Aug. 20, 1935. R. N. DU BOIS 2,011,804

INTERNAL COMBUSTION ENGINE

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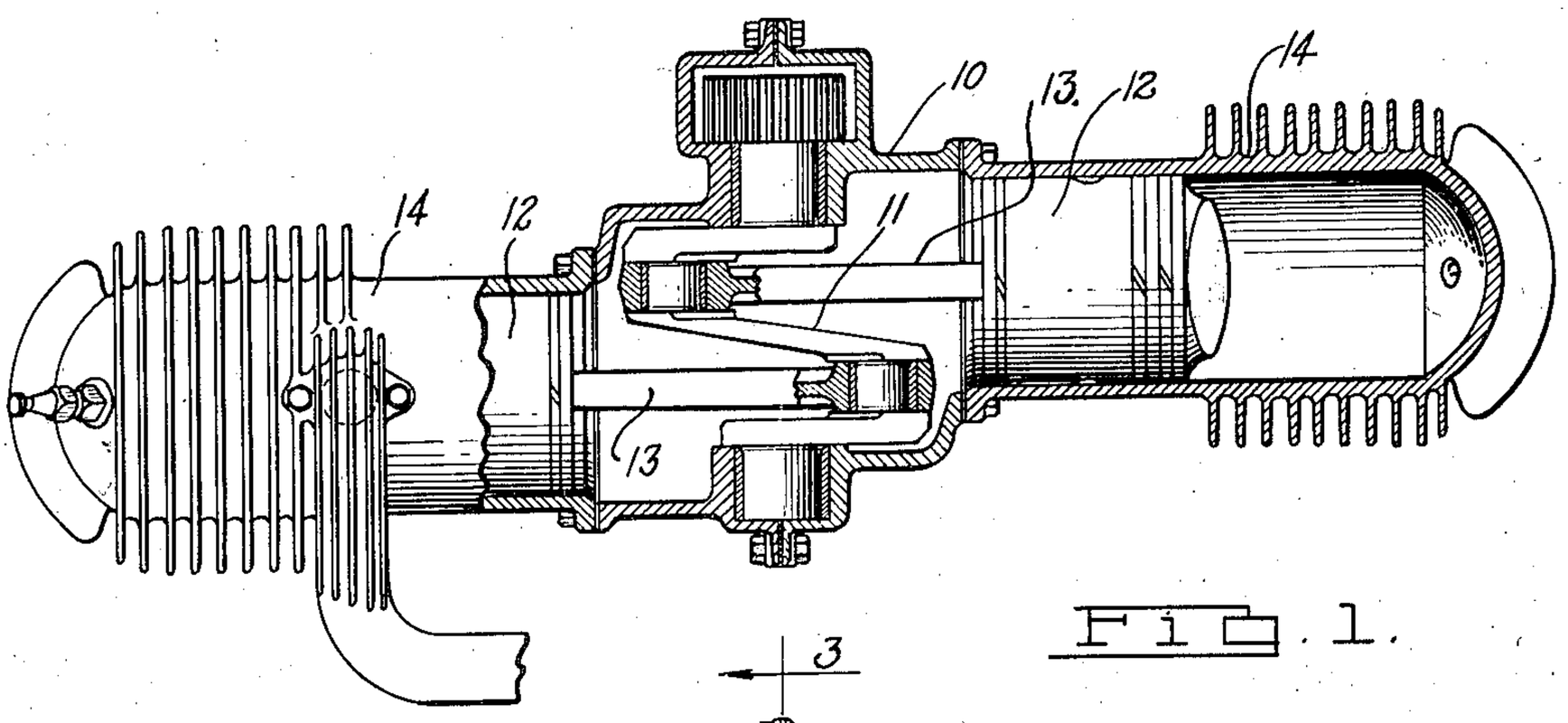

Fig. 1.

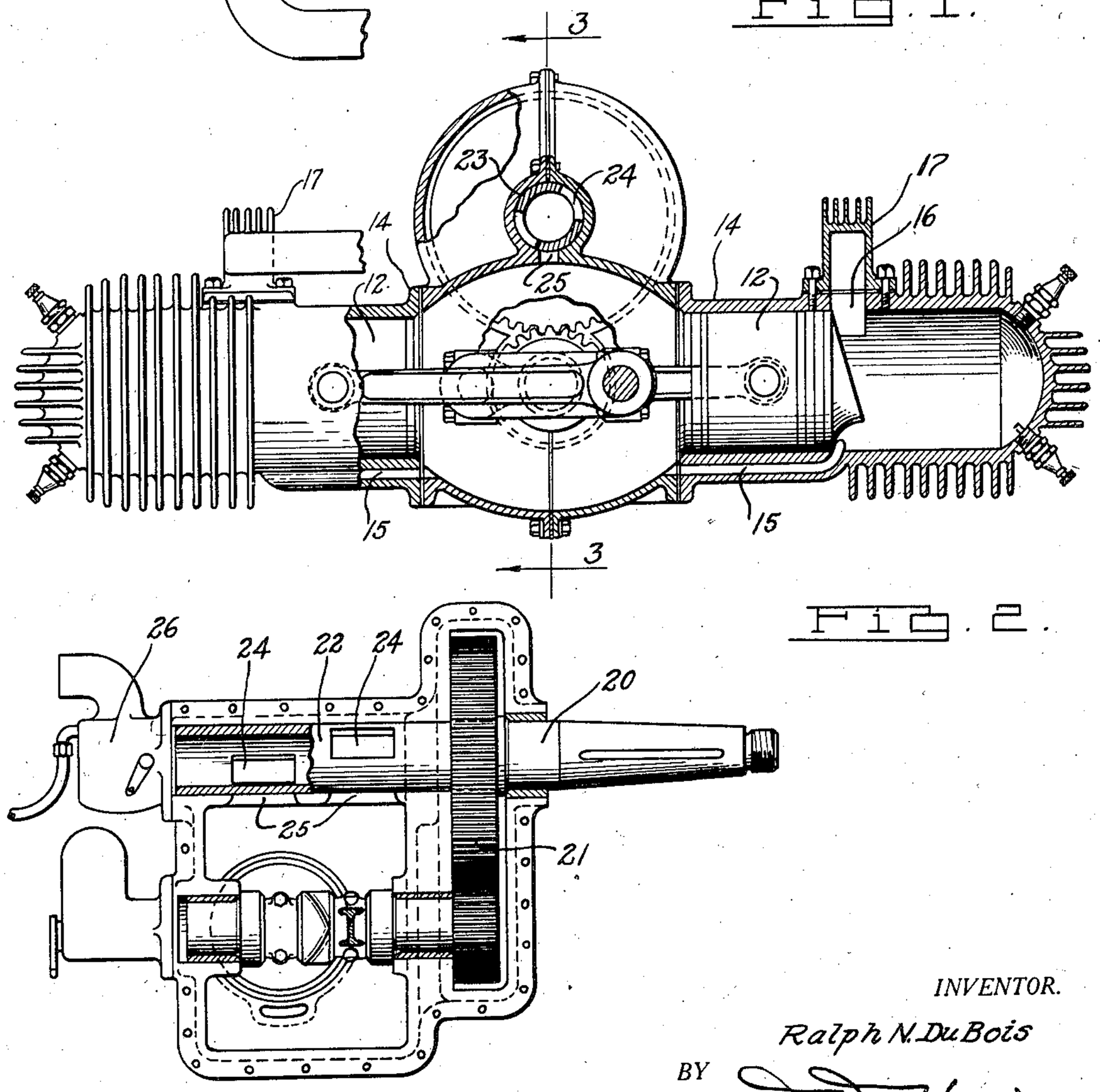

Fig. 2.

Fig. 3.

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INTERNAL COMBUSTION ENGINE

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6 Claims. (Cl. 123—73)

My invention relates to internal combustion engines and more particularly to two-cycle engines having opposed cylinders, this type of engine being especially adapted for use with light weight aircraft such as gliders and the like. Obviously the principles of my invention may be embodied in engines other than the type mentioned above and in engines other than those adapted for aircraft use.

It may be noted that simplicity and cheapness is one of the primary requisites of engines of this character since they are most generally employed with gliders which are usually operated by men and boys of more limited flying experience, who are not usually experienced in operating an engine employing the complicated mechanism such as is found in aircraft engines of relatively higher horsepower.

It is the object of my invention to provide an engine, simple in construction and operation, which may be readily adapted for use in gliders or other comparatively light airplane structures.

Another object of my invention is to produce an internal combustion engine that may be economically manufactured and operated by providing an engine structure comprising a valving mechanism of simple and economical construction that may be operated with a minimum of maintenance.

A further object of my invention is to provide an engine of the type specified of simple construction by employing a power take-off shaft which carries a valving means for controlling the fuel in-take.

For a more detailed understanding of my invention, reference may be had to the accompanying drawing which illustrates one form which my invention may assume, and in which:

Figure 1 is a plan view, partly in section of a two-cycle engine constructed in accordance with my invention,

Figure 2 is a vertical longitudinal sectional view of the engine, and

Figure 3 is a vertical transverse sectional view thereof taken substantially on the line 3—3 of Figure 2.

The internal combustion engine illustrated in the accompanying drawing comprises a crankcase 10, and a crankshaft 11 which is supported therein and operatively connected with pistons 12 by the connecting rods 13. The cylinders 14 are bolted or otherwise secured to the crankcase 10 and are preferably arranged in a staggered opposed relation as shown in Figure 1.

The pistons in each cylinder are preferably operated in unison. The cylinders are each provided with intake passages 15 open to the crankcase at one end, the other end of these passages arranged to be uncovered when the piston is at the bottom of its stroke. Suitable exhaust ports 16 are provided and an exhaust manifold 17 is bolted or otherwise suitably secured to the cylinders, the incoming gases tending to scavenge the cylinders.

The fuel is first drawn into the crankcase from whence it is drawn into the cylinders, and a novel means has been provided for controlling the fuel inlet. A power take-off shaft 20, such as a propeller shaft is supported by the crankcase and preferably lies parallel with respect to the crankshaft axis. The propeller shaft is operatively connected with the crankshaft and is preferably driven at one-half crankshaft speed by means of gearing 21, said gearing being preferably located at the front end of the engine. The power take-off or propeller shaft 20 is preferably provided with an extension 22 supported in suitable bearings carried by the crankcase. The crankcase is so constructed as to provide a bore 23 which receives the extension of the propeller shaft, said extension being hollow and provided with one or more inlet ports 24 that cooperate with the inlet ports 25 carried by the crankcase. As the propeller shaft is rotated in timed relation with the crankshaft, the ports 24 are periodically brought into registration with the crankcase ports 25, at the proper time. A carburetor 26 is preferably secured to an external face of the crankcase and is constructed to feed the fuel into the open end of the hollow propeller shaft (see Figure 3). Therefore, the fuel is injected into the interior of the crankcase through ports 24, 25 at every revolution of the crankshaft.

It will thus be noted that I have provided a two-cycle engine suitable for use with light aircraft that comprises a fuel intake valving mechanism of simple construction and which can be very readily maintained in proper adjustment with a minimum of attention.

Although I have illustrated but one form of my invention and have described in detail but a single application thereof, it will be apparent to those skilled in the art to which my invention pertains, that various modifications and changes may be made therein without departing from the spirit of my invention or from the scope of the appended claims.

What I claim as my invention is:

1. An internal combustion engine of the type adapted for use with aircraft and including a

crankcase ported for intake, a crankshaft supported by said crankcase, and a propeller shaft rotatably supported by the crankcase and driven by said crankshaft at one-half crankshaft speed, said propeller shaft having a tubular extension housed within the crankcase structure, said extension providing an engine intake passage and having ports spaced axially and angularly of the extension and cooperating with said ported crankcase to provide an intake cyclical event for every revolution of the crankshaft.

2. An internal combustion engine of the type adapted for use with aircraft and including a crankcase ported for intake, a crankshaft supported by said crankcase, and a propeller shaft rotatably supported by the crankcase and driven by said crankshaft at one-half crankshaft speed, said propeller shaft having a tubular extension housed within the crankcase structure, said extension providing an engine intake passage and having ports spaced axially and angularly of the extension and cooperating with said ported crankcase to provide an intake cyclical event for every revolution of the crankshaft, said crankcase including a bore providing a bearing for supporting substantially the full length of said extension.

3. An internal combustion engine of the type adapted for use with aircraft and including a crankcase ported for intake, a crankshaft supported by said crankcase, and a propeller shaft rotatably supported by the crankcase and driven by said crankshaft at one-half crankshaft speed, said propeller shaft having a tubular extension housed within the crankcase structure, said extension providing an engine intake passage and having ports spaced axially and angularly of the extension and cooperating with said ported crankcase to provide an intake cyclical event for every revolution of the crankshaft, said crankcase including a bore providing a bearing for supporting substantially the full length of said extension, said propeller shaft projecting beyond the forward face of the crankcase structure.

4. An internal combustion engine of the type adapted for use with aircraft and including a crankcase ported for intake, a crankshaft supported by said crankcase, and a propeller shaft supported by the crankcase and geared to the crankshaft, said propeller shaft extending forwardly beyond the crankcase to provide a propeller drive, said propeller shaft extending parallel with the crankshaft and having a hollow rearward extension overlying the crankshaft and axially aligned with the propeller shaft axis, said extension being ported for intake whereby to provide a rotary valve means controlling engine intake.

5. An internal combustion engine of the two-stroke cycle type adapted for use with aircraft and including a crankcase ported for intake, a crankshaft supported by said crankcase, and a propeller shaft supported by the crankcase and geared to the crankshaft, opposed cylinders having their axes arranged transversely to said crankshaft, said propeller shaft extending forwardly beyond the crankcase to provide a propeller drive, said propeller shaft extending parallel with the crankshaft and having a hollow rearward extension overlying the crankshaft and axially aligned with the propeller shaft axis, said extension having a port for cooperation with said ported crankcase.

6. An internal combustion engine of the two-stroke cycle type adapted for use with aircraft and including a crankcase ported for intake, a crankshaft supported by said crankcase, and a propeller shaft supported by the crankcase and geared to the crankshaft, opposed cylinders having their axes arranged transversely to said crankshaft and to said propeller shaft, a piston for each of said cylinders connected to simultaneously operate said crankshaft, said propeller shaft extending forwardly beyond the crankcase to provide a propeller drive, said propeller shaft extending parallel with the crankshaft and having a hollow rearward extension overlying the crankshaft and axially aligned with the propeller shaft axis, said extension having a port for cooperation with said ported crankcase.

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