H. B. CHALMERS.

HAND STARTING DEVICE FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JULY 5, 1913.

1,216,416. Patented Feb. 20, 1917.

Fig. 1,

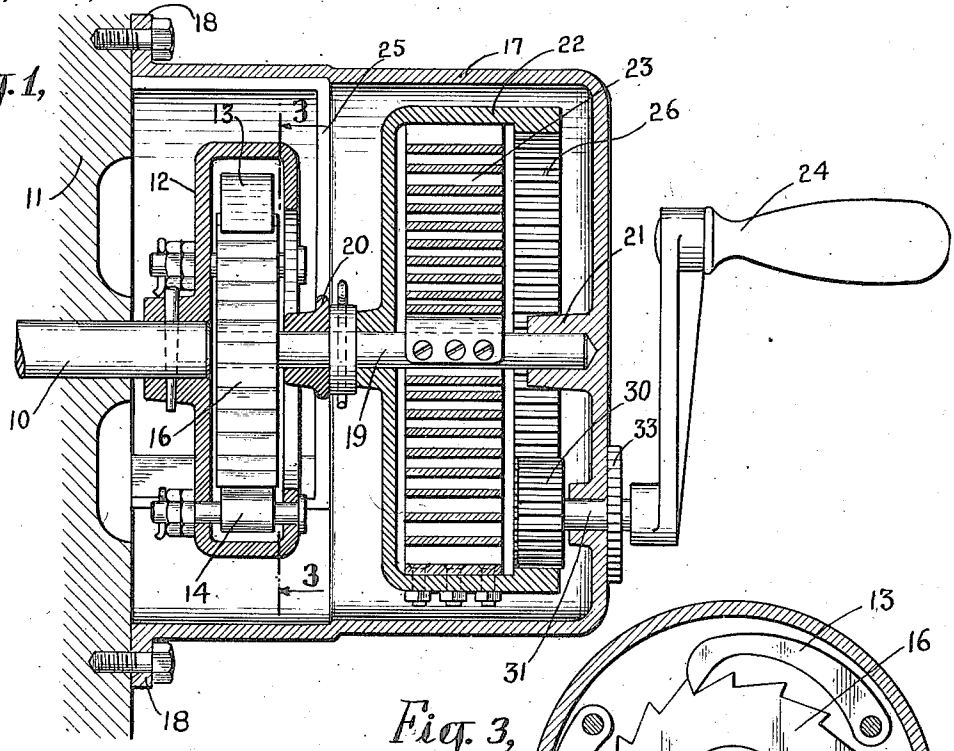


Fig. 3,

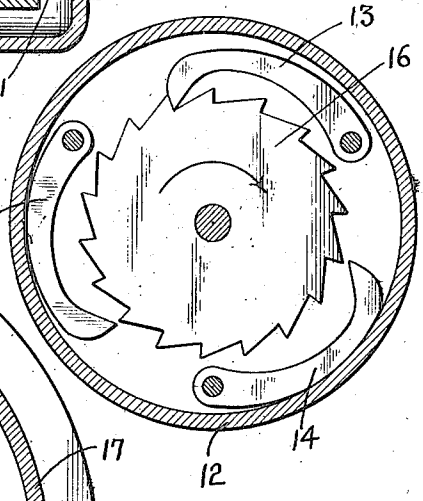
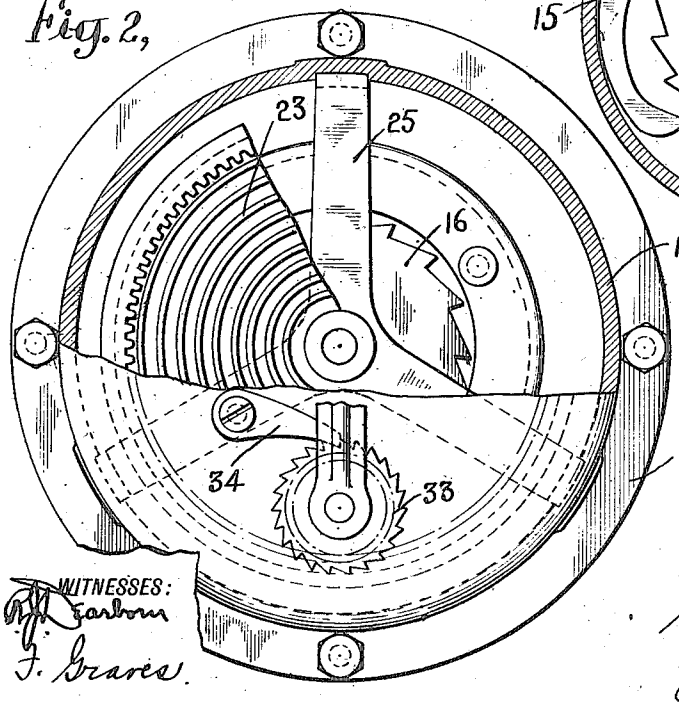


Fig. 2,



WITNESSES:

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HAND STARTING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

1,216,416. Specification of Letters Patent. Patented Feb. 20, 1917.

Application filed July 5, 1913. Serial No. 777,396.

To all whom it may concern:

Be it known that I, HARRY B. CHALMERS, a citizen of the United States, and a resident of Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Hand Starting Devices for Internal-Combustion Engines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

My invention relates to starting devices for internal combustion engines and has special reference to such as are adapted for manual operation.

One object of my invention is to provide a simple and durable starting device of the aforesaid character that shall be effective in operation and shall only require a relatively small manual effort on the part of the operator, to start an engine with which it is associated.

Another object is to avoid the possibility of a backward kick being transmitted from the engine shaft to the actuating lever of the starter.

Other objects and advantages of my invention will be set forth hereinafter.

I will describe my invention in the following specification and point out the novel features thereof in appended claims.

Referring to the drawings,—

Figure 1 is a longitudinal sectional elevation of a starter constructed in accordance with my invention.

An end elevation of the starter is shown in Fig. 2 with the casing and certain of the parts broken away and shown in section to more clearly show the construction.

Fig. 3 is a sectional view on the line 3—3 of Fig. 1 showing the main starting ratchet and pawls of the device.

Like characters of reference designate corresponding parts in all the figures.

10 is a shaft of an internal combustion engine of which 11 is a part of the casing. Secured to the shaft where it extends beyond the casing is a pawl carrier 12 in which are pivoted pawls 13, 14 and 15 and within which is a ratchet 16.

In addition to the ratchet and pawl carrier, the starter comprises a casing 17 having a flange 18 by which it is secured to the engine frame 11, an auxiliary shaft 19 which is rotatably supported in bearings 20 and 21, a spring housing 22 rotatably mounted on the shaft 19, a spiral spring 23, an actuating lever 24 and suitable gearing for connecting the lever to the spring housing. The bearing 20 is formed in the hub of a spider 25 which is fitted into the open end of the casing 17 and the bearing 21 consists of a hollow boss in the end of the casing 17.

The spring housing 22 has an annular body having an integral hub which is fitted to rotate on the shaft 19. An internal gear wheel 26 is secured to or integral with the body of the housing and the spiral spring 23 is located within the housing between the hub and the gear wheel. It is secured at its inner end to the shaft 19 and at its outer end to the annular body of the housing.

A pinion 30 meshes with the internal gear wheel 26 and is secured to a shaft 31 which is rotatably supported in the casing 17 through which it extends. At its outer end it is connected to the actuating lever 24 which is so arranged and proportioned that it can readily be utilized for rotating the shaft and winding up the spring.

Mounted on the shaft 31 adjacent to the casing 17 is a ratchet 33 which is adapted to be engaged by a pawl 34, the pawl being pivotally secured to the casing as shown in Fig. 2.

The operation of the device is as follows:

Assuming that the engine is at rest, the first step in starting it is to turn the lever or crank 24 and thereby put the spring 23 under tension. The spring is of sufficient power to readily start the engine when it is under a predetermined tension, but the lever may be turned with comparative ease since the internal gear wheel and pinion 30 constitute a speed reducing connection. As the spring housing 20 is rotated and the spring put under tension, the lever is prevented from being thrown backward by the spring by means of the ratchet 33 and the pawl 34. As soon as the spring has been placed under sufficient tension, it will produce a rotation of the engine shaft 10, at least one of the pawls 13, 14 and 15 being in engagement with the ratchet 16 which is secured to the adjacent end of the shaft 19.

The action of the spring is particularly advantageous in starting the engine because the engine compression will prevent its turning over until a comparatively large amount of energy is stored in the spring. Once this compression is overcome, the engine will be rapidly driven through a number of complete revolutions.

When the engine starts and its speed increases, the pawls 13, 14 and 15 are thrown outwardly by centrifugal force so that they do not engage the ratchet 9 and consequently the starter is automatically disconnected from the motor shaft.

Various modifications may be effected within the spirit and scope of my invention and it is my intention not to be restricted by the arrangement shown and described but only by such limitations as are indicated in the appended claims.

What I claim is:

1. A starter for internal combustion engine comprising a housing adapted to be secured to the engine frame, a starter shaft rotatively mounted in the housing in substantial alinement with the engine shaft, a ratchet on the starter shaft, a pawl carrier adapted to be secured to the engine shaft having one or more pawls coöperating with said ratchet and adapted to be released centrifugally, a spring in the housing secured to the starter shaft at one end, a rotatable gear in the housing secured to the spring at its opposite end, and a cranking handle outside the housing operatively connected to the spring winding gear only.

2. In combination with an engine shaft, a pawl carrier secured thereto, pawls pivotally supported by the carrier, an auxiliary shaft coaxial with the engine shaft, a ratchet secured to the auxiliary shaft adapted to cooperate with the pawls, a spring housing rotatably mounted on the auxiliary shaft, a spiral spring secured at one end to the housing and at the other end to the auxiliary shaft, a gear wheel affixed to the housing, an actuating lever, and an interposed pinion meshing with the gear wheel whereby the turning of the lever is adapted to put the spring under tension said pawls being adapted to be automatically released when the engine speed exceeds a predetermined value.

3. In combination with an engine shaft, a pawl carrier secured thereto, an auxiliary shaft coaxial with the engine shaft, a ratchet secured to the auxiliary shaft, pawls pivotally supported by the carrier, arranged to coöperate with the ratchet and adapted to be automatically released therefrom when the engine speed exceeds a predetermined value, a spring housing rotatably mounted on the auxiliary shaft, a spiral spring secured at one end to the housing and at the other end to the auxiliary shaft, a gear wheel affixed to the housing, an actuating lever, an interposed pinion meshing with the gear wheel, and a pawl and ratchet for preventing a reverse movement of the lever whereby the turning of the lever is adapted to put the spring under tension.

In witness whereof, I have hereunto set my hand this 2 day of July, 1913.

HARRY B. CHALMERS.

Witnesses:
GRACE QUIMBY,
F. GRAVES.