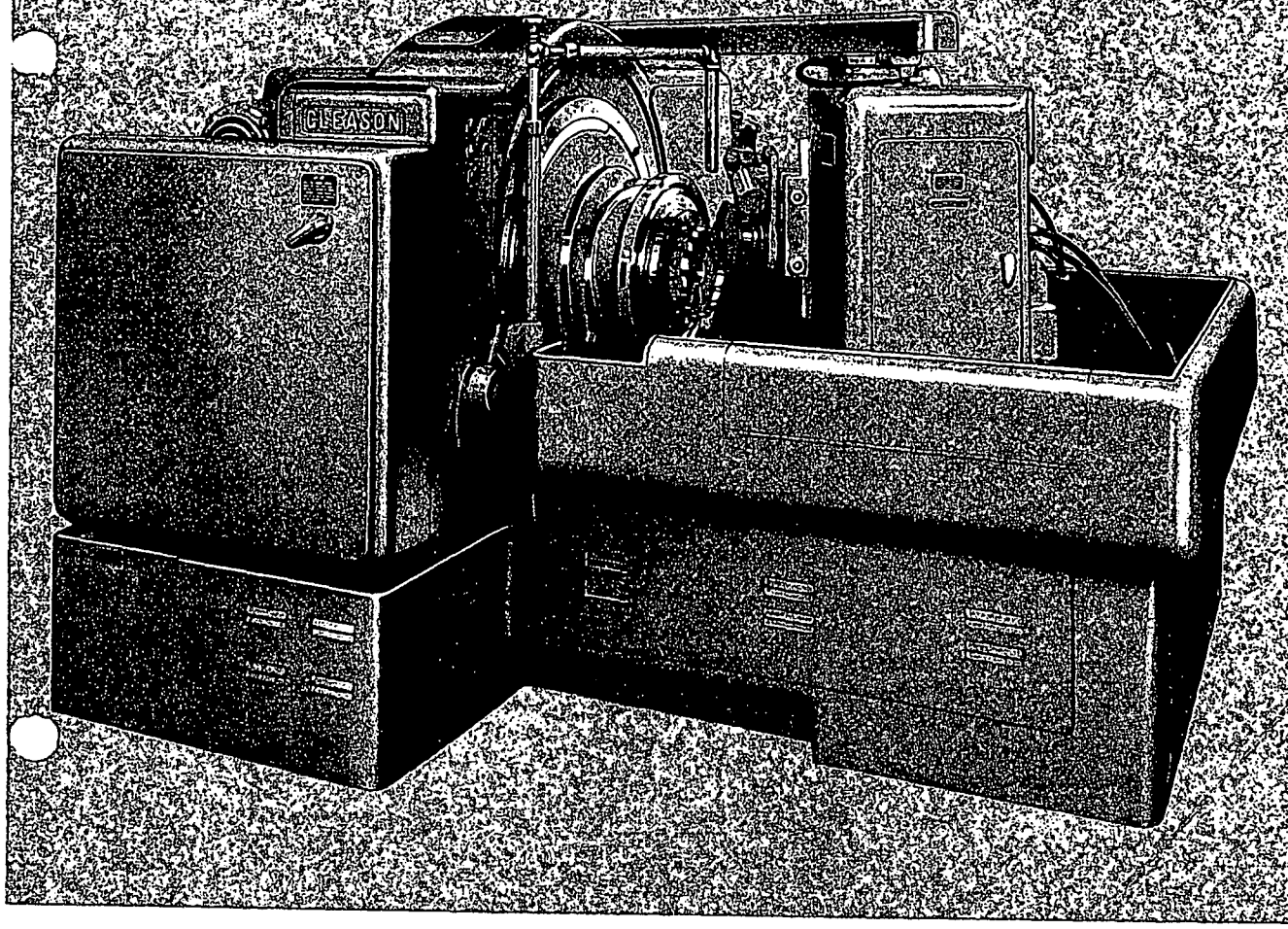
GLEASON NUMBER 116

HYPOID GENERATOR



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GLEASON NUMBER 116 HYPOID GENERATOR

• The No. 116 Hypoid Generator is a completely automatic, high-speed machine for cutting spiral bevel, Zerol® bevel and hypoid gears. The machine is outstanding for its range of work—capable of roughing and finishing both gears and pinions. It handles diameters up to 18 inches, and gears of 2 diametral pitch and finer.

This new generator offers many advantages: improved quality of product, increased production rates, longer cutter life, easier setup and operation, simplified development of tooth bearing and the use of the Unitool* Method.

ADVANTAGES

Improved Quality Excellent quality is maintained at all production rates. Improved control of tooth bearing shape, size and position is provided by the increased range of machine adjustments. Exact duplication of repetitive jobs is assured owing to the rigid design and construction of this machine. In addition, improved quality of profile shape, surface finish and extremely close tolerances are obtained on the No. 116 Generator as a result of the new type of feed and generating mechanism and the increased rigidity of the cutter spindle and machine construction.

Increased Production Higher production is assured owing to a reduction of cutting and setup times. Also, the extremely efficient cutting cycles provided by the new feed and generating mechanism for both generated and non-generated gears combined with increased rigidity make possible improved production rates. Changing the machine from one job to another is facilitated by the convenient location of verniers, controls and other adjustments.

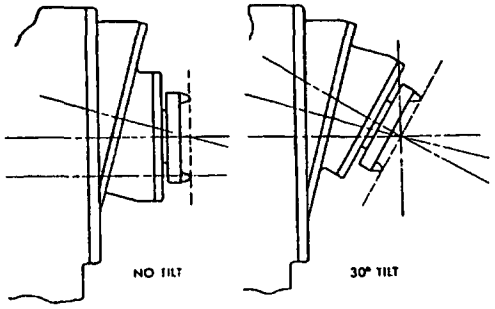
If the machine is to be used for volume production, for automotive type work, it can be equipped with special cams. These cams vary the rate of roll so that the cutting blades remove equal amounts of stock during all portions of the generating roll—increasing production by 50%.

A new mechanism precisely positions the cutter and the work each time the sliding base is withdrawn for de-chucking. This feature eliminates the necessity to locate the stock dividing gage in relation to the work arbor each time a new workpiece is placed on the machine—saving time and eliminating a source of human error.

Longer Cutter Life Rigidity of cutter spindle mountings and efficient cutting cycles assure increased cutter life on the No. 116 Generator.

Easier Operation The No. 116 Hypoid Generator incorporates many new adjustments which contribute to faster and more accurate machine setup and greater ease of operation. Hydraulic movement of the sliding base to and from the cutting position is provided to increase the speed and convenience of changing the work. The No. 116 is also equipped with a double-acting hydraulic chuck, which is easy to set up and has the advantage that uniform, torque-free chucking tension is always obtained on the work. Newly designed cutter truing and stock dividing fixtures are more accurate and easier to use.

Simplified Development Any desired tooth bearing can readily be obtained on gears produced on this machine. The many new adjustments which have been incorporated on the No. 116 permit refinements of tooth bearing previously unobtainable.



Arrangement for tilt of Cutter Spindle. Actual cutter tilt is 0-30° with no limit on swivel angle which controls the direction of the tilt.

*Trademark
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Use of Unitool Method With the Unitool Method, a single cutter of each standard diameter is used for cutting a wide variety of spiral bevel, Zerol bevel and hypoid gear ratios. The method is intended for cutting gears in small quantities and is particularly useful where experimental gears are needed for prototype models. Since the method is based on just six standard cutter diameters, only a minimum of tooling is needed, and the calculations are comparatively short and do not require specially trained personnel. The gear member of the Unitool pair is produced on the No. 116 Generator with or without generating roll and the mating pinion is generated to run correctly with the gear.

FEATURES

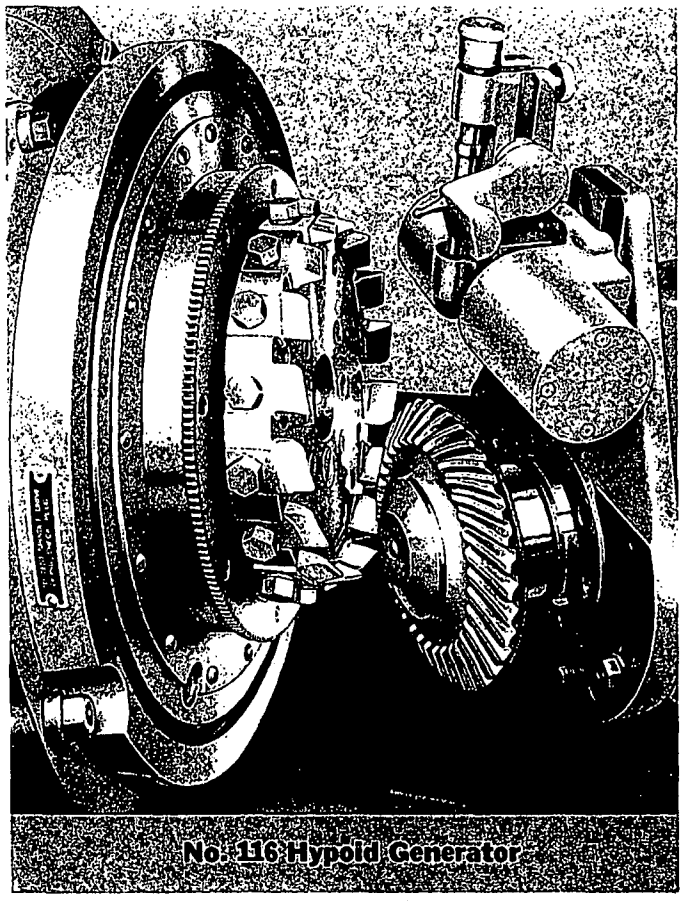
An entirely new type of cam-actuated generating and feed mechanism and universal cutter tilt are two outstanding features of the No. 116 Hypoid Generator. These, coupled with the increased rigidity of design and construction, contribute to the improved quality of product and efficient cutting cycles of this machine.

The No. 116 Generator is equipped with a double path feed cam – one path is used for roughing and finishing gears by the Formate-* Unitool method; the second path is used for rough and finish cutting both gears and pinions using the standard generating roll.

As mentioned earlier, variable rate-of-roll cams can be provided for increased cycle efficiency (at some cost in versatility) in high production situations. When production is high enough to justify separate pinion machines for finishing the drive and coast sides, a further refinement is possible: the machine can be equipped to cut on the up-roll only, or the down-roll only, depending on which side of the pinion tooth it will cut. In such cases the stresses on machine, cutter, and work are always in the most favorable direction for quality and long life.

The cutter spindle adjustments have been designed to provide universal cutter tilt (30° in all directions), at the same time giving maximum rigidity to the spindle mounting. The cutter center does not move when the cutter axis is tilted, as shown in diagram on opposite page. This tilt takes place about an axis which intersects the cutter axis and lies in the plane of the blade points, resulting in simplified calculations and fewer adjustments when position or shape changes in the tooth bearing are made.

All moving parts on this machine are fully enclosed and automatically lubricated. Automatic safety features are provided wherever necessary. Push button stations are suitably located so that the machine can be controlled from various operating positions.



No. 116 Hypoid Generator

OPERATION

A circular face-mill type cutter is used on the No. 116 Hypoid Generator as shown above.

The tooth profile shape is produced by the generated method in which a relative rolling motion takes place between the gear and the rotating cutter. The action is as though the gear being cut were rolling with the mating crown gear of which the cutter represents a tooth. Once the gear is chucked in the work head, the machine operation is entirely automatic.

With the machine arranged for generating roll cutting, the feed cam moves the work head and gear into cutting position. The cradle on which the cutter is mounted then rolls in timed relationship with the work spindle to generate a tooth space. At the completion of one tooth

SPECIFICATIONS

Gleason No. 116
Hypoid Generator

	English	Metric
CAPACITY		
Diametral pitch (coarsest)	2	12.7 Mod
Cone distance, maximum (30° spiral angle and 12" cutter)	9"	230mm
Work Head angle	12° to 90°	
Extreme ratio	Any practical ratio	
Minimum ratio for pinions to operate with Formate gears	2 to 1	
Maximum gear pitch diameter (30° spiral angle)		
10 to 1 ratio	18"	460mm
2 to 1 ratio	16"	406mm
1 to 1 ratio	12¾"	324mm
Face width (maximum)	2¾"	70mm
Number of teeth	5-150	
WORK SPINDLE		
Diameter of taper hole at large end	3¾"	100mm
Taper	¾" (per ft)	1:20
Depth of taper	6"	150mm
Diameter of hole through spindle	3¼"	78mm
Diameter of spindle nose	5½"	140mm
CUTTER DIAMETER		
6", 7½", 9" and 12"		
150mm, 190mm, 230mm, and 305mm		
WORK HEAD SETTINGS		
Maximum offset above center	4½"	114mm
Maximum offset below center	4½"	114mm
Maximum distance from machine center to nose of spindle	13½"	343mm
Minimum distance from machine center to nose of spindle	2½"	63mm
FEEDS AND SPEEDS		
Cutter speeds	17 to 115 R.P.M.	
Feed (sec./tooth)	9 to 80 seconds	
ELECTRICAL EQUIPMENT		
Feed Motor	5 H.P. 1800 R.P.M.	
Hydraulic Motor	¾ H.P. 1800 R.P.M.	
Coolant Motor	½ H.P. 3600 R.P.M.	
MISCELLANEOUS		
Floor Space	75" x 114"	190 cm x 290 cm
Net Weight	23,700 Lbs.	10,750 Kg
Shipping Weight, boxed for export		
1 case 106" x 84" x 65"	25,300 Lbs.	
1 case 320 cm x 240 cm x 196 cm		11,475 Kg

(*) Limited by cutter diameter and number of blades (submit prints)

space, the cradle and work reverse direction, the work is withdrawn and indexing takes place. The work head moves forward and the sequence of motions is repeated until every tooth has been cut. The machine stops automatically when the work is finished.

The special high production cams produce the same sequence of motions, except that the rate of roll varies so that the blades remove equal amounts of stock during all portions of the generating roll.

When the straight infeed path is employed, the rolling motion of the gear and cradle is locked and the tooth space is cut by a depth feed of the work directly into the cutter. After each tooth space is cut the work is withdrawn and the gear blank is indexed to the next tooth space. This sequence of motion is repeated until the gear is completed.

STANDARD EQUIPMENT

Index, ratio of roll, speed and feed change gears for one part
Double-acting hydraulic chuck
Motors and controls

EXTRA EQUIPMENT

Cutters and fixtures
Work spindle clamp and cradle yoke
Additional change gears to make complete set with cabinet
Work holding equipment for one part
Modified roll attachment
Index positioning arrangement
Universal stock dividing gage

GLEASON

GLEASON WORKS

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