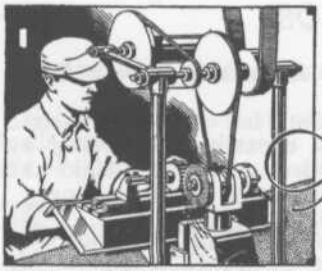
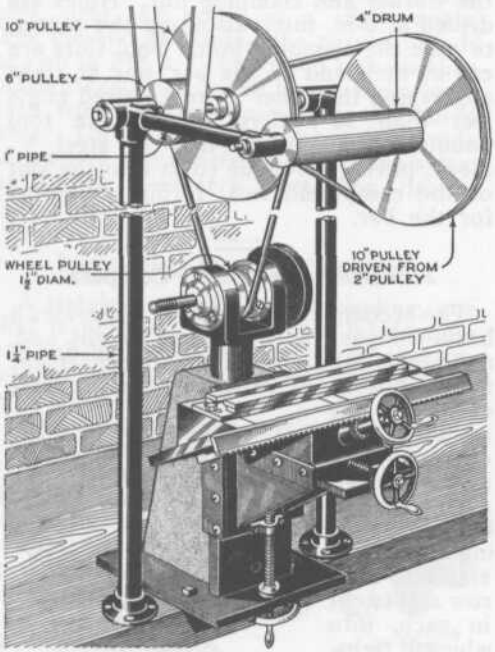


A SMALL BENCH GRINDER

By J.V.Romig

THE grinding machine, as an authority on machine tools has said, is "an exception to the otherwise universal tendency toward deterioration of workmanship, the grinding machine being the only machine tool that produces work of the same quality as its own parts." To the man in the experimental and similar small shops, the machine described in this article will open a field that has been heretofore closed, unless he wishes to invest in an expensive commercial machine, or



The Countershaft Arrangement Illustrated Is Merely Suggestive. Many Modifications Are Possible, Though the Pulley Sizes should be Preserved

be content with a makeshift rigged up on a small lathe.

This machine is a companion to the miller described on page 449 of the March issue, and, in this design also, the number of castings is kept down to the minimum, standard cold-rolled steel, flat and round, being used wherever possible.

Accuracy *is* the most desirable feature of any grinder, and this can only be attained by its having a good wheel head, accurate slides and bearings, and weight correctly placed.

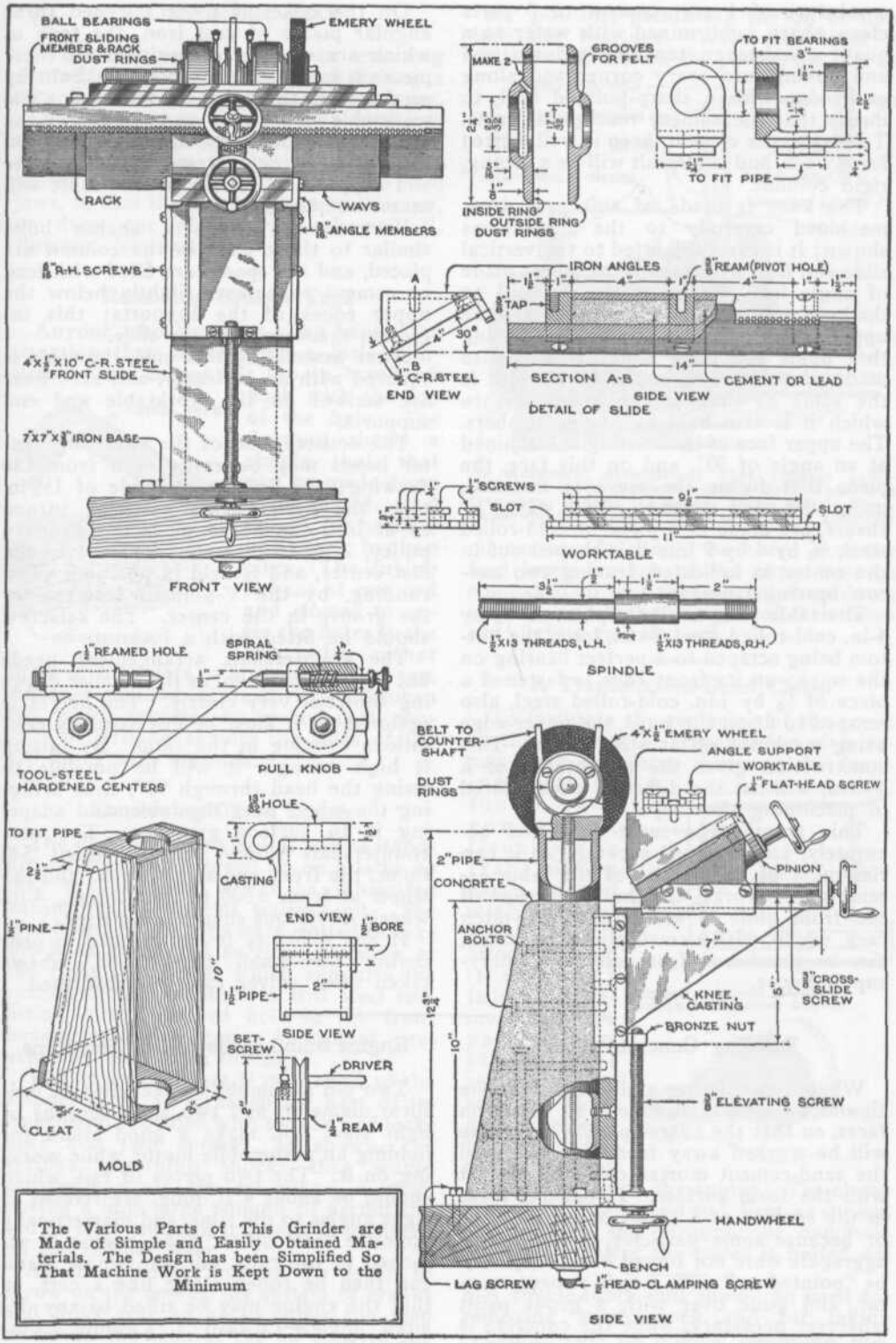
The wheel head of this machine is cast, from a simple pattern, in soft gray iron, and machined as shown in the upper right-hand corner of the large drawing. The boss on the bottom is turned to fit the 2-in. pipe column, and the wings are bored an easy push fit for the ball bearings used. A hole is drilled and tapped through the bottom, to take the upper end of the clamping screw.

The inner edges of the inside races of the bearings butt against the shoulders on the spindle, the outer races being lightly clamped by means of the dust flanges. These flanges are machined as shown, and are fitted with felt rings to exclude the grinding dust. The wheel spindle is turned from cold-rolled steel, and threaded with a right and left-hand screw; the inner wheel flanges are tapped to fit the spindle, the outer ones being a loose fit on it. The spindle pulley is1 1/2 in. in diameter and is grooved for a 3/8-in. round belt. Any material on hand may be used for the pulley, which should be pinned to the spindle.

The main frame of the machine is built up of 2-in. pipe, a 1/2 by 4-in. cold-rolled steel slide, and a base of 3/8-in. iron plate, the whole being knit together by a casting of cement. The 2-in. pipe forms the column upon which is mounted the wheel head, and on its front face, filed or shaped flat, is fitted the front slide.

This pipe screws into the base, the latter being tapped with a standard 2-in. pipe thread; the pipe is bored and faced square at the top to receive the head. The front slide is secured to the pipe by flat-head screws. Care must be taken in assembling, to see that the pipe, slide, and base are perfectly square with each other.

Holes are drilled and tapped in slide and base, for the 1/4-in. stove bolts that anchor the assembly to the cement; these bolts are of varying lengths, and may be interwoven with soft-iron wire to provide a better bond with the cement. The mold is made of soft pine; after the anchor bolts are screwed in place, it is put in position and clamped firmly. Fill it with



The Various Parts of This Grinder are Made of Simple and Easily Obtained Materials. The Design has been Simplified So That Machine Work is Kept Down to the Minimum

a mixture of 1 part cement to 3 parts clean, sharp sand, mixed with water to a quaky consistency, tamping it down well and poking into every corner and along each edge with a sharp-pointed tool, to insure that the cement reaches all parts. To season the cement, keep it well wetted for a week, and the result will be a strong, rigid column.

The knee is made of soft gray iron, machined carefully to the dimensions shown; it is carefully fitted to the vertical slide and held by means of members made of angle iron, 3/16 in. thick, fastened to the knee with round-head screws. On the upper face of the knee runs the casting that holds the table slide; this is also made of soft gray iron, and its width is the same as that of the knee face, to which it is also held by angle members. The upper face of this casting is machined at an angle of 30°, and on this face, the piece that forms the ways is fastened, using flat-head screws. The ways, or shears, are made of a piece of cold-rolled steel, 1/2 by 4 by 9 in.; it is shaped out in the center as indicated, leaving two narrow bearing faces.

The table slide is also a piece of 1/2 by 4-in. cold-rolled steel, 14 in. long, the bottom being scraped to a perfect bearing on the ways; on its front edge is fastened a piece of 1/4 by 1-in. cold-rolled steel, also scraped to fit on the ways, the upper edge being machined off at a 30° angle. This construction gives the advantages of a V-bed, without the difficulty encountered in machining that type.

This front piece must be fitted accurately, and fastened securely, as it carries most of the weight of the table assembly and work. On the lower edge of the front slide is mounted a fine-pitch rack, which, with a small pinion to match, can be purchased from any machinery-supply house.

On the table slide are fastened three angular pieces of cast iron, the tops of which are exactly in line, and on these pieces is mounted the worktable, built up as shown in the detail, of flat steel. The worktable pivots on a stud working in the center cast-iron support, and is clamped in position by cap screws tapped into the end supports. The slot in the table will accommodate 3/8-in. bolts.

Between the supports, anchor bolts similar to those used in the column are placed, and the spaces are filled with lead or cement to a level slightly below the upper edges of the supports; this increases the weight of the slide.

After assembling this unit, the table is squared with an indicator, and zero lines are scribed on the worktable and end supports.

The construction of the swiveling center heads may be easily seen from the drawing; the bodies are made of 1 1/2-in. pipe, the heads being castings, turned to fit into the bored pipes. A grooved pulley, 2 in. in diameter, is fitted to the fast center, and is held in position, when running, by the V-pointed setscrew in the groove in the center. The setscrew should be fitted with a locknut.

The countershaft arrangement needs but little description, as the smaller drawing shows it very clearly. The height is optional, as it must be governed by conditions existing in the shop. By raising it high enough, it will be possible to swing the head through 90°, thus bringing the wheel over the table, and adapting it to surface grinding. The rear countershaft should run at about 540 r.p.m., the front one at 108 r.p.m., and the wheel at from 3,500 to 3,800 r.p.m., 4-in. wheels of various shapes being used.

If any difficulty is experienced in procuring the small handwheels, wheels taken from valves can be substituted.