	2
SPINDLE—Chrome nickel steel			
Flanged end with standard taper hole	No. 50	No. 50	No. 50
Diameter of nose	5 1/16"	5 1/16"	5 1/16"
Size of hole through	1 1/8"	1 1/8"	1 1/8"
Speeds, r.p.m. (twenty-one in approximate geometrical progression)	20, 25, 32, 39, 47, 59, 74, 92, 114, 142, 178, 220, 270, 333, 414, 515, 635, 780, 970, 1200, 1500	18, 22, 27, 34, 41, 51, 63, 78, 97, 122, 152, 188, 230, 286, 357, 445, 550, 675, 840, 1045, 1300	18, 22, 27, 34, 41, 51, 63, 78, 97, 122, 152, 188, 230, 286, 357, 445, 550, 675, 840, 1045, 1300
Reverse	Yes	Yes	Yes
FEEDS—Inches per minute			
Number of feeds	32	32	32
Standard Range—Table and cross feeds	1/2" to 40"	1/2" to 40"	1/2" to 40"
Low Series—1/2 to 20= 1/2, 5/8, 3/4, 1, 1 3/8, 1 3/4, 2 1/8, 2 3/4, 3 3/8, 4 5/8, 5 3/4, 7 1/8, 9 1/8, 12 3/8, 15 3/8, 20.			
High Series—1 to 40=1, 1 1/4, 1 1/2, 2, 2 3/4, 3 1/2, 4 1/4, 5 1/2, 7 1/4, 9 1/4, 11 1/2, 15 1/4, 19 3/4, 24 3/4, 30 3/4, 40.			
Full range of feeds is obtained by shifting auxiliary lever located on right side of machine (bracket of knee).			
Vertical feeds are 8/10 of table and cross feeds given above.			
OPERATING CONTROLS			
Hand cross, longitudinal and vertical adjustments	Front and Rear	Front and Rear	Front and Rear
Speed changes, by power	Front and Rear	Front and Rear	Front and Rear
Feed changes, by power	Front and Rear	Front and Rear	Front and Rear
Single independent cross, longitudinal and vertical power feeds	Front and Rear	Front and Rear	Front and Rear
Spindle start and stop	Front and Rear	Front and Rear	Front and Rear
Power rapid traverse in all directions with spindle stationary or running	Front and Rear	Front and Rear	Front and Rear
POWER RAPID TRAVERSE RATES. Inches per minute			
Longitudinal	100"	100"	100"
Cross	100"	100"	100"
Vertical	80"	80"	80"
DRIVE			
Pulley speed	600 r.p.m.	600 r.p.m.	600 r.p.m.
Horsepower rating (Also see "Electrical Equipment Specifications")	5-7 1/2 h.p.	7 1/2-10 h.p.	10-15 h.p.
LUBRICATION			
Column and knee	Automatic Oil Shot	Automatic Oil Shot	Automatic Oil Shot
Saddle and table			
CLUTCH	Multiple Disc, Oil	Multiple Disc, Oil	Multiple Disc, Oil
FLOOR SPACE	98"x97 3/4"	114"x114"	138"x118"
Area	66 sq. ft.	90 sq. ft.	113 sq. ft.
SHIPPING WEIGHTS AND DATA—All weights are for enclosed multiple "V" belt motor drive or chain motor drive, exclusive of motor and control equipment.			
Net weight	6,350 lbs.	8,480 lbs.	9,150 lbs.
Gross weight, domestic	7,350 lbs.	9,530 lbs.	10,500 lbs.
Gross weight, export	7,550 lbs.	9,880 lbs.	10,900 lbs.
Approximate size of case	88"x74"x52"	94"x80"x52"	100"x84"x54"
Approximate cubic feet	196	227	263
CODE NAME—Chain motor drive, exclusive of motor	HISDI	HISEE	HICIK
CODE NAME—Enclosed multiple "V" belt drive, exclusive of motor. (Supplied as standard equipment unless otherwise specified).	HIALP	HIBVE	HITIP

STANDARD EQUIPMENT—Listed on Page 37
EQUIPMENT SUPPLIED AT EXTRA COST—Listed on Page 38

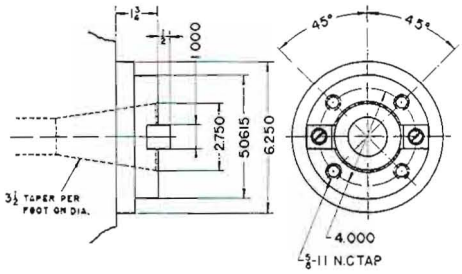
SPECIFICATIONS FOR CINCINNATI UNIVERSAL

DIMENSIONAL DRAWING





PC-337



SPINDLE NOSE

STANDARD FLANGED END WITH NO 50 SERIES TAPER

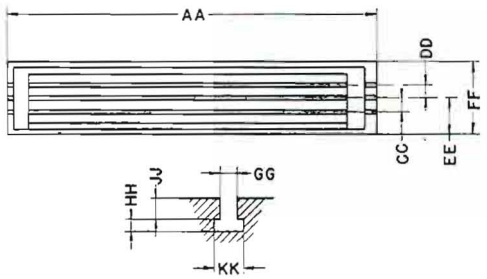
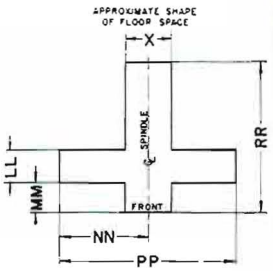


TABLE AND T-SLOT

PC-336



FLOOR PLAN

Size of Machine	A	B	C Min.	C Max.	D	E	F	J	K	L	M	N	P	R	S Min.	S Max.	T Min.	T Max.		Size of Machine
No. 2	30¼	6⅛	9½	19⅞	⅞	16½	32 1/16	50¼	46¼	19	26 1/16	4	4½	7⅜	0	18 1/16	22 1/16	50 11/16	.....	No. 2
No. 3	33½	7⅜	11 1/16	23 1/16	1 1/16	18¾	33 11/16	59	55	20¾	27½	4 1/16	6	8⅝	0	19 1/16	23¼	57¾	.....	No. 3
No. 4	38¼	7⅜	11 1/16	25⅞	1 1/16	22½	33 11/32	59	55	20¾	32 1/16	4 1/16	6	8⅝	0	19 1/16	27¼	69¾	.....	No. 4

Size of Machine	U Min.	U Max.	V	W	X	AA	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	RR	Size of Machine
No. 2	20¼	48¾	64 11/16	27½	30½	52 11/16	2 1/16	2 1/16	6	12¼	11/16	11/16	⅞	1¼	22⅝	19 1/16	50 11/16	99 11/16	99 1/16	No. 2
No. 3	23¼	57¾	70 1/16	29½	32½	62½	3¼	3¼	7½	15¼	11/16	⅝	1	1⅛	27½	17 1/16	57¾	115½	111¼	No. 3
No. 4	27¼	69¾	70 11/16	29½	32½	78½	3¼	3¼	8	16¼	11/16	⅝	1	1 1/16	30 1/16	19 1/16	69¾	139½	119⅞	No. 4

HIGH-SPEED DIAL TYPE MILLING MACHINES

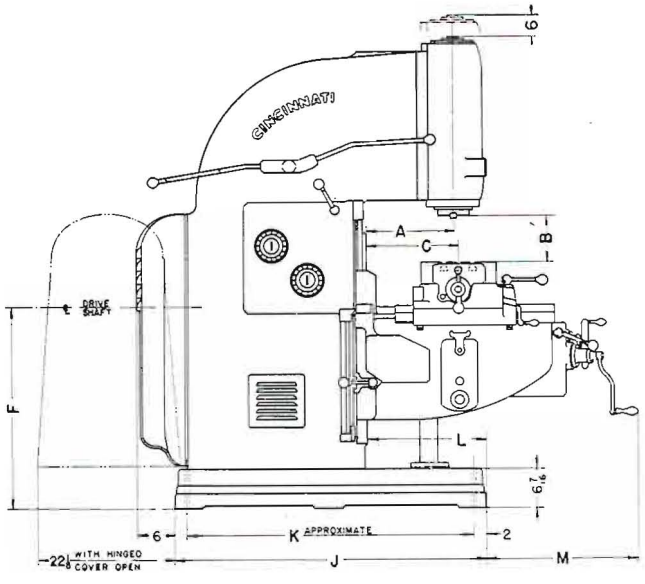
GENERAL SPECIFICATIONS (MODEL ER)

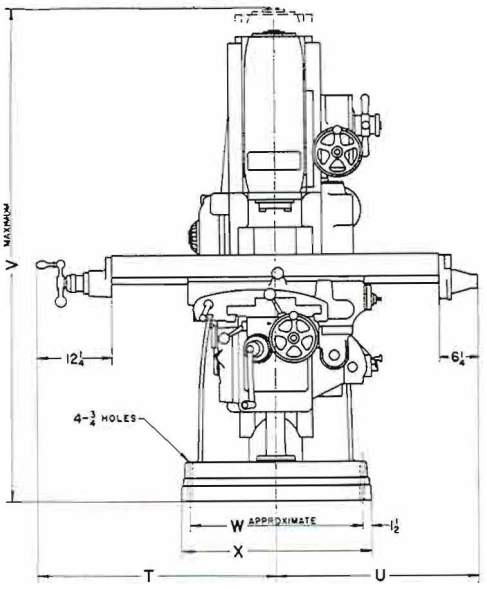
	No. 2 Universal	No. 3 Universal	No. 4 Universal
TABLE			
Working surface	52 11/16"x12 1/4"	62 1/2"x15 1/4"	78 1/2"x16 1/4"
Size over all	52 11/16"x12 1/4"	62 1/2"x15 1/4"	78 1/2"x16 1/4"
T-slots (number and size)	Three—11/16"	Three—11/16"	Three—11/16"
Distance between T-slots	2 1/16"	3 1/4"	3 1/4"
Swivels—Right or left	45°	47°	49°
RANGE			
Longitudinal	28"	34"	42"
Cross	10"	12"	14"
Vertical	18"	19"	19"
Maximum distance from centerline of spindle to top of table	18 1/16"	19 1/16"	19 1/16"
Minimum distance from centerline of spindle to top of table	0"	0"	0"
FULL WIDTH			
Column to brace	30 1/4"	32 1/2"	38 1/2"
Column to inside of outer arbor support bushing—with brace in place	26 5/8"	29 5/8"	34 5/8"
OVERARM—Rectangular			
Distance from under-side to centerline of arbor	6 1/8"	7 3/8"	7 1/8"
ARBOR SUPPORTS—Self-oiling. (See standard equipment list page 37)			
Number	2	2	2
DIVIDING HEAD. (See standard equipment list page 37)			
Swing	10"	12"	14"
Take in length	28"	36 1/2"	52 1/2"
Lead range with standard driving mechanism	2 1/2" to 100"	2 1/2" to 100"	2 1/2" to 100"
SPINDLE—Chrome nickel steel			
Flanged end with standard taper hole	No. 50	No. 50	No. 50
Diameter of nose	5 1/16"	5 1/16"	5 1/16"
Size of hole through	1 1/4"	1 5/8"	1 5/8"
Speeds, r.p.m. (twenty-one in approximate geometrical progression)	20, 25, 32, 39, 47, 59, 74, 92, 114, 142, 178, 220, 270, 333, 414, 515, 635, 780, 970, 1200, 1500	18, 22, 27, 34, 41, 51, 63, 78, 97, 122, 152, 188, 230, 286, 357, 445, 550, 675, 840, 1045, 1300	18, 22, 27, 34, 41, 51, 63, 78, 97, 122, 152, 188, 230, 286, 357, 445, 550, 675, 840, 1045, 1300
Reverse	Yes	Yes	Yes
FEEDS—Inches per minute			
Number of feeds	32	32	32
Standard Range—Table and cross feeds	1/2" to 40"	1/2" to 40"	1/2" to 40"
Low Series—1/2 to 20=1/2, 5/8, 3/4, 1, 1 3/8, 1 3/4, 2 1/4, 2 3/4, 3 1/2, 4 5/8, 5 3/4, 7 1/8, 9 1/8, 12 1/8, 15 1/8, 20.			
High Series—1 to 40=1, 1 1/4, 1 1/2, 2, 2 3/4, 3 1/2, 4 1/4, 5 1/2, 7 1/4, 9 1/4, 11 1/2, 15 1/4, 19 3/4, 24 3/4, 30 3/4, 40.			
Full range of feeds is obtained by shifting an auxiliary lever located on right side of machine (bracket on knee).			
Vertical feeds are 8/10 of table and cross feeds given above.			
OPERATING CONTROLS			
Hand cross, longitudinal and vertical adjustments	Front and Rear	Front and Rear	Front and Rear
Speed changes, by power	Front and Rear	Front and Rear	Front and Rear
Feed changes, by power	Front and Rear	Front and Rear	Front and Rear
Single independent cross, longitudinal and vertical power feeds	Front and Rear	Front and Rear	Front and Rear
Spindle start and stop	Front and Rear	Front and Rear	Front and Rear
Power rapid traverse in all directions with spindle stationary or running	Front and Rear	Front and Rear	Front and Rear
POWER RAPID TRAVERSE RATES—Inches per minute			
Longitudinal	100"	100"	100"
Cross	100"	100"	100"
Vertical	80"	80"	80"
DRIVE			
Pulley—Speed	600 r.p.m.	600 r.p.m.	600 r.p.m.
Horsepower rating (Also see "Electrical Equipment Specifications")	5-7 1/2 h.p.	7 1/2-10 h.p.	10-15 h.p.
LUBRICATION			
Column and knee	Automatic Oil-Shot	Automatic Oil-Shot	Automatic Oil-Shot
Saddle and table			
CLUTCH	Multiple Disc, Oil	Multiple Disc, Oil	Multiple Disc, Oil
FLOOR SPACE	98"x97 1/16"	114"x114"	138"x118"
Area	66 sq. ft.	90 sq. ft.	113 sq. ft.
SHIPPING WEIGHTS AND DATA—All weights are for enclosed multiple "V" belt motor drive or chain motor drive, exclusive of motor and control equipment.			
Net weight	6,700 lbs.	9,100 lbs.	10,100 lbs.
Gross weight	7,800 lbs.	10,400 lbs.	11,500 lbs.
Gross weight, export	8,000 lbs.	10,750 lbs.	11,900 lbs.
Approximate size of case	88"x74"x52"	94"x80"x52"	100"x84"x64"
Approximate cubic feet	196	227	312
CODE NAME—Chain motor drive, exclusive of motor	HISIA	HISGA	HISOJ
CODE NAME—Enclosed Multiple "V" belt drive, exclusive of motor. (Supplied as standard equipment unless otherwise specified.)	HIMUL	HIVEB	HIPLE

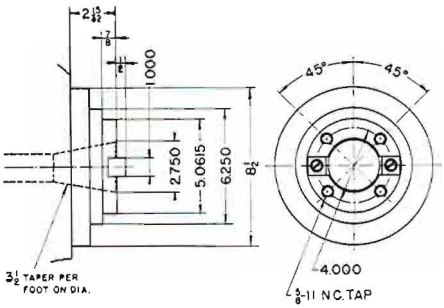
STANDARD EQUIPMENT—Listed on Page 37
EQUIPMENT SUPPLIED AT EXTRA COST—Listed on Page 38

SPECIFICATIONS FOR CINCINNATI VERTICAL

DIMENSIONAL DRAWING







SPINDLE NOSE

STANDARD FLANGED END WITH NO 50 SERIES TAPER

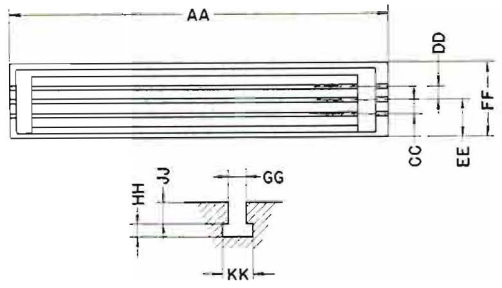
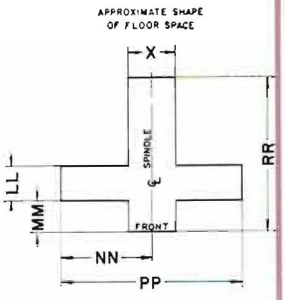


TABLE AND T-SLOT

PC-338



FLOOR PLAN

Size of Machine	A	*B Min.	*B Max.	C Min.	C Max.	F	J	K	L	M	T Min.	T Max.	U Min.	U Max.	V	W	Size of Machine
No. 2	14	0	18 11/32	9 5/16	21 1/2	33 11/32	50 1/4	46 1/4	19	26 7/16	22 5/16	50 5/16	20 5/8	49 1/8	78 11/32	27 1/2	No. 2
No. 3	18	0	22 11/32	10 11/32	27 1/8	38 3/8	59	55	20 3/4	30 5/16	27 1/4	57 3/4	23 1/4	57 3/4	85 1/4	29 1/2	No. 3
No. 4	18	0	22 11/32	11 1/4	27 1/2	38 3/8	59	55	20 3/4	30 5/16	27 1/4	69 3/4	27 1/4	69 3/4	85 1/4	29 1/2	No. 4

Size of Machine	X	AA	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	RR		Size of Machine
No. 2	30 1/2	52 11/32	2 5/16	2 5/16	6	12 1/4	11/32	11/32	7/8	1 1/4	24 5/16	17 11/32	50 5/16	99 11/32	98 1/4	.....	No. 2
No. 3	32 1/2	62 1/2	3 1/4	3 1/4	7 1/2	15 1/4	11/32	5/8	1	1 11/32	31 5/16	16 7/16	57 3/4	115 1/2	111 3/8	.....	No. 3
No. 4	32 1/2	78 1/2	3 1/4	3 1/4	8	16 1/4	11/32	5/8	1	1 11/32	32 1/2	15 5/16	69 3/4	139 1/2	111 3/8	.....	No. 4

*NOTE—MAXIMUM dimension "B" is with head in extreme up position and knee in extreme down position. Both units are reversed for MINIMUM dimension "B".

HIGH-SPEED DIAL TYPE MILLING MACHINES

GENERAL SPECIFICATIONS (MODEL ER)

	No. 2 Vertical	No. 3 Vertical	No. 4 Vertical
TABLE			
Working surface	52 11/16"x12 1/4"	62 1/2"x15 1/4"	78 1/2"x16 1/4"
Size over all	52 11/16"x12 1/4"	62 1/2"x15 1/4"	78 1/2"x16 1/4"
T-slots (number and size)	Three—11/16"	Three—13/16"	Three—13/16"
Distance between T-slots	2 1/16"	3 1/4"	3 1/4"
RANGE			
Longitudinal	28"	34"	42"
Cross	12"	16"	16"
Vertical	13"	16"	16"
Head travel	6"	6"	6"
Distance from spindle nose to top of table	18"	22"	22"
Throat distance, centerline of spindle to column	14"	18"	18"
SPINDLE—Chrome nickel steel			
Flanged end with standard taper hole	No. 50	No. 50	No. 50
Diameter of nose	5 1/16"	5 1/16"	5 1/16"
Size of hole through	1 1/8"	1 1/8"	1 1/8"
Speeds, r.p.m. (twenty-one in approximate geometrical progression)	20, 25, 32, 39, 47, 59, 74, 92, 114, 142, 178, 220, 270, 333, 414, 515, 635, 780,970,1200,1500	18, 22, 27, 34, 41, 51, 63, 78, 97, 122, 152, 188, 230, 286, 357, 445, 550, 675, 840, 1045, 1300	18, 22, 27, 34, 41, 51, 63, 78, 97, 122, 152, 188, 230, 286, 357, 445, 550, 675, 840, 1045, 1300
Reverse	Yes	Yes	Yes
FEEDS—Inches per minute			
Number of feeds	32	32	32
Standard Range—Table and cross feeds	1/2" to 40"	1/2" to 40"	1/2" to 40"
Low Series—1/2 to 20= 1/2, 5/8, 3/4, 1, 1 1/8, 1 3/4, 2 1/2, 2 3/4, 3 5/8, 4 3/8, 5 3/4, 7 5/8, 9 7/8, 12 1/8, 15 3/8, 20.			
High Series—1 to 40=1, 1 1/4, 1 1/2, 2, 2 3/4, 3 1/2, 4 1/4, 5 1/2, 7 1/4, 9 1/4, 11 1/2, 15 1/4, 19 3/4, 24 3/4, 30 3/4, 40.			
Full range of feeds is obtained by shifting an auxiliary lever located on right side of machine (bracket on knee).			
Vertical feeds are 8/10 of table and cross feeds given above.			
OPERATING CONTROLS			
Hand cross and vertical adjustments	Front	Front	Front
Hand longitudinal adjustment	Front and Rear	Front and Rear	Front and Rear
Speed changes, by power	Front and Rear	Front and Rear	Front and Rear
Feed changes, by power	Front and Rear	Front and Rear	Front and Rear
Single independent cross and vertical power feeds	Front	Front	Front
Single independent longitudinal power feed	Front and Rear	Front and Rear	Front and Rear
Spindle start and stop	Front and Rear	Front and Rear	Front and Rear
Power rapid traverse in all directions with spindle stationary or running	Front and Rear	Front and Rear	Front and Rear
Rear hand adjustments, cross and vertical; rear power feed controls, cross and vertical are supplied only on request and at extra cost.			
POWER RAPID TRAVERSE RATES—Inches per minute			
Longitudinal	100"	100"	100"
Cross	100"	100"	100"
Vertical	80"	80"	80"
POWER TRAVERSE TO HEAD. (Supplied at extra cost)			
Number of feeds	16	16	16
Feed rates	.6 Dial Readings	.6 Dial Readings	.6 Dial Readings
Feed range	.3" to 12"	.3" to 12"	.3" to 12"
Rapid traverse rate (inches per minute)	31	31	31
DRIVE			
Pulley speed	600 r.p.m.	600 r.p.m.	600 r.p.m.
Horsepower rating. (Also see "Electrical Equipment Specifications")	5-7 1/2 h.p.	7 1/2-10 h.p.	10-15 h.p.
LUBRICATION			
Column and knee	Automatic	Automatic	Automatic
Saddle and table	Oil-Shot	Oil-Shot	Oil-Shot
CLUTCH	Multiple Disc, Oil	Multiple Disc, Oil	Multiple Disc, Oil
FLOOR SPACE	98"x79 11/16"	114"x93 5/8"	138"x95"
Area	54.3 sq. ft	74.1 sq. ft.	91 sq. ft.
SHIPPING WEIGHTS AND DATA—All weights are for enclosed multiple "V" belt motor drive or chain motor drive, exclusive of motor and control equipment.			
Net weight	7,100 lbs.	9,300 lbs.	9,950 lbs.
Gross weight, domestic	8,300 lbs.	10,200 lbs.	10,800 lbs.
Gross weight, export	8,500 lbs.	10,900 lbs.	11,550 lbs.
Approximate size of case	88"x84"x52"	100"x90"x54"	100"x90"x54"
Approximate cubic feet	223	282	282
CODE NAME—Enclosed chain motor drive, exclusive of motor	HILAC	HISAR	HISHT
CODE NAME—Enclosed multiple "V" belt drive, exclusive of motor. (Supplied as standard equipment unless otherwise specified on order)	HIELT	HIOPT	HIQUI

STANDARD EQUIPMENT—Listed on Page 37
EQUIPMENT SUPPLIED AT EXTRA COST—Listed on Page 38

SPECIFICATIONS FOR CINCINNATI

PLAIN MEDIUM SPEED

GENERAL SPECIFICATIONS (MODEL ER)

	No. 2 Plain	No. 3 Plain	No. 4 Plain
TABLE			
Working surface	52 11/16" x 12 1/4"	62 1/2" x 15 1/4"	78 1/2" x 16 1/4"
Size over all	52 11/16" x 12 1/4"	62 1/2" x 15 1/4"	78 1/2" x 16 1/4"
T-slots (number and size)	Three—1 1/16"	Three—1 1/16"	Three—1 1/16"
Distance between T-slots	2 1/16"	3 1/4"	3 1/4"
RANGE			
Longitudinal	28"	34"	42"
Cross	10"	12"	14"
Vertical	19"	20"	20"
Maximum distance from centerline of spindle to top of table	19 1/16"	20 1/16"	20 1/16"
Minimum distance from centerline of spindle to top of table	0"	0	0"
FULL WIDTH			
Column to brace	30 1/4"	33 1/8"	38 1/4"
Column to inside of outer arbor support bushing—with brace in place	26 3/8"	29 5/8"	34 5/8"
OVERARM—Rectangular			
Distance to centerline of arbor	6 1/8"	7 3/8"	7 3/8"
ARBOR SUPPORTS—Self-oiling. (See standard equipment list on page 37)			
Number	2	2	2
SPINDLE—Chrome nickel steel			
Flanged end with standard taper hole	No. 50	No. 50	No. 50
Diameter of nose	5 1/16"	5 1/16"	5 1/16"
Size of hole through	1 1/8"	1 1/8"	1 1/8"
Speeds, r.p.m. (sixteen in approximate geometrical progression)	20, 26, 32, 40, 47, 60, 74, 92, 116, 141, 179, 222, 262, 331, 414, 500	18, 22, 27, 33, 40, 51, 63, 78, 96, 123, 151, 187, 223, 281, 350, 450	18, 22, 27, 33, 40, 51, 63, 78, 96, 123, 151, 187, 223, 281, 350, 450
Reverse	Yes	Yes	Yes
FEEDS—Inches per minute			
Number of feeds	16	16	16
Standard range—Table and cross feeds	1/2" to 20"	1/2" to 20"	1/2" to 20"
1/2, 5/8, 1, 1 3/8, 1 3/4, 2 1/8, 2 3/4, 3 3/8, 4 3/4, 5 3/4, 7 1/8, 9 7/8, 12 3/8, 15 3/4, 20. Vertical feeds are 8/10 of table and cross feeds given above.			
OPERATING CONTROLS			
Hand cross, longitudinal and vertical adjustments	Front and Rear	Front and Rear	Front and Rear
Speed changes, by power	Front and Rear	Front and Rear	Front and Rear
Feed changes, by power	Front and Rear	Front and Rear	Front and Rear
Single independent cross, longitudinal and vertical power feeds	Front and Rear	Front and Rear	Front and Rear
Spindle start and stop	Front and Rear	Front and Rear	Front and Rear
Power rapid traverse in all directions with spindle stationary or running	Front and Rear	Front and Rear	Front and Rear
POWER RAPID TRAVERSE RATES—Inches per minute. (For standard feed series machines).			
Longitudinal	100"	100"	100"
Cross	100"	100"	100"
Vertical	80"	80"	80"
DRIVE			
Pulley speed	600 r.p.m.	600 r.p.m.	600 r.p.m.
Horsepower rating. (Also see "Electrical Equipment Specifications")	5-7 1/2 h.p.	7 1/2-10 h.p.	10-15 h.p.
LUBRICATION			
Column and knee	Automatic Oil Shot	Automatic Oil Shot	Automatic Oil Shot
Saddle and table			
CLUTCH	Multiple Disc, Oil	Multiple Disc, Oil	Multiple Disc, Oil
FLOOR SPACE	98"x97 1/16"	114"x114"	138"x118"
Area	66 sq. ft	90 sq. ft.	113 sq. ft.
SHIPPING WEIGHTS AND DATA—All weights are for enclosed multiple "V" belt motor drive or chain motor drive, exclusive of motor and control equipment			
Net weight	6,250 lbs.	8,380 lbs.	9,050 lbs.
Gross weight, domestic	7,250 lbs.	9,430 lbs.	10,400 lbs.
Gross weight, export	7,450 lbs.	9,780 lbs.	10,800 lbs.
Approximate size of case	88"x74"x52"	94"x80"x52"	100"x84"x54"
Approximate cubic feet	196	227	263
CODE NAME—Enclosed chain motor drive, exclusive of motor	TOOMO	IMRIC	IMLEC
CODE NAME—Enclosed multiple "V" belt drive, exclusive of motor. (Supplied as standard equipment unless otherwise specified on order.)	TUALP	IMALP	IMENC

DIMENSIONAL DRAWING—Same as shown on Page 28
STANDARD EQUIPMENT—Listed on Page 37
EQUIPMENT SUPPLIED AT EXTRA COST—Listed on Page 38

DIAL TYPE MILLING MACHINES

UNIVERSAL MEDIUM SPEED

GENERAL SPECIFICATIONS (MODEL ER)

	No. 2 Universal	No. 3 Universal	No. 4 Universal
TABLE			
Working surface	52 11/16"x12 1/4"	62 1/2"x15 1/4"	78 1/2"x16 1/4"
Size over all	52 11/16"x12 1/4"	62 1/2"x15 1/4"	78 1/2"x16 1/4"
T-slots (number and size)	Three—11/16"	Three—11/16"	Three—11/16"
Distance between T-slots	2 1/16"	3 1/4"	3 1/4"
Swivels—Right or left	45°	47°	49°
RANGE			
Longitudinal	28"	34"	42"
Cross	10"	12"	14"
Vertical	18"	19"	19"
Maximum distance from centerline of spindle to top of table	18 1/16"	19 1/16"	19 1/16"
Minimum distance from centerline of spindle to top of table	0"	0"	0"
FULL WIDTH			
Column to brace	30 1/4"	33 1/2"	38 1/4"
Column to inside of outer arbor support bushing—with brace in place	26 3/8"	29 3/8"	34 1/8"
OVERARM—Rectangular			
Distance to centerline of arbor	6 1/8"	7 3/8"	7 3/8"
ARBOR SUPPORTS—Self-oiling. (See standard equipment list on page 37)			
Number	2	2	2
DIVIDING HEAD. (See standard equipment list on page 37)			
Swing	10"	12"	14"
Take in length	28"	36 1/2"	52 1/2"
Lead range with standard driving mechanism	2 1/2" to 100"	2 1/2" to 100"	2 1/2" to 100"
SPINDLE—Chrome nickel steel			
Flanged end with standard taper hole	No. 50	No. 50	No. 50
Diameter of nose	5 1/16"	5 1/16"	5 1/16"
Size of hole through	1 1/8"	1 1/8"	1 1/8"
Speeds, r.p.m. (sixteen in approximate geometrical progression)	20, 26, 32, 40, 47, 60, 74, 92, 116, 144, 179, 222, 262, 331, 414, 500	18, 22, 27, 33, 40, 51, 63, 78, 96, 123, 151, 187, 223, 281, 350, 450	18, 22, 27, 33, 40, 51, 63, 78, 96, 123, 151, 187, 223, 281, 350, 450
Reverse	Yes	Yes	Yes
FEEDS—In inches per minute			
Number of feeds	16	16	16
Standard range—Table and cross feeds	1/2" to 20"	1/2" to 20"	1/2" to 20"
1/2, 5/8, 3/4, 1, 1 3/8", 1 3/4, 2 1/8, 2 3/4, 3 1/4, 4 1/4, 5 1/4, 7 1/8, 9 1/8, 12 3/8, 15 3/8, 20. Vertical feeds are 8/10 of table and cross feeds given above.			
OPERATING CONTROLS			
Hand cross, longitudinal and vertical adjustments	Front and Rear	Front and Rear	Front and Rear
Speed changes, by power	Front and Rear	Front and Rear	Front and Rear
Feed changes, by power	Front and Rear	Front and Rear	Front and Rear
Single independent cross, longitudinal and vertical power feeds	Front and Rear	Front and Rear	Front and Rear
Spindle start and stop	Front and Rear	Front and Rear	Front and Rear
Power rapid traverse in all directions with spindle stationary or running	Front and Rear	Front and Rear	Front and Rear
POWER RAPID TRAVERSE RATES—Inches per minute. (For standard feed series machines).			
Longitudinal	100"	100"	100"
Cross	100"	100"	100"
Vertical	80"	80"	80"
DRIVE			
Pulley speed	600 r.p.m.	600 r.p.m.	600 r.p.m.
Horsepower rating. (Also see "Electrical Equipment Specifications")	5-7 1/2 h.p.	7 1/2-10 h.p.	10-15 h.p.
LUBRICATION			
Column and knee	Automatic Oil-Shot	Automatic Oil-Shot	Automatic Oil-Shot
Saddle and table			
CLUTCH	Multiple Disc, Oil	Multiple Disc, Oil	Multiple Disc, Oil
FLOOR SPACE	98"x97 1/16"	114"x114"	138"x118"
Area	66 sq. ft.	90 sq. ft.	113 sq. ft.
SHIPPING WEIGHTS AND DATA—All weights are for enclosed multiple "V" belt motor drive or chain motor drive, exclusive of motor and control equipment.			
Net weight	6,600 lbs.	9,000 lbs.	10,000 lbs.
Gross weight, domestic	7,700 lbs.	10,300 lbs.	11,400 lbs.
Gross weight, export	7,900 lbs.	10,650 lbs.	11,800 lbs.
Approximate size of case	88"x74"x52"	94"x80"x52"	100"x84"x64"
Approximate cubic feet	196	227	312
CODE NAME—Enclosed chain motor drive, exclusive of motor	TULEC	IMDRI	IMFYZ
CODE NAME—Enclosed multiple "V" belt drive, exclusive of motor (Supplied as standard equipment unless otherwise specified on order.)	TUMUL	IMUVB	IMELD

DIMENSIONAL DRAWING—Same as shown on Page 30
STANDARD EQUIPMENT—Listed on Page 37
EQUIPMENT SUPPLIED AT EXTRA COST—Listed on Page 38

SPECIFICATIONS FOR CINCINNATI

VERTICAL MEDIUM SPEED

GENERAL SPECIFICATIONS (MODEL ER)

	No. 2 Vertical	No. 3 Vertical	No. 4 Vertical
TABLE			
Working surface	52 11/16"x12 1/4"	62 1/2"x15 1/4"	78 1/2"x16 1/4"
Size over all	52 11/16"x12 1/4"	62 1/2"x15 1/4"	78 1/2"x16 1/4"
T-slots (number and size)	Three—11/16"	Three—1/2"	Three—11/16"
Distance between T-slots	2 1/16"	3 1/4"	3 1/4"
RANGE			
Longitudinal	28"	34"	42"
Cross	12"	16"	16"
Vertical	13"	16"	16"
Head travel	6"	6"	6"
Distance from spindle nose to top of table	18"	22"	22"
Throat distance, centerline of spindle to column	14"	18"	18"
SPINDLE—Chrome nickel steel			
Flanged end with standard taper hole	No. 50	No. 50	No. 50
Diameter of nose	5 1/16"	5 1/16"	5 1/16"
Size of hole through	1 1/8"	1 1/8"	1 1/8"
Speeds, r.p.m. (Sixteen in approximate geometrical progression)	20, 26, 32, 40, 47, 60, 74, 92, 116, 141, 179, 222, 262, 331, 414, 500	18, 22, 27, 33, 40, 51, 63, 78, 96, 123, 151, 187, 223, 281, 350, 450	18, 22, 27, 33, 40, 51, 63, 78, 96, 123, 151, 187, 223, 281, 350, 450
Reverse	Yes	Yes	Yes
FEEDS—Inches per minute			
Number of feeds	16	16	16
Standard range—Table and cross feeds	1/2" to 20"	1/2" to 20"	1/2" to 20"
1/2, 5/8, 3/4, 1, 1 1/8, 1 1/4, 2 1/8, 2 3/4, 3 1/8, 4 5/8, 5 3/4, 7 1/4, 9 1/8, 12 3/8, 15 1/8, 20. Vertical feeds are 8/10 of table and cross feeds given above.			
OPERATING CONTROLS			
Hand cross and vertical adjustments	Front	Front	Front
Hand longitudinal adjustment	Front and Rear	Front and Rear	Front and Rear
Speed changes, by power	Front and Rear	Front and Rear	Front and Rear
Feed changes, by power	Front and Rear	Front and Rear	Front and Rear
Single independent cross and vertical power feeds	Front	Front	Front
Single independent longitudinal power feed	Front and Rear	Front and Rear	Front and Rear
Spindle start and stop	Front and Rear	Front and Rear	Front and Rear
Power rapid traverse in all directions with spindle stationary or running	Front and Rear	Front and Rear	Front and Rear
Rear hand adjustments, cross and vertical; rear power feed controls, cross and vertical, are supplied only on request and at extra cost.			
POWER RAPID TRAVERSE RATES. Inches per minute. (For standard feed series machines).			
Longitudinal	100"	100"	100"
Cross	100"	100"	100"
Vertical	80"	80"	80"
POWER TRAVERSE TO HEAD. (Supplied at extra cost)			
Number of feeds	16	16	16
Feed rates, for machines having standard table feeds	1/2 Dial Readings	1/2 Dial Readings	1/2 Dial Readings
Feed rates, for machines having low table feeds	Same as Dial Readings	Same as Dial Readings	Same as Dial Readings
Feed range	1/4" to 10"	1/4" to 10"	1/4" to 10"
Rapid traverse rate, inches per minute	44	44	44
DRIVE			
Pulley speed	600 r.p.m.	600 r.p.m.	600 r.p.m.
Horsepower rating. (Also see "Electrical Equipment Specifications")	5-7 1/2 h.p.	7 1/2-10 h.p.	10-15 h.p.
LUBRICATION			
Column and knee	Automatic Oil-Shot	Automatic Oil-Shot	Automatic Oil-Shot
Saddle and table			
CLUTCH	Multiple Disc, Oil	Multiple Disc, Oil	Multiple Disc, Oil
FLOOR SPACE	98"x79 1/16"	114"x93 5/16"	138"x95"
Area	54.3 sq. ft.	74.1 sq. ft.	91 sq. ft.
SHIPPING WEIGHTS AND DATA—All weights are for enclosed multiple "V" belt motor drive or chain motor drive, exclusive of motor and control equipment.			
Net weight	7,050 lbs.	9,200 lbs.	9,850 lbs.
Gross weight, domestic	8,200 lbs.	10,100 lbs.	10,700 lbs.
Gross weight, export	8,400 lbs.	10,800 lbs.	11,450 lbs.
Approximate size of case	88"x84"x52"	100"x90"x54"	100"x90"x54
Approximate cubic feet	223	282	282
CODE NAME—Enclosed chain motor drive, exclusive of motor	TUTOO	IMRYE	IFORV
CODE NAME—Enclosed multiple "V" belt drive, exclusive of motor (Supplied as standard equipment unless otherwise specified on order)	TUVEB	IMEVE	IMMUL

DIMENSIONAL DRAWING—Same as shown on Page 32
STANDARD EQUIPMENT—Listed on Page 37
EQUIPMENT SUPPLIED AT EXTRA COST—Listed on Page 38

DIAL TYPE MILLING MACHINES

STANDARD EQUIPMENT—Supplied with the Machine

PLAIN MACHINES—High-Speed and Medium Speed

ARBOR SUPPORTS No. 2 Millers—one Style "B" with 2⅛" adjustable arbor bushing and provided with lug for brace—one Style "A" with adjustable arbor bushing for pilot end arbors. Nos. 3 and 4 Millers—one Style "B" with 2⅛" adjustable arbor bushing without lug for brace—one style "B" with 2⅛" adjustable arbor bushing and provided with lug for brace.

ADJUSTABLE ARBOR TIGHTENING ROD.

STANDARD FEED RANGE—High speed machines, ½" to 40". Medium speed machines, ½" to 20".

ARBOR SUPPORT BUSHING ADAPTER M-01 (includes adjustable bushing, nut, washer and screw) for Style "A" arbors, Nos. 3 and 4 Machines only.

WRENCHES. COOLANT PUMP.

OVERARM BRACE.

UNIVERSAL MACHINES—High-Speed and Medium Speed

ARBOR SUPPORTS No. 2 Millers—one Style "B" with 2⅛" adjustable arbor bushing and provided with lug for brace—one Style "A" with adjustable arbor bushing for pilot end arbors. Nos. 3 and 4 Millers—one Style "B" with 2⅛" adjustable arbor bushing without lug for brace—one Style "B" with 2⅛" adjustable arbor bushing and provided with lug for brace.

ARBOR SUPPORT BUSHING ADAPTER M-01 (includes adjustable bushing, nut, washer and screw) for Style "A" arbors, Nos. 3 and 4 Machines only.

ADJUSTABLE ARBOR TIGHTENING ROD.

STANDARD FEED RANGE—High speed machines, ½" to 40". Medium speed machines, ½" to 20".

STANDARD UNIVERSAL DIVIDING HEAD EQUIPMENT, including tailstock with 2-point adjustable center; steady rest; one plate for indexing through 40 to 1 reduction—all numbers up to and including 60, all even numbers and those divisible by 5 up to 120, and many beyond; one plate for direct indexing; one center for headstock; and provision for connecting head to enclosed driving mechanism segment. Sizes (nominal swing): 10" for No. 2 Machine; 12" for No. 3 Machine; 14" for No. 4 Machine.

ENCLOSED DRIVING MECHANISM SEGMENT, including change gears for spiral milling, leads range from 2½" to 100" (only) for Standard Universal Dividing Heads.

WRENCHES. COOLANT PUMP.

OVERARM BRACE.

VERTICAL MACHINES—High-Speed and Medium Speed

ADJUSTABLE ARBOR TIGHTENING ROD

WRENCHES COOLANT PUMP

STANDARD FEED RANGE—High speed machines, ½" to 40". Medium speed machines, ½" to 20".

SPECIFICATIONS FOR CINCINNATI

EQUIPMENT SUPPLIED AT EXTRA COST (Not Included in Price of Standard (Basic) Machine)

For Medium Speed and High-Speed Machines

(See pages 22-27 for illustrations and brief descriptions)

PLAIN, UNIVERSAL AND VERTICAL MACHINES

1. *TABLE AND CROSS FEEDS:
   (a) For Medium Speed Machines, sixteen; ¼ to 10 or ¾ to 30 inches per minute.
   (b) For High-Speed Machines, thirty-two; ¼ to 20 inches per minute.
2. WIDE RANGE DIVIDER (applied to Standard Universal Dividing Head) for divisions from 2 to 400,000, hundreds of them exact and others compensated for the fractional remainder.
3. VISES, CHUCKS AND CHUCK ADAPTERS.
4. ARBORS, ADAPTERS, COLLETS, QUICK CHANGE ADAPTERS, Etc.
5. STANDARD ATTACHMENTS, High-Speed Universal, Heavy Vertical, Universal Spiral, Rack Milling, Slotting, Circular Milling, Cam Milling, High Number Indexing Attachment for Dividing Head, Spiral Milling Head, etc.
6. INDEX BASES, RAISING BLOCKS, RIGHT ANGLE PLATES.
7. PRECISION MEASURING EQUIPMENT. (Recommended for short dimensions only.)
8. PUMP, CUTTER COOLANT, individually motor driven, including ¼ H.P. motor, manual starter and piping. Code Name.....PUDIA
9. ELECTRICAL MOTOR AND CONTROL EQUIPMENT.
10. SPLASH GUARDS.

PLAIN AND UNIVERSAL MACHINES ONLY

1. ARBOR SUPPORTS:
   (a) Style "B" with 2⅛" adjustable arbor bushing without lugs for brace for use on No. 2 machines. Code Name.....ARBBS
   (b) Style "B" with 2⅛" adjustable arbor bushing without lug for braces for Nos. 3 and 4 Machines. Code Name.....AJUSB
   (c) Style "A" with adjustable arbor bushing, for pilot end arbors: No. 3 Machine. Code Name.....ARTMY; No. 4 Machine. Code Name.....ARMMF

PLAIN AND VERTICAL MACHINES ONLY

1. STANDARD UNIVERSAL DIVIDING HEAD AND EQUIPMENT, including tailstock with 2-point adjustable center; steady rest; one plate for indexing through 40 to 1 reduction—all numbers up to and including 60, all even numbers and those divisible by 5 up to 120, and many beyond those shown in the table of specification sheet; one plate for direct indexing; one center for headstock; and provision for connecting head to enclosed driving mechanism segment.

   10" size for No. 2 Machine. Code Name.....HUTER

   12" size for No. 3 Machine. Code Name.....HYDRA

   14" size for No. 4 Machine. Code Name.....HEDPA

2. ENCLOSED DRIVING MECHANISM SEGMENT, including change gears for spiral milling, leads ranging from 2½" to 100" (only) for Standard Universal Dividing Heads.

   No. 2 Machine. Code Name.....DREDT
   Nos. 3 and 4 Machines. Code Name, DREHS

VERTICAL MACHINES ONLY

1. POWER FEED AND POWER QUICK TRAVERSE to the Vertical Head.
2. TURRET STOP, four-position with dial indicator. Code Name (In Field).....TUMAC
   Code Name (Prior to Shipment).....FOPST
3. REAR HAND ADJUSTMENTS AND REAR POWER FEED CONTROLS: cross and vertical. Supplied at factory only. (Not supplied as standard equipment on Vertical Machines.)

UNIVERSAL MACHINES ONLY

1. LONG AND SHORT LEAD ATTACHMENT with a range .010 to 1000 inches or .024 to 2400 centimeters. Must be installed at factory before machine is shipped.
   No 2 Machine. Code Name.....LOSHO
   Nos. 3 and 4 Machines. Code Name, LONSH

*NOTE: These feeds are optional at the time the order is placed. When machines are equipped with the low ranges of feeds (¼" to 10" for the Medium Speed machines and ¼" to 20" for the High-Speed machines), rapid traverse rates are cut in half.

DIAL TYPE MILLING MACHINES

ELECTRICAL EQUIPMENT

The motors and controls listed below are suitable for the machines illustrated and described in this booklet.

CHARACTERISTICS

Current	Cycles	Phase	Voltage	Speed R.P.M.
A. C.	60	2 or 3	220/440/550	1800
A. C.	50	2 or 3	220/440/550	1500
A. C.	50	2 or 3	380/500/Etc.	1500
A. C.	25	2 or 3	220/440/550	1500
D. C.	..	.....	115 or 230	1750

MOTOR HORSE POWER AND FRAME SIZES

No. 2 Machine		Nos. 2 and 3 Machines		Nos. 3 and 4 Machines		No. 4 Machine	
H. P.	N. E. M. A. Frame	H. P.	N. E. M. A. Frame	H. P.	N. E. M. A. Frame	H. P.	N. E. M. A. Frame
5	254	7½	284	10	324	15	326
5	254	7½	284	10	324	15	326
5	254	7½	284	10	324	15	326
5	284	7½	*326	10	364	15	365
5	...	7½	...	10	...	15	...

*7½ H. P. motor, totally enclosed ball bearing, frame No. 326, can not be used on No. 2 Dial Type.

Open frame ball bearing motors are recommended.

Motors larger than the following can not be used:

No. 2 Dial Type—N.E.M.A. frame 326.
No. 3 Dial Type—N.E.M.A. frame 364.
No. 4 Dial Type—N.E.M.A. frame 365.

A. C. MOTORS—Standard make, N.E.M.A. frame, normal torque, low starting current (normal starting current for 5 h.p. motors), floor mounted with conduit box on left viewing shaft end.

D. C. MOTORS—Standard make, shunt wound, constant speed, 40° C. continuous, open, rotation clockwise viewing shaft end, floor mounted with conduit box on left viewing shaft end.

A. C. CONTROLS—Standard make, enclosed type, full voltage magnetic starter with thermal overload protection. For all A. C. circuits over 220 volts, a control transformer and 110 volt coils are included to provide low voltage at the push button station—a safety feature.

D. C. CONTROLS—Standard make, enclosed type magnetic starter with definite time acceleration, thermal overload protection and without dynamic braking.

PUSH BUTTON STATION—Separate "Start-Stop" included with A. C. or D. C. controls.

ORDERING INSTRUCTIONS — The following electrical data must accompany each order:

(a) Voltage.

(b) Current (A. C. or D. C.). If A. C., also include:

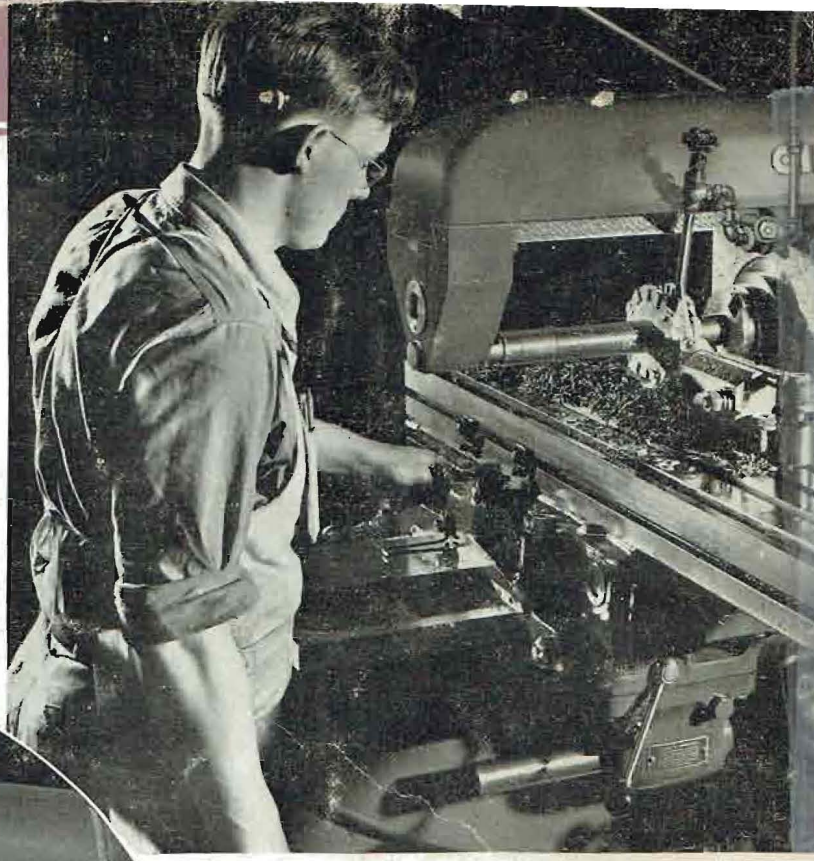
1. Phase.
2. Cycle.
3. Control circuit voltage.

(d) Horsepower, speed, and type of frame (open or totally enclosed) and motor bearing.

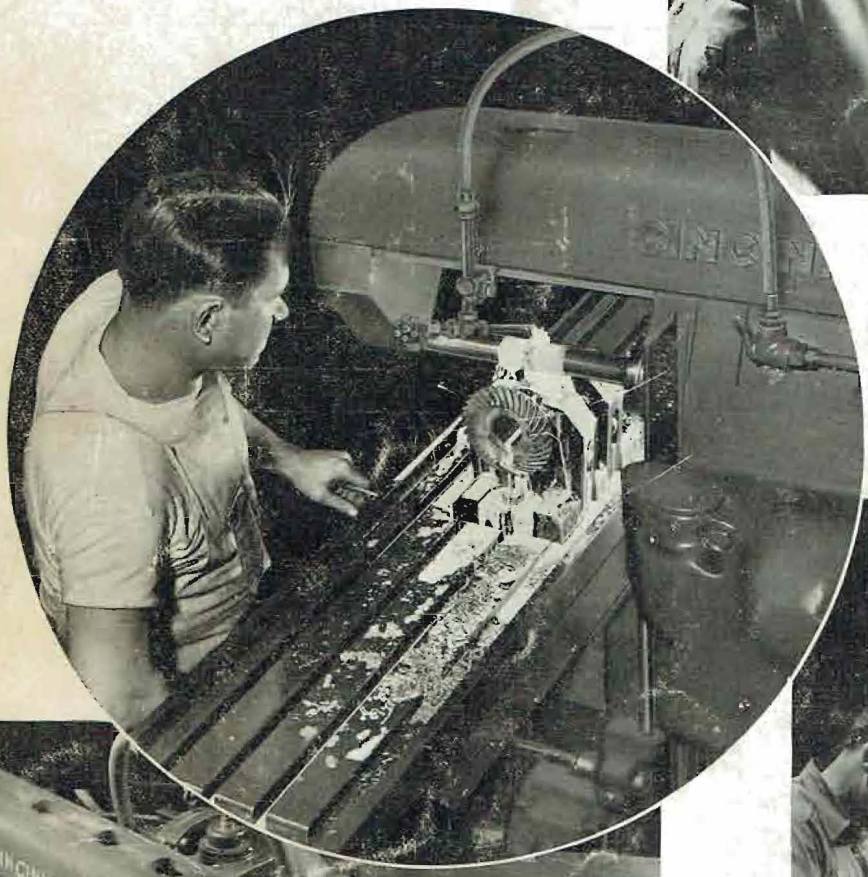
CINCINNATI

Dial Types in the Field . . .

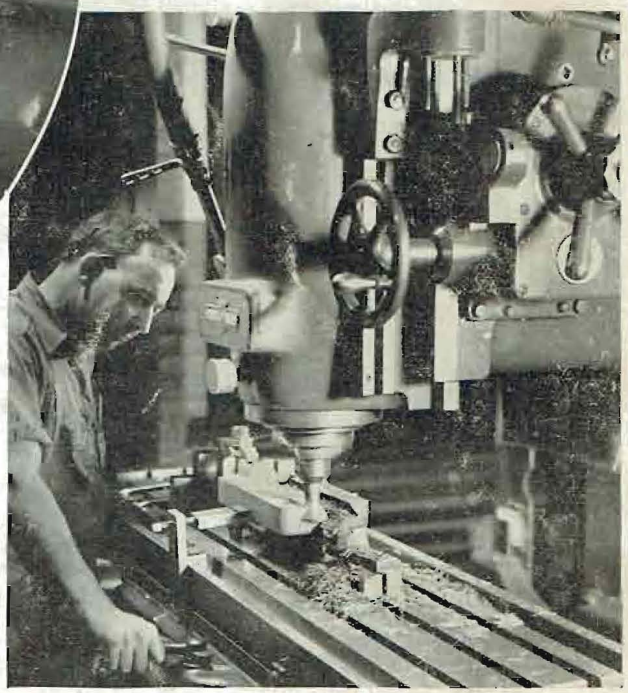
Right—A heavy stock removal job on a No. 2 Plain High Speed Machine. Milling two sides of extension supports, reducing a spherical shape of $1\frac{3}{4}$" diameter to a width of $\frac{13}{16}$".

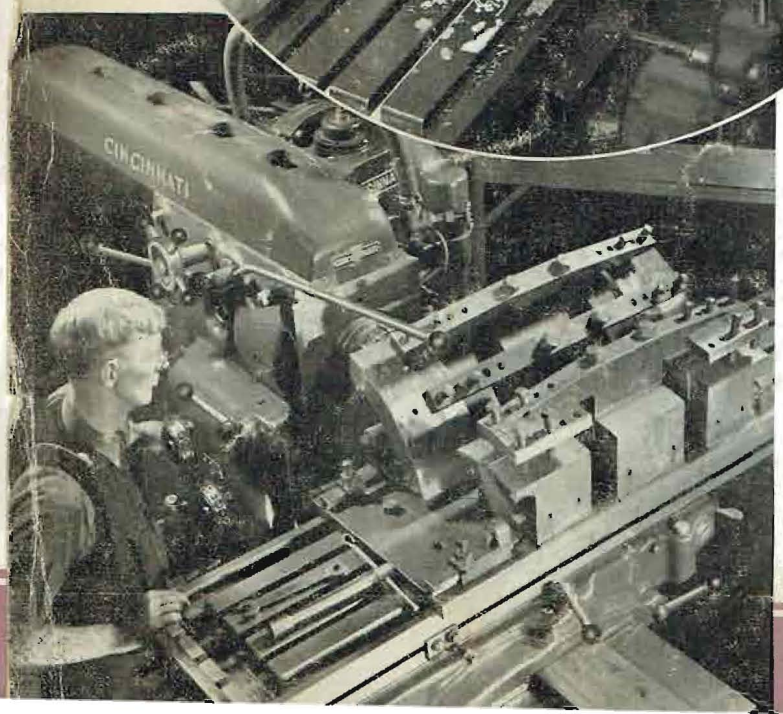


Below—Milling the keyway in a heat-treated bevel gear. High Speed Dial Type Millers have the wide range of speeds and feeds so necessary in shops where one lot of parts may be tough, hard steel and the next lot soft aluminum.



Below—A No. 3 Vertical Dial Type roughs and finishes, from the solid, a cast iron dovetail slide. The turret stop attachment at the side of the vertical head assures a close limit of accuracy between the dovetail and the top surface.





Left—The operator can always see the job on a Horizontal Dial Type, because there are complete front and rear controls. This No. 4 Plain Dial Type faces both ends of the shell section of a tire building drum.

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