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STARTING MECHANISM FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED NOV. 21, 1916.

1,240,422. Patented Sept. 18, 1917.

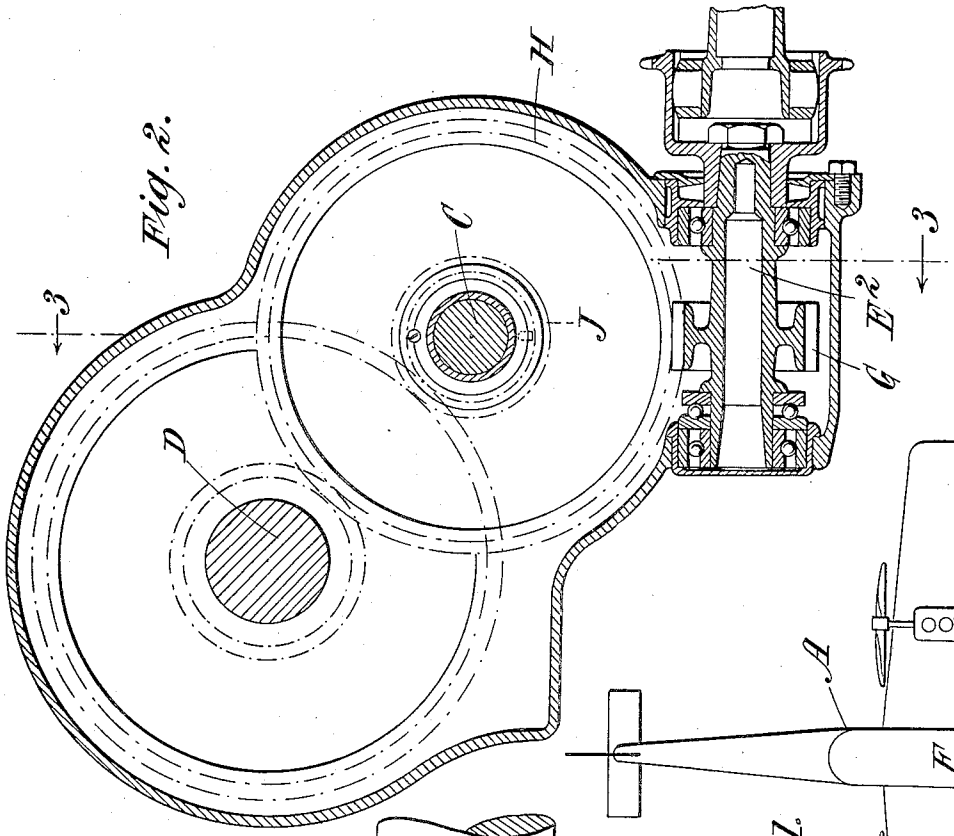


Fig. 2.

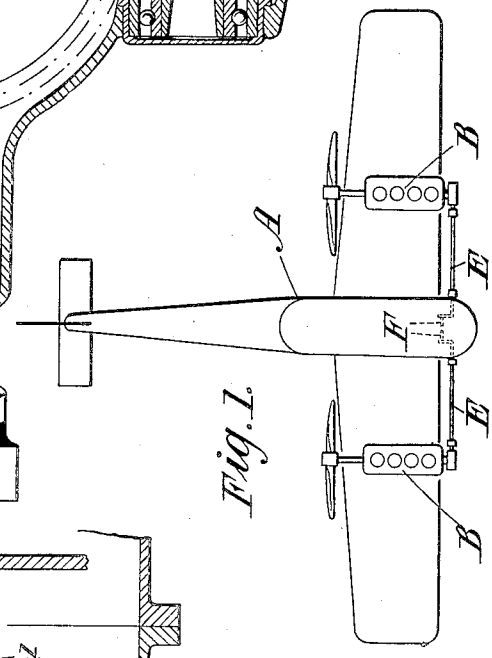


Fig. 1.

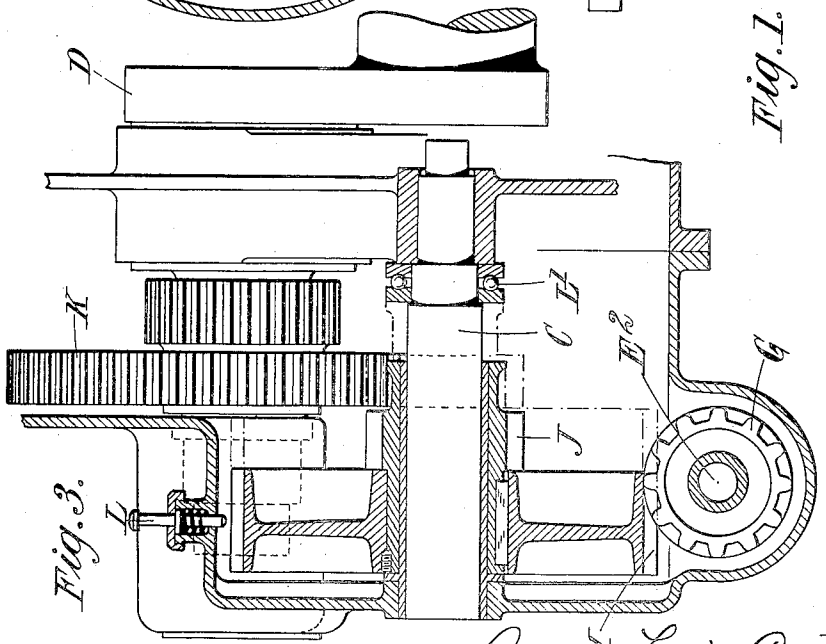


Fig. 3.

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UNITED STATES PATENT OFFICE.

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STARTING MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

1,240,422. Specification of Letters Patent. Patented Sept. 18, 1917.

Application filed November 21, 1916. Serial No. 132,644.

To all whom it may concern:

Be it known that I, LOUIS COATALEN, a subject of the King of Great Britain, residing at Wolverhampton, in the county of Stafford, England, have invented certain new and useful Improvements in Starting Mechanism for Internal-Combustion Engines, of which the following is a specification.

This invention relates to starting mechanism or turning gear for internal combustion engines, preferably such as are fitted to aeroplanes.

In the accompanying drawings,

Figure 1 is a diagrammatic view showing one arrangement of a starting mechanism constructed in accordance with this invention, and applied to an aeroplane having two engines located outside the fusilage. The figure is a plan view showing part of an aeroplane.

Fig. 2 is a cross section at right angles to the engine shaft illustrating part of the starting mechanism, and

Fig. 3 is a section on the line 3—3 of Fig. 2.

Like letters indicate like parts throughout the drawings.

The object is to provide simple mechanical starting mechanism which can be employed to start an engine from a point some distance away and to one side of the engine. For example, on certain types of aircraft the engine is outside the fusilage, and it is desired that the aviator inside the fusilage be able to turn the engine crank shaft for starting. It is the object to enable this to be effected in a simple manner.

Accordingly I employ a starting shaft which projects at right angles to the engine shaft, and may therefore extend inside the fusilage or elsewhere, and this starting shaft drives the engine shaft through intermediate gearing which comprises a pair of plain wheels adapted to mesh automatically when the starting shaft is rotated, and a pair of helical gears which provide the required right angle transmission. Of these helical gears the driven element is broad and is free to slide so that when the starting shaft is first rotated the driven helical gear moves laterally, engaging the spur gears. Continued rotation causes the engine shaft to be driven round.

Thus an engine may be arranged parallel to the fusilage with the starting shaft extending at right angles from the engine into the fusilage and by employing intermediate gearing between the starting shaft and the engine shaft a very considerable gear reduction can be obtained as will be obvious.

In the application shown in Fig. 1, the aeroplane is provided with a central fusilage A and outside of this and at each side thereof is arranged an engine B. The starting mechanism which forms the subject of this invention enables either engine to be turned from inside the fusilage.

The mechanism illustrated comprises an intermediate shaft C which lies parallel to the engine shaft D, which may be the engine crank shaft as illustrated, and at right angles to the starting shaft E. The two starting shafts E project within the fusilage and their inner ends are provided with rotating devices such as starting handles F, or starting motors may be used.

Each starting shaft E is preferably flexible, being, if necessary, provided with universal joints, and the outer end E^2 carries a helical gear G, which meshes constantly with a broad helical gear H formed in one with, or attached to a plain pinion J. The compound gear constituted by the members H and J is free to slide on the intermediate shaft C and when it is at its right hand extremity the gear J meshes with the gear K on the engine shaft. When at the left hand extremity, as shown in Fig. 3, the gears J and K are disengaged.

If desired there may be some frictional device acting upon the compound gear H J, or there may be a positive drag consisting of a pin such as L which has to be pushed into engagement with a tooth on the gear H when starting, and is normally held out of engagement by a spring. Usually, however, the natural frictional drag of the parts is sufficient to cause the gear H J to slide as required. The result is that when the starting shaft is rotated the gear H tends to lag and, instead of rotating, it moves axially taking with it the pinion J which is consequently slid into mesh with the gear K. The compound pinion then bears up against the thrust bearing L′ and the continued rotation of the starting shaft turns the engine shaft slowly causing the engine to draw in charges of gas which are subsequently fired in any convenient manner.

I wish to make it clear that I know that it is not novel to use helical gearing in engine turning mechanism for the purpose of effecting automatic engagement and disengagement. For instance, in one case it has been proposed to drive the engine through two helical gears on shafts at right angles so arranged that when the driver is rotated it caused the driven gear first to move endwise on its shaft and engage a clutch on the engine shaft and then be rotated.

What I claim as my invention, and desire to secure by Letters Patent, is:—

1. In turning gear for an internal combustion engine, the combination of an engine shaft, a gear wheel thereon, a starting shaft at right angles thereto, a turning device at one end of said starting shaft, a helical pinion at the other end of said starting shaft, an intermediate shaft at right angles to said starting shaft and parallel to said engine shaft, a broad helical gear sliding on said intermediate shaft and meshing with said helical pinion, a gear pinion fixed to said helical gear and adapted to mesh with said gear wheel on said engine shaft, substantially as set forth.

2. In turning gear for an internal combustion engine, the combination of an engine shaft, a gear wheel thereon, a starting shaft at right angles thereto, a turning device at one end of said starting shaft, a helical pinion at the other end of said starting shaft, an intermediate shaft at right angles to said starting shaft and parallel to said engine shaft, a broad helical gear sliding on said intermediate shaft and meshing with said helical pinion, a gear pinion fixed to said helical gear and adapted to mesh with said gear wheel on said engine shaft, a detent engaging said broad helical gear, and a spring holding said detent out of engagement, substantially as set forth.

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

LOUIS COATALEN.

Witnesses:

SAMUEL BAYLISS,

L. CURETON.