

Technical Description of The Martin 333 Aircraft Engine

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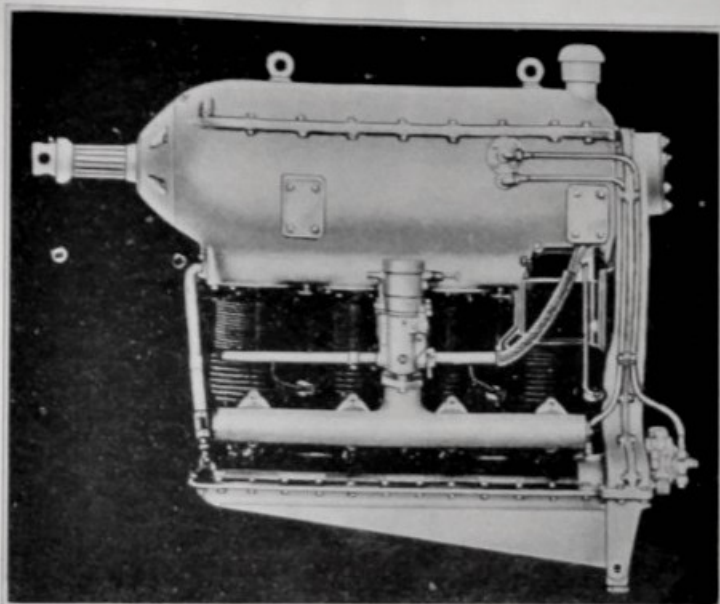
EARLY in 1927, Mr. Louis Chevrolet, who for years has been associated with the design of automotive engines, and who has a notable record as a driver of racing cars, started designing an aircraft engine. Engineering practice which had been proved by years of subjection to the gruelling grind of the race track was used as a basis for the development of the new engine. The in-line principal was adopted after a summing up of opinions gathered from many reliable sources of information. An interesting trend towards this type of design had been noted, and its many advantages, both from a mechanical and aerodynamic standpoint, were decidedly in its favor.

The result of these years of designing and testing was a four-cylinder in-line, inverted engine, remarkably economical, powerful, and of extremely light weight. This engine, the Martin 333, rated at 120 h. p. at 2100 r. p. m., and weighing 260 pounds, dry, has a fuel consumption of .48 pounds per b. h. p., and a brake mean effective pressure of 136 pounds per sq. in.

Every detail of this engine has been carefully studied as to its relation to the other parts of the engine, and it is to this application of balanced design that the engine owes its great performance and economy.

The Glenn L. Martin Motors Company, a subsidiary of the Glenn L. Martin Company, of Baltimore, Maryland, has been formed to produce the Model 333 engine, and to develop other models of similar construction, but of greater horsepower.

The crankcase of the Martin engine is cast in two pieces from heat treated magnesium. It is semi-elliptical in form, and divided above the center line of the crankshaft. The inherent strength of the



Martin 333 four-cylinder in-line inverted aircraft engine.

material used in the case is amply reinforced by ribs to withstand much greater stresses than would be encountered under service conditions.

The crankshaft is forged from heat treated chrome nickel steel, then machined and tested for static and dynamic balance. The main bearings, of which there are five, are $2\frac{1}{2}$ " in diameter, and the crankpin bearings are $2\frac{3}{8}$ " x $2\frac{3}{8}$ ". Thrust in either direction is taken by a single row ball bearing.

The connecting rods are H section forged duralumin, babbitt lined. Oil is taken from a small hole drilled through the crank-

pin bearing to the side of the rod this hole providing a spray to the pin bearing.

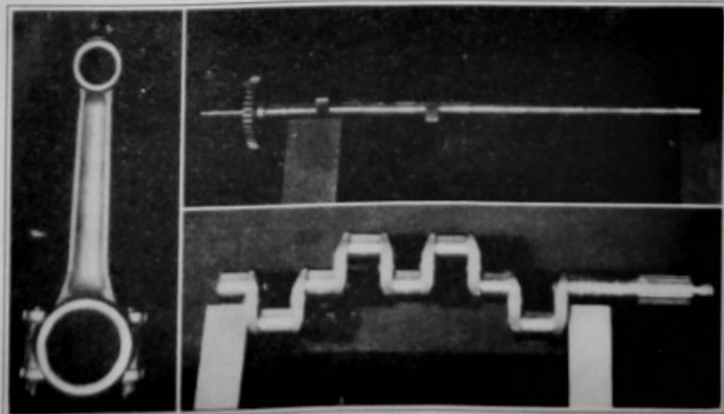
The cylinders of the Martin engine are machined from chrome molybdenum steel forgings, heat treated, and are supplied with ample fins for cooling. The cylinder head is machine molded, aluminum alloy, so designed that the exhaust port comes out from the bottom of the head when the engine is in its inverted position.

Pistons are of trunk type, of aluminum-silicon alloy, having four rings, three compression and one oil scraper.

Two camshafts, one for intake, and one for exhaust, are located under the head. Each camshaft is supported by eight bearings, and is driven by a triple link chain and train of gears. The camshafts are interchangeable.

The valve mechanism of the Martin engine is a new departure from conventional aircraft engine valve gear.

The valves are actuated directly by the cams through lifter cups of Nitralloy steel. The cams strike the lifter cups a trifle off center, causing the cup to rotate each time it is struck. The valve springs are both wound the same direction, and each



Left: Connecting rod.

Above: Camshaft.
Below: Crankshaft.