

side-crank types, built right or left-hand, and either set to run over or under.

The centre-crank engine possesses the advantage of requiring less space and having no outboard bearing for which a foundation must be provided. The side-crank bed-plate is a combination of the deep box pattern and the "tangye" frame. It is heavily built and has a broad footing upon the foundation. The main bearing housing is liberally proportioned, while the target end to which the cylinder is bolted is of great strength and stiffness. The finishing of all machined parts is done upon a special combination milling

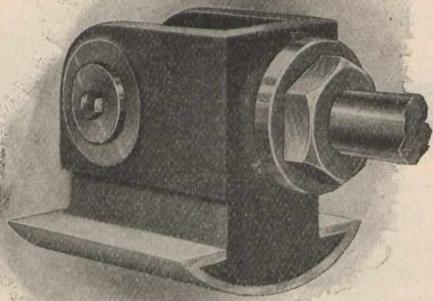


Fig. 11.—Cross-head of Medium-speed four-valve Engine. (three-quarter view).

and boring machine, and the finishing of the main bearing housing, the facing of the target end and the boring of the cross-head guide are all accomplished without resetting and in practically one operation.

The main bearings are made in three parts, two quarter-boxes and a bottom shoe, which completely surround the shaft with the exception of a small space at the top. The quarter-boxes are held in adjustment by a vertical wedge between one of the boxes and the housing of the bearing. This wedge is in contact with the box the entire length of the bearing, and is adjusted and held by set screws in the

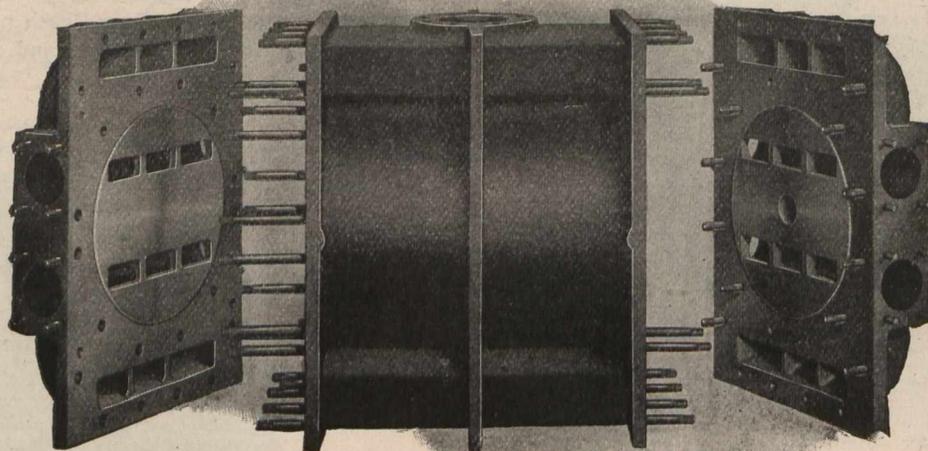


Fig. 13.—Cylinder and heads of four-valve Engine.

cap. The cap and the wedge may, therefore, be removed and replaced without disturbing the adjustment of the bearing, something that is impossible with most types of main bearings. The bottom shoe is free to move sidewise, and is, therefore, always centred under the shaft. This manner of arranging the main bearing was adopted by the Atlas Engine Works after an extensive study of the subject, and is based upon the fact that most of the wear of such a bearing is in a horizontal direction, the forces due to the push and pull of the piston being much greater than that due

to the weight of the shaft and fly-wheel. These bearings are faced with anti-friction metal securely peened into anchoring recesses and then bored and scraped to fit the shaft. The two quarter-boxes may be removed without disturbing the engine shaft, while the bottom shoe can be slid out after jacking the shaft up one-sixteenth of an inch.

The crank shafts of both the centre and side-crank types are built up from hammered wrought iron shafts, crank-disks of a special mixture and hammered steel crank-pins. Each crank is key-seated and forced to place over the key on its shaft by hydraulic pressure, the amount of which depends upon the size of the shaft. The crank-pin holes are then bored through the disks absolutely true to the shafts. The holes on a centre-crank shaft are both bored at one setting

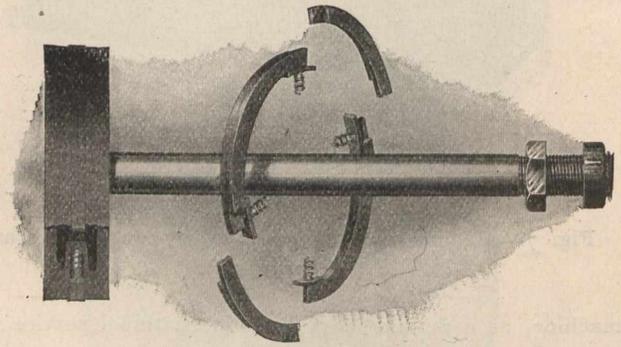


Fig. 12.—Piston and packing rings.

on a special machine, which assures absolute alignment. The crank-pin is forced into place, and one end of the shaft, which has previously been rough, is turned up, using the other finished end as a line of reference. The crank-disks are carefully counter-balanced and are turned up smooth and polished.

The cross-head is practically one solid piece. The pin is ground to fit tapered holes on both sides, and is firmly held by a bolt and washer. It can easily be removed or turned part way around to present new surfaces for wear. The shoe at the bottom is cylindrical in form to fit the bored guide in the bed, and is held down by heavy guide caps. The wearing surfaces are babbitted and scraped to a running fit. Oil is fed through the guide caps at the highest point of the wearing surface, and works downward through grooves toward the middle or lowest point. Lowering the

guide caps afford ample means for the compensation of all wear.

The piston-rod passes through a large opening in the back of the cross-head in which it is centred by three set-screws, after which the jam-nuts are drawn up tightly to hold it in place.

The piston is provided with Babbitt & Harris' patent automatic spring packing, consisting of two rings, each of which is divided into four segments and occupies a separate channel. The segments lap over each other by fish joints,