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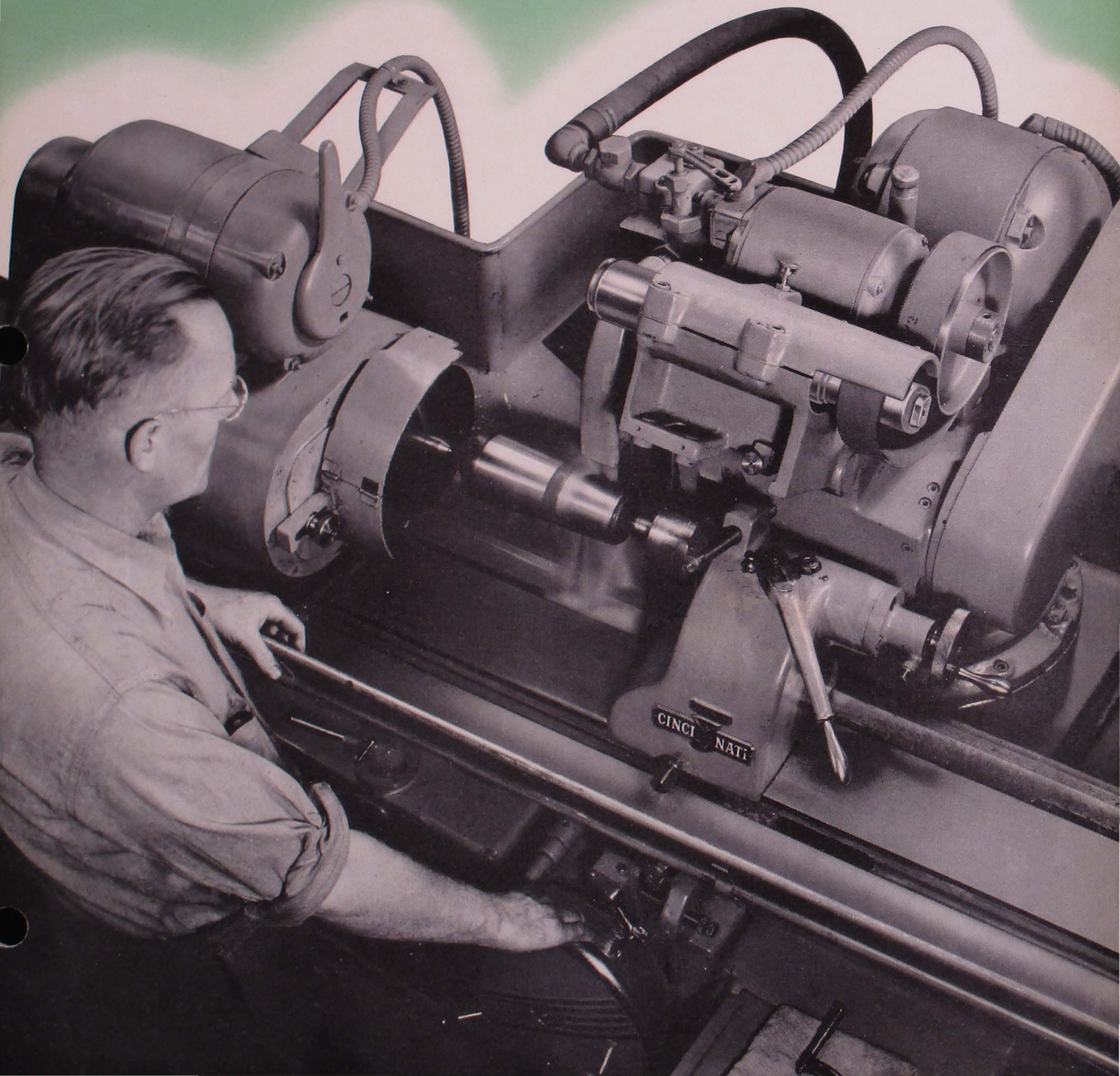
Cincinnati FILMATIC

# 12" HYDRAULIC UNIVERSAL GRINDING MACHINES

CINCINNATI GRINDERS INCORPORATED, CINCINNATI 9, OHIO, U. S. A.



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# 12″ HYDRAULIC UNIVERSAL GRINDING MACHINES

Basic standards for your tool room grinding operations may be raised to new levels of refinement and economy with CINCINNATI Hydraulic Universal Grinding Machines. For example, finish and accuracy tolerances much better than accepted standards may be obtained without special preparation. Then there's the factor of physical effort. It has been minimized by combining the control of three functions with the movement of one lever (the starting and stopping of the coolant flow, work rotation and table traverse are all controlled with the start-stop lever) and by placing the control levers within easy reach from the operator's normal working position. This convenient grouping of controls, along with other important design factors such as two-speed hand table traverse and cross traverse, naturally lowers the fatigue factor of all-day operation, and gives these grinding machines an exceptionally high value for precision cylindrical grinding in the tool room.

## THE COVER

Grinding the taper on a center for a roll grinder. Convenient swivel table adjustment and independent right- and left-hand tarry control facilitate the grinding of taper work.

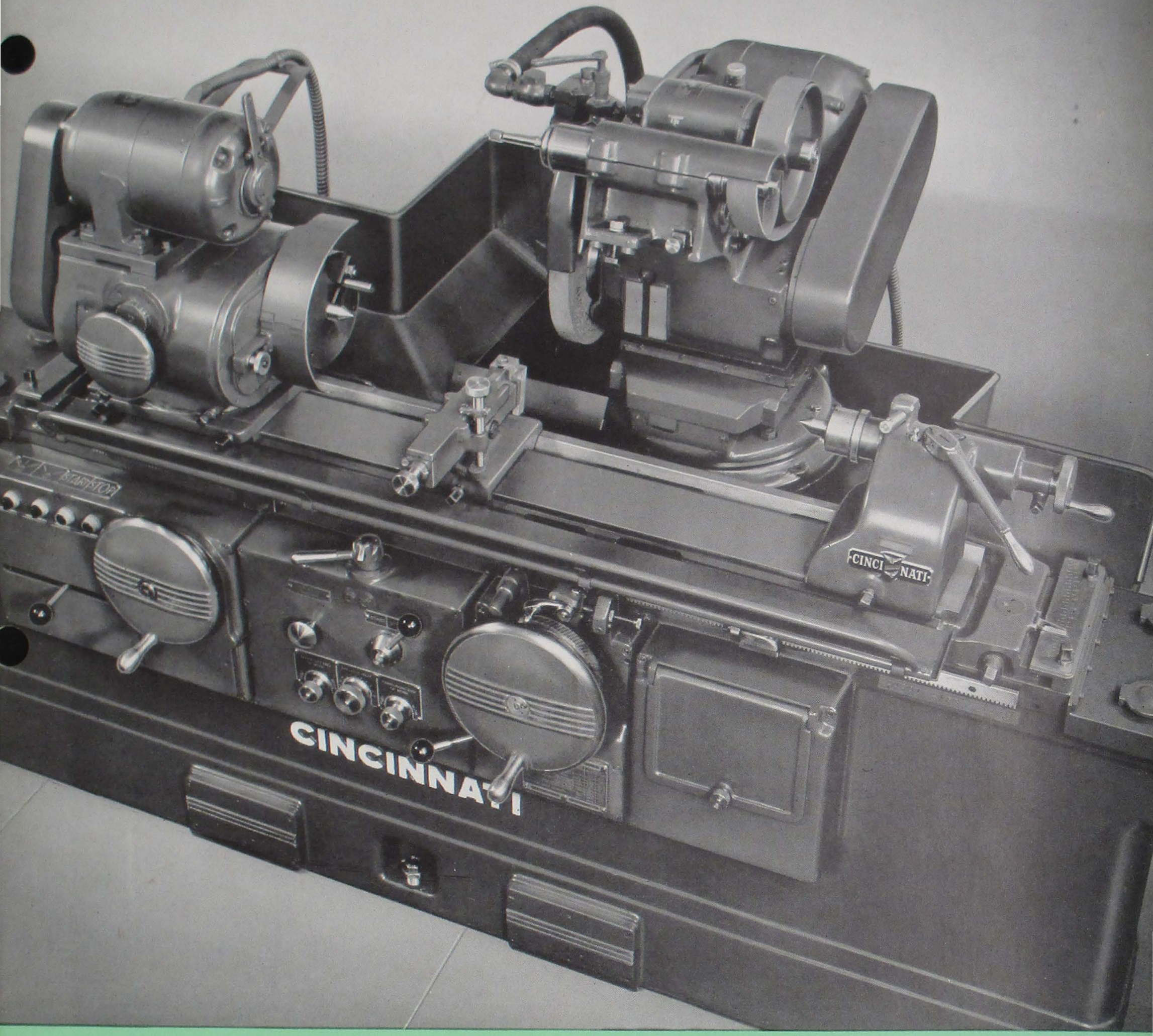

● FRONT VIEW OF CINCINNATI 12" x 36" HYDRAULIC UNIVERSAL GRINDING MACHINE

The design and specifications of the machines illustrated herein are subject to change without notice.

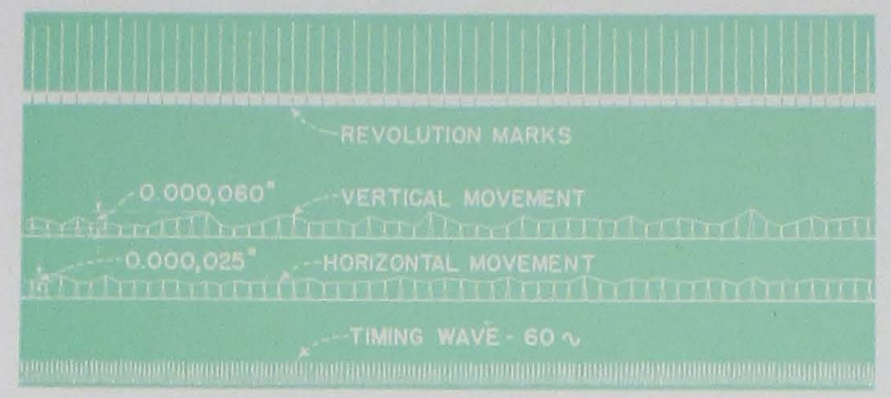
# HIGHLIGHTS OF DESIGN

## *and Accruing Benefits*

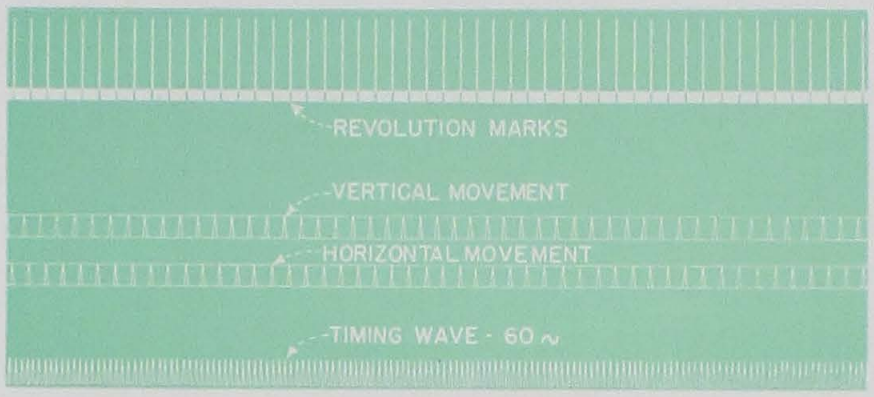
1. **Filmatic Grinding Wheel Spindle Bearings**—an important factor in producing exceptionally fine finishes with less regard to the skill of the operator; eliminate bearing maintenance.
2. **Hinged Type Internal Grinding Attachment**—eliminates most of the set-up time for internal work. External and internal grinding may be completed in one chucking of the work.
3. **Infinitely Variable Work Speeds,** 55 to 500 r.p.m.—the right speed for the job instantly available. No gears or chains in the headstock.
4. **Infinitely Variable Table Traverse Speeds, 3″ to 240″ Per Minute**—a sufficient range for truing the wheel and obtaining any smoothness of finish desired.
5. **Exceptionally Accurate Movement of Wheel Head Cross Slide**—for accurate sizing of work.
6. **Accuracy of Table Reversal Within .004″**—operator can grind close to shoulders without fear of spoiling the work.
7. **Automatic Start-Stop of Coolant Flow and Work Rotation, with Auxiliary Independent Controls**—less fatigue in operating the machine.
8. **Dog Controlled Table Reciprocation From 3/32″ to Full Table Traverse**—short stroke produces same effect as oscillating grinding wheel spindle, eliminating the need for it . . . short work may be ground by traverse method.
9. **Independent Right and Left-Hand Tarry Adjustments**—aid finish and sizing at ends of taper work and when grinding next to shoulders.
10. **Two-Speed Hand Table Traverse and Cross Traverse** — convenient for quick set-ups.
11. **Automatic Filtered Pressure Lubrication For Table Ways**—helps to keep maintenance at a negligible figure, increases useful machine life-span.
12. **Standard Headstock Spindle Nose**—standard chucks may be applied with no intermediate adapters.
13. **Table Ways Protected By Telescopic Guards**—another feature of low maintenance and long life-span.
14. **Coolant Reservoir Integral With Bed**—mass of coolant adds considerably to machine stability, aiding in producing fine finishes.
15. **Independent Unit Construction of Hydraulic Control Element Groups**—simplifies service jobs on the machine.



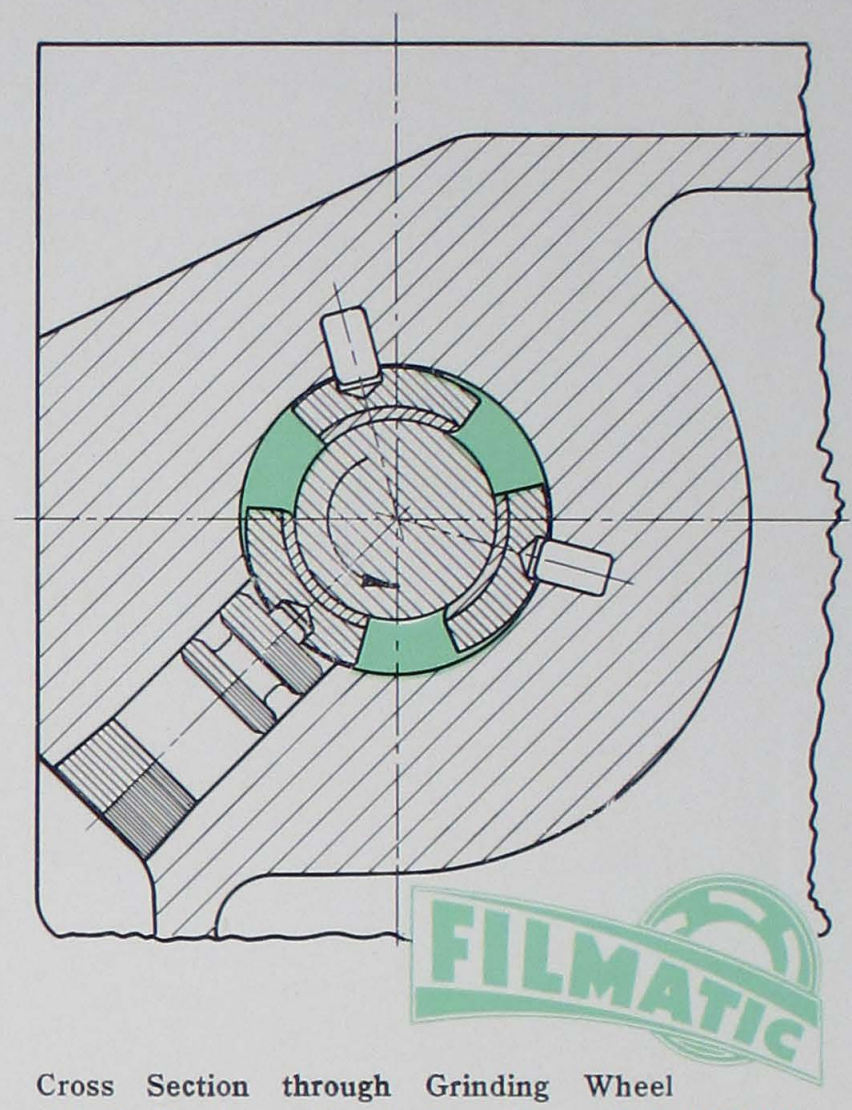

● Looking down on a CINCINNATI 12" Hydraulic Universal Grinding Machine. Lever at the extreme left is extra equipment for magnetic chuck operation.




**Old style bearing—60 millionths vertical flutter; 25 millionths horizontal flutter. Tips of the wave peaks indicate the spindle position once each revolution. The irregularity in position of the wave tips in this oscillogram indicates a slight fluttering of spindle axis.**




**FILMATIC bearing—no discernible spindle flutter. The even alignment of the wave tips in this oscillogram indicates a true running spindle.**




**Cross Section through Grinding Wheel Spindle Bearing, with spindle at Rest. Only CINCINNATI Grinding Machines may carry the FILMATIC trade-mark.**

# MACHINE DESCRIPTION

## Grinding Wheel Spindle and Bearings

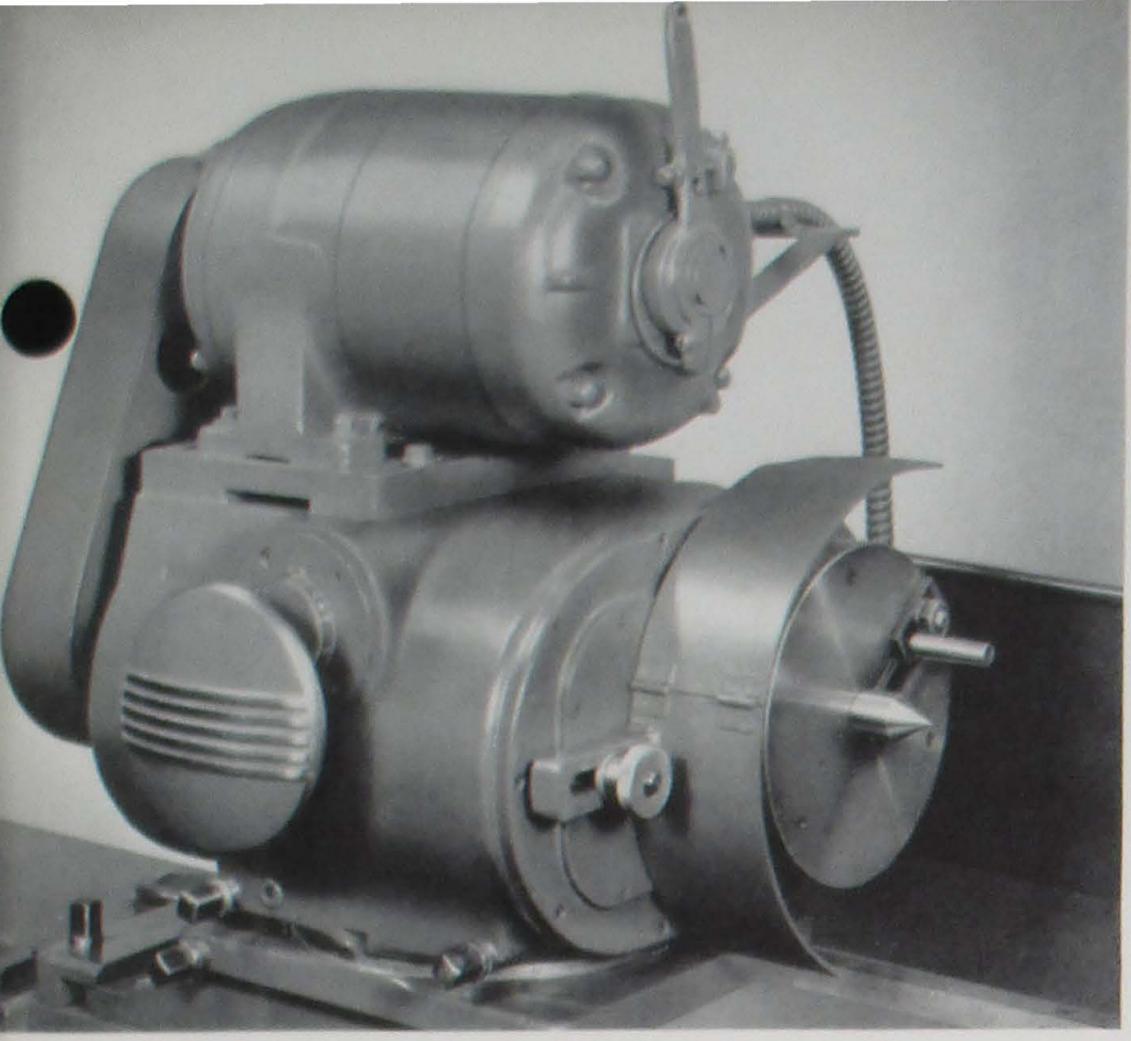
CINCINNATI 12″ Hydraulic Universal Grinding Machines have the exclusive FILMATIC bearings for the grinding wheel spindle. They are of multiple shoe construction, steel backed and bronze lined, and self adjusting for variations in load resulting from heavy or light cuts. Completely submerged in oil, the shoes create self-renewing wedge shaped oil films which rigidly and accurately support the spindle at all times. If the oil level falls below the safe limit, a float switch automatically cuts out the grinding wheel drive motor, protecting the bearings against neglect. This construction is simple and reliable; no seizing under heavy, roughing cuts; smooth running for high-grade finishing cuts.

The grinding wheel and driving sheave are located exceptionally close to the front and rear bearings respectively. This design provides the maximum rigidity for the spindle and aids in producing fine finishes.

## Wheel Head

The grinding wheel spindle is driven direct from the motor by means of multiple V-belts. These belts, matched for uniformity of pitch length, each transmit an equal load and therefore have the longest possible life span. Outboard drive simplifies the service job of replacing worn belts.

Definitely held down to the bed by means of square gibbing, the cross slide and wheel head can not deflect upward under a heavy cut. Liberal bearing areas and narrow guides promote smooth cross adjustment and accuracy throughout the life of the machine.



Headstock unit. Driven by a ¾ h.p. motor, it incorporates a type of drive and speed change mechanism, known as the "Speed Ranger," offering instantaneous changes of an infinite number of speeds ranging from 55 to 500 r.p.m.

## Headstock

The headstock incorporates the smooth running "Speed Ranger" drive and speed change. Infinitely variable from 55 to 500 r. p. m., the correct work speed is quickly available for any job by merely turning a handwheel.

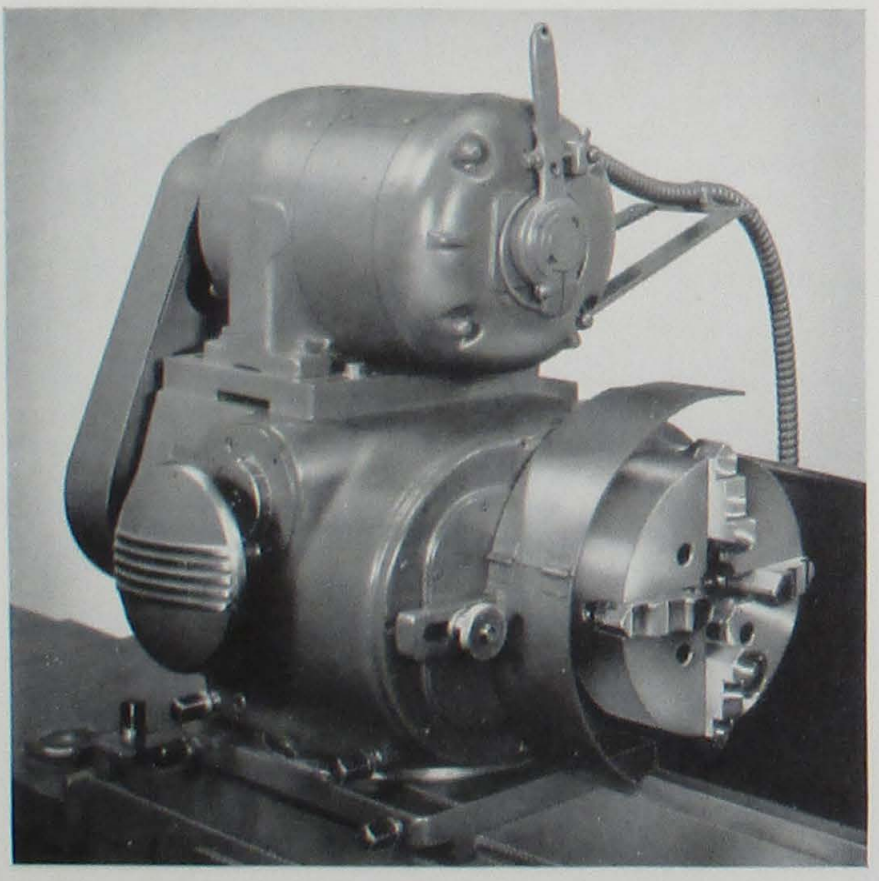
The spindle is mounted on precision anti-friction bearings, having a single, accessible adjustment at the rear. The front end conforms to 5″ Lathe Standard Spindle Nose. This construction offers four advantages:

1. Closer accuracy may be obtained on chuck and face plate work.
2. Standard chucks may be used without intermediate adapters.
3. Affords exceptional rigidity.
4. Work and chuck or face plate may be removed as a unit for inspection and then replaced for further grinding. A "quick change" adapter is available for this type of work.

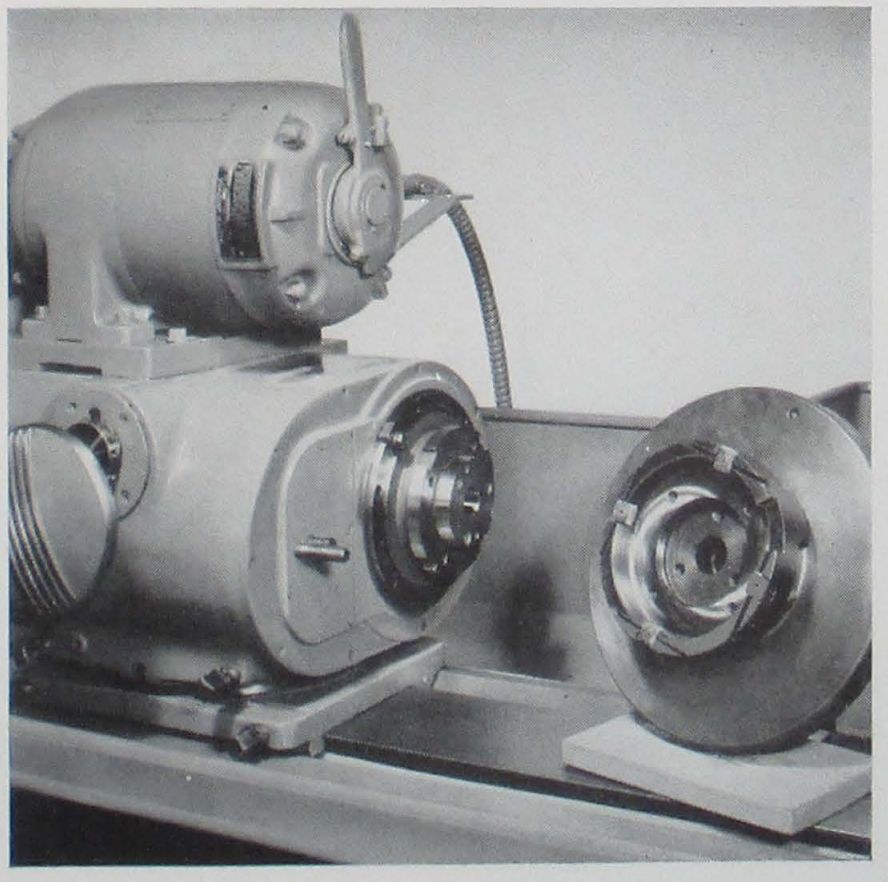
Power for the headstock drive is obtained from a ¾ h. p. motor mounted on top of the unit. V-belts are employed in the primary and secondary drives.

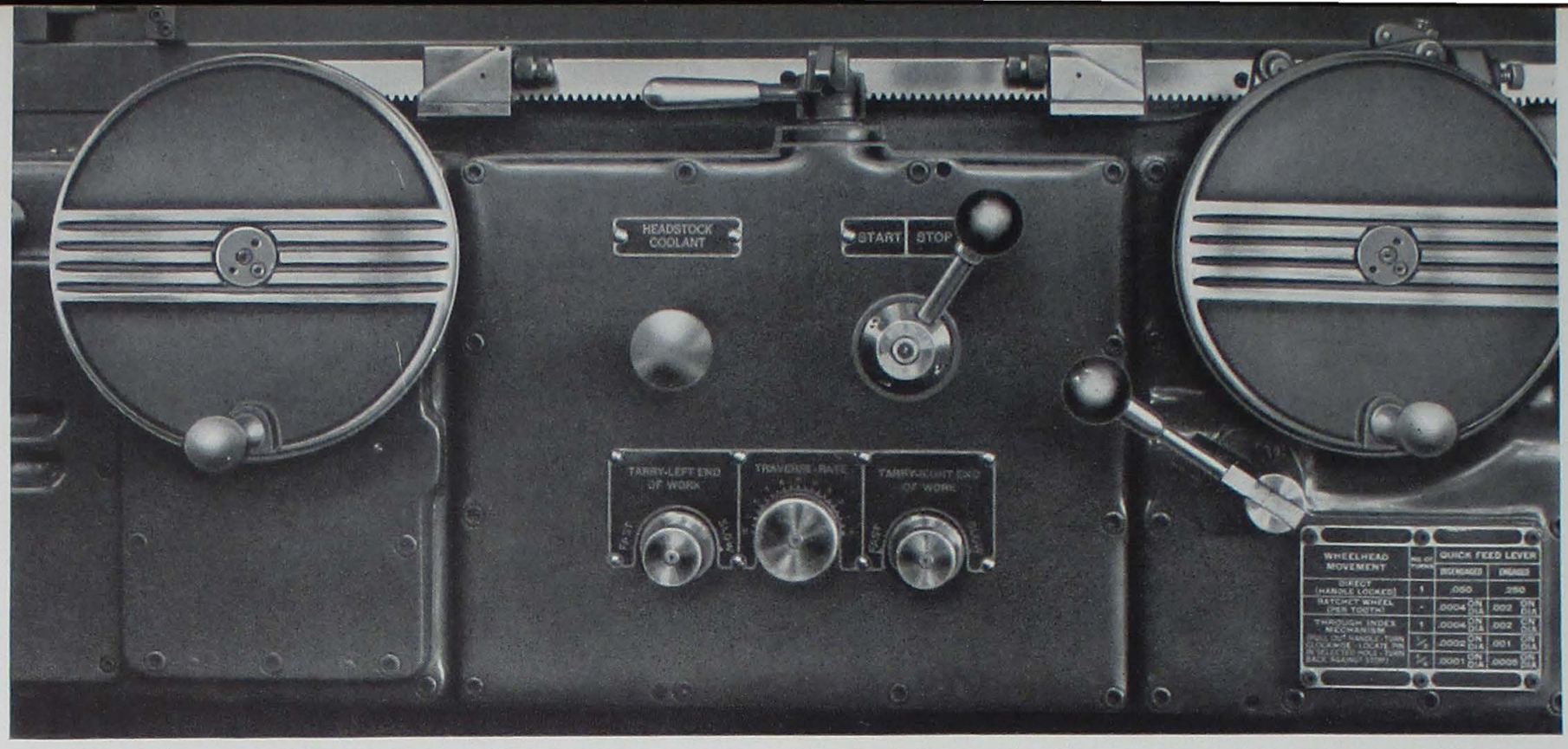
The headstock unit may be swiveled up to 90° toward wheelhead, 30° away from wheelhead, and graduations on the base are easy to read. The operator has a choice of either live or dead spindle. A simple locking device makes it easy to change from one to the other.

Chuck mounted on headstock spindle nose for a "live spindle" grinding operation.



Face Plate, with Quick Change Adapter, ready to mount on spindle nose.



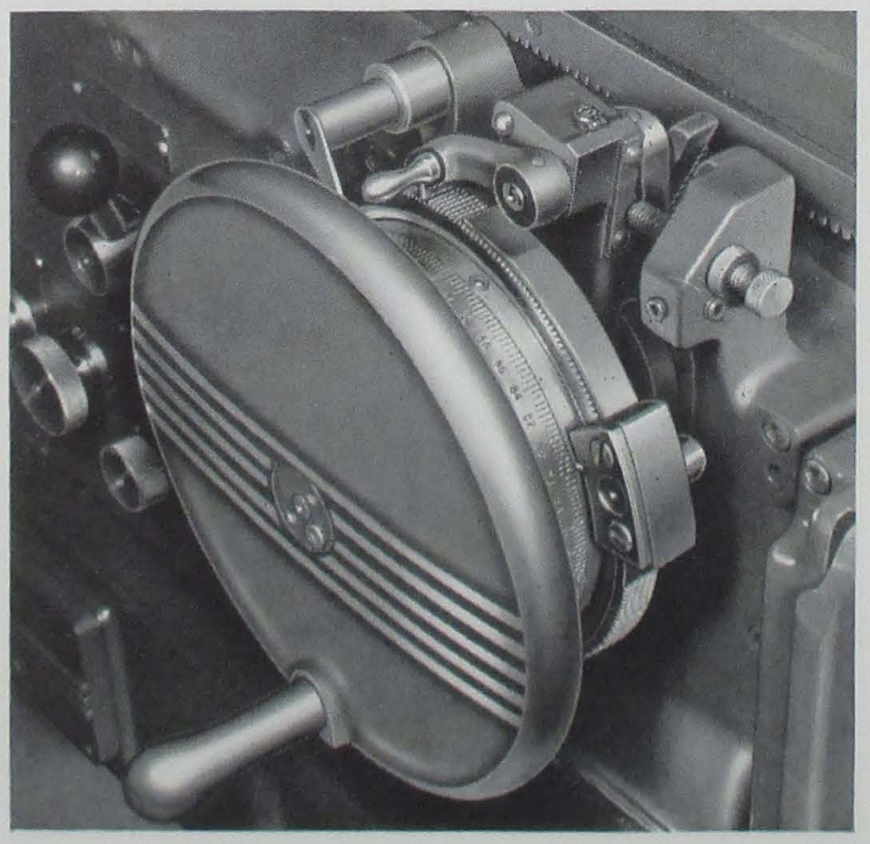



Operating controls are grouped close together, convenient to reach, easy to manipulate. Notice the unit type construction, which permits any control unit to be removed independently of the others.

## Cross Traverse

The hand cross traverse has two speeds to facilitate set-ups and adjustment of the wheel from one diameter to another . . . rapid rate of $\frac{1}{4}''$ and slow rate of .050″ per revolution of the handwheel.

Automatic pick feed may be adjusted for a reduction in work diameter, at each table reversal, ranging from .0004″ to .0028″ in low gear and .002″ to .014″ in high gear. Fine hand adjustment produces a .0001″ reduction in work diameter.



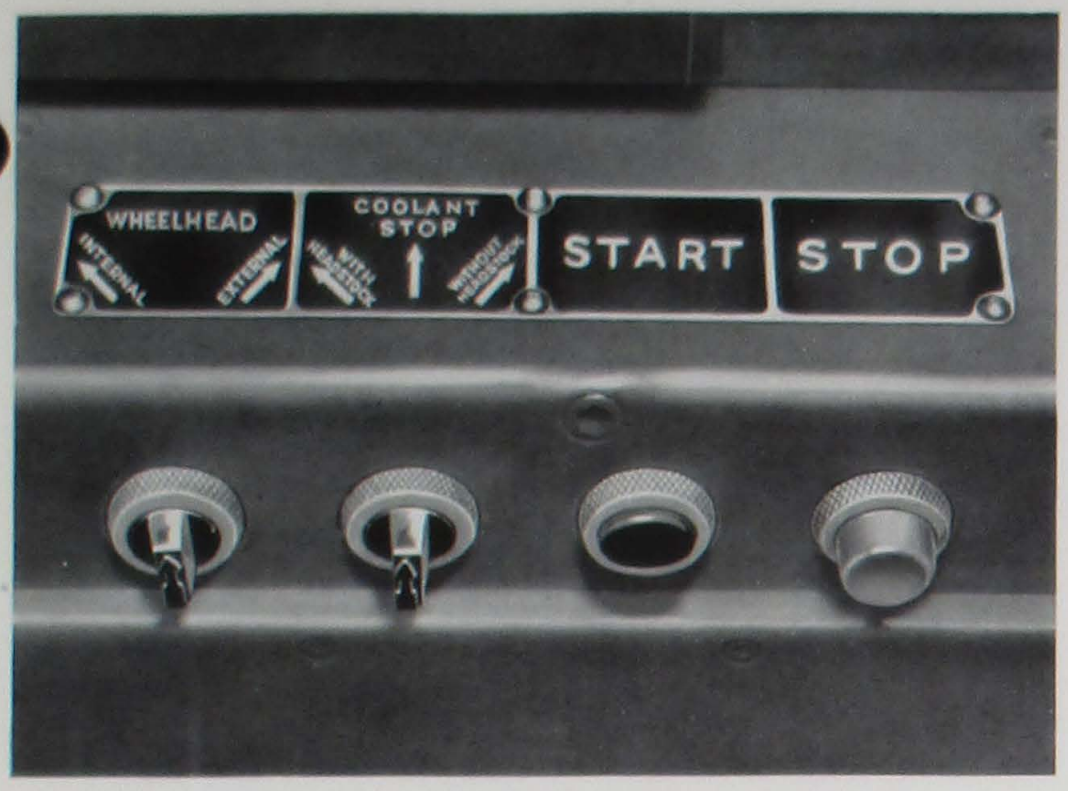
Cross feed handwheel and pick-feed mechanism. Notice the easy-to-read graduations on the shoulder diameter behind the handwheel.

## Controls

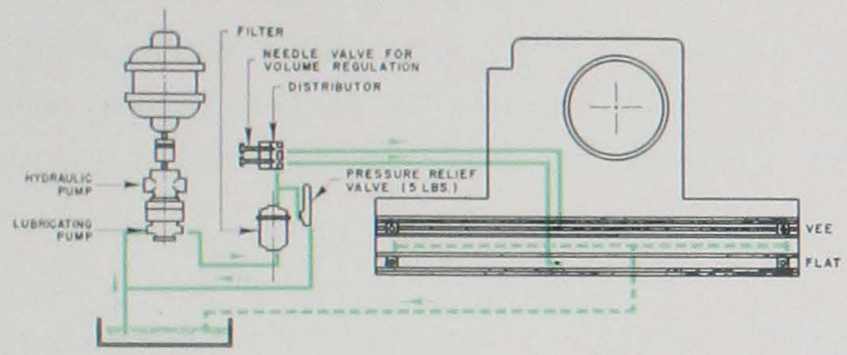
Control levers are conveniently grouped in front of the machine, in the most natural and comfortable arrangement for the operator. All electrical control buttons—headstock and coolant, internal attachment, and start-stop—are also conveniently grouped together, and can be reached without moving a step from the operator's normal working position. No stretching, straining, or stooping ever required to operate these machines.

The work rotation and coolant flow automatically start and stop when the power table traverse starts or stops; saves time and energy. In addition, the headstock rotation may be controlled independently of the table movement. Other independent controls are also included; convenient for truing up chuck work and dressing the wheel.

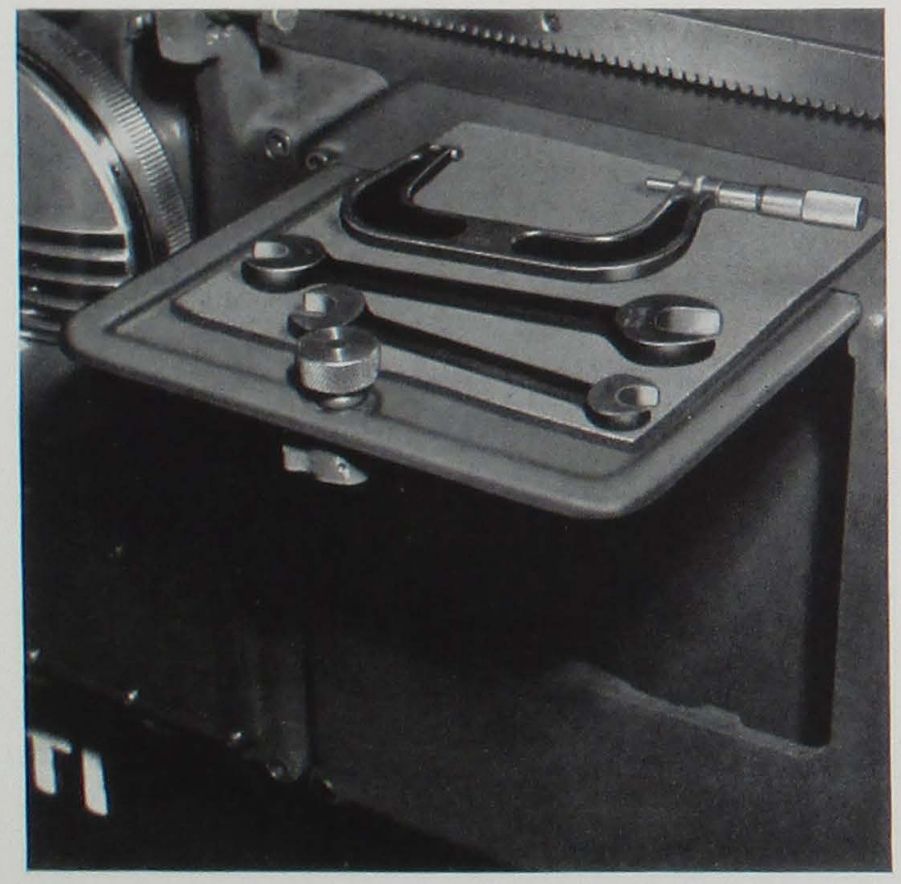
Another convenience for the operator—the utility box cover may be swung up and latched in the horizontal position to serve as a handy tool tray.




Control buttons are built-in, grouped together near the operator's working position, and clearly labeled for easy reference.



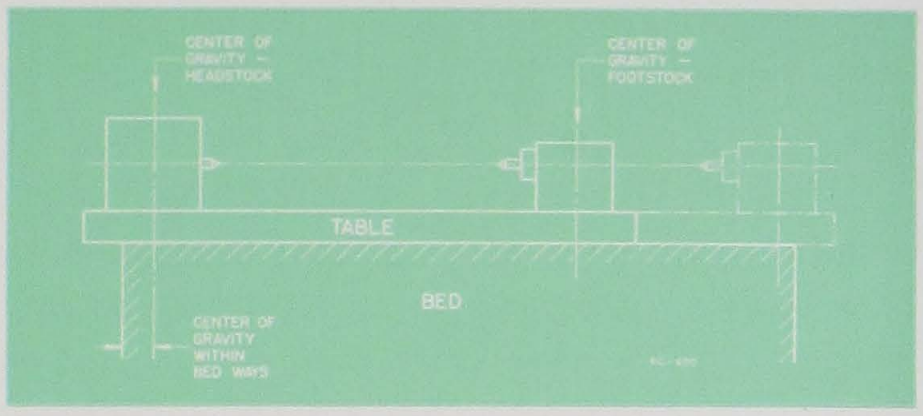

Circuit diagram for automatic pressure lubrication of table ways.



Every detail of operating convenience has been carefully worked out. No need to turn around and lay the "mikes" on a bench; the utility box cover acts as a convenient shelf.

## Bed

The bed has plenty of mass to damp out vibrations. In addition, it has a large capacity built-in coolant reservoir which holds several hundred pounds of coolant, adding considerably to the stability of the machine.




With table traversing its maximum stroke, center of gravity of headstock and footstock units is supported by bed ways. No deflection—long work is ground as accurately as short work.

Table ways are pressure lubricated with filtered oil from a circulating system. They are covered by telescoping guards provided with peep holes to observe the oil supply. Guards, filtered oil, and pressure lubrication provide triple protection for the table ways; maintain new-machine accuracy for the longest possible time.

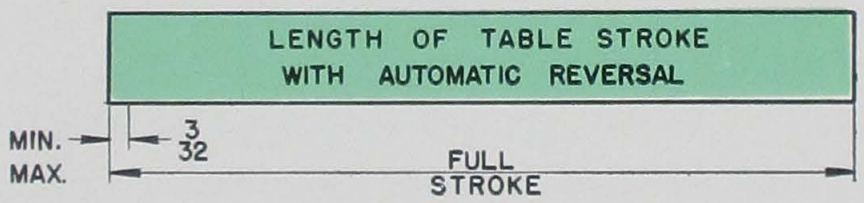
Bed ways supporting the table are exceptionally long. At either end of the maximum stroke, the center of gravity of the headstock or footstock will not overhang the ways. These generous proportions constitute a sound basis for producing high quality work.

## Table Traverse

Power table traverse, hydraulically operated, provides infinitely variable traverse rates of 3″ to 240″ per minute. The range is wide enough for the finest quality finish or a quick rough grind.

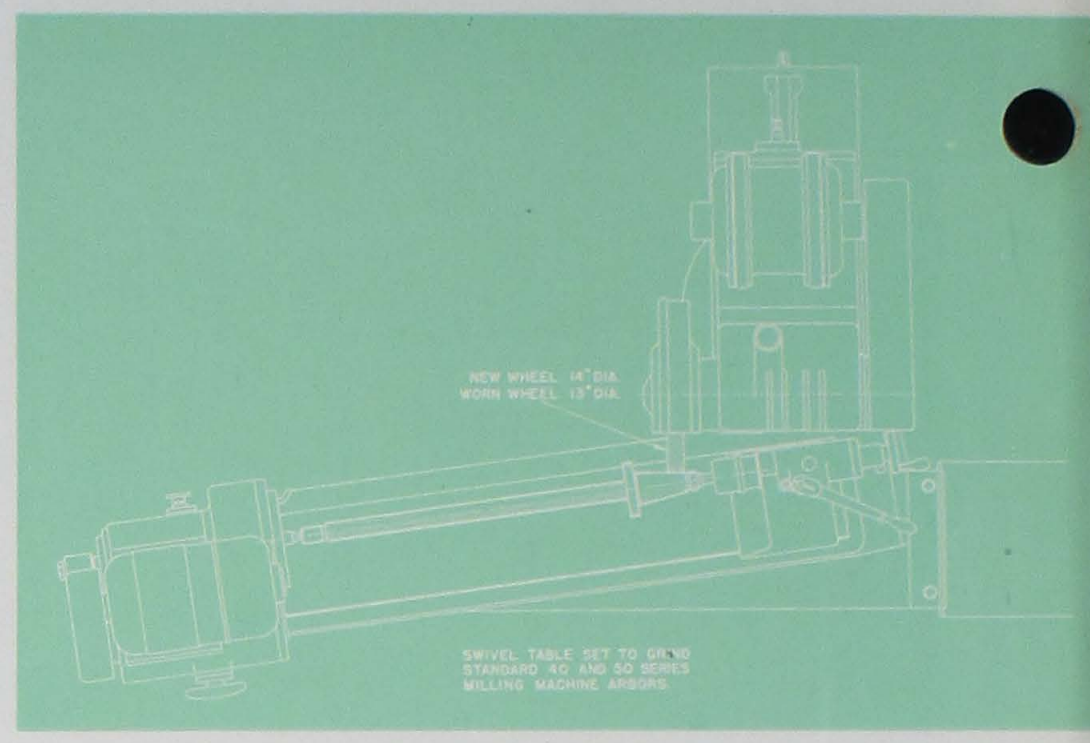
| 3 | INFINITE NUMBER OF TRAVERSE RATES FROM 3" TO 240" PER MINUTE | 240 |
|---|---|---|

Standard hand table traverse is mechanically operated. With this arrangement, there are two rates: rapid feed for setting up and for long movements; fine feed for shoulder grinding. Servo hand table traverse may be obtained at extra cost. The traverse handwheel is stationary and inoperative when the power traverse is engaged; a safety factor for both the operator and machine.




The reversing mechanism trips very accurately, within .004″ or less, allowing the operator to traverse grind close to shoulders without fear of jamming the work into the wheel. Tarry at each end of the stroke may be independently adjusted.

Power table traverse may be set for any stroke from $\frac{3}{32}$″ to the maximum specified. When set for the minimum stroke of $\frac{3}{32}$″, two advantageous possibilities arise: (A) It produces an effect comparable to a reciprocating grinding wheel spindle, eliminating the need for such a construction. (B) With the automatic pick feed engaged during the minimum stroke, and the table reversing not more than 50 times per minute, an automatic plunge cut cycle is produced. Then, too, short work, barely longer than the width of the wheel, may be ground in the conventional manner.



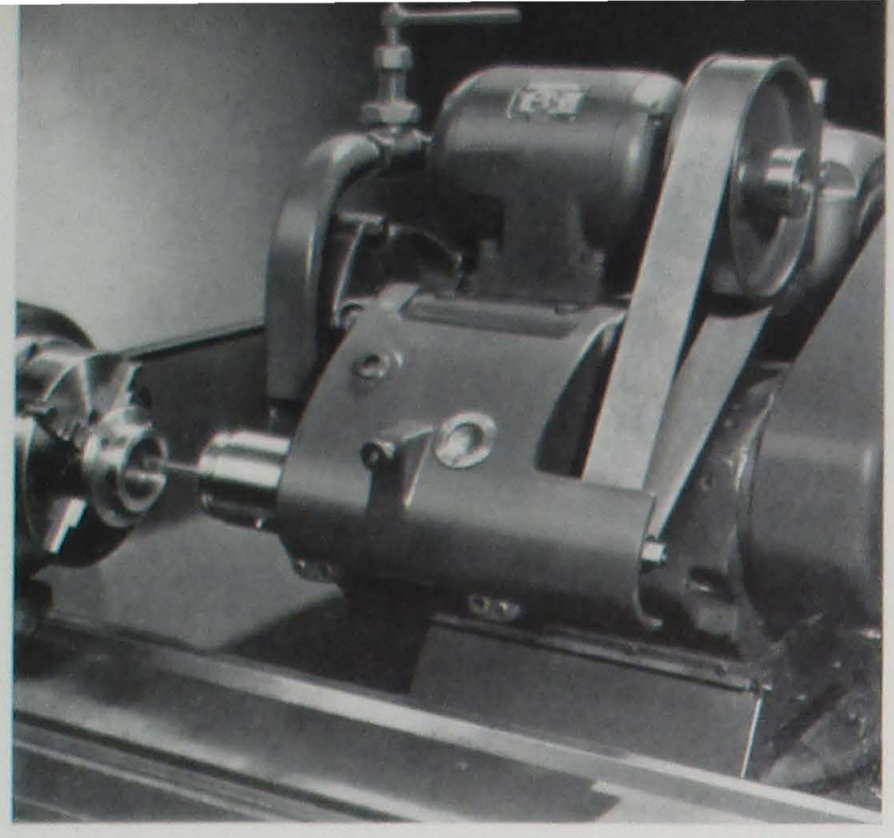

Set-up for grinding steep tapers of 3½″ per foot on 48″ machine.

## Hydraulics

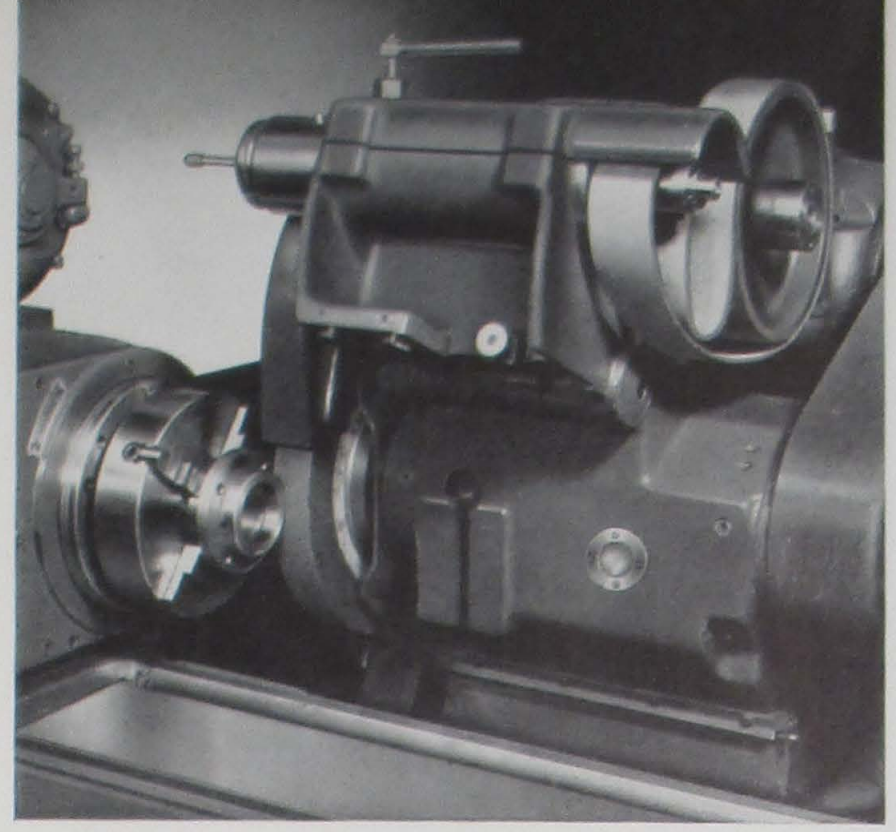
The hydraulic oil compartment is integral with the base, completely sealed against entrance of dust. As an additional precaution for long life and freely operating valves, the oil is filtered continuously.

Low working temperatures of the hydraulic oil are maintained by virtue of the relatively large capacity of the reservoir. Furthermore, much of the heat generated in the hydraulic circuit is quickly dissipated by the low temperature mass of coolant in the compartment adjoining the hydraulic oil reservoir. The resulting rise in temperature of the bed casting is very small, not enough to affect the accuracy of the machine.

Various units in front of the machine may be removed independently of each other, greatly expediting maintenance jobs. Operating parts are simple and accessible.



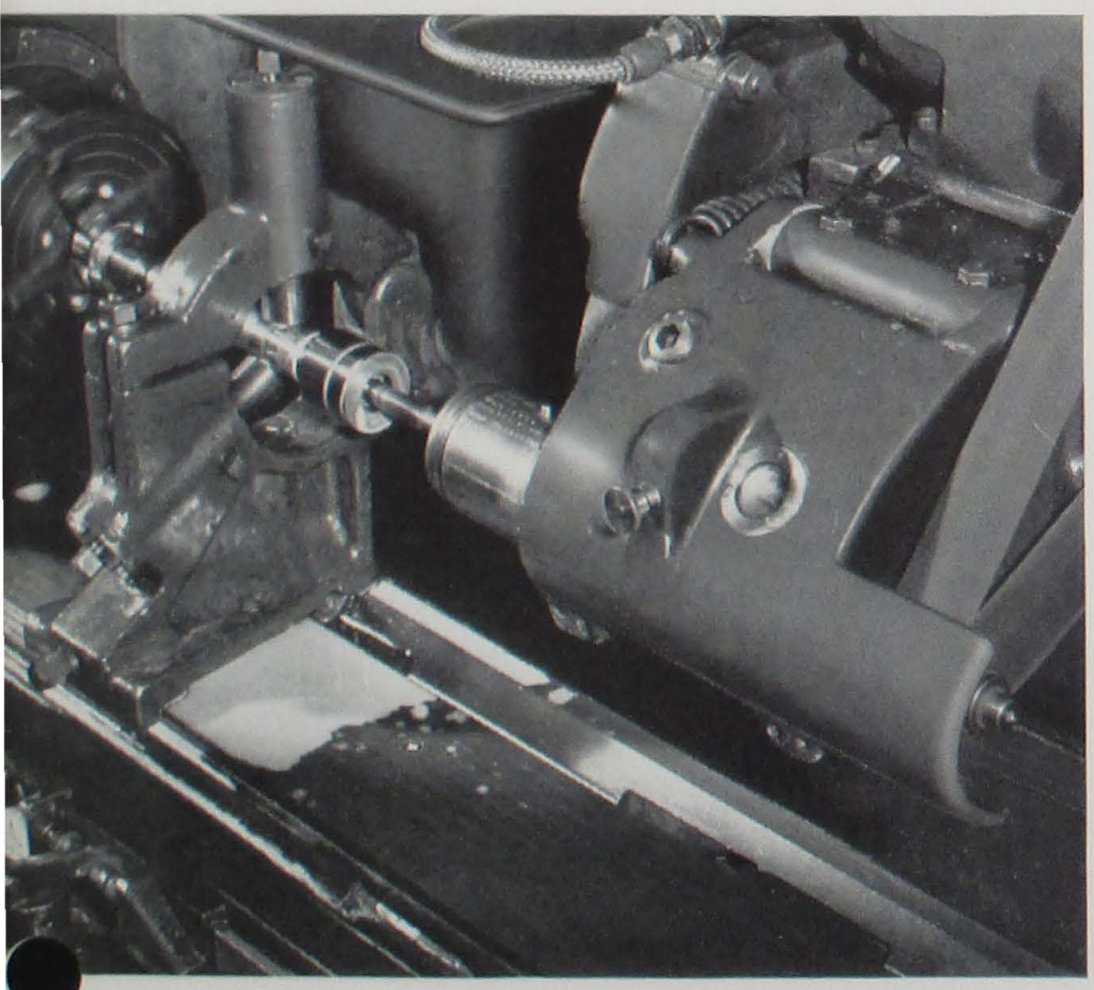
The Internal Grinding Attachment in grinding position. You can change set-ups as often as you like, because the attachment is always in place, ready to go in a few seconds. In many cases the part can be ground externally and internally without removing it from the chuck.



In this illustration the Internal Grinding Attachment has been swung up and out of the way for an external grinding job. Nothing has been removed, nor has the wheelhead been reset, yet there is perfect freedom for grinding any external job within the capacity of the machine.

## Internal Grinding

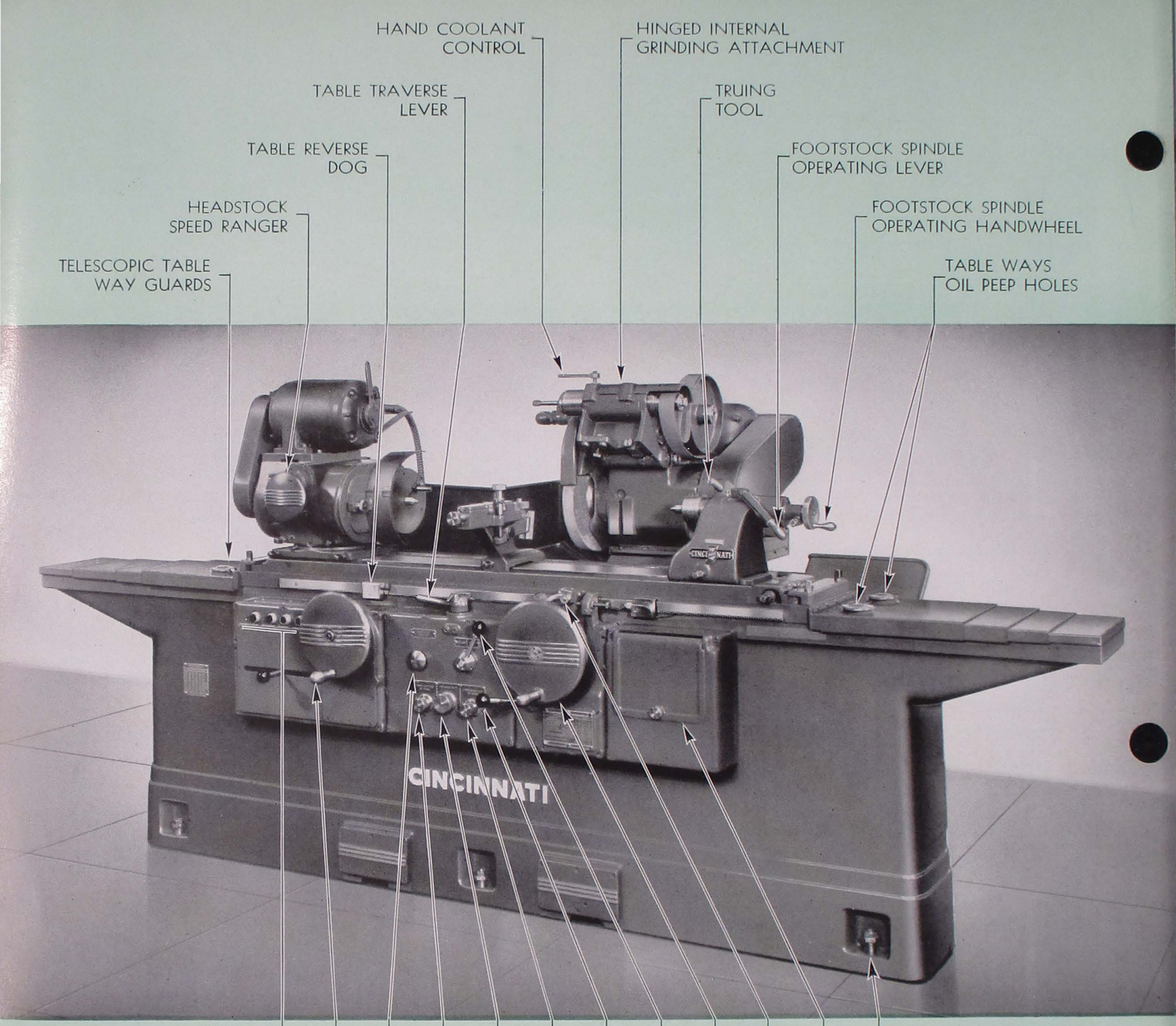
Always in place and instantly available for grinding holes, the Hinged Internal Grinding Attachment (standard equipment with the machine) reduces set-up time to almost nothing. There are no parts to remove or assemble; no swivel adjustments to make. Even the belt may be left on the pulleys, if desired. Just swing the attachment down, tighten one hold-down bolt, and it's ready for the job.



Grinding the bore in a sleeve, using the center rest (also standard equipment) to support the free end of the part.

If the design of the part permits, internal and external grinding can be done in one setting. Then there's no doubt about concentricity, for there's no chance for error. While internal grinding, the external grinding wheel may be stopped, and vice versa.

Quills for grinding various sizes of holes are interchangeable in the standard Internal Grinding Attachment spindle. Where a variety of holes are to be ground, more than one quill is recommended. See page 15 for complete table of quills and corresponding wheels.




## AN INDEX TO OPERATING CONTROLS AND CONSTRUCTION DETAILS

# 12" HYDRAULIC UNIVERSAL GRINDING MACHINE

## GENERAL SPECIFICATIONS

| | 12" x 36" | 12" x 48" | 12" x 72" |
|---|---|---|---|
| **CAPACITY** | | | |
| Maximum swing over table | 12 15/16" | 12 15/16" | 12 15/16" |
| Maximum diameter machine will grind with full size wheel (14" dia.) | 12 15/16" | 12 15/16" | 12 15/16" |
| Minimum diameter machine will grind with new or worn wheel | 0 | 0 | 0 |
| Nominal distance between centers | 36" | 48" | 72" |
| Swivel table graduated to angle of — towards wheelhead | 10° | 8 1/2° | 6° |
| Swivel table graduated to angle of — away from wheelhead | 3° | 3° | 3° |
| Swivel table graduated taper per foot — towards wheelhead | 4 1/4" | 3 1/2" | 2 1/2" |
| Swivel table graduated taper per foot — away from wheelhead | 1 1/4" | 1" | 1" |
| **GRINDING WHEELHEAD** | | | |
| Swivel range — Lower swivel, right and left | 90° | 90° | 90° |
| Swivel range — Upper swivel, right and left | 30° | 30° | 30° |
| Grinding wheels regularly supplied (diameter x face x hole) | 14" x 1 1/2" x 5"<br>14" x 1" x 5" | 14" x 1 1/2" x 5"<br>14" x 1" x 5" | 14" x 1 1/2" x 5"<br>14" x 1" x 5" |
| **HEADSTOCK AND FOOTSTOCK** | | | |
| Taper hole in headstock and footstock spindles | No. 9 B. & S. | No. 9 B. & S. | No. 9 B. & S. |
| Number of work rotation speeds | Infinite | Infinite | Infinite |
| Range of work rotation speeds | 55–500 | 55–500 | 55–500 |
| Headstock spindle nose, American Lathe Standard | 5" | 5" | 5" |
| Headstock swivel — Toward wheelhead | 90° | 90° | 90° |
| Headstock swivel — Away from wheelhead | 30° | 30° | 30° |
| **MISCELLANEOUS** | | | |
| Number of table traverse speeds | Infinite | Infinite | Infinite |
| Range of table traverse speeds | 3 to 240" per min. | 3 to 240" per min. | 3 to 240" per min. |
| Distance floor to work centers | 42 1/4" | 42 1/4" | 42 1/4" |
| Automatic infeed at table reversal (diameter reduction) — Low | .0004" to .0028" | .0004" to .0028" | .0004" to .0028" |
| Automatic infeed at table reversal (diameter reduction) — High | .002" to .014" | .002" to .014" | .002" to .014" |
| Wheelhead movement per turn of infeed wheel — Low | .050" | .050" | .050" |
| Wheelhead movement per turn of infeed wheel — High | .250" | .250" | .250" |
| Minimum infeed increment in terms of diameter reduction | .0001" | .0001" | .0001" |
| Minimum movement necessary to reverse table | 3/32" | 3/32" | 3/32" |
| Accuracy of table reversal at all table rates | .004" | .004" | .004" |
| Table tarry adjustment | 0 to 5 sec. | 0 to 5 sec. | 0 to 5 sec. |
| Mechanical hand table traverse—rate per revolution of handwheel: Rapid | 15/16" | 15/16" | 15/16" |
| Mechanical hand table traverse—rate per revolution of handwheel: Slow | 1/10" | 1/10" | 1/10" |
| Hand hydraulic (Servo) table traverse (extra cost)—rate per revolution of handwheel | 1" | 1" | 1" |
| **POWER REQUIREMENTS** (See "Electrical Equipment" page 15) | | | |
| Wheelhead motor | 3 h. p. | 3 h. p. | 3 h. p. |
| Hydraulic pump motor | 1 h. p. | 1 h. p. | 1 h. p. |
| Headstock motor | 3/4 h. p. | 3/4 h. p. | 3/4 h. p. |
| Internal grinding attachment motor | 1 h. p. | 1 h. p. | 1 h. p. |
| Coolant pump motor | 1/4 h. p. | 1/4 h. p. | 1/4 h. p. |
| **FLOOR SPACE REQUIRED** | 62" x 153" | 62" x 184" | 62" x 236" |
| **INTERNAL GRINDING ATTACHMENT** (see page 15) | Included | Included | Included |
| Minimum hole diameter (with standard quill) | 3/4" | 3/4" | 3/4" |
| Maximum depth of hole (with standard quill) | 2 1/2" | 2 1/2" | 2 1/2" |
| **SHIPPING DATA** | | | |
| Net Weight | 6100 | 6700 | 7900 |
| Gross Weight—Domestic | 6700 | 7300 | 8800 |
| Gross Weight—Export | 8500 | 9700 | 12600 |
| Approximate size of case | 144"x52"x64" | 168"x54"x64" | 216"x54"x64" |
| Approximate volume of case, cubic feet | 277 | 336 | 431 |
| **CODE NAME** | | | |
| A. C. Equipment | HYCUB | HYULM | HYFYX |

# SPECIFICATIONS FOR CINCINNATI 12″

## STANDARD EQUIPMENT—SUPPLIED WITH THE MACHINE

Headstock—Swivel base, combination live and dead spindle having 5″ Lathe Standard Spindle Nose. Includes headstock center, No. 9 B&S taper. Motor driven, including motor and controls.

Footstock—Combination lever and screw type with diamond holder bracket and diamond holder (without diamond nib). Includes footstock center, No. 9 B&S taper.

Back Rests—Two-shoe, two-screw type, maple wood shoes; ½″ to 4″ capacity; three with 36″, four with 48″ and five with 72″ machines.

Center Rest—½″ to 4″ maximum work diameter.

Diamond Bracket—Table type for external and internal truing (without diamond nib).

Internal Grinding Attachment—Hinged type, including fitted bracket; one spindle No. 237364; quill No. 233630; two grinding wheels No. 221494; motor pulley and one driving belt; 1 h.p. motor, motor mounting and control equipment. (See page 15 for range drawing and other information.)

Chuck—8″ four-jaw independent. (Light pattern, iron body, with solid reversible jaws.) Mounts directly on spindle nose.

Face Plate—11″ diameter. Mounts directly on spindle nose.

Wheel Mount—Balancing type, for 5″ hole wheels up to 1″ web thickness.

Work Driving Dogs—Reversible type; one ¼″ to 2½″, one 2½″ to 4″, and one 4″ to 6″ capacity.

Wheel Guard, Reversible—For wheels up to 14″ diameter x 1½″ face, with coolant piping and nozzle.

Grinding Wheels:

One 14″ diameter x 1″ face x 5″ hole.

One 14″ diameter x 1½″ face x 5″ hole, recessed one side 8″ diameter x ½″ deep.

Coolant Pump—Individually motor driven with complete piping or sewer connections (not both).

Wrenches and Splash Guards.

Center Knockout Bar.

Complete Electrical Equipment conforming to standard current specifications: A. C.; two or three phase; 50 or 60 cycle; 220 to 550 volts. Wired in accordance with "Machine Tool Electrical Standards"; control panel mounted on the machine.

## EQUIPMENT SUPPLIED AT EXTRA COST

### Not Included in Price of Standard (Basic) Machine

1. Electrical Equipment in accordance with J.I.C. Standards.
2. D.C. Electrical Equipment. Controls are mounted on a separate floor stand panel.
3. Draw-in Collet Attachment for Headstock—Lever Operated—includes adapter for spindle nose. Price includes any six collets listed in item 5. Specify collet sizes desired.
4. Draw-in Collet Attachment for Headstock—Handwheel Operated. Includes adapter for spindle nose. Price includes any six collets listed in item 5. Specify collet sizes desired.
5. Collets for Draw-in Collet Attachments—Items 3 and 4—⅛″, 3/16″, ¼″, 5/16″, ⅜″, 7/16″, ½″, 9/16″, ⅝″, 11/16″, ¾″, 13/16″, ⅞″, 15/16″, and 1″ diameter.
6. Additional Full Centers for Headstock and Footstock—No. 9 B & S taper.
7. Half Center for Footstock—For ¼″ minimum work diameter; 1⅜″ length of flat.
8. Permanent Magnetic Chuck with Adapter, 7″ diameter.
9. Quick Change Adapter—For face plate or chuck, complete with special L-head bolts.
10. Magnetic Chucks—Can be supplied for 115 or 230 volt, direct current. If D.C. is not available, a rectifier can be supplied which will enable the use of alternating current. Chuck, collector rings, adapter plates, water guards and bracket, and demagnetizing switch for headstock motor included. (See table, page 15.)

# HYDRAULIC UNIVERSAL GRINDING MACHINE

## EQUIPMENT SUPPLIED AT EXTRA COST

10. Magnetic Chucks. See description page 14.

| Size No. | Face Diameter | Holding Capacity | | | | Weight Pounds | Code Name |
|---|---|---|---|---|---|---|---|
| | | Rings | | Discs | | | |
| | | Minimum | Maximum | Minimum | Maximum | | |
| 7-R | 7 3/8" | 1 5/8" | 6 3/8" | 1 5/8" | 7 3/8" | 50 | ROCHU |
| 8-R | 8 3/8" | 2" | 7" | 2" | 8 3/8" | 70 | MACHU |
| 10-R | 10 3/8" | 2 1/4" | 8 5/8" | 2 1/4" | 10 3/8" | 95 | CHUCO |

11. Rectifier—for magnetic chucks when D.C. is not available.
12. Hand Hydraulic (Servo) Control—for table traverse. Must be built into the machine at the factory. Recommended only for machines requiring frequent hand movement of the table when grinding large heavy work.
13. Indicator Attachment—To assist in adjusting the taper of the swivel table. Includes .001" dial indicator.
14. Positive Stop, with 3/8" Micrometer Screw Adjustment—for positioning the table. Useful when doing face or shoulder grinding operations.
15. Radius Truing Attachment—table type. Same attachment can be used for truing either 0" to 3/4" convex or 3/8" to 7/8" concave. One diamond block for either, not both, convex or concave radii, included. Specify convex or concave when ordering. (See item 16 for extra diamond blocks).
16. Extra Diamond Blocks for converting above attachment to true either—
    (a) Convex—0" to 3/4".
    (b) Concave—3/8" to 7/8".
17. Cam Grinding Attachments—Made to order —Submit prints of work.
18. Diamonds—
    1-C (3/4 to 1 1/4 carat).
    2-C (1 1/2 to 1 3/4 carat).
    3-C (2 to 2 1/4 carat).
    4-C (2 1/2 to 3 carat).
19. Double Shaft Motor—Required if wheel and belt guard are interchanged for face grinding operations. Includes motor sheave guard, additional motor sheave, and extra coolant piping.
20. Extra Wheel Mounts—Separate wheel mount recommended for each wheel regularly used. See wheel mount under "Standard Equipment Supplied with Machine".
21. Balancing Arbor for Grinding Wheel—Size No. 4.
22. Balancing Stand for Grinding Wheels—Size No. 1 (20" swing, sensitive way).
23. Additional Quills, Spindles and Wheels—For internal grinding attachment.

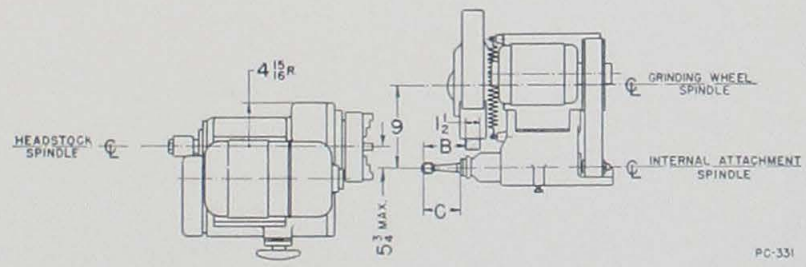
## INTERNAL GRINDING ATTACHMENT

**The Internal Attachment furnished as standard equipment includes one spindle No. 237364, one quill No. 233630, two grinding wheels No. 221494 and one driving belt.**

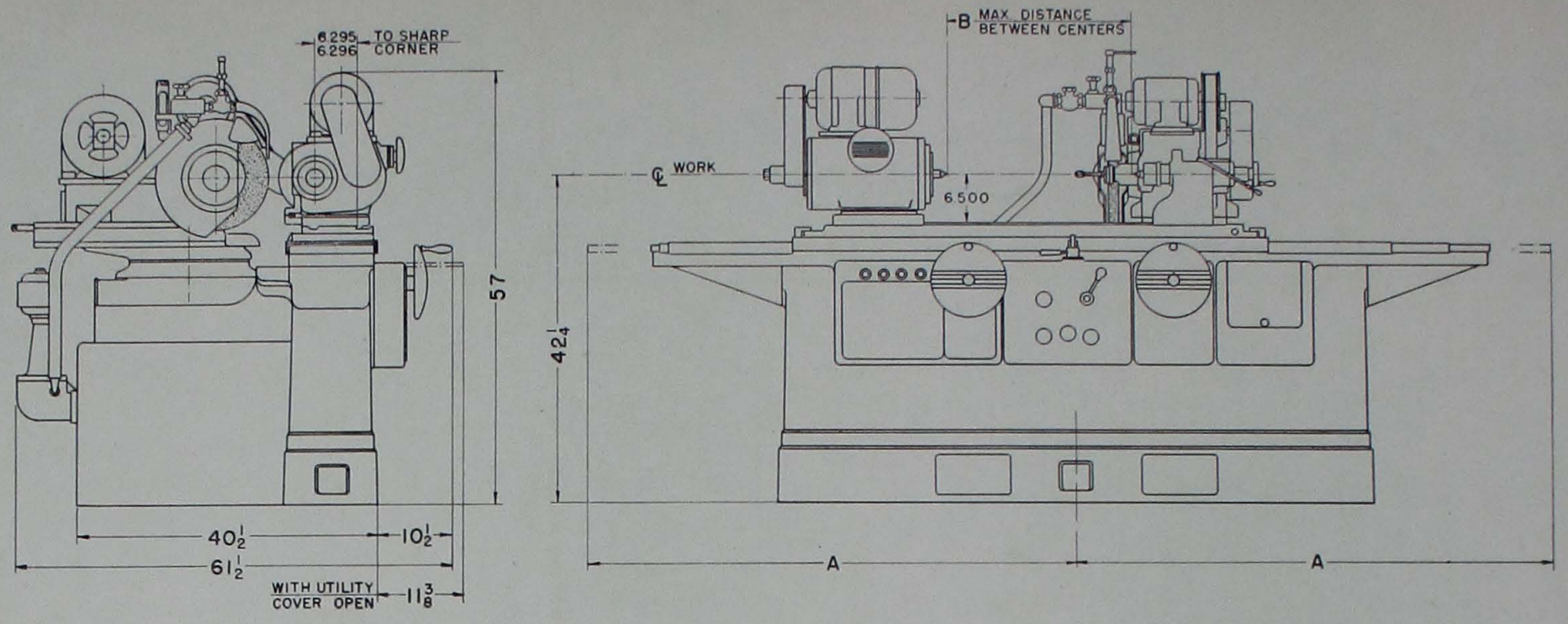
**Listed below are four other quills with corresponding grinding wheels which can be used with spindle No. 237364, any one of which will be furnished instead of quill No. 233630 without extra charge, or as equipment at extra cost.**

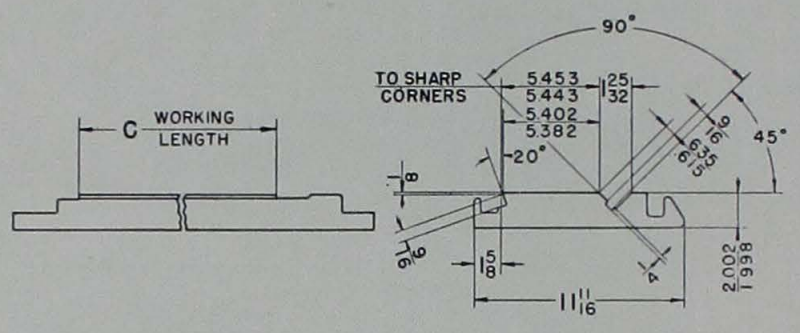
**Internal Grinding Attachment spindles are lubricated for life.**

**All quills and spindle have R. H. threads.**

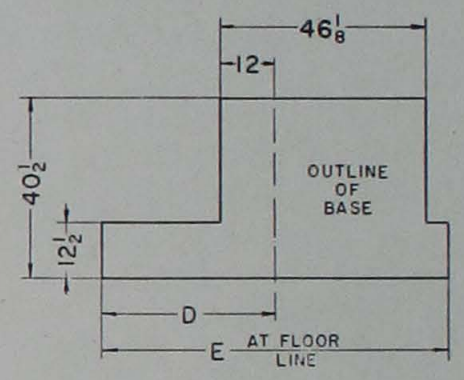



| | Spindle | | Quill | | | Wheel | | | | Capacity | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Part Number | Speed r.p.m. | Part Number | B | C | Part Number | Size | | | Min. Dia. | Max. Depth |
| | | | | | | | Dia. | Face | Hole | | |
| **Standard Equipment.** | **237364** | **15,000** | **233630** | **4 3/32"** | **3 1/2"** | **221494** | **11/16"** | **3/4"** | **1/4"** | **3/4"** | **2 1/2"** |
| **Extra Quills and Grinding Wheels for use with Spindle 237364.** | | | **233627** | **2 27/32"** | **2 1/4"** | **204759** | **1/4"** | **1/2"** | **1/8"** | **5/16"** | **1 1/2"** |
| | | | **233628** | **2 27/32"** | **2 1/4"** | **204760** | **3/8"** | **1/2"** | **1/8"** | **7/16"** | **1 1/2"** |
| | | | **233629** | **3 15/32"** | **2 7/8"** | **204761** | **5/8"** | **5/8"** | **3/16"** | **11/16"** | **2"** |
| | | | **233631** | **4 27/32"** | **4 1/4"** | **219677** | **1 1/4"** | **1"** | **3/8"** | **1 3/8"** | **3"** |



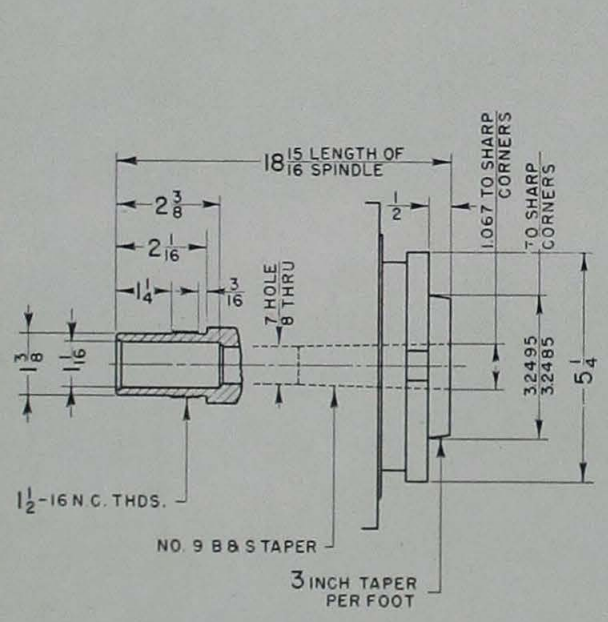




SWIVEL TABLE

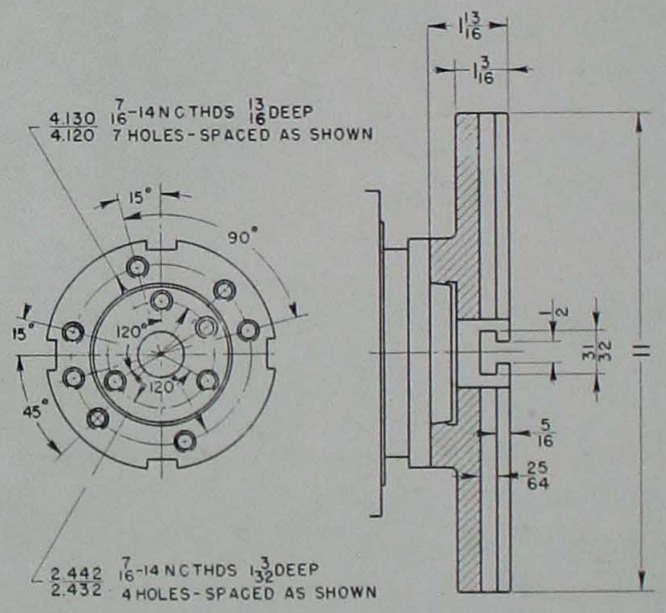



FLOOR PLAN

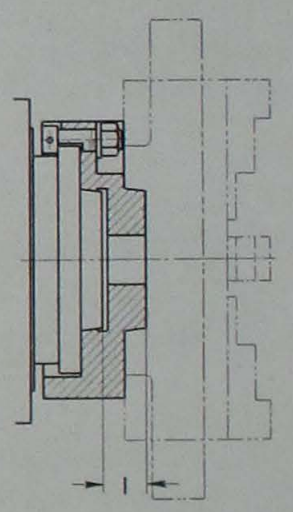
PC-332



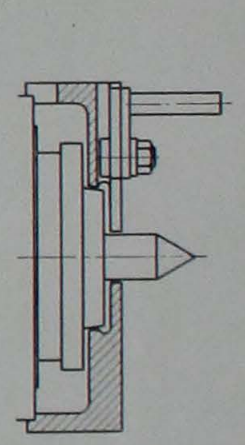

5 INCH - LATHE STANDARD SPINDLE NOSE




FACE PLATE




QUICK CHANGE ADAPTER FOR CHUCK AND FACE PLATE



WORK DRIVER

PC-1788

## DIMENSIONAL DRAWING

| Size of Machine | A | | B | C | D | E |
|---|---|---|---|---|---|---|
| | Maximum | Minimum | | | | |
| 12" x 36" | 76¼" | 69¼" | 39 5/16" | 62½" | 51⅝" | 103¼" |
| 12" x 48" | 91" | 83" | 51 5/16" | 74½" | 63⅝" | 127¼" |
| 12" x 72" | 118½" | 110" | 75 5/16" | 98½" | 87⅝" | 175¼" |

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