CINCINNATI Number Two Cutter and Tool Grinders are designed to keep your cutting tools at their productive peak—with a minimum of time and effort. The Number Two's easy going versatility takes the tight spots out of setups, enabling even the inexperienced operator to handle those difficult tool grinding jobs with confidence and efficiency.

The Number Two offers a choice of either 16" or 24" table travel, with these important features common to either: Two speed tilting wheelhead with instantly reversible spindle drive; duplicate controls for convenient operation in front of or behind the table, and on either side of the wheelhead; ball bearing anti-friction table slide for smooth, straight line traverse; 360° eccentric wheelhead and swivel table which can increase specified cross range by 70%.

These features, plus many more outlined in the pages that follow, represent a practical and efficient means of holding the line on costs—by reducing tool maintenance to its simplest form on CINCINNATI® Number Two Cutter and Tool Grinders.
Cutter and Tool Grinders

virtually unlimited in toolroom application
precise tool maintenance
reduced to its simplest most convenient form...

Look at the wide variety of work that can be performed on a CINCINNATI Number Two Cutter and Tool Grinder! In addition to almost limitless application as a tool sharpener, the Number Two can also be adapted to light cylindrical, surface, and internal grinding operations. A wide selection of Cincinnati attachments permits you to extend the versatility of the basic machine to suit your specific needs.

The photo-story presented here and on the following pages illustrates just a few of the many day-to-day tool grinding problems you can solve with a CINCINNATI Number Two Cutter and Tool Grinder.
A. the left-rear position is convenient for many toolroom grinding operations where the operator grinds the chamfer on a shell end milling cutter.

B. rough grinding the outside diameter of a sintered carbide face mill—cutter is rotated at a constant speed by the Cylindrical Grinding Attachment.

C. grinding a relief angle on a carbide lathe tool—the tool shank is held in the Surface Grinding Attachment, equipped with an intermediate swivel.

D. a typical setup to grind a plain milling cutter—the tilting wheelhead is positioned directly to the desired clearance angle.
...with versatility and range
to take the tight spots out of setups...
A. the tilting wheelhead produces a durable “flat-land” clearance angle on this dovetail milling cutter—the operator controls the grinding operation from the right-rear position.

B. sharpening the teeth of a 10” diameter saw—this setup is greatly simplified by the tilting wheelhead and Universal Toothrest Plate.

C. eccentric wheelhead and swivel table provide added range to grind the face of this extended shell end mill.

D. the No. 2 Radius Grinding Attachment includes a micrometer device, used to accurately determine the correct radius.
...to keep your cutting tools at a productive peak with a minimum of time and effort
A. the No. 1 Radius Grinding Attachment is ideal for sharpening ball nose end mills and grinding ball point tracer fingers used in die sinking operations.

B. all grinding operations on this large face mill are performed using the Face Mill Grinding Attachment. This setup provides ample vertical range and rigid table support.

C. grinding the tooth race of a form relieved milling cutter, using the Gear Cutter Sharpening Attachment.

D. the Internal Grinding Attachment is ideal for light toolroom operations, such as grinding the I.D. of this bushing.
features that make every job a better one

1. **Cincinnati** offers a two-speed tilting wheelhead as standard equipment.

2. Duplicate Controls permit convenient operation at front or rear of table, and at either side of the machine.

3. Eccentric Wheelhead may be positioned at any angle to suit the grinding operation, increases cross range by 3 1/2".

4. Swivel Table is offset, swings a full 180° to increase cross range by an additional 3 1/2".

5. Accurate, effortless table traverse is assured through anti-friction table slide design.

6. Differential Table Traverse control provides smooth, steady hand table movement.

7. Spring Cushioned Table Dogs minimize shock at table reversal.

8. Power Table Traverse (optional, 24" table travel machines only) assures smooth, controlled power table movement within a range of 7" to 90" per minute.

9. Adjustable Wheelhead Pile can be raised or lowered with a minimum of effort, provides ample vertical range for a wide variety of work.

10. "Tang-Rot" Taper Setting Device enables the operator to position the swivel table with "gage block" accuracy.

11. Fine Adjustment Taper Setting Device saves time when grinding matching tapers.

12. Clearance Setting Dials on Workhead and Tailstock are graduated for accurate setting of clearance angles.

13. Universal Workhead accommodates either 50 Series or No. 12 D & G tapers. Anti-friction spindle mounting assures smooth, accurate rotation.

14. Tailstocks feature reversible centers. Right hand tailstock has retractable center. Thumb-screw clamping device on each tailstock assures positive alignment.

15. Micrometer Toothrest Holder has fine adjustment for grinding hobs, taps and form cutters.

16. One Shot System simplifies lubrication routine, assures correct amount of lubricant where needed.

17. A wide selection of Attachments is available for specific cutter and tool grinding requirements.
two speed tilting wheelhead...

...instantly reversible spindle drive

The tilting wheelhead, standard with CINCINNATI Number Two Cutter and Tool Grinders, is built to take care of itself and your cutting tools for years to come.

Two sets of precision ball bearings support each end of the spindle, maintaining rigid alignment and smooth rotation. Spindle bearings are permanently lubricated and sealed within a dust-proof cartridge.

The spindle operates at two speeds (3890 and 6530 rpm) and is instantly reversible at the flick of a switch. A totally enclosed 1 hp motor provides positive drive to the spindle through a tooth-grip belt and step pulleys. Center distance between pulleys is constant, ensuring proper belt tension at all times. Speed changes are made by simply moving the drive belt to the adjacent step on the pulleys.

A. Tilting wheelhead simplifies setup to sharpen this large inserted tooth cutter. Two speed spindle drive permits use of large and small diameter grinding wheels.
The tilting wheelhead further simplifies setups by permitting the operator to tilt the head directly to the desired clearance angle. The tilting wheelhead is especially recommended for sharpening tapered reamers and angular cutters as it produces a more durable "flat land" clearance angle.

The wheelhead will tilt 15 degrees above or below center in the vertical plane. To tilt the head, the operator merely loosens a clamping screw, positions the head to the desired clearance angle, and retightens the clamping screw. A positive positioning plunger provides a quick means of resetting the head to the "zero" or horizontal position.

B. the tilting wheelhead eliminates "tilt and roll" of the workhead spindle when setting up to sharpen the chamfer on this staggered tooth cutter.
duplicate controls for convenience and ease of operation

CINCINNATI Number Two Cutter and Tool Grinders are equipped with duplicate controls, providing four positions from which the operator can easily adjust the table or cross slide, raise or lower the wheelhead and start or stop the spindle. This design feature assures complete control of the grinding operation from a convenient position, regardless of the size or style of cutter.

1. Operator controls table traverse and cross adjustment from left front position. Here he can keep an eye on the grinding operation while standing clear of grit and dust.

2. Here the operator controls table traverse with his right hand, cross movement with his left. Differential table traverse control is used for fine feed portions of the grinding operation. Right front table control knob for moving the workpiece to and from the grinding wheel.

3. Grinding an arbor mounted saw from the left rear operating position.

4. The operator has moved to the right rear position to grind the O.D. of a shell end milling cutter.
eccentric wheelhead and swivel table
provide more effective cross range

CINCINNATI Number Two Cutter and Tool Grinders offer
greater versatility and more effective cross range than
machines of comparable size. The normal cross range of the sal-
dle, coupled with the 360° eccentric wheelhead and offset
swivel table, enables the operator to grind the end teeth of
those extra long cutters, such as the extended shell mill
shown in the illustration at the left. The normal cross range of
the machine is 10". When swiveled 180°, the offset swivel
table extends the cross range 3½"; the eccentric wheelhead
adjusted to the extreme rear position extends the cross range
an additional 3½", giving the machine 17" of total
extended cross range. An advantageous feature when you
consider the offset table and/or eccentric wheelhead may be
clamped in any angular position to suit the setup.

A. eccentric wheelhead and swivel table conveniently pos-
tioned to grind the chamfer of an extended cutter.

10" normal cross range with saddle extended.

offset table swiveled 180°, adding 3½" of cross range.

eccentric wheelhead swiveled to rear, increasing extended
cross range to a total of 17".
The eccentric wheelhead arrangement consists of two independent swivels: the eccentric wheelhead and the wheelhead column. Each can be swiveled 360°. No trick at all for the operator to adjust the eccentric wheelhead to suit any particular grinding operation since these swivels provide an infinite number of angular adjustments. Another advantage of the eccentric wheelhead is that it gets the grinding wheel right over the table surface with no additional saddle bearing length. This means less overhang with the saddle in the extreme operating position, and in most cases eliminates the need for spindle extensions.

B. the eccentric wheelhead puts the wheel right over the work on surface grinding operations.

C. swivel table is positioned at right angles to the grinding wheel, permitting the face of this boring tool to be ground in position.
The anti-friction table slide on the Number Two Cutter and Tool Grinder provides effortless traverse. The super-sensitive sliding table moves on hardened steel balls, matched for uniformity of size, rolling in hardened steel V-ways. Accurate, smooth straight line traverse and long life are other advantages offered by this construction. If for some reason after years of service these hardened steel ways must be replaced, the job can be done by your own men. Replacement ways are hardened and ground to dummy units in our shop. This means new machine accuracy may be restored inexpensively in your own shop by one man in about two hours.

A. a closer look at one of forty hardened steel balls that support the table, assure easy movement.
smooth and steady...with cushioned table reversal

The differential table traverse control provides smooth steady hand table movement for cylindrical, internal, and surface grinding operations, and for truing the grinding wheel. When the control is engaged, the table moves a mere \( \frac{5}{32} \)" for each complete revolution of the handwheel. In addition, front and rear table hand controls become inoperative when the control is engaged, preventing sudden movement of the table and workpiece during the grinding operation.

Spring cushioning table dogs not only govern the length of table traverse, but they also offer an important secondary advantage. They absorb the shock at table reversal. The dogs may be reversed if positive table stop is desired.

B. a slight movement of the center plunger engages or dis-engages differential table traverse control.

C. spring cushioned table dogs may be reversed for adjustable positive stop, if desired.
A Number Two Cutter and Tool Grinder equipped with Power Table Traverse is truly an all-around toolroom machine. In addition to being fully capable as a cutter sharpener, it is ideal for light production work involving cylindrical, internal, or surface grinding operations.

Table feed rates are infinitely variable within a range of 7” to 90” per minute. Table drive can be quickly disengaged for manual control when desired. Power Table Traverse is optional equipment, available for 24” Table Travel machines only.

A. smooth, powered table movements assure finer finish, closer tolerances when surface grinding.

B. CINCINNATI Number Two Cutter and Tool Grinder having 24” table travel and equipped with Power Table Traverse.
The adjustable wheelhead pile provides ample vertical range for going up, to sharpen large diameter face mills; or for going down, to position the grinding wheel close to the table surface. Dual controls permit the operator to raise or lower the wheelhead from either side of the machine, and once the desired setting is made, an anti-backlash device within the elevating mechanism maintains correct wheelhead height throughout the grinding operation. The elevating mechanism is sealed away from grit and dirt and is lubricated by the one shot system for a long life of trouble-free service.

A. here’s the type of job that requires plenty of vertical range. The Number Two handles it with room to spare.

B. getting the wheelhead down low is no problem either, as shown in this boring bar setup.
The "Tange Bar" taper setting device permits quick positioning of the swivel table when grinding angular cutters and tapered reamers. The operator multiplies the tangent of one-half of the included angle by 12, or utilizes the given value of the taper per foot from the centerline to obtain the correct gage block setting. The operator replaces this value with precision gage blocks, accurately positioning the swivel table to grind the taper.

The swivel table can be adjusted forward or backward for tapers up to 2" per foot with the Fine Adjustment Taper Setting Device. Direct taper settings are made by merely turning a swivel adjusting screw and reading the taper per foot directly from a scale within the table. This is a desirable feature when making the fine and accurate settings required to obtain an exact bearing the full length of previously ground workpieces.
Setting the correct clearance angle is one of the easiest operations on a Number Two Cutter and Tool Grinder. The operator can tilt the grinding wheelhead directly to the desired clearance angle, or he can "roll" the cutter the correct number of degrees as indicated by the clearance setting dials on the workhead or left hand tailstock.

A. easy-to-read scale on wheelhead swivel enables operator to position the grinding wheel directly to the desired clearance angle.

B. clearance angles for adapter mounted and shank type cutters are easily obtained with the clearance setting dial on the left-hand end of the workhead.

C. arbor mounted cutters can be quickly adjusted to the desired clearance angle with the clearance setting dial on the left-hand tailstock.
a truly universal workhead...
accurate positive tailstock alignment

Universal workhead accommodates cutters with either the No. 12 B & S taper (No. 5 Morse taper optional) or the No. 50 Series National Standard taper. Anti-friction spindle mounting assures smooth, easy movement when rotating the spindle from one grinding position to another. The base and workhead swivel are graduated in 1 degree increments to aid in obtaining accurate adjustments in the horizontal and vertical planes.

Tailstocks are easily positioned anywhere along the table surface. Tightening the thumbscrews before clamping the tee bolt always locates the tailstocks from the same side of the table T-slot. This assures accurate positive alignment of both tailstock centers. Centers can be easily removed and reversed in the tailstocks. This enables the operator to use the retractable center or clearance setting dial center at either end of the table, convenient to the normal working position.
Toothrests speed setups...
quick, positive lubrication

Toothrests and toothrest holders simplify the problem of supporting the cutting edge during the grinding operation. The micrometer toothrest holder is graduated in thousandths of an inch, for fine clearance adjustment of the toothrest blade. A spring-actuated pivot snaps the toothrest blade back to the working position after each index.

The Universal Toothrest Plate is completely adjustable and can be mounted on the wheelhead pile, machine table, and top or bottom of the workhead. Plain and micrometer toothrest holders are interchangeable, permitting use of either holder with the plain or universal toothrest plate.

Your operator will appreciate the time-saving convenience of the one shot lubrication system. The actuating plunger is located in the cross slide at the front of the machine. One pull daily assures the proper amount of lubricant to table hand controls, cross feed screw, cross slide bearings, and wheelhead elevating mechanism.
A wide selection of standard attachments is available for CINCINNATI Number Two Cutter and Tool Grinders. Each of these attachments is designed to reduce both the time and effort involved in specific areas of cutter sharpening. The proper attachments can reduce tool maintenance costs through simplified setups and increased operator efficiency. Illustrated and briefly described on the following pages are many of the accessories available for the Number Two Cutter and Tool Grinder.

**surface grinding attachment**
Flat forming tools, lathe tools, and work of a similar nature may be accurately and quickly ground with the CINCINNATI Surface Grinding Attachment. The attachment consists of a swivel vise with an intermediate support between the vise and the base, which allows the vise to be swiveled 360° in both the horizontal and vertical planes. The regular workhead support may be removed and placed between the vise support and the base, making the vise adjustable in three planes. Surfaces up to 4" wide can be ground in one setting.
gear cutter sharpening attachment

Form relieved cutters are sharpened by grinding the face of the teeth. The CINCINNATI Gear Cutter Sharpening Attachment is designed for this particular operation. The bracket which supports the cutter is swiveled to the angle of the tooth face. A spring pawl locates against the back of the tooth, holding it in the grinding position. The attachment accommodates cutters up to 8 3/4" O.D. and up to 2" diameter hole.

cylindrical grinding attachment

The CINCINNATI Cylindrical Grinding Attachment can be used for all types of straight or taper cylindrical grinding, such as reamers, lathe centers, mandrels, reclaimg cutters, and for facing operations on cutter hubs, gear shaper cutters, collars, etc.

The attachment will swing 10 1/2" diameter work in a chuck or between live or dead centers. Right- or left-hand rotation is selected with a reversing switch at the left side of the bed.
...that further increase versatility and usefulness

Internal grinding attachment

The Internal Grinding Attachment is used with the Cylindrical Grinding Attachment to grind inside diameters up to 3½" in length. The attachment may be reversed, enabling the operator to grind from the left or right side of the machine. The internal grinding spindle is powered by a positive drive belt from a gear tooth pulley mounted on the wheelhead spindle. The attachment operates at approximately 23,000 rpm, permitting the use of smaller diameter internal grinding wheels.

Face mill grinding attachment

Face mills up to 18" diameter may be sharpened with a high degree of accuracy on the CINCINNATI Face Mill Grinding Attachment. The attachment consists of a workhead, swivel plate and base. The work spindle is mounted on anti-friction bearings and has a No. 50 Series National Standard taper hole. The base and swivel block are both graduated in degrees, permitting the cutter to be swiveled to the desired clearance angle.
work support blade grinding attachment

Centerless grinder work support blades may be reground to their original accuracy with a CINCINNATI Work Support Blade Grinding Attachment. The attachment has a swivel range of 45°, permitting the operator to accurately grind any blade angle within this range. A large dial at the left of the attachment facilitates setting the blade to the desired angle.

no. 1 radius grinding attachment

The CINCINNATI No. 1 Radius Grinding Attachment is ideal for sharpening small ball-end cutters having straight or helical flutes. It consists of a base plate, two slides each having a micrometer adjustment, and a workhead, having a No. 12 B & S or No. 5 Morse taper hole spindle.

An index plate at the rear of the workhead permits direct indexing of straight fluted cutters, having 1, 2, 3, 4, 5, 6, 8, 12 and 24 flute. The capacity of the attachment is 0" to 2" radii and 4" maximum cutter diameter.
...that reduce setup and operating time

draw-in collet attachment

Small straight shank cutters can be conveniently ground with the CINCINNATI Draw-In Collet Attachment.

An adapter fits the No. 12 B & S (or No. 5 Morse) end of the workhead spindle. A draw-in bolt extends through the workhead, holding the straight cylindrical collets in the collet adapter. Collets (optional) available for the adapter are: \( \frac{1}{8} \)" to \( 1 \frac{1}{8} \)" in increments of \( \frac{1}{4} \)"; 0.125" to 1.125" in decimal increments (specify exact size); and metric sizes from 3mm to 28mm in increments of 1mm.

long reamer grinding attachment

The CINCINNATI Long Reamer Grinding Attachment is useful in grinding long lining reamers, boring bars, taper reamers and extension taps.

The attachment consists of an extension bar workhead plate, intermediate support and base plate. Maximum distance between centers is 34".

Centers will swing work up to 6" in diameter over the supporting bracket and 7" diameter at any other portion of the bar section.
extended spindle

A CINCINNATI Extended Grinding Wheel Spindle is desirable where a large volume of work can be ground with the grinding wheel extended 2" or 4" from the wheelhead. The entire spindle assembly, including the bearings and housing, is extended from the grinding wheelhead, providing far greater rigidity than a simple "spindle extension." The spindle extends from the left side of the wheelhead only, and is interchangeable with the conventional spindle.

no. 2 radius grinding attachment

Medium to large-sized milling cutters requiring an accurate 90° radius may be ground with the CINCINNATI No. 2 Radius Grinding Attachment.

The attachment consists of a base, swivel plate, adjustable table and workhead support. A micrometer gage is also included for determining the starting position. The workhead and draw-in bolt are standard machine equipment. Capacity of the attachment is 0" to 1" radii and 0" to 12" cutter diameter with 3" maximum width of face.
...and reduce operational costs

workhead indexing attachment

Accurate indexing can be done quickly and easily when the standard workhead is equipped with the CINCINNATI Workhead Indexing Attachment.

It saves time by eliminating the toothroot ordinarily required in the setup. The index plate consists of twenty-four accurately spaced notches and may be easily fastened to the No. 12 B & S (or No. 5 Morse) end of the workhead. Cutter shanks can be inserted in either end of the workhead, just as they can without the attachment.

micrometer table positioning attachment

The CINCINNATI Micrometer Table Positioning Attachment offers a means of obtaining accurate spaces between ground surfaces such as grooves in plungers, combination reamers and drills, and special tools.

The attachment is, in effect, a precision lead screw with 6" of travel for the machine table. A gentle twist of the knurled knob moves the table past the grinding wheel. Removing two hexagon nuts disconnects the attachment from the table of the machine for conventional operation.
Cutting Fluid Attachment

All CINCINNATI Number Two Cutter and Tool Grinders are designed for use with cutting fluid. The Cutting Fluid Attachment consists of a reservoir, pump (capacity five gallons per minute), 3/4 hp motor, piping, and splashguards. The standard attachment is designed for flood type application. If desired, the attachment can be arranged for mist application by the addition of a special valve which connects to your factory air supply.

Heavy Duty Tailstocks

CINCINNATI Heavy Duty Tailstocks increase swing over the table and are useful in supporting heavy boring bars, large milling cutters that cannot be handled on the standard tailstocks. These substantially constructed tailstocks have a 16” swing and carry the work directly over the centerline of the table, for rigid support during the grinding operation. Accurate alignment is assured as both tailstocks are located from the same side of the machine table.
controls are right at hand from any operating position...

1. eccentric wheelhead swivel
2. offset swivel table
3. sliding table
4. taper bar taper setting device
5. fine adjustment taper setting device
6. reversible table dog
7. front table hand control
8. one shot lubrication plunger
9. differential table traverse control
10. wheelhead elevating handwheel
11. electrical control panel
12. front cross adjusting handwheel
13. electrical control compartment
1. retractable center tailstock
2. spindle drive belt cover
3. universal workhead
4. wheelhead upper swivel bracket
5. eccentric wheelhead lower swivel
6. rear table hand control
7. accordion type dust guard
8. rear table hand control
9. wheelhead elevating handwheel
10. rear cross adjusting handwheel
11. rear electrical outlet
general specifications

Swing over Table (Diameter)
Length, between Right and Left-hand Tailstocks (Max.)
Length, between Tailstock and Workhead
Face Mills on Workhead (Max. Diameter)
Saws on Table (Max. Diameter)
Formed Cutters (Max. Diameter using 6" wheel)

TAPER HOLE IN WORKHEAD SPINDLE

One End
Other End

TABLE

T-Slots (Number and Size)

Working Surface

RANGE

Longitudinal Movement of Table
Number of Table Traverse Feeds*
Table Traverse Feed Range (inches per minute)*
Cross Movement of Table
Cross Range Gained by Wheelhead Eccentricity
Cross Range Gained by Swivel Table
Total Extended Cross Range
Table Swivels
Swivel Table Adjustments (Taper Per Ft. on Diam.)

Tangent-Bar Taper
Setting Device

Fine Adjustment Taper
Setting Device

Table Graduations in Center, in degrees
Vertical Movement of Grinding Wheel Spindle
Swivel Movement of Grinding Wheel Spindle
Maximum Distance Centerline Spindle to Top of Table

GRINDING WHEEL SPINDLE SPEEDS

ELECTRICAL EQUIPMENT

FLOOR SPACE FOR OPERATING

SHIPPING DATA

Net Weight (approximately)
Shipping Weight, Domestic
Shipping Weight, Export
Size of Case, Export
Volume of Case, Export

16" table travel  24" table travel

12 R & S
or No. 3 Morse
or No. 5 Morse
50 Series
National
Standard

12 R & S
or No. 3 Morse
or No. 5 Morse
50 Series
National
Standard

Length x Width x Height

Net Weight

Shipping Weight

Size of Case

Volume of Case

*Applies only to 24" Table Travel Machines equipped with power table traverse.

**Floor space required for 24" Table Travel Machine equipped with power table traverse is 71" x 51".
CINCINNATI / NUMBER TWO
standard accessory items

1. Headstock
2. Right hand tailstock
2A. T-Bolt for tailstock
3. Left hand tailstock
3A. T-Bolt for tailstock

7. Extension plate, eye bolt, and ring
7A. Blade holder extension
7B. Micrometer thrust support with round top blade (7A, 7B, and 7B Straightline, incline, and toothed plate)

8. Offset blade
8A. Plain toothrest holder

9. Plain toothrest plate
10. Nut for attaching plain toothrest plate to universal toothrest
10A. Screw for item 10

11. 2 spindle extensions for wheels with 1 1/4" hole
2H.

12. Center for workhead spindles
13. Reducing collet—19 to 3 5/8 & 8 or 3 1/4 Morse

14. Reducing collet—12 to 1 5/8 & 5 or 3 1/4 Morse
15. Reversing collet
16. Center gage
17. Clearence angle setting dog
20. T-Wrench for grinding wheel arbor screw
21. Nutlet wrench

22. Wheel guard for wheel print no. 11Y-110
23. Wheel guard for wheel print no. 6Y-112
24. Diamond brackets
25. Diamond holder with diamond

26. Double end wrench (1/4" and 5/16" openings)
27. Short holder for wheel guard

29. Grinding wheel and collet assembly—wheel print no. 11Y-110 (9/16", 3/4", 11/16" holes) straight cup
30. Grinding wheel and collet assembly—wheel print no. 7Y-110 (3/4", 5/8", 7/8" holes) straight cup

31. Grinding wheel and collet assembly—wheel print no. 7Y-112 (9/16", 11/16", 1 1/4" holes) straight cup
32. Grinding wheel and collet assembly—wheel print no. 11Y-112 (9/16", 3/4", 11/16" holes) straight cup

33. Grinding wheel and collet assembly—wheel print no. 12Y-112 (9/16", 3/4", 11/16" holes) dished

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enclosed, safe and within easy reach

ELECTRICAL EQUIPMENT SUPPLIED WITH:
plain and universal machines
1. Grinding Wheel Spindle Motor: 1 hp totally enclosed ball bearing motor in precision dynamic balance: 220 to 550 volts, 50 or 60 cycle A.C.
2. Magnetic starter for above motor provides overload and under-voltage protection. A reversing toggle switch provides spindle reverse.
3. Disconnect switch, mechanically interlocked with the electrical compartment door.
4. Complete electrical wiring in accordance with N.M.T.B.A. Electrical Standards.

universal machines (only)
1. Cylindrical Grinding Attachment Motor: 3/4 hp totally enclosed ball bearing; 220 to 550 volts, 50 to 60 cycle A.C.
2. Overload relays and reversing toggle for above motor provides overload and under-voltage protection. Includes electrical outlet and reversing drum switch for the Cylindrical Grinding Attachment.

Note: If three-phase current is available up to 600 volts, it should be used for both the grinding wheel spindle motor and Cylindrical Grinding Attachment motor.

main drive motor and grinding wheel speed data
(small step of motor pulley is used with 6" wheel, large step with 3 1/2" wheel)

<table>
<thead>
<tr>
<th>MAIN DRIVE MOTOR</th>
<th>6&quot; DIAM. GRINDING WHEEL</th>
<th>3 1/2&quot; DIAM. GRINDING WHEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td>Cycle</td>
<td>Speed rpm</td>
</tr>
<tr>
<td>1 HP AC</td>
<td>60</td>
<td>3600</td>
</tr>
</tbody>
</table>
OPTIONAL ACCESSORIES
not included in price of standard (basic) machine.

Plain Machine Only
1. Cylindrical Grinding Attachment. Includes 4” 3-jaw universal chuck with 2 sets of non-reversible jaws, internal and external; chuck adapter; chuck wrench; vee belt; plate and screws for motor base; pulley fitted with two clamps, collar, and dog; universal grinding dog; and complete electrical equipment—see page 39. Specify taper in workhead spindle (12 B & S or No. 5 Morse).
2. Surface Grinding Attachment. Includes vise, intermediate support, two T bolts, and base plate.
   (a) For additional intermediate support for this attachment see item 35.
3. Internal Grinding Attachment. Generally used with the Cylindrical Grind attachment—Item 1, above.
4. Gear Cutter Sharpening Attachment. For grinding straight or staggered tooth gear cutters. Includes five bushings; specify English or Metric (1”, 1½”, 1½”, 1¾” and 2”; or 27, 32, 40, 45, and 50 mm O.D.).
Plain or Universal Machines
1. Power Table Traverse. Available for machines having 24" table travel only. 5/8 hp motor provides infinitely variable table feeds ranging from 7" to 90" per minute.

2. Cutting Fluid Attachment (flood type). Includes pump, capacity 5 gallons per minute, 5/8 hp motor, piping, and splash guards. May be arranged for mist application if desired.

3. No. 1 Radius Grinding Attachment. Capacity - 0" to 2" radii and 4" maximum cutter diameter. Attachment spindle has No. 12 B & S or No. 5 Morse taper. Specify taper desired at time of order.

Additional equipment for straight and cylindrical grinding:
- Motor drive equipment, complete. Specify current characteristics.
- Basic parts required for grinding straight shank cutters when either item "c" or "d" is purchased.
- Sleeve for grinding large straight shank cutters - item "b" must also be purchased.
- Capacity: 3/4" and 7/8" diam. shanks, 1" and 1 1/4" diam. shanks.
- Sleeve and draw-in bolt for draw-in collets. Item "b" must also be purchased. See item "e" for collets.
- Collets for grinding taper shank cutters. Mount in attachment spindle. Specify taper in attachment spindle. (No. 12 B & S or No. 5 Morse).

Outside Taper: Inside Taper: No. 12 B & S Nos. 4 to 11 B & S No. 12 B & S Nos. 1 to 4 Morse No. 5 Morse Nos. 4 to 11 B & S No. 5 Morse Nos. 1 to 4 Morse 110.2 Radius Grinding Attachment. Capacity 0" to 1" radii and 0" to 12" cutter diameter. Length not to exceed 4" plus radius to be ground. Attachment includes swivel housing, swivel table, top plate, workhead support, and micrometer locating gage.

The following parts are included as standard equipment supplied with the machine and therefore are not included with the attachment: workhead spindle housing, draw-in bolt, and three reducing collets. If face mills are to be ground, it will be necessary to purchase a Face Mill Adapter, Item 27.

5. Long Reamer Grinding Attachment. Capacity - 6" diam., 34" between centers.

- Face Mill Grinding Attachment. Includes one 2" Raising Block. Capacity - 18" diam. cutters.
- (a) Adapter plate, 8" diameter with 5 1/16" bore.
- (b) Adapter bushing, 2" O.D. with 1 1/2" bore.
- (c) Adapter bushing, 2 1/2" O.D. with 1 1/2" bore.

7. Indexing Attachment for Workhead. Includes one 24-notch index plate. Extra index plates - specify number of notches desired.

- Micrometer Table Positioning Attachment. Operated by an accurate lead screw.

9. Heavy Duty Tailstocks. 16" swing, 19" between centers.

- 2" or 4" Extended Grinding Wheel Spindle.

11. Spindle Extension, 2" and 4" length, 1/2" or 1 1/4" diameter at wheel section.

12. Grinding Wheel Collets and Collet Parts. Specify if collets are for 8" diameter wheels.

13. Wheel Pulley. For 8" diameter grinding wheels.

14. Wheel Guard. For 8" diameter grinding wheels.

15. Standard Grinding Wheels without grinding wheel collet, wheel collet nut, wheel collet
### Optional Accessories

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>2.</td>
<td>Wheel Print No. 11Y-120 flaring cup—3 1/2″ diam. x 1 1/2″ x 1 1/2″ hole.</td>
</tr>
<tr>
<td>3.</td>
<td>Wheel Print No. 0Y-112 straight cup—5″ diam. x 1 1/2″ x 1 1/4″ hole.</td>
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<tr>
<td>4.</td>
<td>Wheel Print No. 1Y straight—6″ diam. x 1/2″ x 1 1/4″ hole.</td>
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<tr>
<td>5.</td>
<td>Wheel Print No. 1Y straight—1″ diam. x 1/2″ x 3/8″ hole.</td>
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<tr>
<td>6.</td>
<td>Wheel Print No. 1Y straight—8″ diam. x 3/8″ x 1 1/4″ hole.</td>
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<tr>
<td>7.</td>
<td>Wheel Print No. 1M straight—6″ diam. x 1/2″ x 1 1/4″ hole.</td>
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<tr>
<td>8.</td>
<td>Wheel Print No. 1M straight—5/8″ diam. x 1/2″ x 1/4″ hole.</td>
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<tr>
<td>9.</td>
<td>Wheel Print No. 1M straight—8″ diam. x 3/4″ x 1 1/4″ hole.</td>
</tr>
<tr>
<td>10.</td>
<td>Wheel Print No. 1M straight—3/4″ diam. x 1/2″ x 1/4″ hole.</td>
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</tbody>
</table>

Note: When ordering grinding wheels specify wheel print number and size. To duplicate previously purchased wheels, include the old wheel marking.

Reducing Collets:
- No. 12 B & S to Nos. 4 to 11 B & S (inclusive)
- No. 12 B & S to Nos. 1 to 4 Morse (inclusive)
- No. 5 Morse to Nos. 1 to 4 Morse (inclusive)
- No. 5 Morse to No. 4 to 11 B & S (inclusive)
- No. 50 Series to No. 40 Series (National Standard taper)

Saw Grinding Attachment.
- Face chuck—complete.

25. Tooth Rests:
- Universal Tooth Rest—complete assembly including item 'b' below.
- Micrometer Adjustable Blade Holder with two blades for Universal Tooth Rest.
- Plain Tooth Rest—complete assembly including plate and item 'd' below.
- Plain Blade Holder with offset blade for Plain Tooth Rest.
- Tooth Rest Blades, Flat Top, Round Top, and Offset (for Plain Tooth Rest only).

27. Face Mill Adapter. For grinding face mills on either the standard workhead or No. 2 Radius Grinding Attachment.
- 4″ 3-jaw Universal Chuck. Mounts in standard workhead spindle. Includes two sets of non-reversible jaw, internal.
and external. No. 5 Morse or No. 12 B & S taper shank only. Specify taper desired (standard equipment on Universal Machines).

29. 4" 4-jaw Independent Chuck. Mounts in standard workhead spindle. Reversible jaws. Specify taper hole in spindle (12 B & S or 5 Morse).

30. Raising Block, 2"—includes long T-bolts.


32. Wrenches: Double end—7/8" and 1" opening, collet nut wrench, and T-wrench for wheel collet lock screw.

33. Cutter Sharpening Arbors. Includes set of collars and nut:
(a) 7/8" diam. x 8 1/4″ usable cutter length.
(b) 1″ diam. x 8 1/4″ usable cutter length.
(c) 1 1/4″ diam. x 8 3/4″ usable cutter length.
(d) 1 1/2″ diam. x 8 3/4″ usable cutter length.
(e) 2″ diam. x 8 1/4″ usable cutter length.


35. Heavy Duty Headstock. Includes 1/4 hp reversible drive motor and special tailstock with retractable center.
CINCINNATI
The Cincinnati Milling Machine Co.
CINCINNATI, OHIO 45209 U.S.A.

Products of the Cincinnati Milling Machine Co. include a complete line of general purpose milling machines, machining centers, production milling machines, die sinking and profile milling machines, cutter and tool grinding machines, center-type grinding machines, centerless grinding machines, roll grinding machines, chucking grinding machines, microcentric grinding machines, special grinding machines, electrical machining equipment, metal forming machines, special broaching machines, special machine tools and complete production lines, special machinery, numerical control systems, tracing systems, gaging systems, hydraulic motors, hydraulic and electro-hydraulic valves and components, service parts, cutting fluids and precision grinding wheels.