

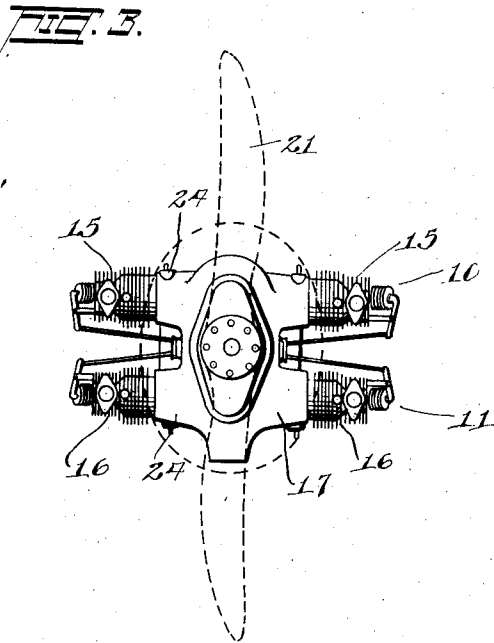
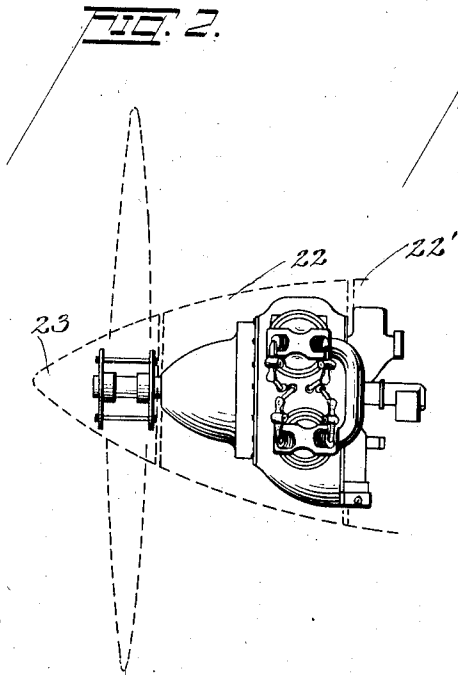
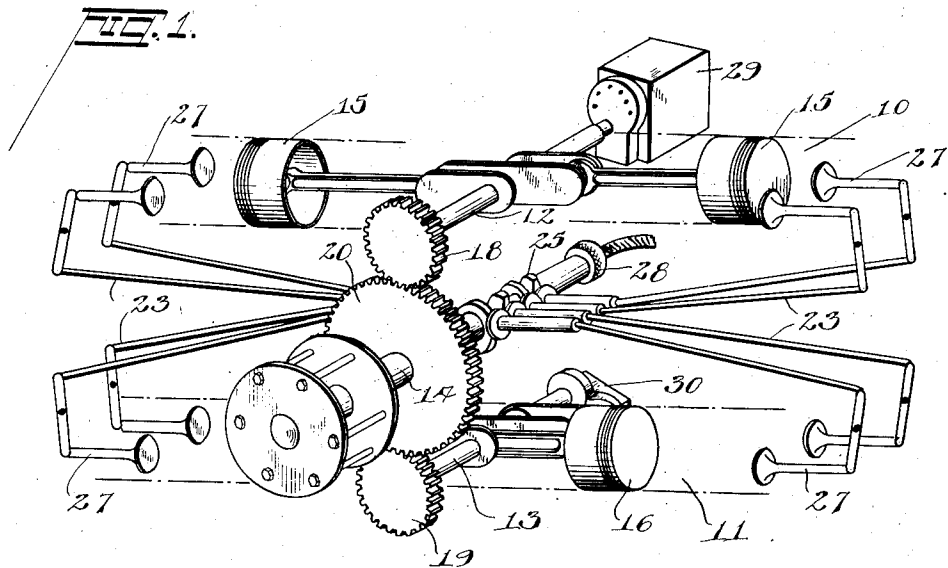
May 3, 1927.

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1,627,108

AIRCRAFT ENGINE

Filed Jan. 30, 1925



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AIRCRAFT ENGINE.

Application filed January 30, 1925. Serial No. 5,855.

This invention relates to aircraft engines, and has particular reference to the provision of a small compact aircooled engine, especially adaptable on small light aircraft.

5 The principal object of the invention is to provide two pairs of horizontally opposed engine cylinders arranged in parallel relation with a propeller shaft, extending centrally between the crankshafts of each pair
10 of cylinders, the cylinders being arranged broadside in the propeller slipstream to secure equal aircooling.

Another object of the invention arising from the arrangement above described, is
15 to provide a two to one ratio between the propeller shaft and the crankshafts, the firing impulses of the upper pair of cylinders being displaced 180° of crankshaft travel from the firing impulses of the lower pair
20 of cylinders, and 90° of propeller shaft travel, thereby communicating even impulses to the propeller. The arrangement further enables the use of the propeller shaft as a camshaft for operating the valve mechanisms for the cylinders extending out between the pairs of cylinders, and a convenient tachometer drive, the crankshafts in turn providing convenient power takeoffs for the operation of auxiliary equipment such
30 as the oil pump and magneto.

The foregoing objects are brought out in the course of the following description, in which reference is made to the accompanying drawing wherein—

35 Fig. 1 is a schematic illustration of the engine of my invention.

Fig. 2 is a side view of the invention, and Fig. 3 a front view thereof.

The engine consists of an upper unit
40 and a lower unit 11, which are virtually duplicate two cylinder engines of the opposed type, operating on the four stroke cycle principle. The firing impulses of the units are displaced 180° of the travel of the
45 crankshafts 12 and 13, so that impulses are communicated at intervals of every 90° travel of the propeller shaft 14. The cylinders 15 of the unit 10, similarly to the cylinders 16 of the unit 11, are provided with aircooling flanges and are bolted to a common crankcase 17, which provides bearings for the crankshafts 12 and 13 and the propeller shaft 14. Within the crankcase 17 a gearing connection is provided between the
50 crankshafts 12 and 13 with the propeller shaft 14 by the meshing engagement of spur

gears 18 and 19 on the crankshafts with a large spur gear 20 on the propeller shaft 14. The gear 20 is in a ratio of two to one with the gears 18 and 19 to secure the operating
60 characteristics above described. The propeller indicated at 21 mounted on the outer end of the propeller shaft 14 provides equal aircooling for the pairs of cylinders 15 and 16 due to its central location with respect to
65 these cylinders, which it will be noted, are disposed broadside in the slipstream thereof. A cowling 22 and spinner 23 provided over the engine crankcase and propeller hub, streamline the engine leaving exposed to
70 the slipstream only the finned cylinders 15 and 16.

The horizontal disposition of the cylinders is of advantage not only in giving compactness and in providing for the aircooling
75 as just described, but also affords clear unobstructed vision forward from the cockpit. It is also to advantage that the engine bearings may form direct extensions off the longérons to provide a four point
80 support at each of the corners of the crankcase as indicated at 24. The cowling 22 can thus be made co-extensive or flush with the fuselage 22', giving a neat trim appearance, and reducing head resistance considerably. 85

The propeller shaft, since it operates at half the crankshaft speed and is centrally located with reference to the engine cylinders, may serve as a camshaft and is provided with cams as indicated at 25 for operating
90 push rods 23, extending out between the pairs of cylinders on both sides of the propeller shaft to operate the valves 27 of the engine cylinders. The propeller shaft also has a connection 28 for a tachometer,
95 the readings of which are usually taken for the propeller speeds. Each of the crankshafts also provides a convenient power takeoff for the operation of a unit of the auxiliary equipment for the engine, thus at
100 29 there is indicated the magneto which is driven through a direct coupling connection with the end of the crankshaft 12. The oil pump 30 is driven off the end of the crankshaft 13, thus the three shafts operating
105 at two different speeds afford power takeoffs for auxiliary units requiring or which preferably have engine speed operation or propeller speed operation.

I claim:

1. In a four-cylinder aircooled propeller-driving engine, a propeller shaft, a pair of

horizontally opposed engine cylinders disposed below said shaft, a double throw crankshaft having pistons connected thereon operating in said cylinders, a two to one gearing between said propeller shaft and said crankshaft, a second pair of opposed engine cylinders above said propeller shaft in parallel relation to said first cylinders and the duplicate thereof, said cylinders having a crankshaft geared to said propeller shaft in relation to the crankshaft of the first pair of cylinders, so that the firing impulses are displaced 180° crankshaft travel and 90° propeller shaft travel, both of said pairs of engine cylinders being disposed broadside to the propeller slipstream and valve mechanisms between the pairs of engine cylinders operated from the propeller shaft.

2. In an aircooled propeller-driving engine, a propeller shaft, a pair of horizontally opposed engine cylinders disposed below said shaft, a crankshaft having pistons connected thereon operating in said cylinders, a two to one gearing between said propeller shaft and said crankshaft, a second pair of opposed engine cylinders above said propeller shaft in parallel relation to said first cylinders and the duplicate thereof, said cylinders having a crankshaft geared to said propeller shaft in relation to the crankshaft of the first pair of cylinders so that the firing impulses are displaced 180° crankshaft travel and 90° propeller shaft travel, both of said pairs of engine cylinders being disposed broadside to the propeller slipstream, valve mechanisms between the pairs of engine cylinders operated from the propeller shaft, accessory drive take-offs on said crankshafts, and a tachometer take-off on said propeller shaft.

In testimony whereof I affix my signature.

HAROLD EMERSON MOREHOUSE.