

H. H. WESTINGHOUSE, C. A. TERRY & W. D. UPTGRAFF, EXECUTORS.

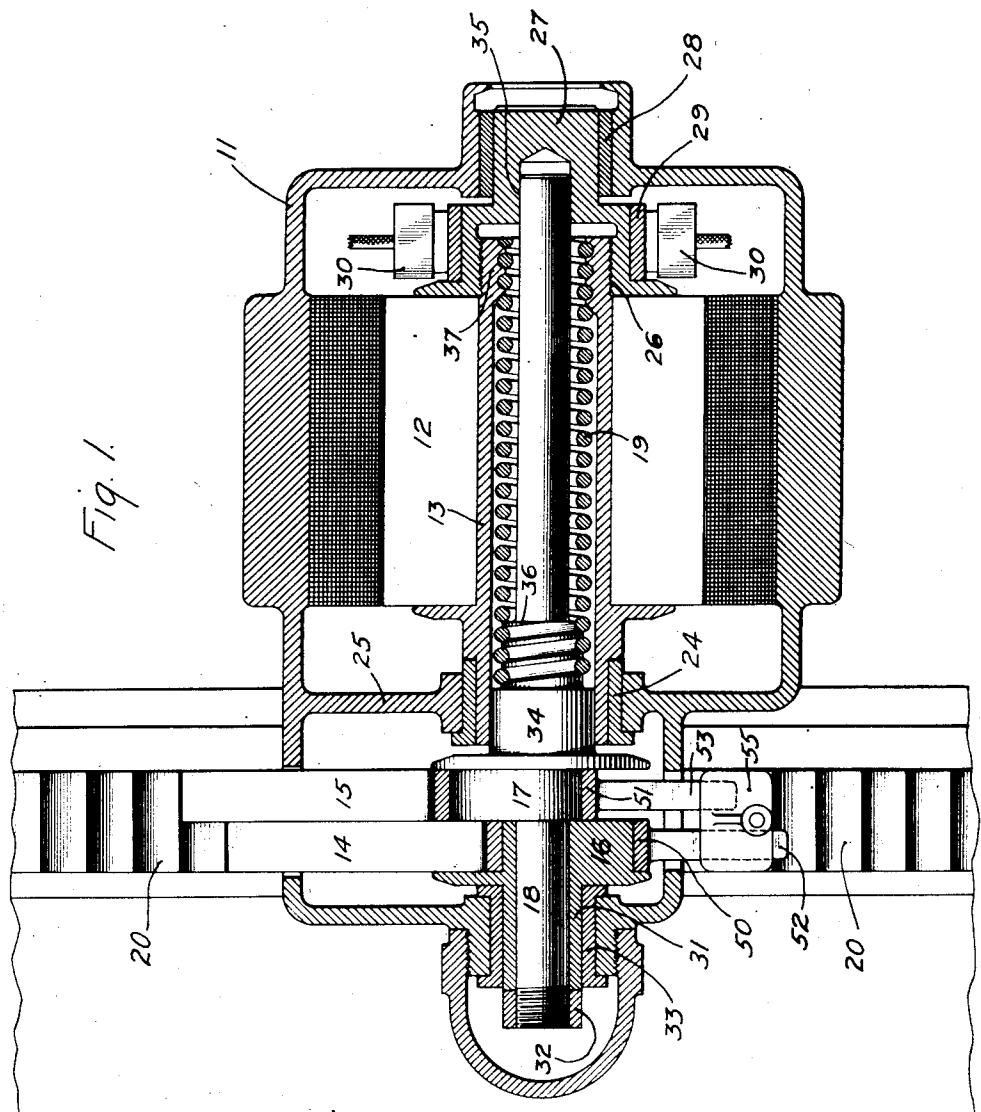
ENGINE STARTER.

APPLICATION FILED DEC. 21, 1912.

1,209,917.

Patented Dec. 26, 1916.

4 SHEETS—SHEET 1.



INVENTOR.

WITNESSES:

B. m. Pers

B. Z. Z.

BY

George Westinghouse

J. S. Brown

HIS ATTORNEY IN FACT

G. WESTINGHOUSE, DEC'D.
H. H. WESTINGHOUSE, C. A. TERRY & W. D. UPTGRAFF, EXECUTORS.
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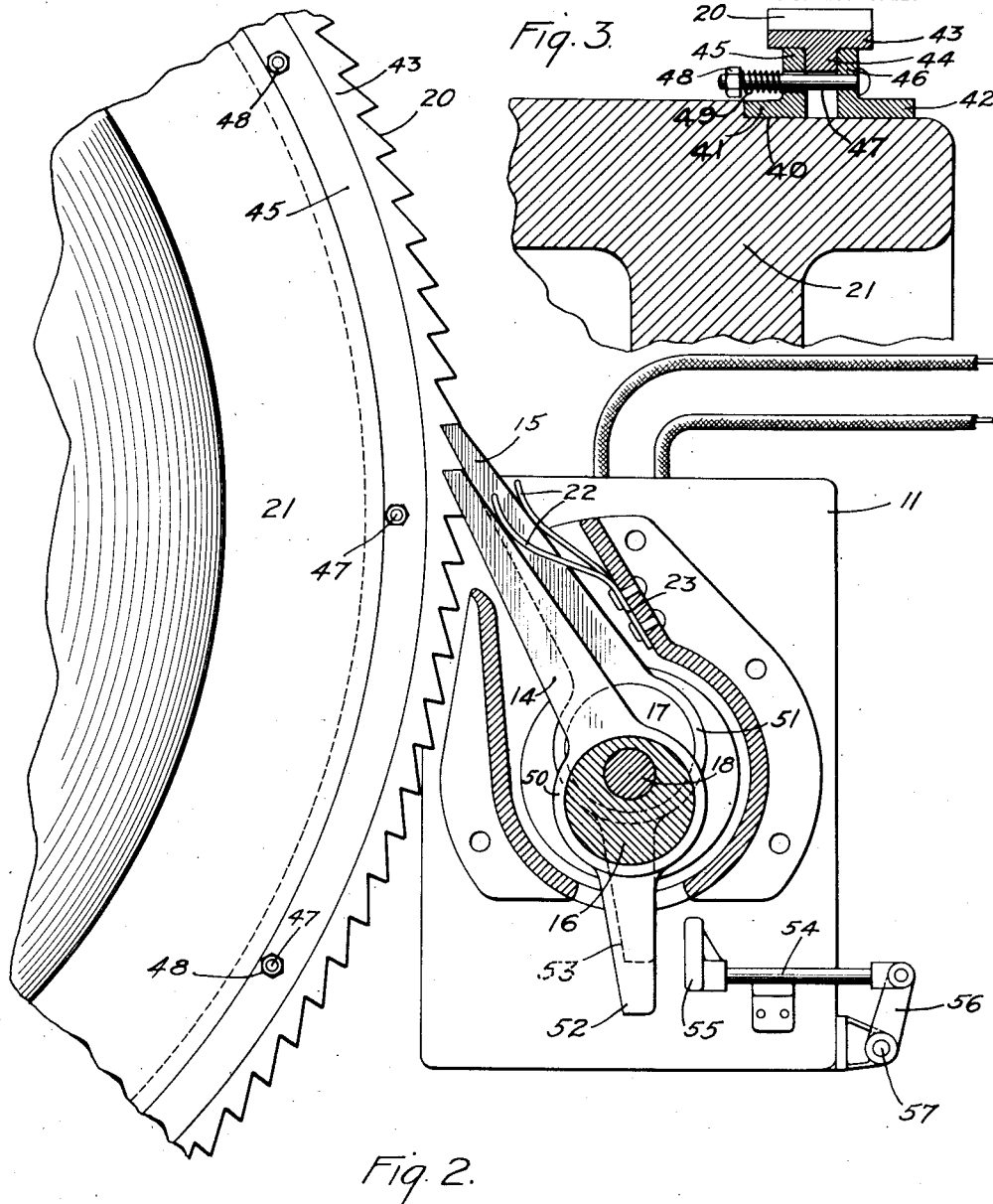


Fig. 2.

INVENTOR.

WITNESSES:
R. M. Terry
C. A. Terry

BY

George Westinghouse
W. D. Uptgraff
HIS ATTORNEY IN FACT

G. WESTINGHOUSE, DEC'D.
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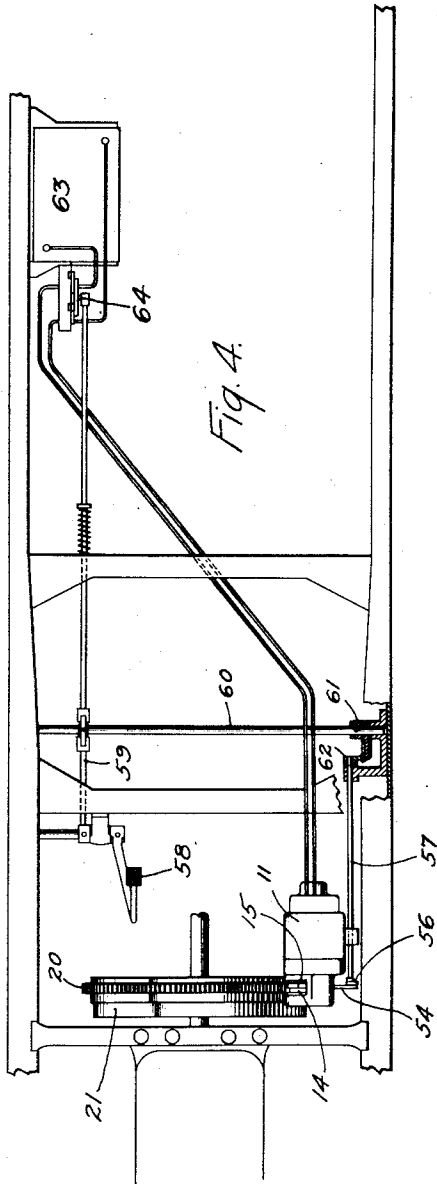


Fig. 4.

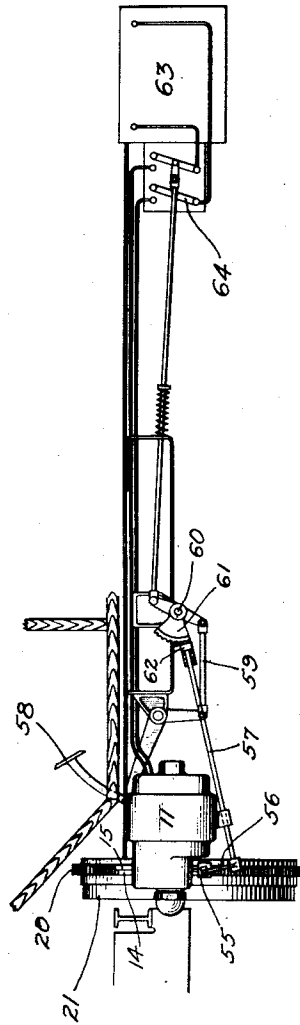


Fig. 5.

INVENTOR.

WITNESSES:

Wm. H. Terry
B. D. Uptgraff

BY

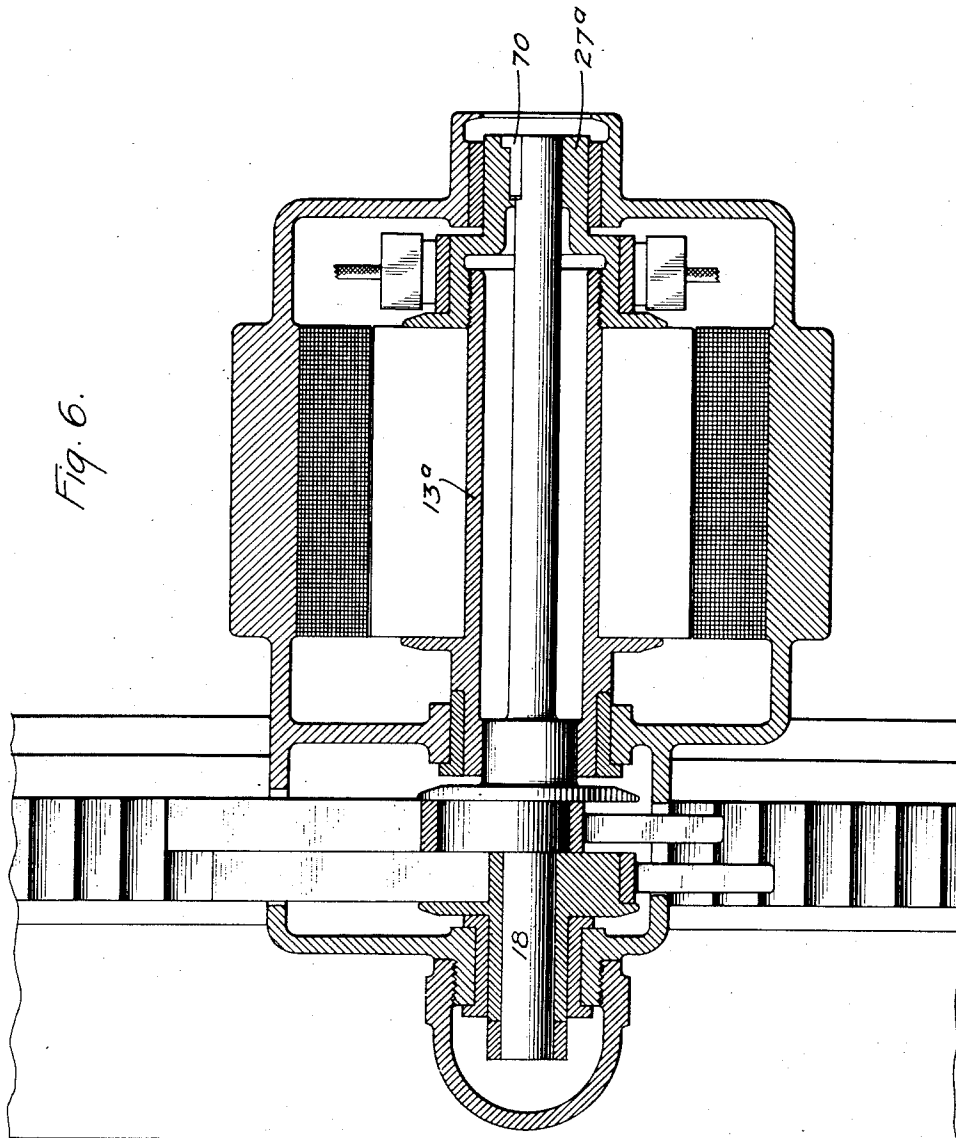
George Westinghouse
J. M. [Signature]
HIS ATTORNEY IN FACT

G. WESTINGHOUSE, DEC'D.
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4 SHEETS—SHEET 4.



INVENTOR.

WITNESSES:

D. M. [Signature]
B. D. [Signature]

BY

George Westinghouse

J. S. [Signature]

HIS ATTORNEY IN FACT

UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, OF PITTSBURGH, PENNSYLVANIA; HENRY HERMAN WESTINGHOUSE, CHARLES A. TERRY, AND WALTER D. UPTGRAFF, EXECUTORS OF SAID GEORGE WESTINGHOUSE, DECEASED.

ENGINE-STARTER.

1,209,917.

Specification of Letters Patent. Patented Dec. 26, 1916.

Application filed December 21, 1912. Serial No. 738,017.

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Engine-Starters, of which the following is a specification.

This invention relates to improvements in starting devices for internal combustion engines and more particularly to electrically operated starting devices for use with motor vehicles such as automobiles and trucks, and an object of this invention has been to produce a simple and relatively cheap electric starting device. This and other objects which will readily appear to those skilled in this art I attain in the device described in the specification and illustrated in the drawings accompanying the same and forming a part of this application, and throughout which drawings like elements are denoted by like characters.

This invention primarily consists of an electric motor connected to drive a pawl device which engages with a ratchet carried by the engine fly wheel. For the purpose of illustration the pawl device is shown provided with two pawls, although obviously one may be used or a number greater than two if desired.

The ratchet device is shown mounted on the periphery of the engine fly wheel but obviously the ratchet may be cut in the fly wheel itself. Where it is desired to install the starting device on a motor vehicle already in service the simplest manner of obtaining the ratchet may be to mount the same on the fly wheel in a manner similar to that shown in this application. If, however, the manufacturer of the motor vehicle is to install the starting device it may be simpler to cut the ratchet directly in the fly wheel. For the purpose of illustration but with no idea of limiting this invention to a particular form of device I have chosen one embodiment of the invention and have illustrated the same in the drawings in which—

Figure 1 is a view more or less diagrammatic in which the electric motor is shown in longitudinal section and the pawl device and ratchet are shown partially in plan and partially in section; Fig. 2 is a view show-

ing the pawl and ratchet device partially in side elevation and partially in section with the pawl engaging the ratchet on the motor fly wheel; Fig. 3 shows a portion of the fly wheel of the engine with the detachable ratchet device in cross-section; Fig. 4 is a diagrammatic plan view of a portion of the motor vehicle with the starting device in place and the mechanism for operating the same diagrammatically illustrated; Fig. 5 is a view similar to Fig. 4 but in side elevation; and Fig. 6 is a view similar to Fig. 1 of a modified form of the device.

The motor and pawl devices are made up into a single organized structure consisting of a motor having field windings 10 secured within a housing or frame 11, an armature 12 mounted on a shaft 13, and a pawl device comprising two pawls 14 and 15 carried on eccentrics 16 and 17 on a shaft 18 driven from the motor shaft 13 through the medium of spring coupling 19. The pawls 14 and 15 are held in yielding engagement with a ratchet 20 carried by the fly wheel 21 of the engine by means of springs 22 secured at 23 to a portion of the housing 11 of the device.

Shaft 13 of the motor at one end is journaled in a bearing 24 located in a partition 25 dividing the housing 11 into a motor compartment and a pawl compartment. The other end of the motor shaft 13 carries by means of a threaded connection 26 a shaft end 27 which is journaled within a bearing 28 carried in one end of the housing 11. The shaft end 27 carries the commutator 29 for the motor and cooperating with the commutator are brushes 30.

Shaft 18 of the pawl device at one end carries a sleeve 31 on which the eccentric 16 is formed. This sleeve may be secured to the shaft in any suitable manner, such as being keyed thereto, and is preferably held on the shaft by means of a nut 32. Sleeve 31 is journaled within a bearing 33. A bearing 34 is formed on the pawl shaft 18 and this bears against the inner surface of motor shaft 13 in line with bearing 24. The other end of the pawl shaft 18 is journaled within a bearing surface 35 formed in shaft end 27.

Spring 19 at one end 36 is secured to the pawl shaft and at the opposite end 37 is secured to the motor shaft. If desired a

double-throw crank may be substituted for the eccentrics 16 and 17.

The spring 19 will be of such strength as to allow the motor under full torque to make about one-half a revolution before the engine is rotated or moved. This will tend to give a uniform motion to the motor and will prevent injury to the armature and commutator by reason of shocks due to the succession of jerks as the pawl engages the ratchet.

As before said the ratchet may be cut in the fly wheel itself or if desired it may be detachably secured to the outer periphery of the fly wheel. In Fig. 3 the fly wheel 21 is shown slightly cut down at 40 and a ring 41 is secured thereon. This ring may be either bolted on or may be a drive fit and held on by friction. A ring 42 is loosely fitted on the fly wheel and between rings 41 and 42 a ring 43, in which the ratchet 20 is cut or otherwise formed, lies. This ring 43 has a depending flange 44 which lies between flanges 45 and 46 of rings 41 and 42. Bolts 47 secured to the ring 42 pass through holes formed for that purpose in ring 41, and around each of these bolts and between flange 45 of ring 41 and a nut 48 threaded onto the outer end of each bolt, a spring 49 is placed. This spring tends to pull ring 42 toward ring 41 and thereby clamp by means of friction the ratchet member to the fly wheel. The tension of these springs can be adjusted by means of the nuts so that the ratchet member under the action of the pawls will not slip relatively to the fly wheel but will slip relatively to the fly wheel in case of a back fire of the engine.

As it is desirable while the engine is in operation to have the pawls out of contact with the ratchet, the eccentric straps 50 and 51 which carry the pawls 14 and 15 are provided with rearward extensions 52 and 53. A lever arm 54 carrying a foot 55 is adapted to be reciprocated so as to contact with arms 52 and 53 to swing the pawl out of engagement with the ratchet as soon as the engine has started. Lever arm 54 connects with a bell-crank lever 56—57 which is rotated by means of a foot pedal 58 through the medium of suitable link and lever connections 59—60 and gears 61 and 62. A storage battery 63 is supplied for furnishing the current to the motor and a switch 64 is connected up so that current will be supplied to the motor as the pawls are allowed to engage with the ratchet. It will be seen that as the foot pedal 58 is depressed the foot 55 will be moved out of contact with arms 52 and 53 and the pawl, by means of springs 22, will be moved into engagement with the ratchet. As the current is simultaneously supplied to

the motor the fly wheel will be turned and a charge of explosive mixture drawn into the engine and fired as is now common practice.

In Fig. 6 a modified form of the device is illustrated and in this form the pawl shaft 18 is keyed by means of a key 70 to shaft end 27^a. The portion lying within the motor shaft 13^a will be of such diameter (and if desired of a shape other than round) as to yield under the full torque of the motor while a pawl is in engagement with the ratchet, allowing the motor to make about a half turn before the ratchet is moved.

In accordance with the provisions of the patent statutes I have described the principle of operation of my invention together with the device which I now consider to represent the best embodiment thereof, but I desire to have it understood that the device shown is only illustrative and that the invention can be carried out in other ways.

Having thus described my invention, what I claim is:

1. In combination in an engine starter, a ratchet for imparting motion to a moving part of the engine to be started, a rotary shaft carrying eccentrics, pawls actuated by said eccentrics for engaging said ratchet and imparting motion thereto, means for actuating said shaft and means for normally holding said pawls out of engagement with said ratchet.

2. In combination in an engine starter, a ratchet for imparting motion to a moving part of an engine to be started, a motor driven shaft, a pawl for imparting motion to said ratchet and eccentrics for actuating the pawl and a yielding connection between said motor driven shaft and said eccentrics.

3. In combination in an engine starter, a ratchet for imparting motion to a movable part of the engine, a pawl for imparting motion to the ratchet, a rotatable shaft for actuating said pawl, a motor having a hollow shaft into which said rotatable shaft extends and a yielding connection between said motor shaft and said rotatable shaft.

4. In an engine starter, a ratchet, a pawl for imparting motion to the ratchet, an eccentric for actuating the pawl, a motor for driving the eccentric and a shaft on which the eccentric is mounted and which projects into the hollow shaft of the motor to which it is connected.

In testimony whereof, I have hereunto subscribed my name this 13th day of December, 1912.

GEO. WESTINGHOUSE.

Witnesses:

C. W. MCGHEE,
ANNA CLOHERTY.