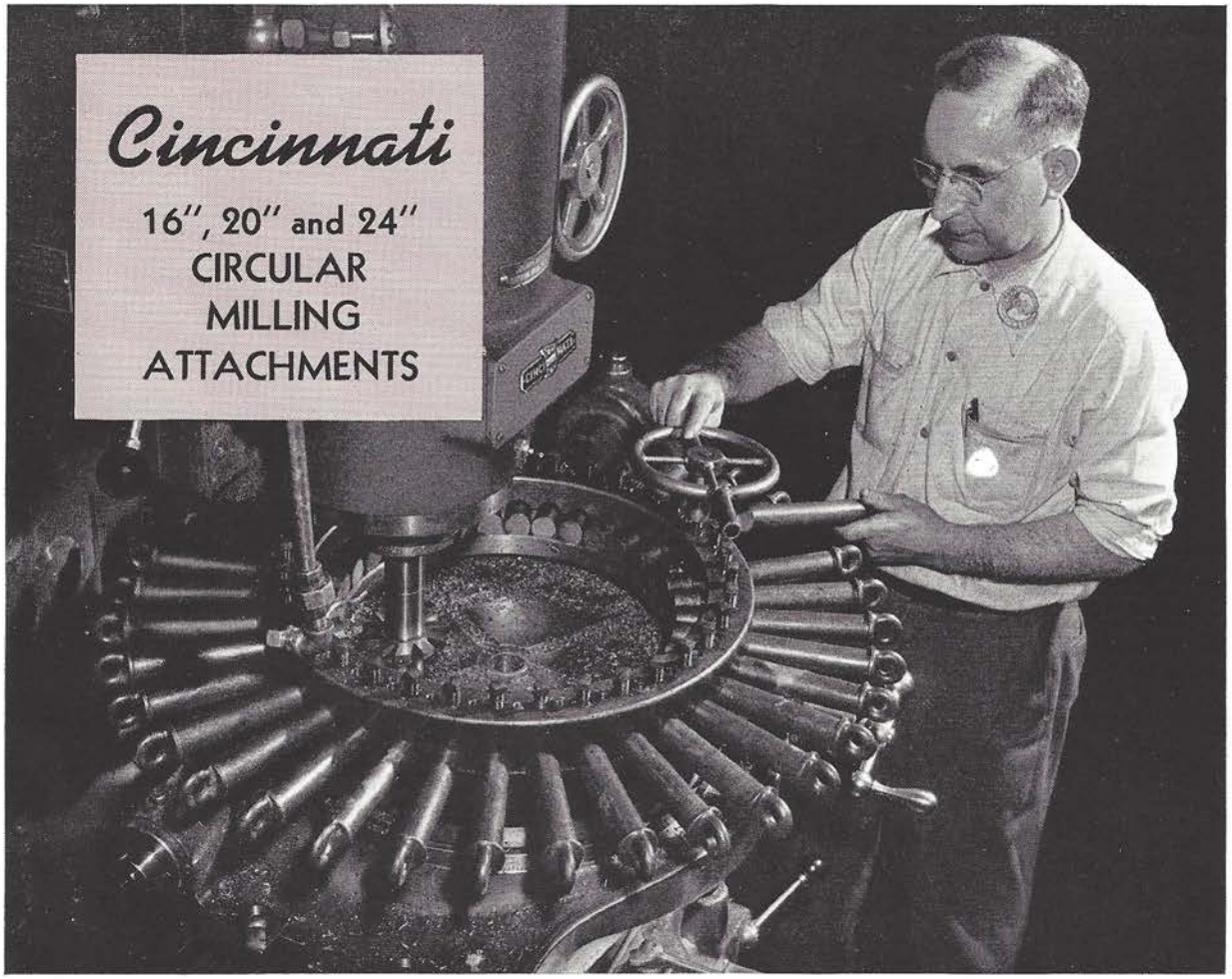

● Continuous milling—the operator loads and unloads the work while the operation of milling the ends of toggle pins proceeds continuously. Equipment consists of a Power Driven Circular Milling Attachment, mounted on a Cincinnati Vertical Dial Type Milling Machine. (Photo courtesy U. S. Navy.)

CINCINNATI Circular Milling Attachments convert horizontal and vertical milling machines into rotary millers while retaining all the advantages of a knee and column type machine. In other words, the attachment adds a rotary feed motion to the three conventional feeds (longitudinal, cross, and vertical), resulting in a machine having four feed motions and capable of milling a greater variety of parts. The drawing on page 2 (Fig. 1) shows some of the additional types of work which can be milled.

There are three sizes of CINCINNATI Circular Milling Attachments—16″, 20″ and 24″. In each case, the size indicates the diameter of the table. All of them are very similar in design, the two larger sizes being identical except as to physical dimensions.

All three sizes may be purchased as hand feed or power feed attachments. Power is derived from the table feed screw drive gear, and transmitted by a secondary gear through a long shaft extending to a bracket mounted on the right hand end of the table. If originally purchased without the power feed mechanism, the parts may readily be added at a later date. (Unless used on standard Universal L-Type or Universal MH-Type Milling Machines. See Note 1, bottom page 4.)

● When ordering Power Feed Circular Milling Attachment for machines in field, submit machine serial number with order.

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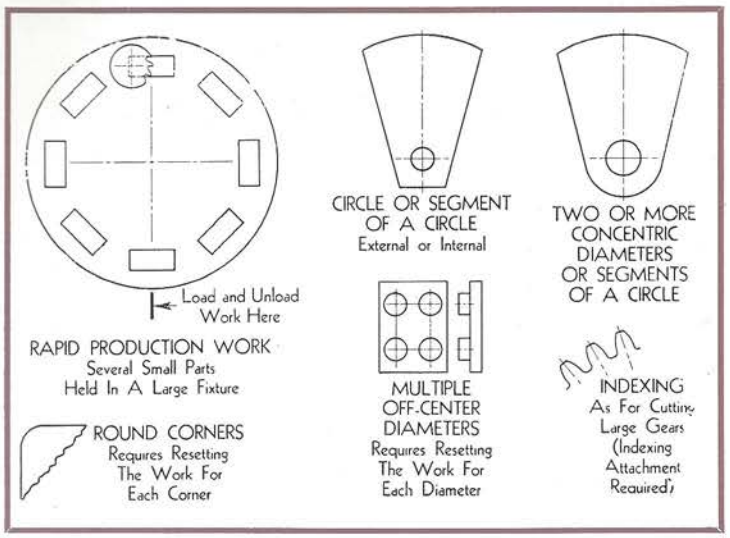


Figure 1—Basic Types of work which can be handled with the aid of CINCINNATI Circular Milling Attachments.

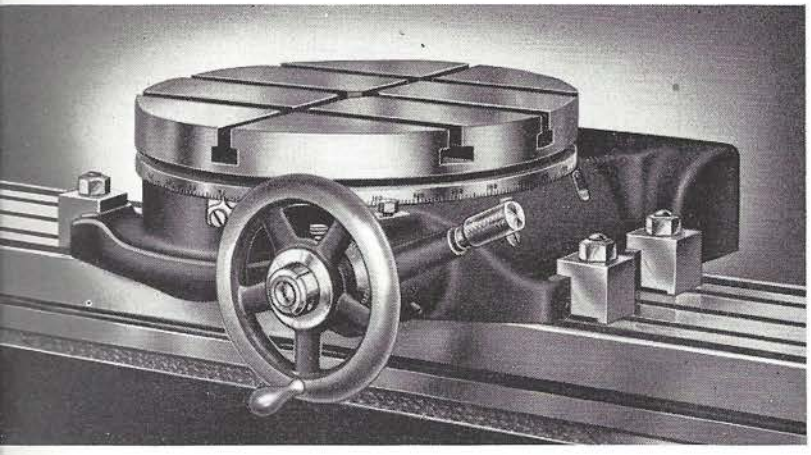
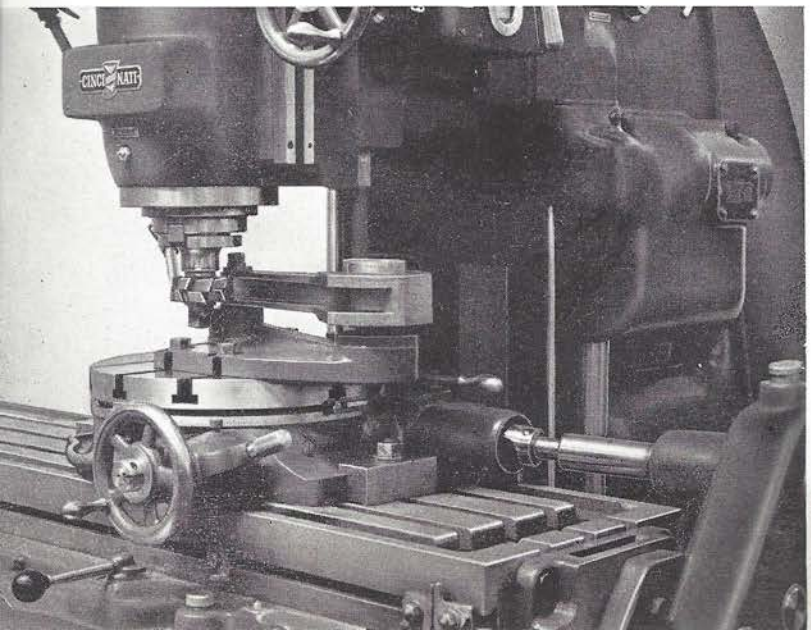


Figure 2—16″ Circular Milling Attachment Arranged for Hand Feed.

Figure 3—Finish Milling Channel at Wrist Pin End of Master Rods. The attachment is a 16″ size, with Power Feed, mounted on a CINCINNATI Dial Type Milling Machine.



16″ Attachment

The 16″ Circular Milling Attachment, arranged for hand feed, is shown in Figure 2. It can be used with any size or style of CINCINNATI Milling Machine, except the 18″ Manufacturing and the automatic types.

There are four standard $\frac{11}{16}$″ T-slots in the table, affording adequate clamping for any type of work or fixture. In addition, the center of the table is fitted with a flanged bushing having an accurate No. 11 B & S taper hole, suitable for central location of work on a stud. A worm wheel attached to the underside of the table provides the means of obtaining rotary motion. It has a ratio with the worm of 120 to 1.

Accurately graduated degree marks on the periphery of the table, with large, easy-to-read numerals, facilitate angular settings. Graduations on the hand crank dial indicate the table rotation in minutes; an additional aid to quick and accurate adjustment of the work to the cutter.

When arranged for power feed (Figure 3), the rotary motion of the table may be engaged (clockwise or anti-clockwise) by means of a lever at the rear. In general, rotary power feed rates depend upon two factors: (1) the diameter being milled and, (2) the machine feed rate which is being used. Power rapid traverse to the rotary table may be obtained by engaging the machine rapid traverse while the attachment feed lever is engaged.

The chief difference between this size and the two larger attachments is in the mounting of the worm. It can be disengaged from the worm wheel attached to the underside of the attachment table, freeing the table so that it can be swiveled by hand. This feature is a time saver when the work must be indexed through a considerable arc, say 180°, for a second cut.

20″ and 24″ Attachments

The 20″ Attachment, arranged for power feed, is illustrated in Figure 4. Both the 20″ and 24″ sizes are intended primarily for the larger machines, principally numbers 3, 4, and 5.

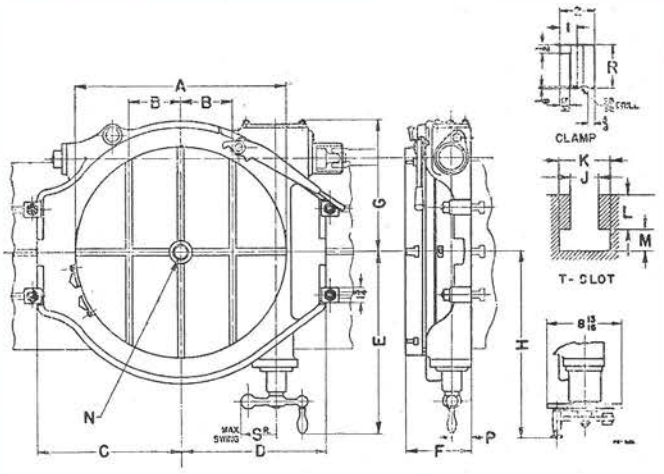
Like the smaller attachment, the bases and tables of the 20″ and 24″ sizes are Meehanite iron castings, assuring permanent flatness of the table. It has four standard $\frac{13}{16}$″ T-slots for clamping the work and fixtures, and an accurately finished No. 12 B & S taper hole in the center for quickly setting up work and fixtures requiring central location. A T-slot around the periphery of the table permits the power feed stop-dogs to be set at any point on its circumference. Accurately graduated degree marks on the periphery of the table, with large, easy-to-read numerals, facilitate angular settings. Graduations on the hand crank dial indicate the table rotation in minutes; an additional aid to quick and accurate adjustment of the work to the cutter.

The worm and worm-wheel drive for the rotary motion has a ratio of 80 to 1. Because of this coarser pitch, and the greater ruggedness of the attachment for power drive, the worm is solidly mounted with anti-friction thrust bearings. Then, too, power-driven attachments have the advantage of a rotary rapid traverse rate, which can be produced by engaging the machine rapid traverse lever.

Indexing Attachment

Work which requires a number of accurately spaced holes, slots, grooves, or other shapes can be machined more quickly if the Circular Milling Attachment is equipped with an auxiliary Indexing Attachment, illustrated in Figure 6. This device, which replaces the hand feed crank, may readily be applied to the 16″, 20″ or 24″ Circular Attachment. (See Note 2, Page 4, regarding application of Indexing Attachment.)

Figure 4—20″ Circular Milling Attachment, mounted on the table of a No. 4 High Power Milling Machine, Arranged for Power Drive. The 24″ Attachment is exactly the same design.



Size	A	B	C	D	E	F	G	H	J	K
16″	16	4	10	10¾	14½	6	9⅜	13½	11/16	1¼
20″	20	5	14⅝	14⅝	19	7	13 13/16	20⅛	13/16	1 11/32
24″	24	6	16 5/16	16 5/16	21	7½	15 5/16	22⅛	13/16	1 11/32

Size	L	M	N			P	R	S
			B. & S. Taper	Dia. at Small End	Plug Depth			
16″	¾	31/64	11	1.250	5¾	1¾	1⅞	3½
20″	1	5/8	12	1.500	6⅞	2¼	2½	4⅛
24″	1	5/8	12	1.500	6⅞	2¼	2½	4⅛

Figure 5—Dimensional Drawing

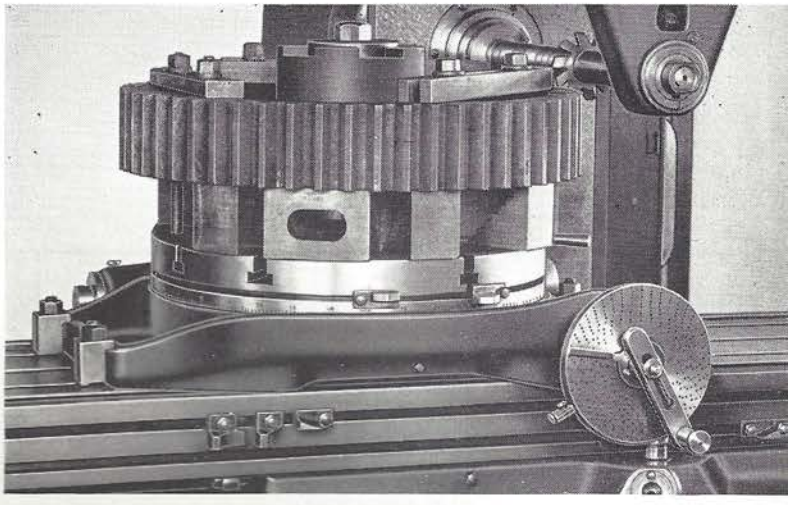


Figure 6—Milling the teeth of a large spur gear. The part is mounted on a Cincinnati Circular Milling Attachment, equipped with an auxiliary Indexing Attachment.

SPECIFICATIONS FOR CIRCULAR MILLING ATTACHMENTS

SIZE OF ATTACHMENT	Diameter of Table	Size of Taper Hole in Table	Width of T-Slots in Table	Total Height	SHIPPING DATA—HAND FEED				SHIPPING DATA—POWER FEED			
					Net Weight, Pounds, Approx.	Shipping Weight, Pounds, Approx.	Size of Case, Inches	Cubic Contents of Case, Cu. Ft.	Net Weight, Pounds, Approx.	Shipping Weight, Pounds, Approx.	Size of Case, Inches	Cubic Contents of Case, Cu. Ft.
16″	16″	No. 11 B.&S.	11/16″	6″	310	390	30x12x28	6	425	545	48x12x28	9
20″	20″	No. 12 B.&S.	13/16″	7″	615	735	40x15x38	13	735	895	60x15x38	20
24″	24″	No. 12 B.&S.	13/16″	7½″	875	1015	48x15x38	16	1000	1140	60x15x38	20
16″	Hand feed may be used on all machines listed below; power feed may be used on all except Nos. 4 and 5 High Power.											
20″	Hand feed or power feed—recommended only for Nos. 3 and 4 Dial Types, Nos. 2, 3, 4 and 5 High Power and Nos. 3 and 4 Standard.											
24″	Hand feed or power feed—recommended only for Nos. 3 and 4 Dial Types and Nos. 4 and 5 High Power.											

CODE NAMES OF ATTACHMENTS

APPLIED TO SPECIFIC MACHINES

SIZE AND TYPE OF MACHINE	16″ ATTACHMENT		20″ ATTACHMENT		24″ ATTACHMENT	
	Code Name, Hand Feed	Code Name, Power Feed	Code Name, Hand Feed	Code Name, Power Feed	Code Name, Hand Feed	Code Name, Power Feed
No. 2 L-Type	CIVEP	*CILTP	.....	.....	.....	.....
No. 2 MH	CIVEP	*CIMHT	.....	.....	.....	.....
No. 2 MI	CIVEP	CIMHT	.....	.....	.....	.....
No. 2 Medium Speed and High-Speed Dial Type	CIVEP	CIXET	.....	.....	.....	.....
Nos. 3 and 4 Medium Speed and High-Speed Dial Type	CAABE	CIRNU	CIRYM	CIRHE	CIPOW	CIRIO
Nos. 4 and 5 High Power	CAABE	.....	CIRYM	CELRY	CIDOX	CYPRE
No. 1 M	CIVEP	CIMED	.....	.....	.....	.....
No. 2 M	CIVEP	CITAC	.....	.....	.....	.....
Nos. 2 High Power and 3 Standard	CIVEP	CAROL	CIHAN	CITWE	.....	.....
Nos. 3 High Power and 4 Standard	CAABE	CARYU	CIRYM	CIRFI	.....	.....
No. 2 Cone Type	CIHFD	CAQUE	.....	.....	.....	.....
No. 3 Cone Type	CIHFD	COSAK	.....	.....	.....	.....
No. 4 Cone Type	CAPUT	CAFFE	.....	.....	.....	.....

STANDARD EQUIPMENT
Supplied with Hand Feed
Circular Milling Attachments

Four T-bolts, nuts, washers, and clamps.
Two suitable tongue strips.
Handwheel (16″ Attachment).
Hand crank (20″ and 24″ Attachments).

STANDARD EQUIPMENT
Supplied with Power Feed
Circular Milling Attachments

Four T-bolts, nuts, washers, and clamps.
Two suitable tongue strips.
Handwheel (16″ Attachment).
Hand crank (20″ and 24″ Attachments).
Driving mechanism, including gear bracket, universal joint shafts and parts for connecting bracket to attachment, and shaft for connecting bracket to power source in machine saddle.

EQUIPMENT SUPPLIED AT EXTRA COST

†Indexing Attachment.
High Number Indexing Attachment (consists of three plates, which replace standard plate on Indexing Attachment, for indexing a wider range of divisions).

SPECIFICATIONS FOR INDEXING ATTACHMENT

Net Weight Pounds	Approx. Shipping Weight Pounds	Code Name 16″ Attachments		Code Name 20″and24″Attachments	
		Applied at Factory	Applied in Field	Applied at Factory	Applied in Field
25	45	EXAFA	EXAND	TDEX	ADEX

NOTES—1. *Power feed drive parts for No. 2 L-type Universal and No. 2 MH Universal machines should be built in at the factory. If applied in the field, write to factory for instructions. Power feed drive parts for the attachment on all other machines may readily be applied in the field.

2. †If indexing equipment is desired for Circular Milling Attachments in the field, the Attachment should be returned to the factory for reconditioning at extra cost.

3. Centering studs are not supplied, as they can be readily made to suit requirements.