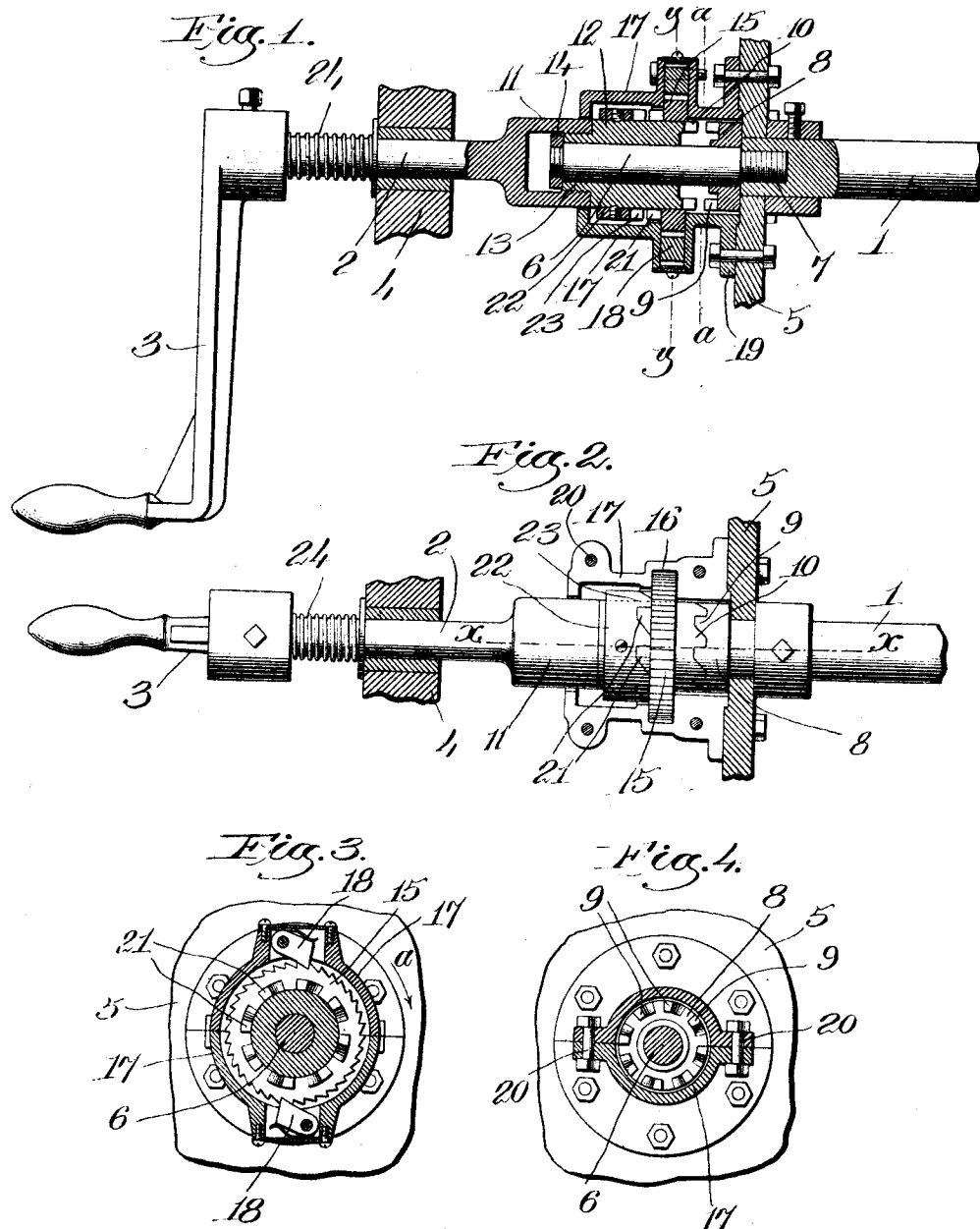


F. DION.
SAFETY CRANKING DEVICE FOR INTERNAL COMBUSTION ENGINES.
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1,049,061.

Patented Dec. 31, 1912.



Witnesses.
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UNITED STATES PATENT OFFICE.

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SAFETY CRANKING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

1,049,061.

Specification of Letters Patent.

Patented Dec. 31, 1912.

Application filed March 29, 1911. Serial No. 617,552.

To all whom it may concern:

Be it known that I, FRANCOIS DION, a subject of the King of Great Britain, residing at Manchester, county of Hillsboro, and State of New Hampshire, have invented an Improvement in Safety Cranking Devices for Internal-Combustion Engines, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to cranking devices for internal combustion engines of that type which are provided with means for automatically disengaging the starting crank from the engine shaft upon the occurrence of a back kick.

The object of the invention is to provide a simple mechanism of this nature which can be inexpensively manufactured and which will be effective in operation.

I will first describe one embodiment of the invention and will then point out the novel features in the appended claims.

Referring to the drawings Figure 1 is a sectional view of a cranking device embodying my invention, said section being taken on substantially the line $x-x$, Fig. 2; Fig. 2 is a top plan view of Fig. 1; Fig. 3 is a section on the line $y-y$, Fig. 1; Fig. 4 is a section on the line $a-a$, Fig. 1.

1 designates a shaft leading to the engine and which may be the crank shaft or any other shaft by which the engine is started. For convenience I will hereinafter refer to said shaft 1 as the engine shaft.

2 designates the starting crank shaft which is provided with a crank handle 3 by which it may be turned. This starting crank shaft is mounted in a suitable bearing 4 to have both longitudinal and rotary movement therein.

5 designates part of the engine frame or any other suitable support in which the end of the engine shaft 1 is journaled.

The engine shaft 1 is provided with a shaft extension 6 which is herein shown as a stud screw-threaded into the end of the engine shaft, as at 7. This shaft extension has rigid therewith a clutch member 8 which is provided with the usual clutch teeth 9 that are adapted to be engaged by cooperating clutch teeth 10 associated with the starting crank shaft for turning the engine shaft forward. The starting crank shaft 2 has associated therewith a shaft ex-

tension 12 in the form of a sleeve which telescopes over the shaft extension 6 and which is provided with the clutch teeth 10. This extension 12 is preferably made separate from the shaft 2, although it might be integral therewith if desired. I prefer to make it separate in order to facilitate the assembling of the parts, and as herein shown, the shaft 2 is provided with the recessed head 11 into which the reduced end 13 of the extension 12 is screw-threaded and the shaft extension 6 is shown as having a nut 14 thereon which is received in the recess in the head 11 and which by its engagement with the extension 12 prevents the parts from being separated.

Loosely surrounding the extension 12 is a ratchet member 15 which is held from movement longitudinally of the shaft and which can freely rotate in one direction but is prevented from rotating in a backward direction. Said ratchet member 15 is held from longitudinal movement by being confined in an annular recess 16 formed in a casing 17 that incloses the clutch members, and this casing 17 has pivoted therein the spring-pressed pawls 18 which prevent backward rotation of the ratchet member, while permitting it to rotate forwardly. This casing 17 may be supported in any suitable way, but is herein shown as formed with a flange 19 which is bolted or otherwise secured to the frame 5. The casing 17 may conveniently be made in two parts which are bolted or clamped together by bolts 20.

The ratchet member 17 has integral therewith teeth 21 having inclined faces and the sleeve 12 has rigid therewith a clutch-disengaging member 22 provided with teeth 23 having inclined faces that are adapted to engage the teeth 21. A spring 24 encircling the starting crank shaft 2 normally tends to hold the clutch-disengaged as shown in Fig. 1.

In order to start the engine the starting crank shaft 2 is moved longitudinally so as to bring the clutch teeth 9 and 10 into engagement in usual manner, and this longitudinal movement also brings the clutch teeth 21 and 23 into engagement, as seen in Fig. 2. When the clutch teeth are thus engaged a turning movement of the crank handle in the proper direction will turn the shaft 2 in the direction of the arrow a , Fig. 3, thus turning the engine shaft 1 forwardly to start the engine, and during this

movement the interlocking of the teeth 20 and 23 will cause the ratchet member 15 to rotate forwardly. If a back kick occurs, the shaft 1 will start to rotate backwardly, thus giving a slight backward movement to the starting crank shaft 2.

The ratchet member 15, however, is held from backward rotation by the pawls 18 and as the starting crank shaft 2 does rotate backwardly, the inclined faces of the teeth 21 and 23 cause longitudinal movement of the starting crank shaft which is sufficient to disengage the clutch teeth 9 and 10 thereby permitting the shaft 1 to continue its rotation backwardly without carrying with it the starting crank shaft.

I am aware that other devices have been invented in which the disconnecting of the starting crank shaft from the engine shaft is secured by the use of a ratchet member having teeth with inclined faces associated therewith. In my invention, however, the clutch members 9 and 10, the ratchet member 15 and the clutch-disconnecting member 22 are all confined within the casing 17 and are, therefore, kept entirely clean and free from dirt. Moreover, the device is extremely compact and takes up no more room than the ordinary cranking device. It can, therefore, be applied to any engine without any special change in the construction of the parts.

The device can be readily taken apart by simply unscrewing the head 11 from the part 12 and then removing the nut 14.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The combination with an engine shaft having an extension and having rigid therewith clutch teeth, of a longitudinally-movable starting crank shaft having a detachable extension which telescopes over the engine shaft extension and is provided with clutch teeth to engage those on the engine shaft, means on the engine shaft extension to prevent the detachable extension from being removed, a ratchet member loosely mounted on said detachable extension, means to prevent backward rotation of the ratchet member, the latter having inclined

teeth thereon extending laterally therefrom and coöperating teeth on the starting crank shaft extension to engage the inclined teeth on the ratchet member when the clutch members are in engagement.

2. The combination with an engine shaft having a shaft extension and having rigid therewith clutch teeth, of a longitudinally-movable starting crank shaft having a detachable extension which telescopes over the engine shaft extension and is provided with clutch teeth to engage those on the engine shaft, means on the engine shaft extension to prevent the detachable extension from being withdrawn from the engine shaft extension, which means are accessible when the starting shaft is disconnected from its extension, a ratchet member loosely mounted on the starting crank shaft extension and provided with laterally-extending inclined teeth, means to prevent backward rotation of the ratchet member, and inclined teeth on said detachable extension to engage those on the ratchet member when the clutch members are in engagement.

3. The combination with an engine shaft having an extension, of a fixed member through which the shaft extends, a casing secured to the fixed member and having an interior annular groove, a collar on the engine shaft situated within the casing and provided with clutch teeth, a starting crank shaft having an extension which telescopes over the engine shaft extension and is provided with clutch teeth to engage those on the engine shaft, a ratchet member loosely mounted on the starting crank shaft extension and occupying and held in position by said groove, means carried by said casing to prevent backward rotation of said ratchet member, inclined teeth extending laterally from the ratchet member, and coöperating inclined teeth extending laterally from the starting crank shaft extension.

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

FRANCOIS DION.

Witnesses:

F. A. PREVOST,
MAUD I. DIONNE.