A CRANKLESS MOTOR

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EDITOR'S NOTE.—Mr. Bedell gained a first-hand knowledge of his subject while employed by The Steel Products Engineering Co., Springfield, Ohio, the firm that manufactured this new motor.

Engineers! Here is your combustion motor without a crankshaft. The old question of how to design the crankshaft has been solved by eliminating that part. You will find a complete answer in this new crankless motor of English design.

My first impression of the 800 horse-power, water-cooled, crankless, aeroplane motor was that of a differential for a large truck. This impression was gained from drawings, outside casting, and partial assembly of this aeroplane motor.

The large outside casting and a majority of smaller castings are of duraluminum and white metal. The outside casting, which is the cylinder block, contains all water ways and oil reservoirs and can be easily lifted by one man. The motor is to have a speed of 1,200 R.P.M., but embodies an internal gear which reduces the propeller speed to 1,040 R.P.M.

The main drive shaft extends longitudinally through the motor much in the same manner as a rear axle for a motor truck.

The cylinders are set parallel with this main axis, and the twelve pistons are connected to six rigid connecting rods which are yoked to the large continuous ring of the "wobble plate." These connections are a running-slip fit, and they are yoked over hemispherical-shaped brass pads which give the yoke a fit that is always parallel to the incline of the continuous ring.

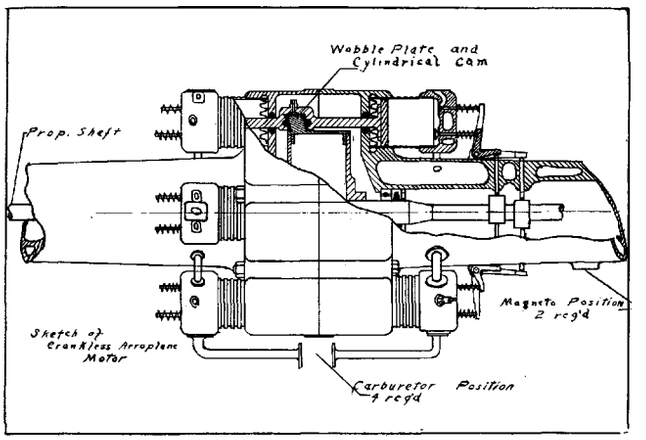
The feature attracting most attention is that the motor is to operate without a crankshaft or the use of leverage on the connecting rods. It is to have a large cylindrical-shaped "wobble plate," which is to embody the principle of the inclined plane. There is a two-inch square or continuous ring chased upon the outside which has a lead of 5¾ inches in a half revolution. This half revolution gives the piston the desired stroke. Each piston has a bore of six inches.

The "wobble plate" has eccentricity, with the center of the drive shaft, of two inches. This enables it to operate the internal gear giving the propeller its desired speed.

The double ignition system, an insurance against accident resulting from faulty ignition, has two magnetoes, so located that they run off of separate gearing. The timing of the motor is one of the most difficult jobs and is not easily explained. The timing is such that two cylinders fire at the same time but are on opposite sides of the ring and are one hundred and eighty degrees apart. This thrust rotates the "wobble plate," and consequently the whole drive shaft.

The valves are operated by rocker arms working at right angles from cams located on the main drive shaft. All working parts are mounted on ball-sockets, which insures one of the smoothest running combustion motors that has ever been produced.

Each connecting rod has two pistons attached



Sketch of the Crankless Motor

at either end and will operate parallel to the long axis of the motor. The rods are cylindrical and have a yoke in the center. They pass through guides located at the end of the cylinders. These guides are fitted with four hemispherical pads which take side thrust as well as torque on the rods.

The "wobble plate" and most of the internal working parts are run in oil. Care has been taken to keep the oil resistance down. This is done by careful location of oil holes and channels throughout the oil reservoirs. The design embodies a medium sized but very efficient water-cooling system as the channels lead the coolant very close to the cylinders and working parts.

There are four carburetors located in the midsection and spaced equally around the motor. These locations give shortest fuel travel and insure introduction of warm fuel into the cylinders.

The workmanship on the motor is of the finest type, and the material has been selected with reference to strength with least weight. The estimated weight is about one and one-half pounds per horse power. The motor is a typical one for aeronautical work, as it is built with such symmetry that there is no tendency to overbalancing when hung in a craft. It is supported at the rear and on the two sides with heavy boiler plate.

The motor will have ample power to pull a large craft and will be very dependable because of the double ignition and excellent fuel distributing system. There have recently been two stationary-type crankless motors built in Australia which have proved successful in that line.

Most of the machinists working on this motor are enthusiastic about its possibilities and believe in its success. Even the most conservative think it will be a smooth-running and powerful motor.

The student branch of the American Society of Ceramic Engineers held a meeting on March 7 at the Orton Memorial Building on Summit St. as the guests of General Edward Orton. They made a tour of the Standard Pyrometric Cone Co. while there.