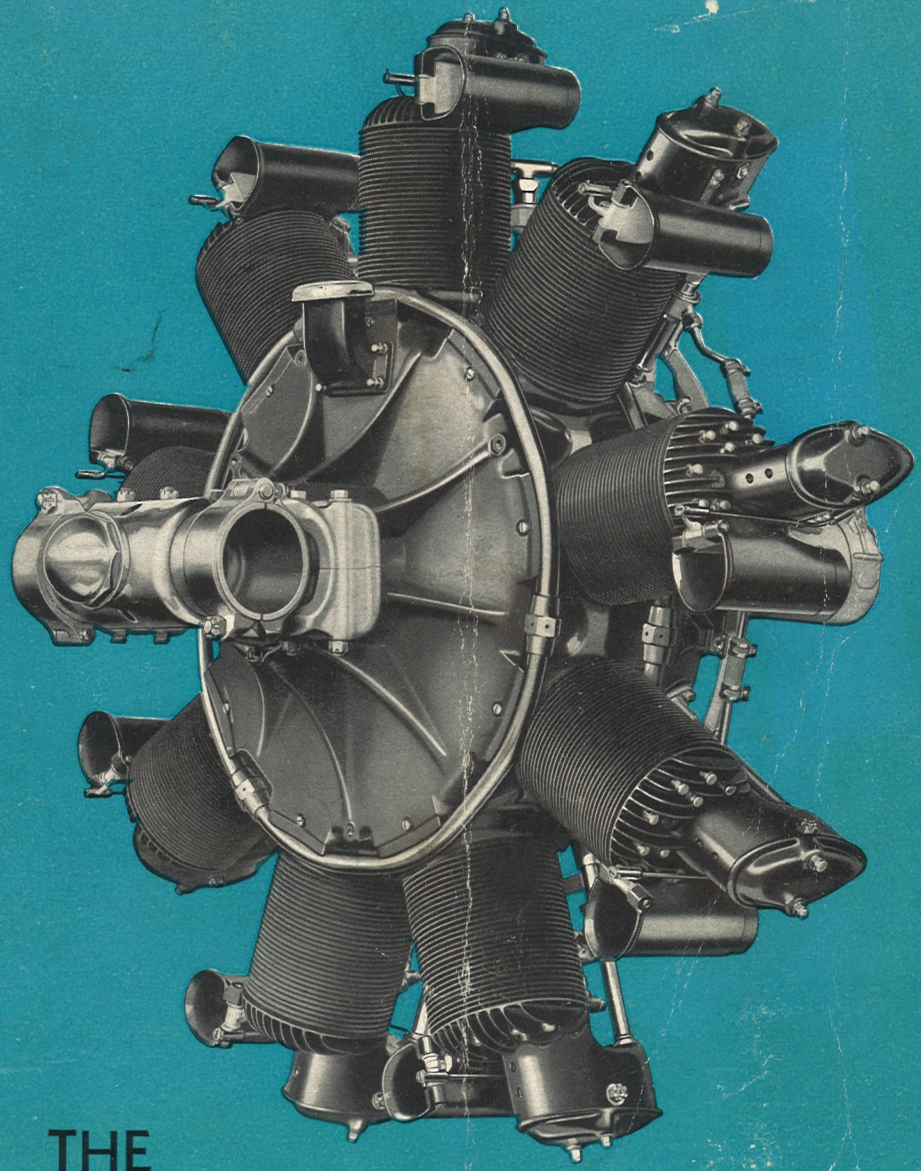
FIRE-SAFE FUEL

GRAPHIC PROOF OF FUEL SAFETY IN THE PACKARD-DIESEL AIRCRAFT ENGINE



THE PACKARD-DIESEL AIRCRAFT ENGINE

PACKARD
MASTER MOTOR BUILDER

THE Packard Motor Car Company has been building aircraft motors since 1915. It has designed and built engines of the greatest power and in all sizes and form. On land, sea and in the air, Packard engines have established scores of world records.

With an experience in designing and building the finest internal combustion motors dating from 1899, Packard, the "Master Motor Builder," was called upon to develop and build aircraft engines of constantly increasing power and diminishing weight for the United States government, beginning with the famed Liberty motor.

These engines won fame for the Army, the Navy, the United States and for the Packard Motor Car Company, as Packard engineering kept the United States to the fore with motors unequalled in power by those to be found anywhere else in the world.

Packard has been building water cooled engines for aircraft, as it was this type of power plant which was most favored by the United States Army and Navy.

Epochal events, however, swung public opinion in this country to the air cooled aircraft engine. Civilian air travel at the same time began exceeding in extent the flying done by the Army and Navy. Motors of less power and lower cost were demanded.

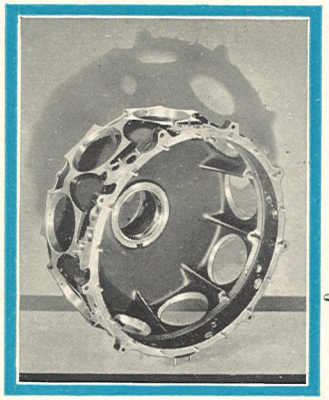
Packard foresaw the desirability of adding air cooled power plants to its great water cooled aircraft engines. Its engineers gave intensive study to the situation.

Packard could have produced conventional, air cooled, gasoline burning engines quickly and could have entered competitively in the world market with the many others manufacturing such motors. It chose a harder route, longer and more costly but one which it believed firmly and sincerely would add a far greater contribution to the art of flying. It decided to adapt the Diesel principle, with all of its advantages for such purposes, to aircraft engines.

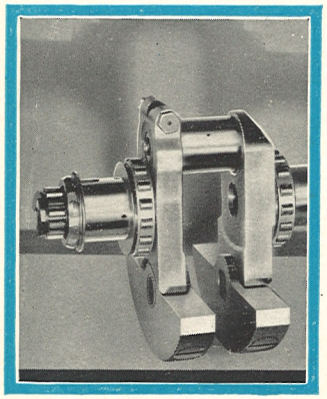
With this decision Packard was attacking a problem the solution of which, long sought by almost countless engineers, had baffled the rest of the world. It was entering a new field almost entirely without the guideposts of precedent and engineering data.

It was equipped, however, with almost limitless resources in money, material, machinery, skill and genius. In the hands of others less fortunately placed or less adequately equipped, the task would have been hopeless.

Led by Alvan Macauley, President; J. G. Vincent, Vice-president and L. M. Woolson, Aeronautical Engineer, Packard laid down a complete program of research, experimental effort, designing, building and testing. This program after three years has culminated in the presentation of the Packard-Diesel aircraft motor, tested in hundreds of hours of flying by foremost pilots of the United States and ready for everyday operation in the air.

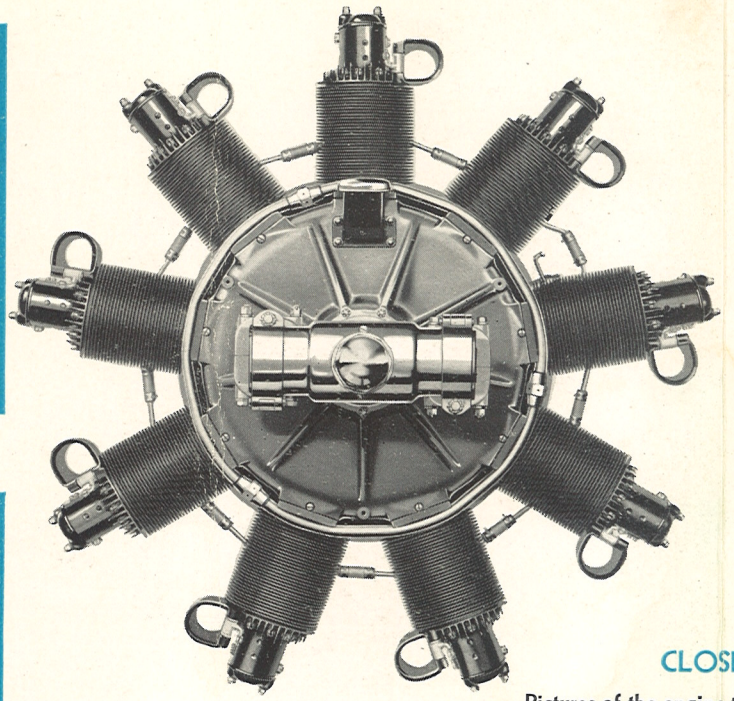


The one-piece crankcase weighs only 34 pounds



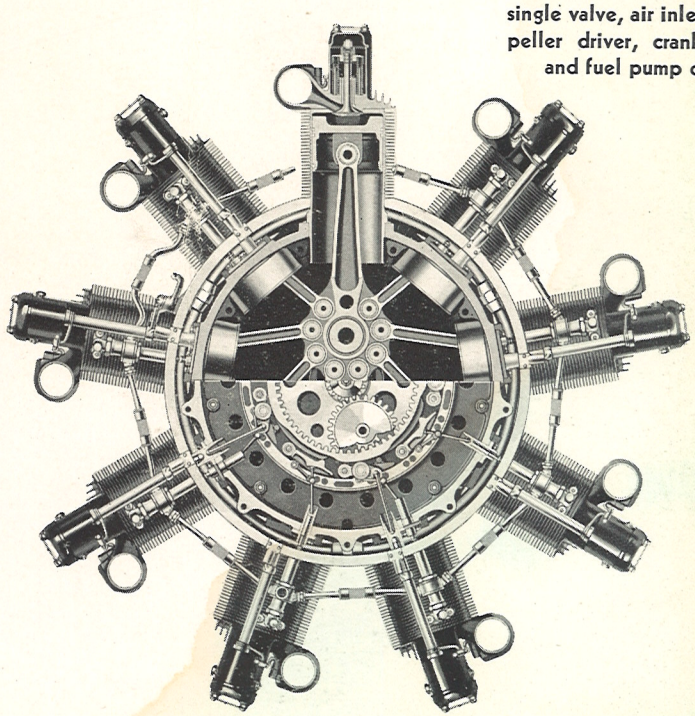
Spring-mounted counterweights relieve crankshaft stresses

An unique pocket in the piston head increases turbulence



CLOSE

Pictures of the engine t
of design and scarcity
views that reveal such
single valve, air inlet,
peller driver, crankca
and fuel pump ope



THE PACKARD-DIESEL AIRCRAFT ENGINE

is utterly unlike any other aircraft engine in the world and, therefore, a few general facts about its more important features will prove of interest

THE Packard-Diesel Aircraft Engine is a nine cylinder, radial, air cooled engine. It has no carburetor, magneto or spark plugs. It operates with fuel oil instead of gasoline. It has but one, instead of two or four valves, per cylinder. Each cylinder has a separate fuel pump, making it an operating unit independent of the other eight. Unless properly atomized or used through a wick like an old fashioned lamp, the fuel it uses will not catch fire even from an open flame. It will actually extinguish a flame when poured over it. The Packard-Diesel engine eliminates the fire hazard from flying.

The Packard-Diesel engine is a four-cycle, but differs widely from a four-cycle gasoline engine in its operation. On the down stroke of the piston, air only is sucked into the cylinder. On the up stroke the air is compressed so greatly that it reaches a temperature of approximately 1000 degrees Fahrenheit. Just before the piston reaches top "dead center," oil is sprayed into the cylinder and is ignited spontaneously by the heated compressed air. Power of this explosion is communicated to the crankshaft through a connecting rod as in a gasoline engine. The gases from the explosion are exhausted into the open air through the same valve on the next up stroke of the piston.

Chief among the contributions the Packard-Diesel engine has made to aviation is the elimination of the danger of fire.

Important also, however, are many other features which engineers of the world have claimed for it and many of which it has proved through more than two years of almost constant operation.

It will reduce the cost of flying, through greater economy of operation and lessened cost of the oil which it uses as fuel.

It will permit of carrying greater "pay loads" or travel farther on an equal amount of fuel used in a gasoline engined plane.

It eliminates electrical interference in both radio reception and transmission, thus permitting a plane to maintain uninterrupted communication with the ground.

Continuous ignition is assured throughout the life of the engine, since this is furnished by high compression inherent in the design.

It does not depend on a finely balanced ratio of air and fuel, constantly changing in a conventional aircraft engine with changes in altitude.

For this reason it will not stop through too "lean" or too "rich" a "mixture."

It will fly upside down as well as right side up.

It has an inherent ability to adjust itself automatically to changes in altitude, taking care of itself without necessity for "mixture adjustments" by the pilot in the rarefied atmosphere of high altitudes.

It can be started as readily and as easily as can a gasoline motor and with similar starting equipment. It has started readily after hours of exposure to temperatures as low as 10 degrees below zero.

A noted American pilot shut it off at an altitude of 5,000 feet, dove it steeply to within 50 feet of the ground, and it restarted instantly and with full power.

Its one large valve is cooled after each exhaust by the inrush of air to the cylinder.

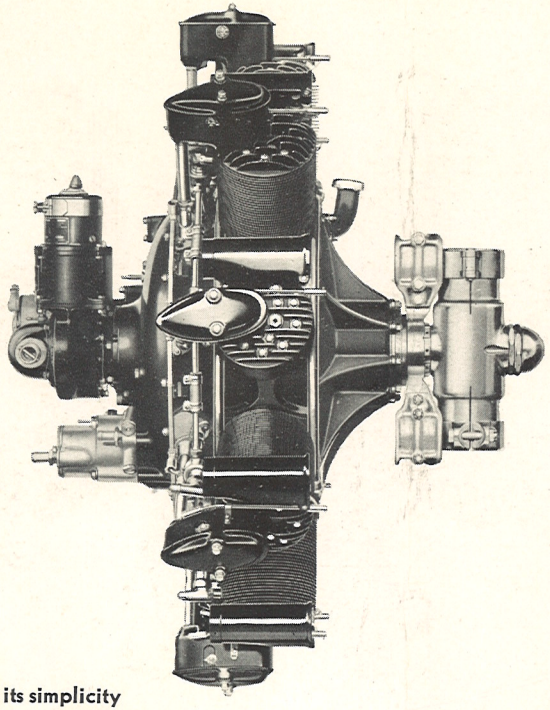
Its non-volatile fuel does not form frost through rapid evaporation during atomization as not infrequently occurs with high test gasoline in a carburetor.

It develops 225 horse power with its fuel pumps set for economy of operation and it weighs 510 pounds.

Packard's completely equipped new aircraft engine factory is operating at full capacity. The new engine has met the exacting tests of the government and has been awarded an Approved Type Certificate number 43 by the Department of Commerce. The Packard-Diesel aircraft motor is now ready for the public, backed by all the facilities of the Packard Motor Car Company for manufacturing, distribution and service.

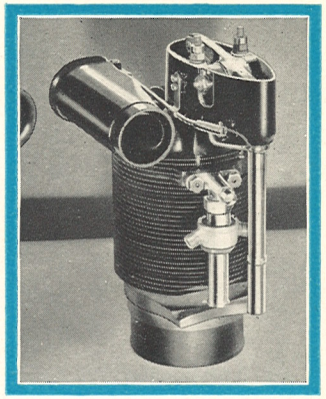
PACKARD MOTOR CAR COMPANY, DETROIT, MICH.

PRINTED IN U. S. A.

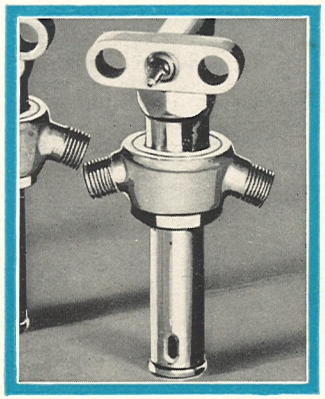


LOSE-UPS

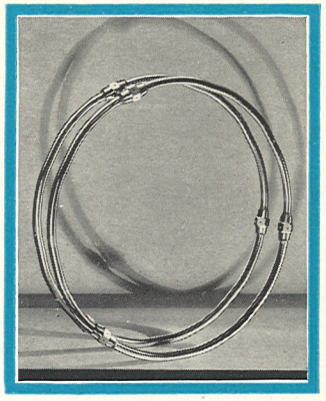
gine that show its simplicity carcity of accessories; and such working details as the nlet, piston, cylinder, pro- rankcase, crankshaft, valve p operating mechanism



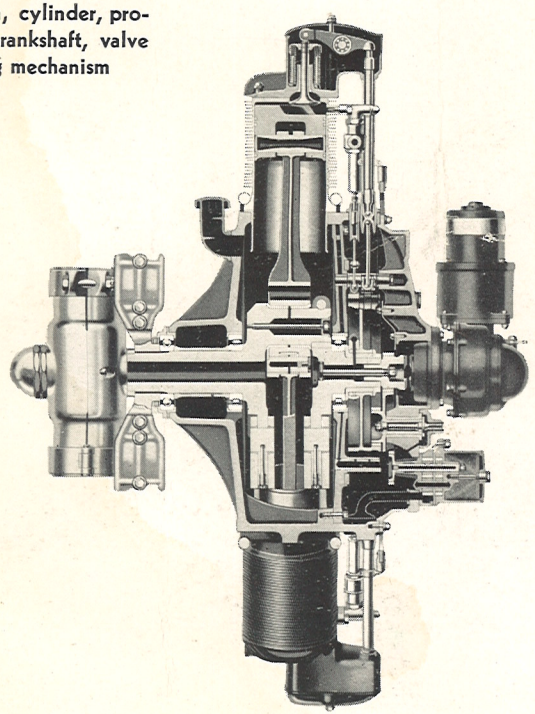
Air inlet port, easy tappet adjustment and fuel pump are shown



Each fuel pump is an independent unit operating separately



Two alloy steel hoops secure the cylinders to the crankcase



SPECIFICATIONS OF THE PACKARD-DIESEL AIRCRAFT ENGINE

FORM—Nine cylinder, four cycle, air cooled static radial.

ROTATION—Counter clockwise, viewed from front.

RATED HORSE POWER—225.

RATED SPEED—1950 r. p. m.

WEIGHT—510 lbs.

WEIGHT PER HORSE POWER—2.26 lbs.

OUTSIDE DIAMETER—45 11/16 in.

OVER-ALL LENGTH—36¾ in.

BORE—4 13/16 in.

STROKE—6 in.

DISPLACEMENT—982 cu. in.

FUEL CONSUMPTION—.46 lbs. per H. P./hr. full power; .40 lbs. per H. P./hr. cruising.

OIL CONSUMPTION—.04 lbs. per H. P./hr.

CRANKCASE—Magnesium barrel type, one-piece construction consisting of one major casting with removable diaphragm containing rear bearing support.

CRANKSHAFT—Forged chrome nickel molybdenum, two-piece construction with counterweights pivoted and spring mounted.

PROPELLER HUB—Furnished with engine to receive S.A.E. No. 1 standard propeller blades.

PROPELLER DRIVE—Through flexible coupling.

MASTER ROD—One piece, I section forged nickel chrome with removable high-lead bronze lined steel bushing.

LINK RODS—I section forged nickel chrome, bronze bushed.

PISTONS—Aluminum, full skirt.

PISTON RINGS—Two compression rings above the pin, one oil ring below the pin.

CYLINDERS—Forged chrome molybdenum steel, integral dome, with aluminum head attached by studs. Cylinders retained by two chrome nickel hoops.

FUEL PUMPS—Independent plunger type mounted on each cylinder.

FUEL CIRCULATING PUMP—Modified C-5; standard equipment.

VALVES—Single valve, high chrome silicon steel, used in connection with venturi for both inlet and exhaust.

VALVE MECHANISM—Push rod and rocker arm with eccentrically mounted roller bearing for clearance adjustment.

VALVE SPRINGS—Multiple helical, 12 per valve.

CRANKSHAFT BEARINGS—Two roller bearings and one deep groove ball bearing.

OIL PUMP—Three sections: suction, circulating and pressure. Pressure 75 lbs.

OIL COOLER—Spiral tube type; standard equipment.

NOSE COWL—Standard equipment.

STARTER—Eclipse electric inertia, Special Series 7. Extra equipment.

GENERATOR—Eclipse type G-1, six volt. Extra equipment.

TACHOMETER DRIVE—S.A.E. standard, ½ engine speed. Counter clockwise.