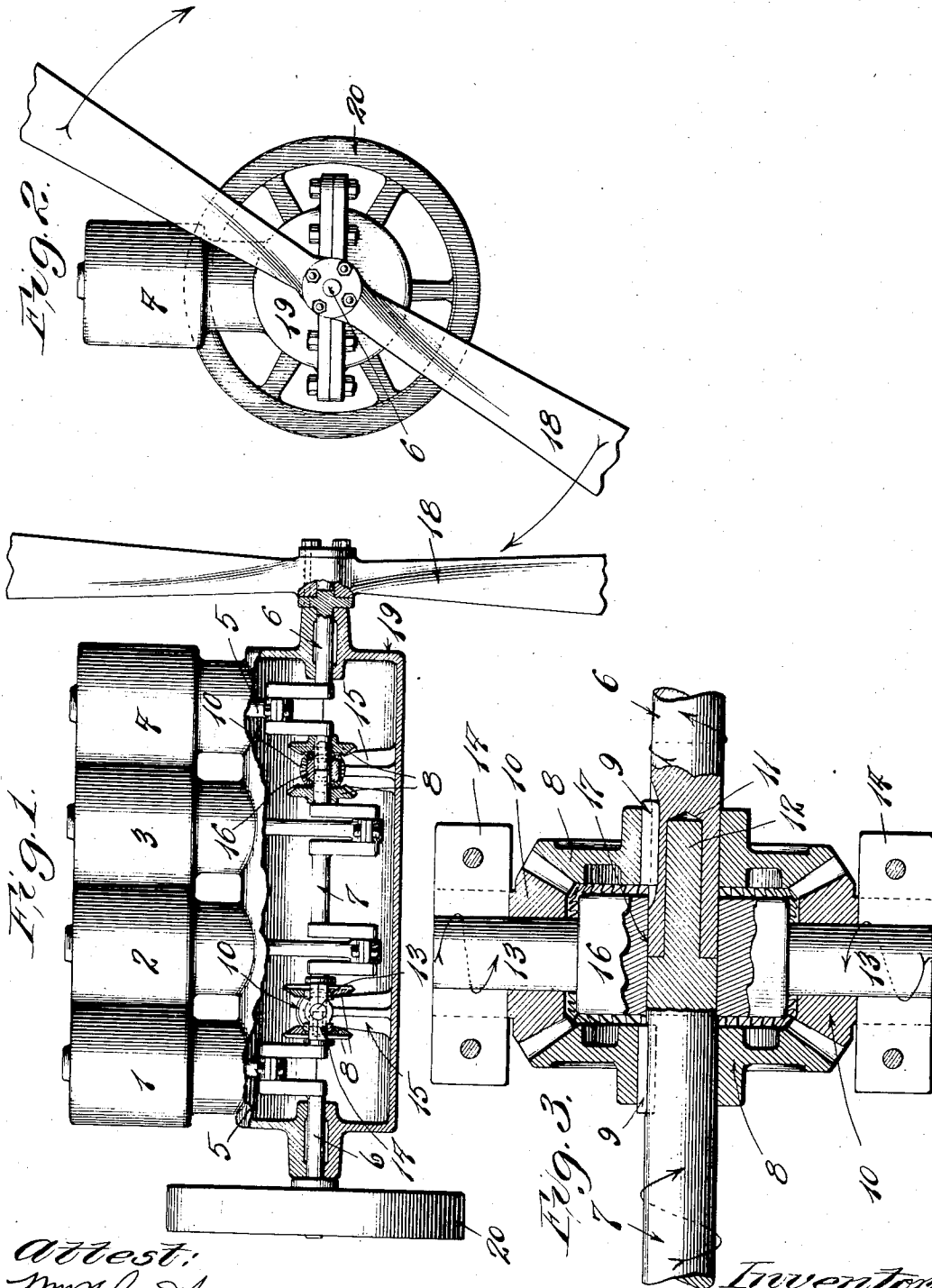


W. P. HOLZMARK.
 NON-GYROSCOPIC AERONAUTIC ENGINE.
 APPLICATION FILED AUG. 26, 1912.

1,060,597.

Patented May 6, 1913.



Attest:
 W. P. Holzmark.
 N. A. Butler.

Inventor:
 WILLIAM P. HOLZMARK
 by Sigman & Langan
 Attys.

UNITED STATES PATENT OFFICE.

WILLIAM PHILLIP HOLZMARK, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO
ISAAC HOLZMARK, OF ST. LOUIS, MISSOURI.

NON-GYROSCOPIC AERONAUTIC ENGINE.

1,060,597.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed August 26, 1912. Serial No. 717,123.

To all whom it may concern:

Be it known that I, WILLIAM P. HOLZMARK, a citizen of the United States, and resident of St. Louis, Missouri, have invented certain new and useful Improvements in Non-Gyroscopic Aeronautic Engines, of which the following is a specification containing a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to an improved non-gyroscopic aeronautic engine, and consists in the novel construction hereinafter described and designated in the claims appended hereto.

Heretofore much trouble has been experienced with aeronautic engines, in which all the revoluble parts move in the same direction during the operation of the engine.

The object of my invention is to provide an improved non-gyroscopic aeronautic engine, in which a portion of the revoluble parts rotate in reverse directions, as I have found by practical experience that such an arrangement almost, if not fully, obviates the gyroscopic action of the rotating parts.

In the drawings: Figure 1 is a sectional side elevation of an engine having my invention applied thereto; Fig. 2 is a front elevation of the same; and Fig. 3 is a sectional plan view of the reversing gear used to connect the parts which rotate in reverse or opposite directions.

In carrying out my invention I may make use of any common form of cylinders and pistons, or any common form of rotary engine or rotatable cylinder engine, the only necessary construction being two engines or two parts of the same engine geared to rotate in opposite direction in order to nullify the gyroscopic action of the rotating parts. In the present instance I have illustrated my invention applied to a common four-cycle engine.

The numerals 1, 2, 3 and 4 respectively, indicate the cylinders of the engine, the same containing the usual pistons connected to their cranks by means of the usual connecting rods 5. The cylinders 1 and 4 are arranged, in the present instance, to rotate their cranks in the same direction, while the intervening cylinders 2 and 3 are arranged to drive their cranks in a direction opposite that in which the cranks of the cylinders 1

and 4 are to be driven. This reverse rotation of the parts is brought about by a peculiar reversing gear, which I interpose between the different sections of the crank shaft 6, in order to reverse the direction of rotation between the sections thus connected. In the present instance the crank shaft is cut into three sections, an intermediate section 7 being connected to the outer sections by means of bevel gears 8 secured to the adjoining ends of the sections by means of keys 9, or other common means, and opposite beveled pinions 10 meshing with the teeth of both of the opposing gear wheels 8. One of the meeting ends of the shaft sections is preferably provided with a bearing socket 11, in which is fitted a journal 12 projecting from the adjoining section and arranged to rotate in said bearing and thereby be supported in alinement with the mating section (see Fig. 3). The said pinions 10 are each provided with a stub journal 13, upon which they may freely rotate. The outer ends of said stub journals 13 are mounted in suitable bearings 14 supported upon the crank case pillars 15 while the inner ends of said stub journals are preferably fixed within the central block 16 which is located in the space between the opposing bevel gears 8 and the opposing pinions 10, the said block 16 being provided with a perforation 17 in which are loosely mounted the mating shaft sections.

The numeral 18 indicates a common aeronautical propeller fixed upon the end of the main shaft, which projects through the crank case 19.

On the opposite projecting end of the main shaft I have shown a common fly wheel 20, but in aeronautical engines the same will not be necessary, as it has been found that the rotating parts have sufficient momentum to enable a separate fly wheel to be dispensed with.

The operation is as follows: Referring to Fig. 3, it will be observed that the section 6 of the crank shaft will rotate in the direction indicated by the arrow thereon, while the mating section 7 will rotate in an opposite or reverse direction, also indicated by an arrow. This construction compels the cranks of the engines 1 and 4 to rotate in a given direction, while the cranks of the adjoining engines 2 and 3 necessarily rotate in a reverse direction, but the power of all the

engines will be simultaneously exerted to rotate the propeller 18 in the same direction in which the cranks of the engines 1 and 4 are rotated. The construction above described will also permit the explosions in the various cylinders to be "balanced" in a manner well known to persons skilled in the art, and which need not therefore be further described.

10 I claim:

1. A non-gyroscopic aeronautic engine, comprising an engine provided with oppositely rotatable axially-aligned crank-shaft sections, and a reverse-gear connecting said sections to neutralize the gyroscopic effect of each section.

2. The combination of two tandem aeronautical engines having axially-aligned crank-shaft sections, and a reverse-gear connecting said sections, to permit the crank of one of said engines to rotate in one direction

while the crank of the other engine rotates in a reverse direction.

3. The combination of two aeronautical reversely-running engines having a series of axially-aligned crank-shaft sections, suitable bearings for said sections, and a reversing-gear connecting said sections and permitting one of said sections to rotate in one direction while the adjoining section rotates in a reverse direction, in combination with a single propeller connected to one of said sections, to be driven simultaneously by both of said reversely-running engines.

In testimony whereof, I have signed my name to this specification, in presence of two subscribing witnesses.

WILLIAM PHILLIP HOLZMARK.

Witnesses:

E. L. WALLACE,
JOHN C. HIGDON.