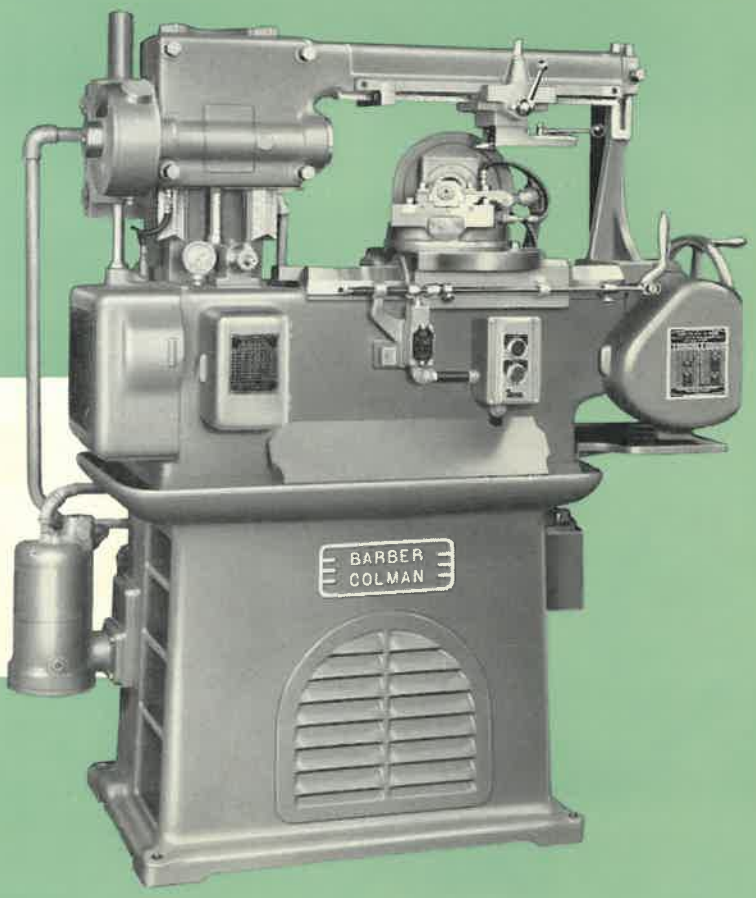
BARBER-COLMAN NO. 6-10 HOBBING MACHINE

NO. 6-10

NO. 6-16

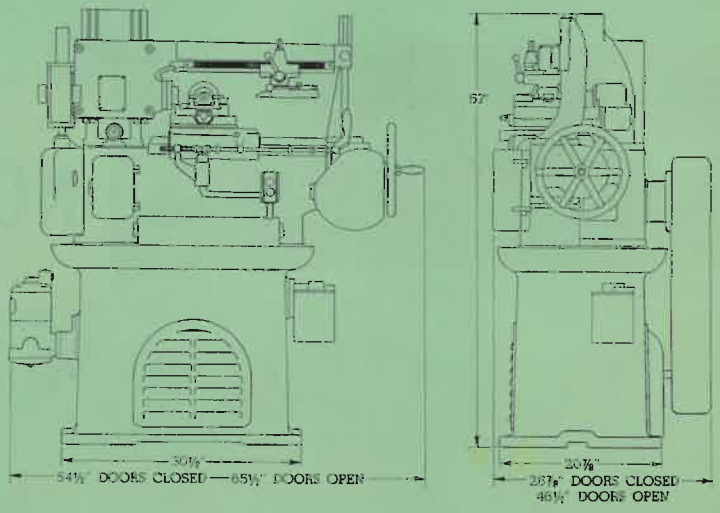
NO. 6-20



HOBBING MACHINES

No. 6-10, 6-16, 6-20

The No. 6-10 Hobbing Machine is a mechanical machine designed for general-purpose hobbing. It will hob spur and helical gears, splines, serrations and special forms of 16 DP and finer, depending upon the diameter of the blank. With the addition of extra tooling, it will cut worms and worm gears. The V-type ways on the bed and upright, a work slide integral with the overarm, tapered roller bearings in the hob drive, and automatic lubrication make this machine very accurate and rigid. It is equipped with a triple-thread index worm for maximum production. Its ease of set-up makes it suitable for either long or short runs. The No. 6-10 is available with beds which are 6" and 10" longer than standard.



SPECIFICATIONS

CAPACITY

	6-10	6-16	6-20
Maximum DP and dia. in steel, 1 cut	16 DP — 2" Dia. 48 DP — 6" Dia.	16 DP — 2" Dia. 48 DP — 6" Dia.	16 DP — 2" Dia. 48 DP — 6" Dia.
Maximum rated work diameter	6"*	6"*	6"*
Maximum travel of hob slide	10½"	16½"	20½"
Maximum distance work spindle face to tail center	15¾"	21¾"	25¾"
Distance work spindle face to C.L. of hob spindle at 0° hob swivel setting	Max. 12¾" Min. 2¼"	Max. 18¾" Min. 2¼"	Max. 22¾" Min. 2¼"
Distance C.L. of work spindle to C.L. of hob spindle	Max. 3⅞" Min. ¼"	Max. 3⅞" Min. ¼"	Max. 3⅞" Min. ¼"
Distance C.L. of work spindle to bottom of overarm	3"	3"	3"
Maximum hob diameter	2-1/16"	2-1/16"	2-1/16"
Maximum swivel angle setting	60° R to 90° L**	60° R to 90° L**	60° R to 90° L**
Hob speed	Max. 533 RPM Min. 133 RPM	Max. 533 RPM Min. 133 RPM	Max. 533 RPM Min. 133 RPM
Hob spindle	Shank-type	Shank-type	Shank-type
Hob arbor, straight	¾"	¾"	¾"
taper	#0 or #1	#0 or #1	#0 or #1
Work spindle bore diameter	1-1/32"	1-1/32"	1-1/32"

MOTORS

Main drive	2 HP, 1200 RPM	2 HP, 1200 RPM	2 HP, 1200 RPM
Lubrication drive	1/20 HP, 1800 RPM	1/20 HP, 1800 RPM	1/20 HP, 1800 RPM
Coolant pump	1/4 HP, 3450 RPM	1/4 HP, 3450 RPM	1/4 HP, 3450 RPM

WEIGHT AND DIMENSIONS

Floor space, doors open	65½" x 46½"	71½" x 46½"	75½" x 46½"
Height	57"	57"	57"
Weight, net	1975 lbs.	2010 lbs.	2035 lbs.
domestic shipping	2375 lbs.	2410 lbs.	2435 lbs.
export shipping	2600 lbs.	2635 lbs.	2670 lbs.
Export shipping case, dimensions	36" x 54" x 62"	36" x 60" x 62"	36" x 64" x 62"
cubic content	70 cu. ft.	78 cu. ft.	83 cu. ft.

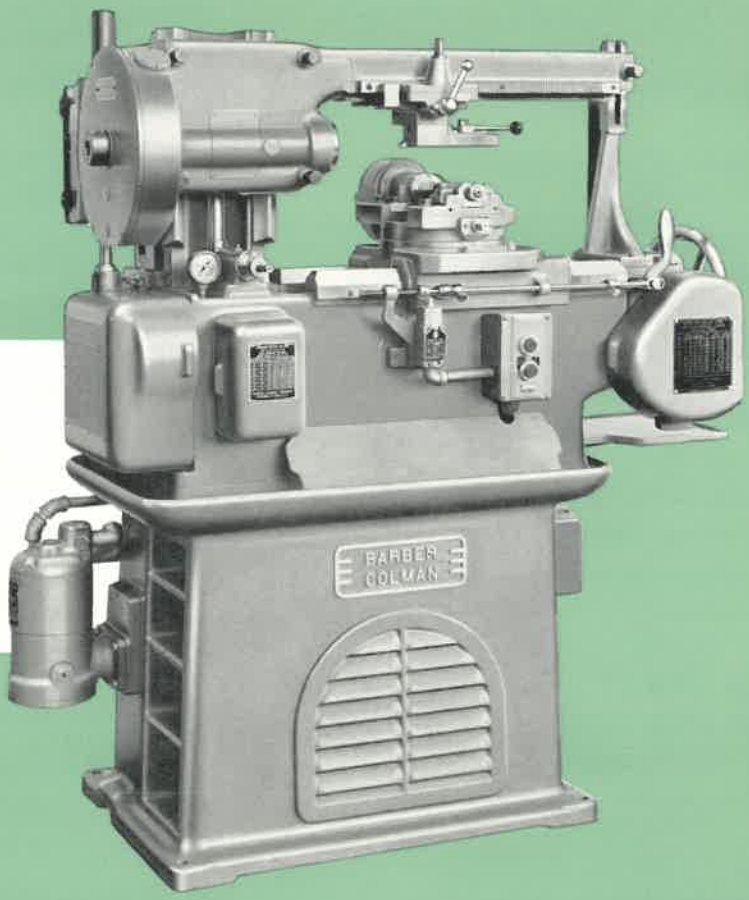
*Subject to variation depending upon gear diameter, pitch, helix angle and tooling.

**For helix angles 45° and greater, a 90° hob swivel is recommended

Specifications Subject to Change Without Notice

NO. 6-10

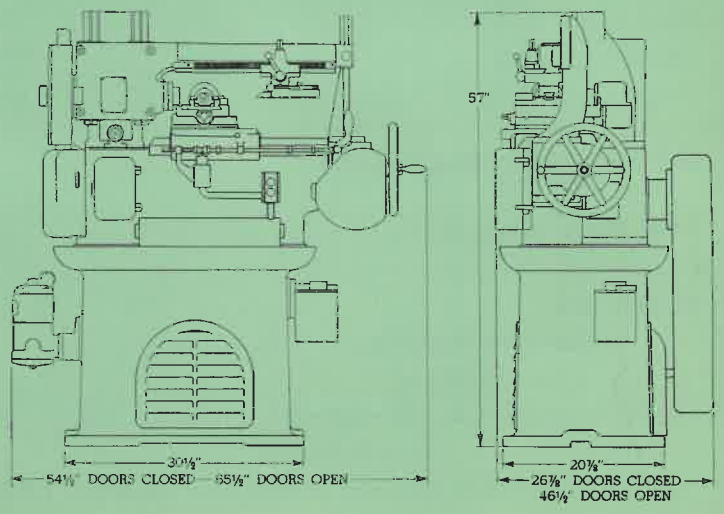
PRECISION



HOBBING MACHINE

No. 6-10 Precision

The No. 6-10 Precision Hobbing Machine is designed to meet the demand for additional accuracy on many fine-pitch gears. It is used primarily for hobbing precision fine-pitch gears for instruments and other precision mechanisms. In conjunction with Barber-Colman Class AA hobs, this machine will produce the finest hobbed gears obtainable. Although it is similar in construction to the standard machine, the Precision No. 6-10 is equipped with a large, single-thread index worm gear for maximum tooth spacing accuracy. In addition, all other assemblies are made from selected parts and are fitted more carefully.



CAPACITY

Maximum DP and dia. in steel, 1 cut	16 DP — 2" Dia.
	48 DP — 6" Dia.
Maximum rated work diameter	6"*
Maximum travel of hob slide	10½"
Maximum distance work spindle face to tail center	15¾"
Distance work spindle face to C.L. of hob spindle at 0° hob swivel setting	Max. 12¾" Min. 2¼"
Distance C.L. of work spindle to C.L. of hob spindle	Max. 3⅞"
	Min. ¼"
Distance C.L. of work spindle to bottom of overarm	3"
Maximum hob diameter	2-1/16"
Maximum swivel angle setting	60° R to 90° L**
Hob speed	Max. 533 RPM
	Min. 133 RPM
Hob spindle	Shank-type
Hob arbor, straight	¾"
taper	#0 or #1
Work spindle bore diameter	1-1/32"

SPECIFICATIONS

MOTORS

Main drive	2 HP, 1200 RPM
Coolant pump	1/4 HP, 3450 RPM

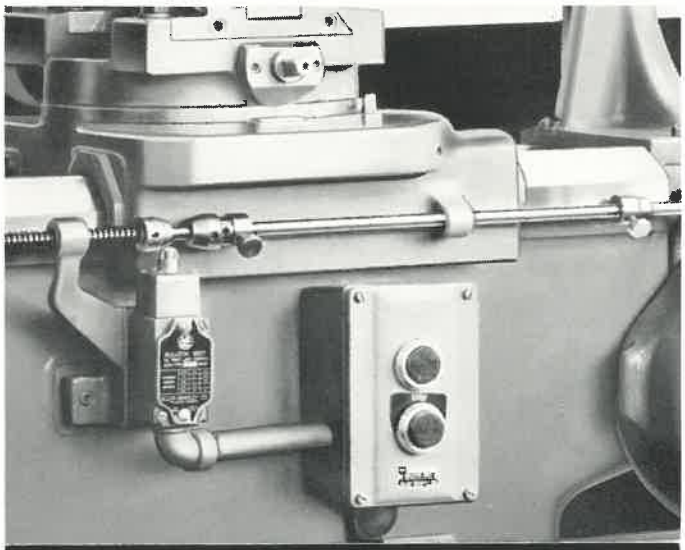
WEIGHT AND DIMENSIONS

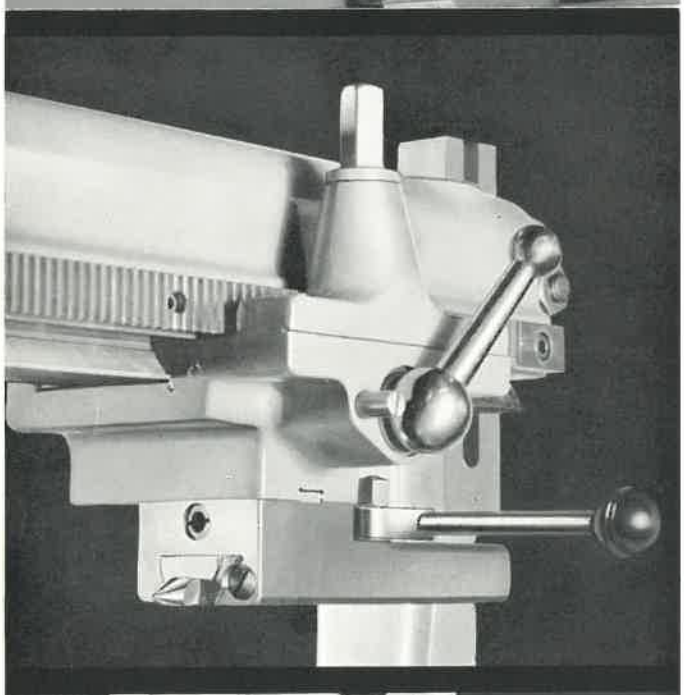
Floor space, doors open	65½" x 46½"
Height	57"
Weight, net	1975 lbs.
domestic shipping	2375 lbs.
export shipping	2600 lbs.
Export shipping case, dimensions	36" x 54" x 62"
cubic content	70 cu. ft.

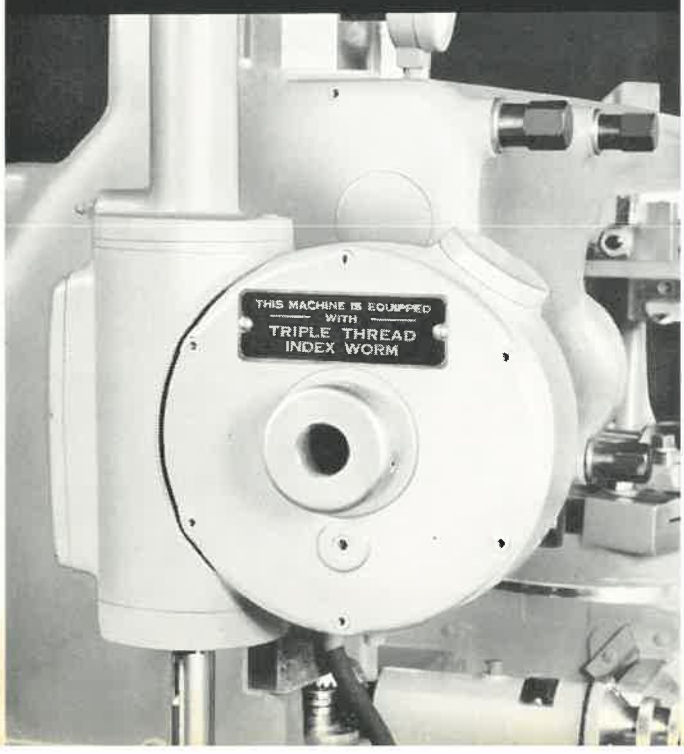
*Subject to variation, depending upon gear diameter, pitch, helix angle and tooling.

**For helix angles 45° and greater, 90° hob swivel is recommended.

CONSTRUCTION







ADJUSTABLE FEED STOPS

The adjustable feed stops can be set to de-energize the main motor at the end of the cut when feeding either to the left or to the right. The feed is automatically disengaged at the end of the cut only when feeding to the left.

LEVER-OPERATED TAIL CENTER

The lever-operated tail center is standard equipment on the No. 6-10. To facilitate setting the center in position, the bracket is equipped with a shaft with an integral spur gear which meshes with the rack on the overarm. Using the hand crank, the bracket is quickly moved into position. The center is clamped into position by turning the clamp handle. The lever action of the center allows the work to be mounted and removed without moving the bracket. The work is positively held in position when the center is engaged.

INDEX WORM AND GEAR

The index worm is hardened and ground steel. It is mounted in precision anti-friction tapered roller bearings for maximum accuracy. The bronze index worm gear is pressed onto the left end of the work spindle. The cast iron case provides an oil reservoir assuring constant lubrication for both the worm and worm gear.

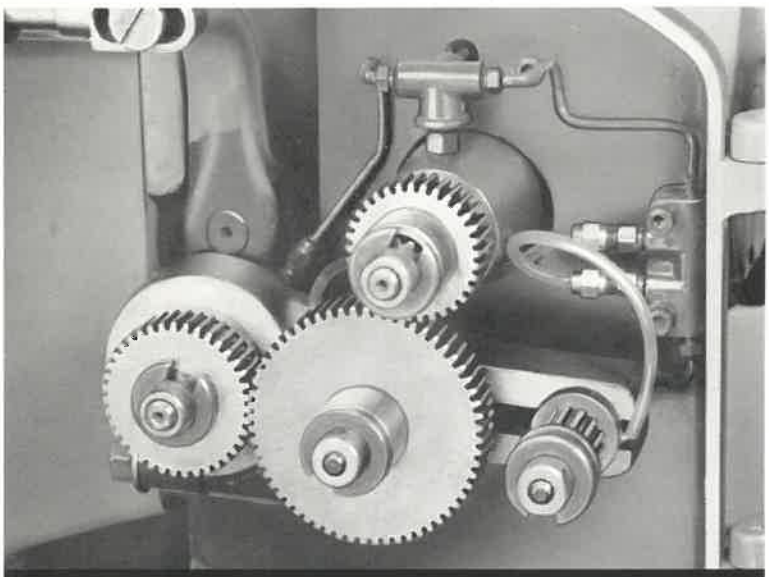
INDEX CHANGE GEARS

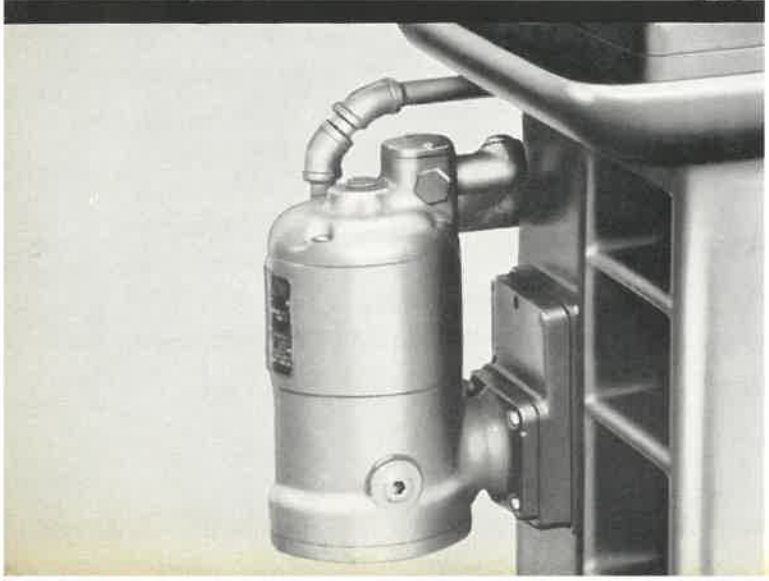
The index change gears and mounting shafts and studs are designed with splined bores and diameters. The change gears are locked on their respective shafts by nuts and quick-removable slotted washers. Studs are provided for additional idler gears. All bearing surfaces are automatically lubricated by the Bijur system. A keyway has been substituted for one of the internal splines so that these gears can be used on old machines with single-key shafts.

AND OPERATING FEATURES

FEED CHANGE GEARS

The feed change gears are readily accessible beneath the cover of the gear box on the right front end of the machine. The various feed combinations available with the standard gears are listed on the cover. The gears and shafts are splined, and the gears have a keyway for interchangeability with old-style machines. The gears are locked on the shafts with nuts and quick-removable slotted washers. The shafts are automatically lubricated by the Bijur system. A drip pan is provided beneath the feed change gear box to prevent excess oil from dripping on the floor.





SPEED CHANGE GEARS

The speed change gears operate on shafts with fixed center distances. The shafts are mounted in precision anti-friction bearings and are automatically lubricated by the Bijur system. The various speeds available and the respective gear combinations are listed on the cover.

COOLANT PUMP

The coolant pump is located on the left end of the machine base. It is driven by a 1/4 HP, 3450 RPM motor. Coolant is pumped to the work area through the flexible hose. Coolant flow is controlled by the valve. The coolant tank is located in the base of the machine, and baffle plates are provided to facilitate the settling of chips and other foreign matter.

BED WAYS

The bed ways on the No. 6-10 are heat treated and ground. The rear way is flat, and the front way is V-shaped to provide maximum rigidity and accuracy.

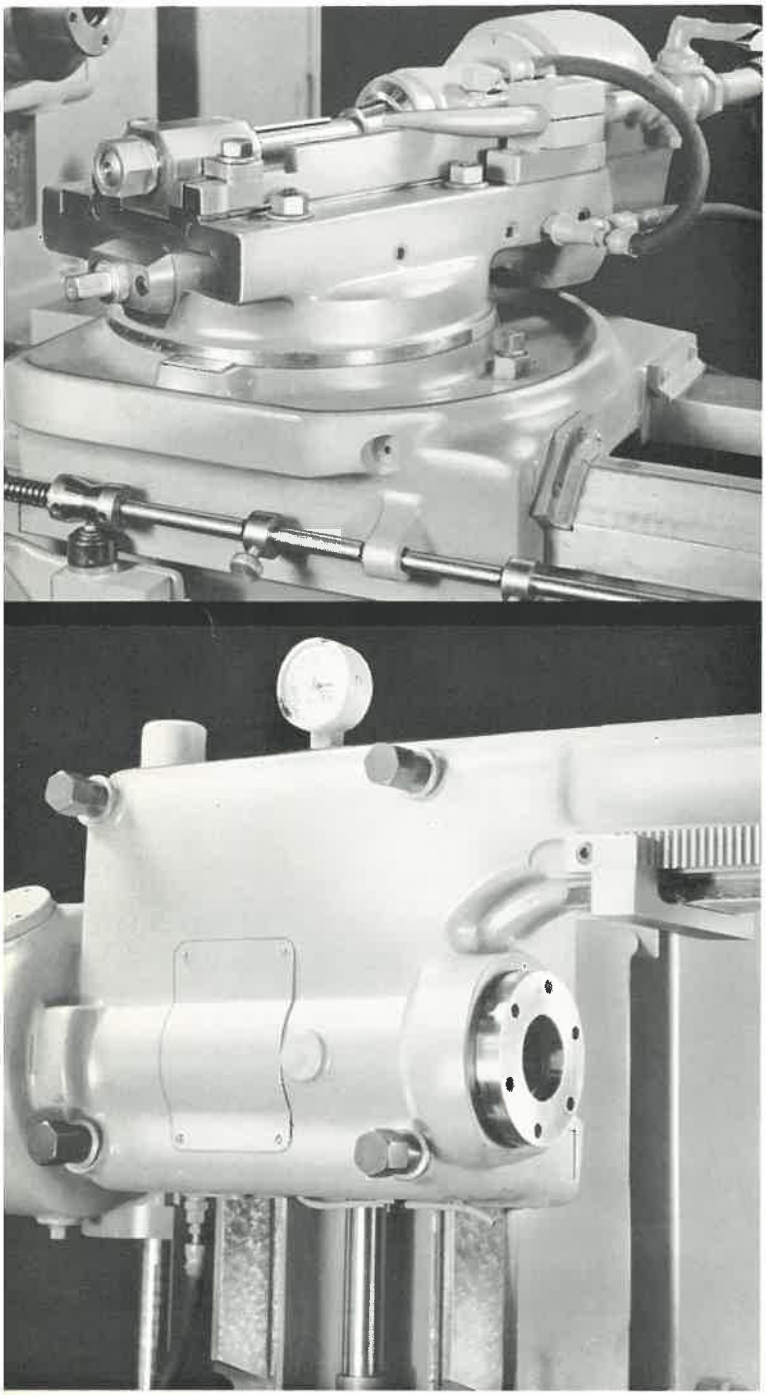
UPRIGHT WAYS

Two V ways are provided on the upright column to provide a rigid and accurate attachment for the work slide. The V ways are scraped to a master plate, and the workslide is scraped to the upright. Tapered take-up gibs are provided on the work slide to compensate for wear.

HOB SPINDLE SLIDE AND SWIVEL

The hob spindle is designed to accommodate both straight and tapered arbors. Special arbors are available for any bore size or taper. The slide is equipped with a threaded shaft with a graduated dial for accurately shifting the hob. The slide is dove-tailed to the swivel, and locked in place by the four nuts on the

CONSTRUCTION AND OPERATING FEATURES (CONT.)



swivel. The hob drive pinion and drive shaft have tapered roller bearings. Spiral bevel gears reduce the noise and allow the hob drive to be reversed by changing the leads to the motor. All running surfaces are automatically lubricated by the Bijur system. Wear strips on the end support can be replaced rather than replacing the complete support. The standard swivel is adjustable from 60° right to 90° left. The vernier indicating dial is graduated to 10' for accurate setting.

HOB CARRIAGE

The hob carriage is scraped and fitted to the ground V and flat ways. It is automatically lubricated by the Bijur system, and is equipped with rubber wipers to keep chips and grit from between the bearing surfaces. The split feed nut for removing backlash between the feed screw and nut is adjusted by the square head screw on the carriage. The screw has an integral worm which turns the split nut. Tapered take-up gibs are provided to adjust for wear between the bed and carriage.

WORK SLIDE AND OVERARM

The work slide and overarm are cast as one unit. It is scraped to the V ways on the upright, and is provided with tapered gibs for wear adjustment. It is automatically lubricated by the Bijur system. The right end of the overarm is scraped to the C-type end brace, and is provided with a T bolt for clamping. The rack on the overarm allows the rack-type tail center bracket to be positioned rapidly. The slide is clamped to the upright by four clamp screws. The slide is raised and lowered by means of the elevating screw which is turned by the elevating screw shaft through bevel gears. The graduated dial is provided for accurately setting the work to the correct depth.

WORK SPINDLE

The work spindle is forged high-carbon steel. It is heat treated and ground to precision tolerances. The hole through the spindle is 1-1/32" diameter. It is enlarged at the spindle nose to 1.750" pilot for the adapter. The spindle is supported in bronze bushings. The front bushing is scraped to the taper of the work spindle. The rear bushing is scraped to the taper of a sliding steel sleeve. Adjustment is made by turning the adjusting nut to bring the sliding steel sleeve higher on the taper on the bronze bushing. All bearings are automatically lubricated by the Bijur system.

BIJUR PUMP

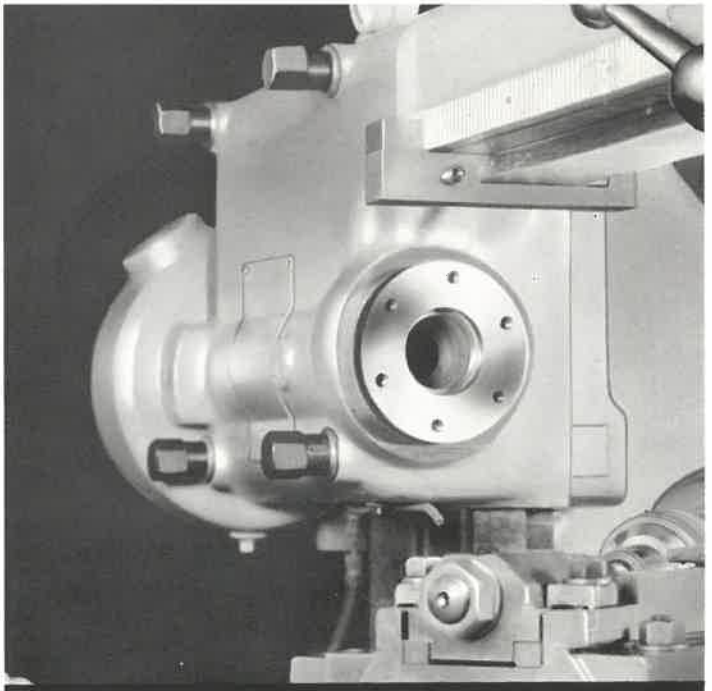
The Bijur lubricating pump is located on the base of the machine at the right end. It is driven by a 1/20 HP, 1800 RPM motor. It automatically lubricates all bearing surfaces of the machine with the exception of the elevating screw shaft, main drive motor and index worm shaft. A pressure gauge on the work slide indicates the pressure in the system.

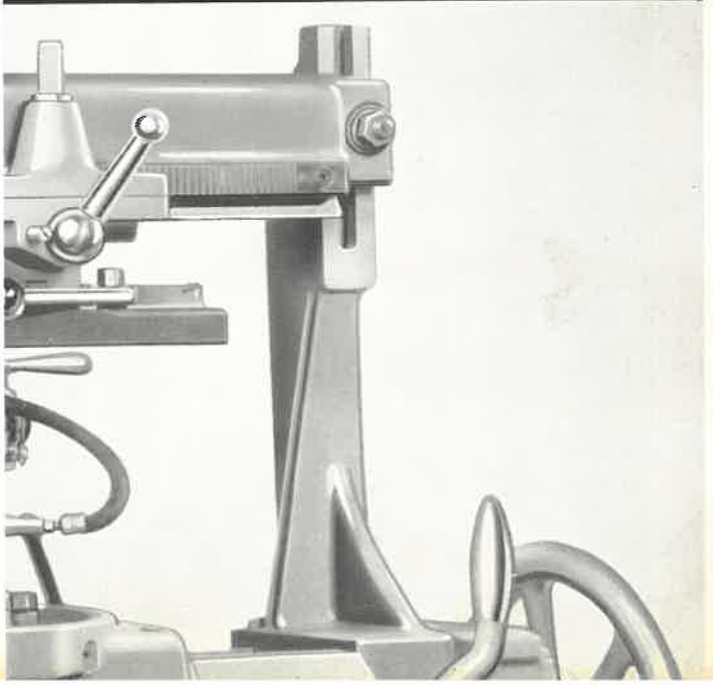
MAIN DRIVE MOTOR

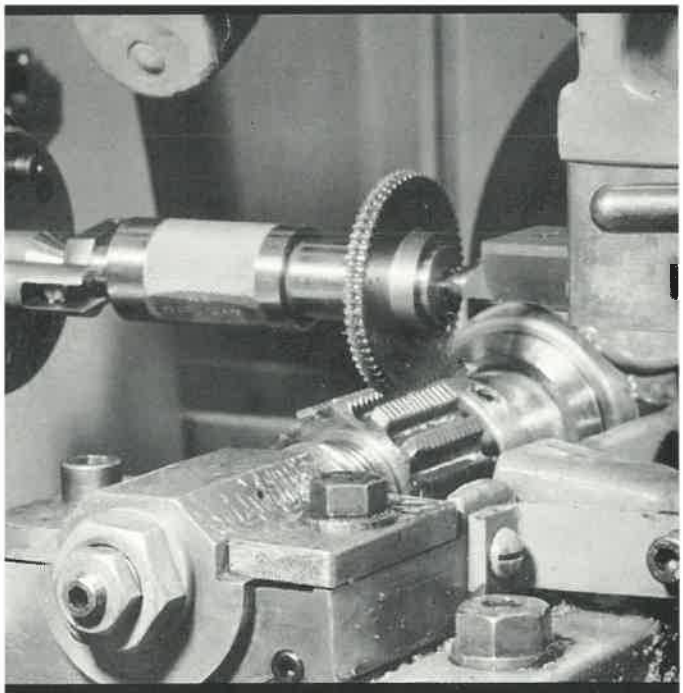
Power is supplied for the No. 6-10 by a 2 HP, 1200 RPM motor through a V belt drive. The motor is located in the center of the machine base. It is easily accessible from both the front and back by removing the ventilating covers. A safety cover is provided over the V belt drive.

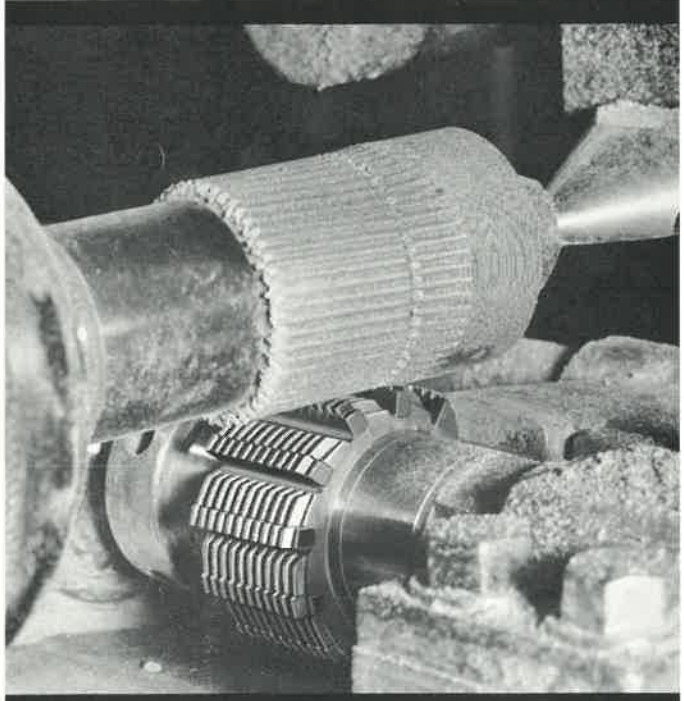
C-TYPE OVERARM END BRACE

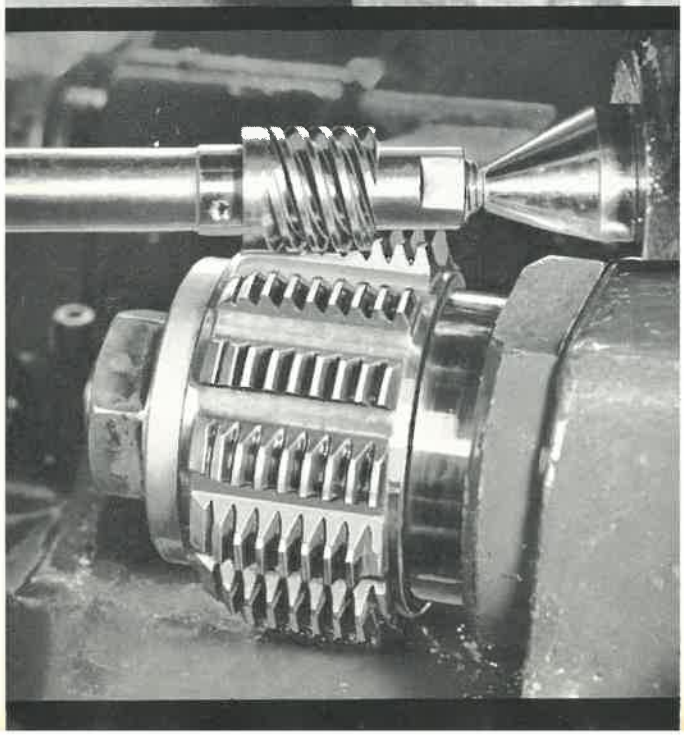
The C-type end brace provides a positive means for clamping the overarm in position. The clamping bolt rides in the T-slot, allowing the overarm to be quickly and easily clamped into position when set to the correct depth of cut.











APPLIC

PRECISION GEARS

Machine — Precision No. 6-10
Outside diameter — 2.672"
Helix angle — 3° 39' LH
Pressure angle — 14½°
Diametral pitch — 48
Hob — Class AA
No. of threads — 1
Hob speed — 230 RPM
Feed — .010"/rev.
Total Composite Error — .0003"
Tooth-to-tooth Composite Error — .00015"
AGMA Accuracy Class — Prec. Class 2

CARBIDE-TIPPED HOB

Material — Phenolic
No. of teeth — 47
Helix angle — Spur
Diametral pitch — 32
Hob — Carbide-tipped — Class A
No. of threads — 1
Hob speed — 533 RPM
Feed — .040"/rev.
Pieces per sharpening — 6000
Pieces per hob — 60,000

WORM HOBBING

Machine — No. 6-10 with 90° swivel
Material — Stainless steel
No. of threads — 4
Lead angle — 15° 44'
Pressure angle — 14½°
Diametral pitch — 24
Face width — ¾"
Hob — Class A
No. of threads — 1
Hob speed — 133 RPM
Feed — .0054"/rev.

ATIONS

WORM MILLING

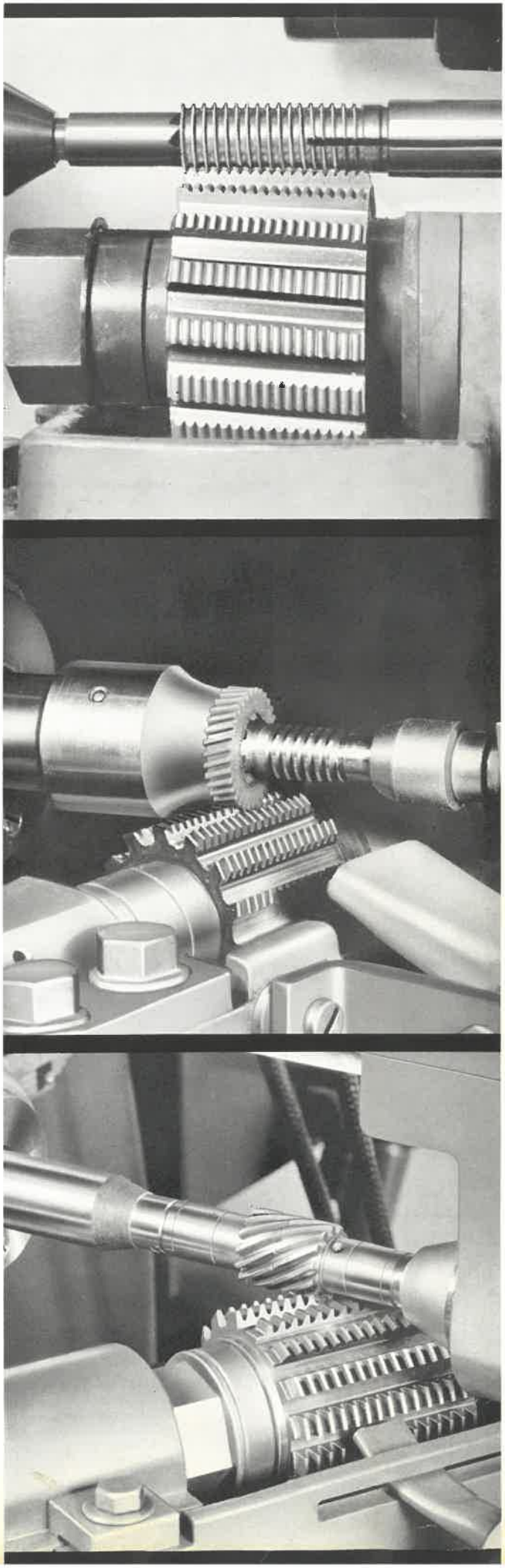
Machine — No. 6-10 with 90° swivel and vertical feed
No. of threads — 1
Axial pitch — .100"
Cutter — Multiple thread milling cutter
Vertical feed — .020"/rev.
Horizontal feed — .100"/rev.

WORM GEAR

Machine — No. 6-10 with vertical feed
Material — Phenolic
Helix angle — 7° 47'
Pressure angle — 14½°
Diametral pitch — 32
Hob — Class C
No. of threads — 1
Hob speed — 533 RPM
Vertical feed — .025"/rev.

DISTRIBUTOR PINION

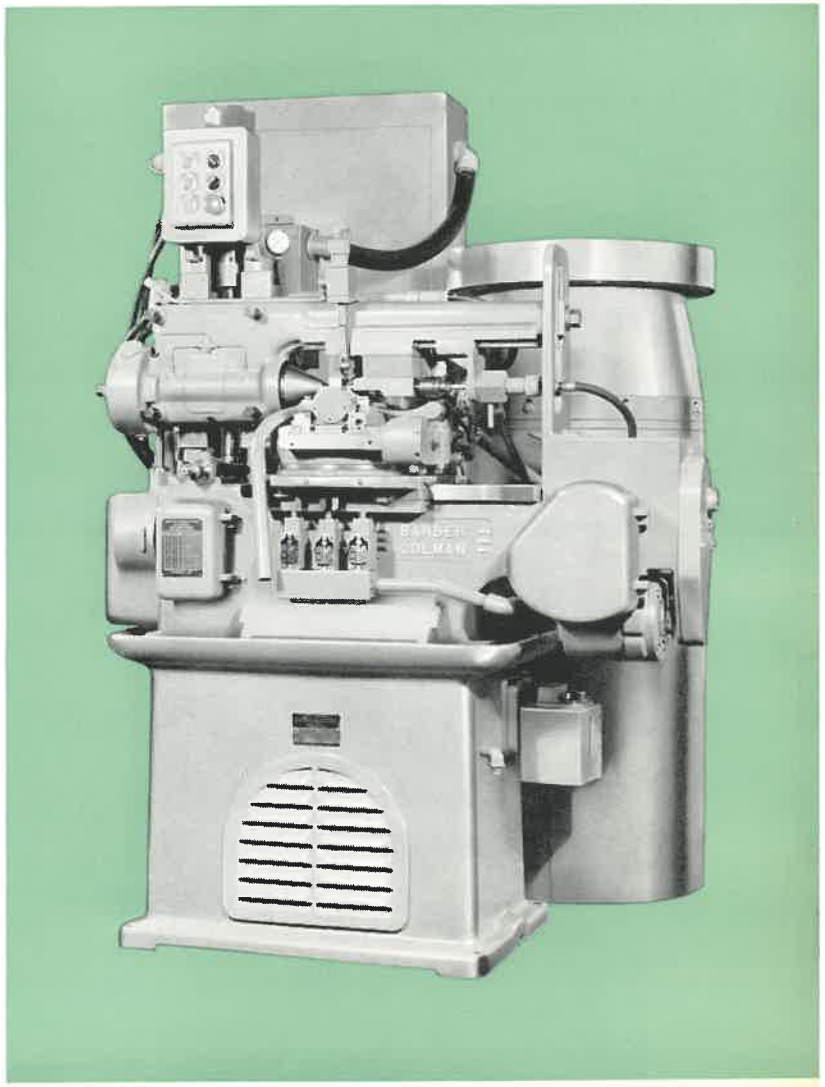
Machine — No. 6-10 with automatic cycling and automatic hob shifter
Material — Nickel alloy iron
No. of teeth — 13
Helix angle — 30°
Pressure angle — 14½°
Diametral pitch — 16
Face width — .620", 2 per load
Hob — 3" x 3" Class C
No. of threads — 2
Hob speed — 183 RPM
Feed — .040"/rev.



SPECIAL EQUIPMENT AND

AUTOMATIC MACHINE

The standard No. 6-10 machine can be readily adapted to completely automatic hobbing. The necessary additions include automatic clamping, automatic cycling and magazine loading. This machine can be tooled to handle a wide variety of parts within the capacity of the machine. The primary requirement is that it must produce the same part on a mass production basis in order to be economical. However, its economy for long production runs is outstanding. After machines are started at the beginning of a shift, filling the hoppers and removing the finished gears are all that is required, except for changing worn or dull hobs. Some types of gears to which this machine could be applied economically include automatic transmission gears, automotive accessory gears, appliance gears, fishing reel gears, etc.

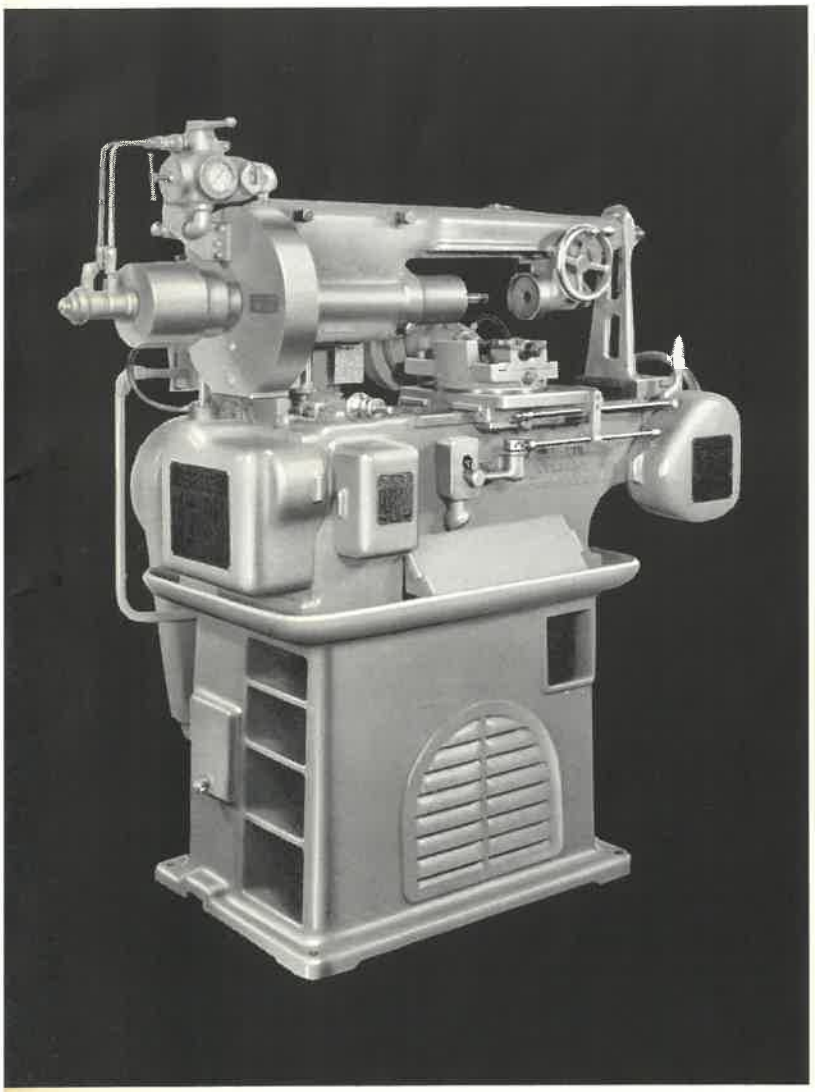


Following is a description of a job on one of a battery of automatic machines in a mass production plant. The part is an automatic transmission pinion.

Operation — Pre-shave hobbing
Hob speed — 175 SFM
Feed — .050" per revolution
Complete cycle time — 1 minute
No. of teeth — 16
Helix angle — 18° 30'
Normal diametral pitch — 18
Material — SAE 1330
Outside diameter — .937"
Face width — 5/8"
Hob size — 1 7/8" x 3" x 3/4"
No. of threads — 1
Hob class — Class C pre-shave

Because of the work holding tooling, rejects are held to an absolute minimum. A substantial overall reduction in cost per gear has been effected through reduced man-hours and continuous high-speed production.

TOOLING



Blanks are automatically loaded through a hopper-feed system and are positively located and clamped on a solid arbor in cutting position. Cycle sequence includes rapid traverse to the cutting position, lowering the work slide to cutting depth, hobbing the gear, raising the work slide to clear the hob, rapid traverse away from the cut, and ejecting the gear. A new blank is loaded automatically, and the cycle is repeated continuously until the machine is shut off.

Other machine features include automatic hob shifting for greater tool life and positive clamping and ejection of the work. Rapid traverse is actuated electrically. A combination of electric limit switches, program motor and mechanical movements governs the cycle. A limit switch stops the machine if a blank with an undersize bore is presented for hobbing, and the machine is under complete control at all times.

This type of machine is adaptable to many high production hobbing operations within the capacity of the machine. The cycle can be designed to suit the requirements of the job, and tooling, feed, speed and cycle timing will be arranged accordingly. Ask your Barber-Colman representative how he can apply automatic hobbing to your specific application.

WORK HOLDING EQUIPMENT

Work holding equipment is always designed specifically to meet the requirements of the job. There are, however, certain types of tooling which are quite common. Most machines are equipped with an adapter with a #9 B & S taper bore as special equipment. The face of this adapter is in the same relative location as the face of the old-style spindle so that tooling made for old machines can be used on the new machines. Minimum distance from the face of the adapter to the centerline of the hob spindle is ¾".

SPECIAL EQUIPMENT AND TOOLING (cont.)

Collets are often used for holding and driving the work. Collets and adapters are easily applied to any arbor or shaft size, and every machine is furnished with a draw bar. Handwheel-operated and lever-operated draw bars are available as special equipment. Serrated drivers are often used for small parts. For maximum accuracy, many parts are held between centers and driven by a dog attached to the work spindle face. The No. 6-10 can be fitted with an air cylinder for clamping and driving the work. Many other types of tooling are available to satisfy any requirements.

BURRING ATTACHMENTS

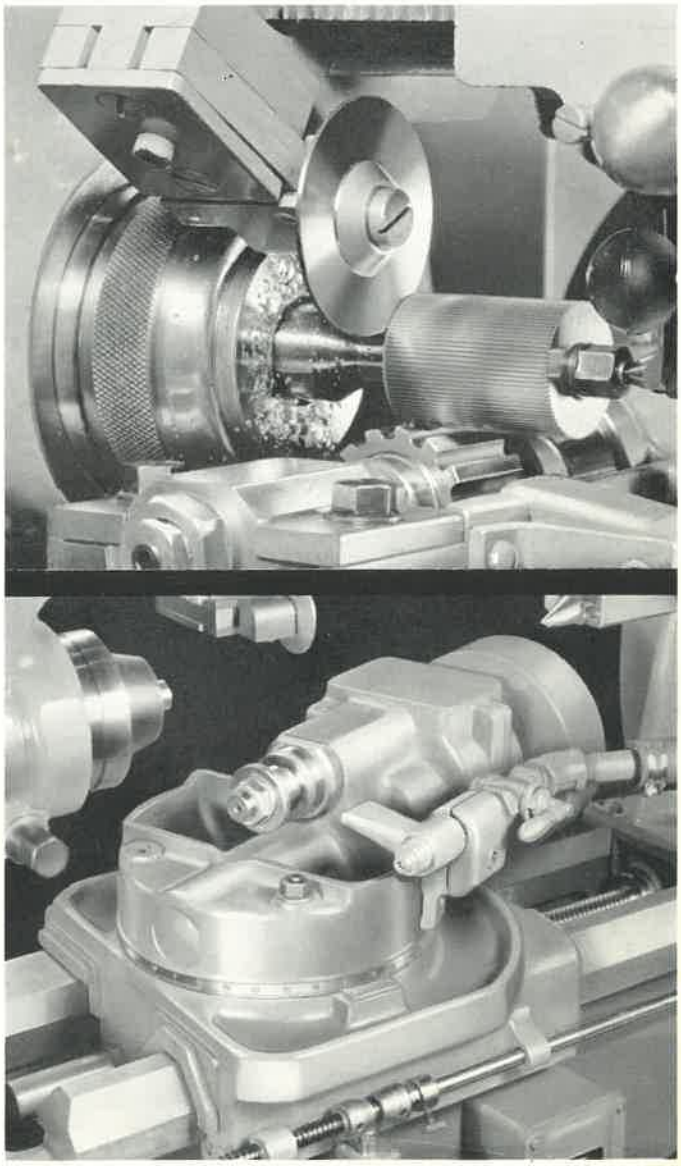
Burring attachments are sometimes applied to the No. 6-10 to eliminate hand filing, brushing or other methods of removing burrs. Burring attachments can be either single point or rotary, but the rotary type is most common. It is spring loaded to provide the correct pressure against the face of the part.

90° HOB SWIVEL

When hobbing work with a helix angle of 45° or greater, or when thread milling, a 90° hob swivel is recommended to eliminate possible interference between the hob spindle and the work spindle or tail center. The special 90° swivel for the No. 6-10 does not have an outboard support, and it requires a special hob with a narrow face.

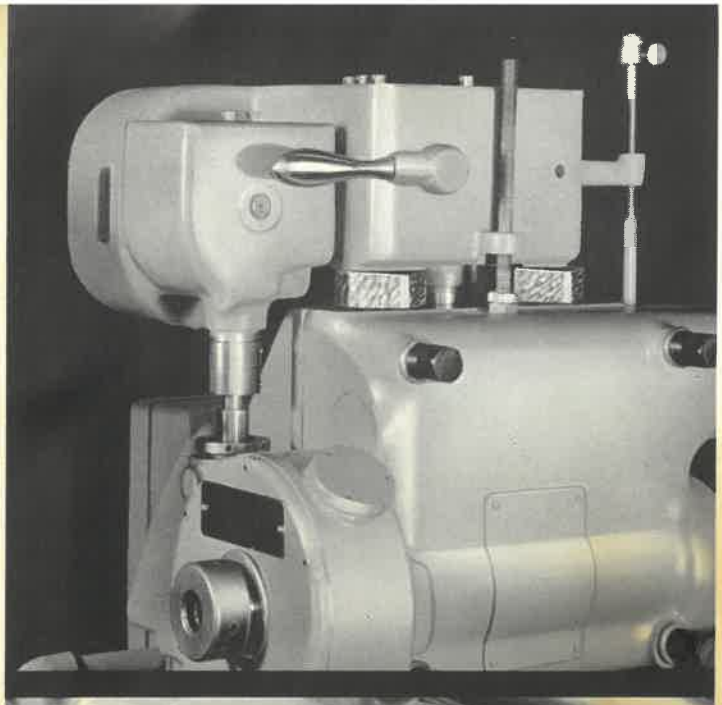
HIGH-SPEED HOB SWIVEL

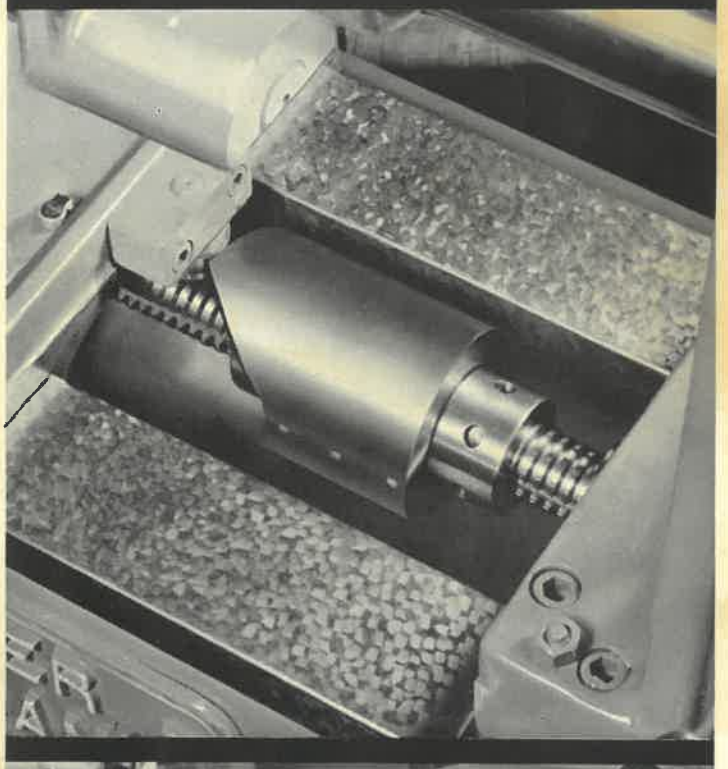
A hob swivel with a speed range of 555 RPM to 2222 RPM is available for the No. 6-10. This swivel has been used advantageously on non-metallic gears cut with a carbide-tipped hob. Standard swivels can be changed to high-speed swivels in the field by substituting different hob drive gears.

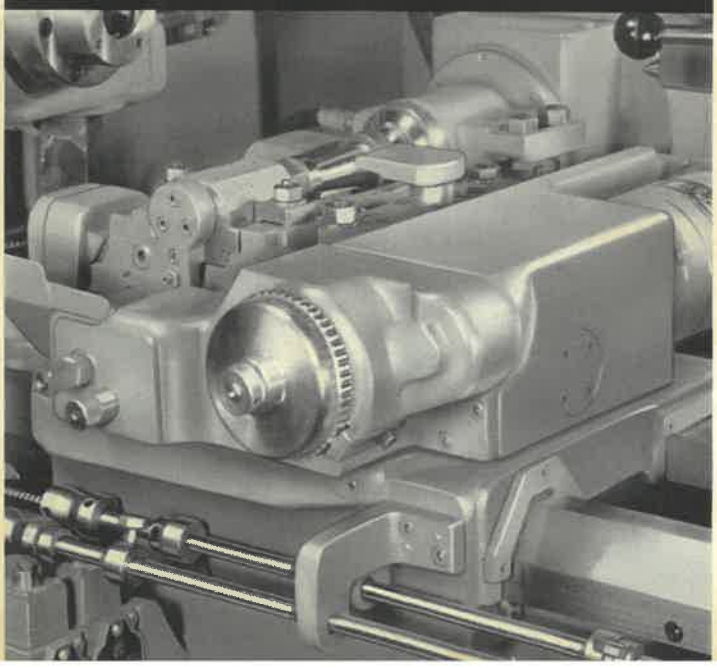


DIFFERENTIAL

The purpose of the differential is to hold a constant relationship between the hob, the work, and the feed even when the feed is disengaged. It is recommended on the No. 6-10 for hobbing helical work when two cuts are required or when a tooth must be held in relation to a feature on the part.







VERTICAL FEED UNITS

Vertical feed units should be used for increased production on the No. 6-10 whenever the work must be fed radially to depth. In addition to saving the time of cranking the work slide to depth manually, vertical feed units control the rate of feed much more accurately than the manual method. The cam vertical feed unit is recommended for large production runs. The work is automatically fed to depth and rapid traversed to the starting position, and the feed per revolution of the work can be varied to approach a uniform cutting load. The geared vertical feed unit is more versatile and is normally used when many different parts are to be cut. The geared type can be installed on machines in the field, but the cam type should be ordered with the machine.

AUTOMATIC CYCLING

The No. 6-10 machine can be made with an automatic cycle so that the only manual labor required is to unload, load and start the machine. A horizontal feed cam will produce an automatic cycle if the hob can be rapid traversed back through the work. This cam is limited to a fairly short amount of hob slide travel. For work which requires that the hob slide be raised for rapid traverse, a combination of a vertical feed unit and a horizontal feed cam can produce an automatic cycle. The equipment for automatic cycling should be ordered with the machine so that it can be installed in our plant.

AUTOMATIC HOB SHIFTER

To allow maximum hob life, an automatic hob shifter is available for the No. 6-10 machine. The shifter is mechanical and can be set to shift a definite amount after each cutting cycle. The desired amount of shift can be selected to suit the requirements of the job.

SALES REPRESENTATIVES

California, Los Angeles 58
Garrett Supply Company
3844 South Sante Fe Avenue
Phone — Kimball 7221 (Small Tools)

California, Los Angeles 23
Seaboard Machinery Co.
3212 E. Olympic Blvd.
Phone — Angelus 3-4188

California, San Mateo
F. W. Strasmann Co.
600 So. Bayshore Freeway
Phone — Diamond 4-6464

Illinois, Chicago 1
Barber-Colman Company
221 North LaSalle Street
Phone — Andover 3-2518

Illinois, Rock Island
Barber-Colman Company
1800 3rd Avenue
Phone — 6-8600

Indiana, Indianapolis 8
Barber-Colman Company
54 W. 30th Street
Phone — Walnut 3-2702

Massachusetts, Framingham
Barber-Colman Company
Phone — Trinity 5-5279

Michigan, Detroit 2
Barber-Colman Company
523 New Center Building
Phone — Trinity 5-4288 and 5-4289

Michigan, Kalamazoo 2
Barber-Colman Company
209 W. S. Dewing Building
Phone — 2-2519

Michigan, Lansing 16
Barber-Colman Company
1004 Prudden Building
Phone — Ivanhoe 5-6268

Minnesota, Minneapolis 3
Chas. W. Stone Company
1019 Marquette Avenue
Phone — Geneva 8631

Missouri, St. Louis 17
Wm. Scheer Company
6376 Clayton Road
Phone — Mission 5-7950

New York, Bergenfield, N. J.
Barber-Colman Company
112 So. Washington Avenue
Phone — Dumont 4-4379

New York, Rochester 4
Barber-Colman Company
212 Burke Building
Phone — Baker 5-6920

North Carolina, Charlotte 8
Apex Machine Tool Supply
P.O. Box 8005
Phone — EXpress 9-0455 and 9-0456

Ohio, Cincinnati 8
Barber-Colman Company
1987 Madison Road
Phone — East 1-7895

Ohio, Cleveland 15
Barber-Colman Company
3030 Euclid Avenue
Phone — Endicott 1-2114

Oklahoma, Tulsa 3
Hulsey Machinery & Supply
1328 East 6th Street
Phone — Gibson 7-9080

Pennsylvania, Philadelphia 32
Barwood & Company
3137 North 15th Street
Phone — Sagamore 5660

Pennsylvania, Pittsburgh 16 (Dormont)
G. C. Wood
1364-66 Illinois Avenue
Phone — Locust 1-4777 and 1-4778

Texas, Houston 23
Preston Machine Tool Sales
3016 Canal Street
Phone — Capital 4-9757

Washington, Seattle 8
Dawson Machinery Co.
5700 1st Ave., South
Phone — Lander 8877 (Machine Tools)

Washington, Seattle 4
H. F. Soderling Co.
1729 1st Ave., South
Phone — Main 6056 (Small Tools)

Wisconsin, Milwaukee 3
William E. Quirk Company
610 West Michigan Street
Phone — Broadway 1-3230

Quebec, Montreal 9
J. H. Ryder Machinery Co., Reg.
8455 Decarie Blvd.
Phone — RIverside 4-2861

Ontario, Toronto 5
J. H. Ryder Machinery Co., Reg.
1130 Bay Street
Phone — WAlnut 4-6611

FOREIGN

Barber & Colman Ltd., Marsland Road, Brooklands, near Manchester, England
Austria, Vienna — Ing. Franz Stasna, Martinstrasse 60
France, Paris — Ets. Horstmann, 54 Rue Saint Maur
India, Fort Bombay — Batliboi & Co., Forbes Street
Italy, Milan — Compagnia Generale Macchine Utensili, Via Parini 14
Spain, Madrid — Comercial Anonima Blanch, Sagasta 18
Sweden, Stockholm — A/B P. Landgren & Co., Luntmakeregatan 14
Switzerland, Zurich — Josef Binkert, Bahnhofstrasse 35
Netherlands, Amsterdam — Lindeteves Metaalbewerkingmachines N. V. Niewmarkt 17-23
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