HEIM CENTERLESS ROLL GRINDER

A grinding machine for automatically grinding cylindrical work without placing such work on centers, is now being manufactured by the Ball & Roller Bearing Co., Crosby St. and Maple Ave., Danbury, Conn. This machine is known as the Heim centerless cylindrical roll grinder, and is the invention of L. R. Heim, general manager of the company. The machine is adapted for grinding work such as rolls for roller bearings, wrist-pins, camshafts, valve lifters, valve-lifter roll-pins, pistons, shackle bolts, spring bolts, roller chain studs, or in fact any cylindrical part that requires grinding on only one diameter. A large battery of these grinders is in use in the Ball & Roller Bearing Co.'s plant in connection with the manufacture of journal roller bearings, radial roller bearings, and various small cylindrical parts manufactured for the trade by this company.

General Features of Construction

Figs. 1 and 2 show front views of the latest design of this machine. In Fig. 1 the machine is shown with the doors or covers removed from the wheel housing so that the position of the regulating wheel and the grinding wheel may be seen. This illustration also shows the roll-supporting fixture, and the chute in which the rolls are placed and from which they pass into the roll support, and thence between the grinding and regulating wheels. It will be noticed that there is a platform or shelf at the front of the machine on which the rolls

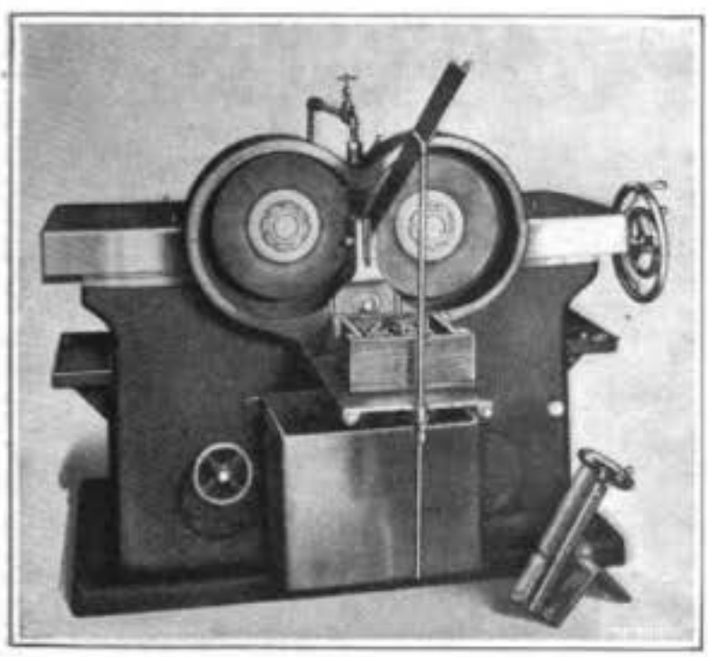

Fig. 1. Heim Centerless Roll Grinder with Wheel Housing Cover removed

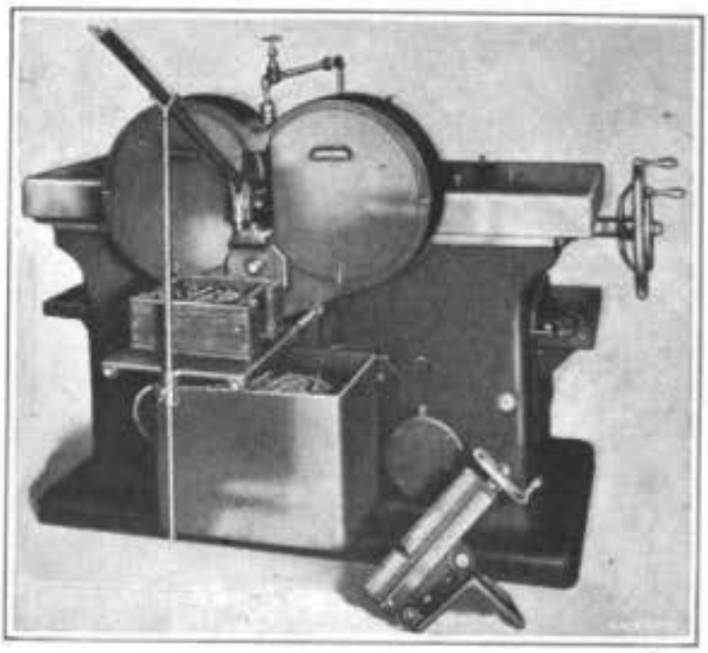

Fig. 2. Heim Centerless Roll Grinder made by Ball & Roller Bearing Co.

or supply of work can be placed in a convenient position for the operator. In feeding, the operator places the pieces to be ground in the chute, which is supported by a rod clamped to the shelf, as shown. Underneath the work-holding shelf is a water tank provided with a tray into which the work is automatically dropped after being ground. The tray into which the work falls is hung from the top of the water tank, and can be easily removed and dumped when it is full.

The roll-regulating wheel and the grinding wheel are adjusted in respect to each other and the roll-supporting fixture, by means of the two handwheels shown at the right-hand end of the machine. The grinding wheel and regulating wheel are each mounted on a slide, which, in turn, is mounted on the top of the main bed of the machine. These slides, the housings for the wheels, and the regulating spindles are of heavy construction, as will be readily apparent by referring to Fig. 3. On each side of the machine base, there is a large opening. The openings at the ends of the base and the one at the rear are provided with metal doors. Over the doors of the openings at the ends of the machine are hung trays for holding tools. The opening at the rear of the machine gives easy access to the mechanism inside the frame.

The water tank, fastened to the front of the bed, serves as a cover for the front opening in the base. Attached to the water tank is a centrifugal pump, driven from the main drive shaft of the machine. This pump supplies the grinding and regulating wheels with a constant flow of coolant.

Design of Driving Mechanism

The drive shaft for driving the grinding spindle and also for conveying power to the regulating wheel spindle and coolant pump is hung in the main bed of the machine, and is mounted on radial roller bearings, which are enclosed in a substantial housing and rotate in oil. From this drive shaft, power is conveyed to another shaft on which is mounted a speed reduction gear. This gearing and the shaft to which it is attached are enclosed in a housing and run in oil. By the use of this gearing, four speeds can be transmitted to the regulating wheel spindle. The design of the machine is such that the driving belts of the regulating wheel spindle and the grinding wheel spindle pull from underneath, and therefore have a tendency to hold the wheel-slides down in contact with the bed of the machine, thus adding to the rigidity of the slides in which the wheel-spindles are mounted. The slack in these driving belts is taken up by idlers mounted on anti-friction bearings.

The wheel-spindles are made from a special alloy steel, hardened, tempered, and ground, and they run in large phosphor-bronze bearings. These bearings provide automatic

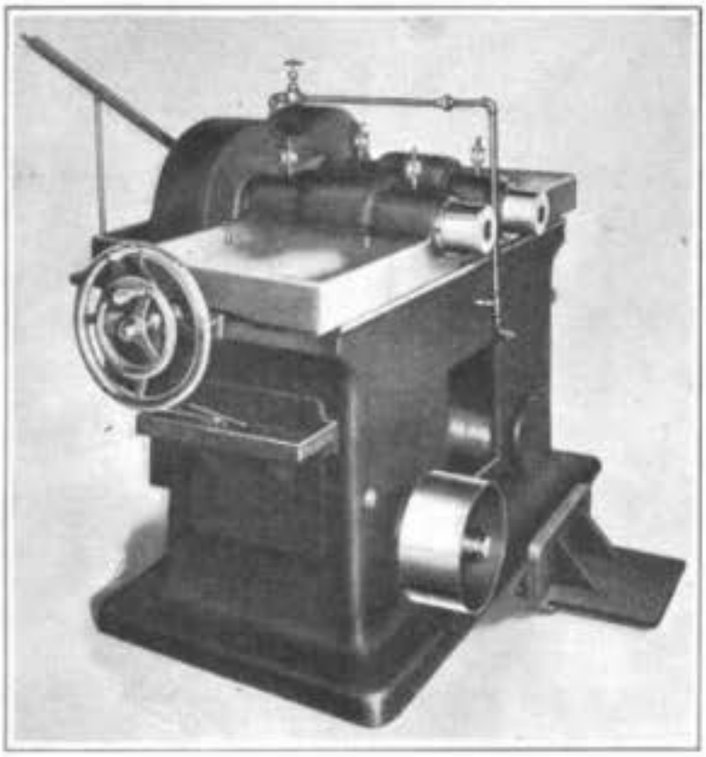

Fig. 3. Rear View of Heim Centerless Grinder

lubrication for the spindles, and the design is such that grit and dirt are absolutely excluded. The lateral thrust on the spindles is taken by ball bearings.

Operation of Machine

One operator can take care of a machine; that is, under normal conditions, he can keep the chute full of work and attend to the gaging and adjusting of the wheels. In some instances, it would be possible for one operator to attend to more than one machine, depending upon the nature of the work to be ground. When very long runs of any one size of work are to be ground, automatic feeders can be provided, so that one operator can run several machines, it merely being necessary for him to adjust the wheels, gage the work, and fill the magazines at regular intervals. The machine can be provided with tight and loose pulleys to be driven from a countershaft, or it can be driven by a motor either hung to the ceiling, set on the floor, or mounted on the machine at the end of the bed.

A diamond wheel-dresser shown in the lower right-hand corner of Figs. 1 and 2 is furnished with the machine. This device is placed between the two wheels and fastened to the machine, after first removing the roll-supporting fixture. The truing diamonds are passed back and forth across the faces of the wheels by operating the handwheel at the end of the truing fixture. In this way the faces of both wheels are dressed parallel with each other.

The changing of the speed of the regulating wheel is accomplished by the use of a handwheel shown on the left side of the main bed of the machine near the coolant tank. By turning this handwheel in one direction, the speed of the regulating wheel can be changed from that employed for grinding to that employed for dressing the wheel. By a slight turn of this wheel, the power drive can be disconnected from the regulating wheel.

It is claimed by the manufacturers that exceptionally high production rates can be obtained by the use of this machine, the increase in some instances ranging as high as from 100 to 500 per cent over the ordinary method of grinding, and at the same time a high degree of accuracy can be maintained. The grinding and regulating wheels employed on this machine are of the regular type such as are used on external grinders, and the life of the grinding wheel is approximately the same as that of an external grinding wheel, while the life of the regulating wheel is much greater. This machine occupies a floor space of 4 by 6 feet, and when equipped for belt drive it weighs approximately 4500 pounds.