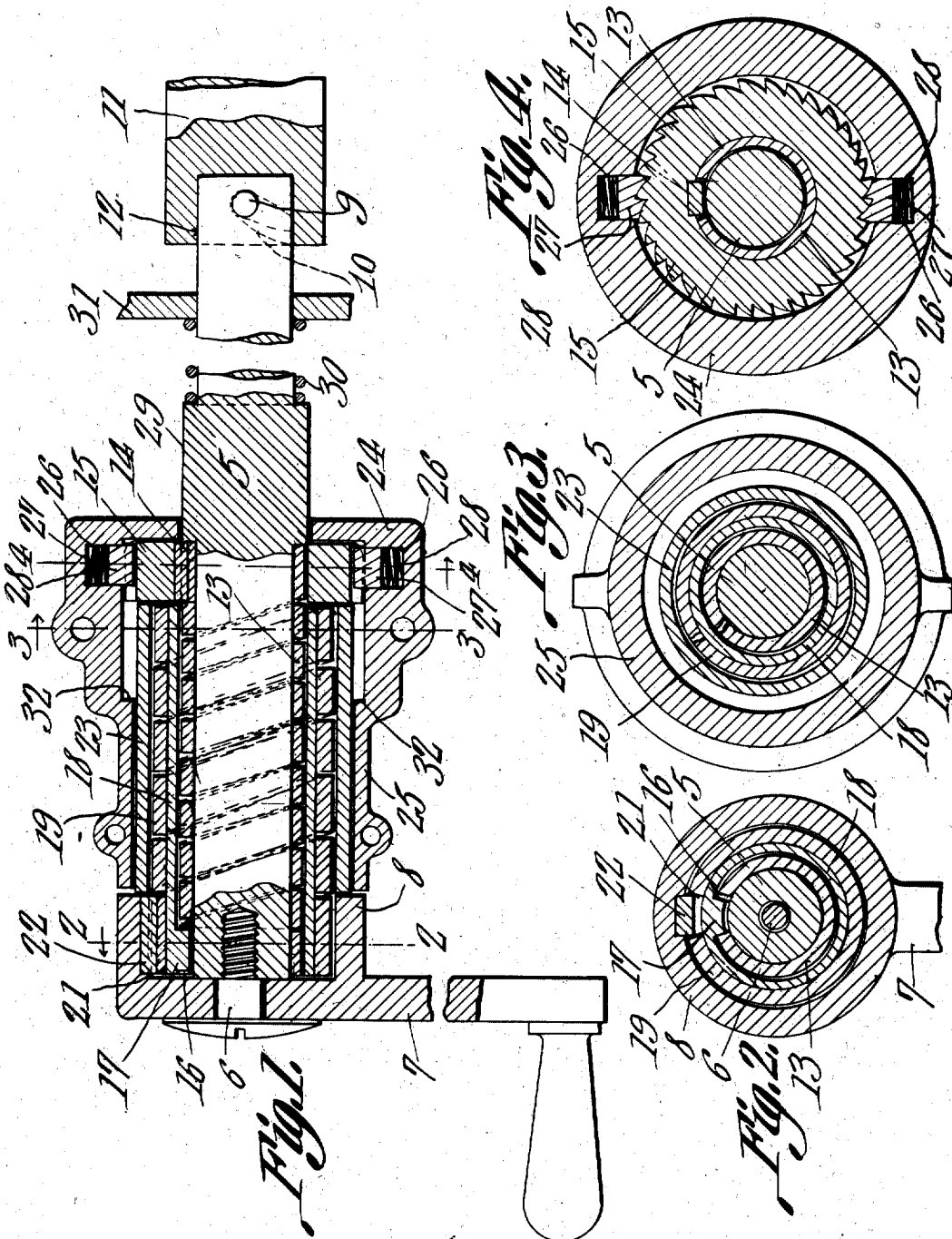


S. T. REEVES.
 STARTING DEVICE FOR INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED SEPT. 26, 1910.

1,001,303.

Patented Aug. 22, 1911.



Witnesses

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UNITED STATES PATENT OFFICE.

SAMUEL T. REEVES, OF ALBANY, WISCONSIN.

STARTING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

1,001,303.

Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed September 26, 1910. Serial No. 583,825.

To all whom it may concern:

Be it known that I, SAMUEL T. REEVES, a citizen of the United States, residing at Albany, in the county of Green and State of Wisconsin, have invented a new and useful Starting Device for Internal-Combustion Engines, of which the following is a specification.

This invention relates to starting devices for internal combustion engines and includes a hand crank and a clutch mechanism for connecting the same to the engine shaft.

The invention relates more particularly to the clutch mechanism, its object being to provide a mechanism of this kind which enables the engine to be readily started from a state of rest, and which mechanism is constructed so that the operator is protected against injury in case the engine kicks back, and thus causes a reverse rotation of the engine shaft, the hand crank being automatically released in this event.

The invention also has for its object to provide a starting device which enables the hand crank to be placed in the most convenient position for operation, regardless of the position of the engine shaft.

Other objects and advantages of the invention will be manifest when the same is better understood, it consisting in a novel construction and arrangement of parts to be hereinafter described and claimed.

In the accompanying drawing forming a part of this specification:—Figure 1 is a longitudinal section of the device. Figs. 2, 3 and 4 are transverse sections on the lines 2—2, 3—3, and 4—4, respectively of Fig. 1.

In the drawing, 5 denotes the starting shaft. To one end of this shaft is connected by means of a screw or other suitable means 6, a hand crank 7 having on one side of its hub a sleeve-like extension 8, the internal diameter of said sleeve being greater than the diameter of the starting shaft, in order that the parts to be hereinafter described which encircle the shaft, may enter the sleeve. The opposite end of the shaft carries a transverse pin 9 which is adapted to enter an inclined slot 10 made in the end of the engine shaft 11, said end having an axial socket 12 to receive the end of the starting shaft which carries the pin 9. The starting and engine

shafts are in axial alinement, and the former is movable in the direction of its length, so that its end which carries the pin 9 may be inserted into the socket 12, with said pin entering the notch 10, whereby the two shafts are coupled together. By inclining the slot 10, the two shafts will be automatically uncoupled when the engine shaft is started, its speed then being greater than that of the starting shaft, in view of which the pin will pass out of the slot, and at the same time the starting shaft is moved in the direction of its length, away from the engine shaft, and out of the socket 12. Various other devices may be employed for coupling the starting and engine shafts together.

That portion of the starting shaft 5 which is adjacent to the hand crank 7 is encircled by a coiled spring 13, to one end of which is rigidly secured by means of a key or other suitable fastening means 14, to a ratchet disk 15. In the other end of the spring is made a notch 16 which extends parallel to the axis of the spring. Into this notch extends a lug 17 which is on the inside of a sleeve 18 which is placed around the spring, the spring being loose within the sleeve, but fitting snugly around the starting shaft 5, although not attached thereto.

The sleeve 18 is snugly encircled by a coiled spring 19, but is not attached thereto. The spring 19 has a notch 21 which extends parallel to its axis, and which notch is entered by a lug or key 22 carried by the sleeve 8, on the inside thereof, the spring extending into said sleeve. That portion of the spring 19 which is outside the sleeve 8, is loosely carried by a sleeve 23.

A housing 24 incloses the ratchet disk 15, and has an extension 25 on one side which incloses the sleeve 23, and the parts within the same. This housing will be suitably fastened to some convenient portion of the engine frame. The housing is so dimensioned that the ratchet disk 15 is free to move back and forth therein when the starting shaft 5 is moved in the direction of its length as already described.

At diametrically opposite points, the housing 24 is provided with apertures 26 in which are mounted pawls 27 which project into the interior of the housing so as to engage

the teeth of the ratchet disk 15, said pawls being pressed into engagement with the ratchet teeth by means of coil springs 28 located in the apertures 26, as clearly shown in Fig. 4 of the drawings.

The shaft 5 is provided with a shoulder 29, one end of which engages the ratchet disk 15 on that side opposite the side on which the springs 13 and 19 are located. The opposite end of the shoulder 29 is engaged by one end of a coiled spring 30, said spring being coiled around the starting shaft, and abutting at its other end against some stationary portion 31 of the engine frame. The function of this spring 30 is to assist the longitudinal movement of the starting shaft in a direction to release the engine shaft. When the starting shaft is advanced to place the coupling pin 9 within the socket 10, the spring is compressed, and at the same time the ratchet disk 15 is moved forwardly in the housing 24 so that its teeth are engaged by the pawls 27. When the starting shaft becomes disconnected from the engine shaft, the spring retracts the starting shaft still further, and disengages the ratchet disk from the pawls, the starting shaft, and the disk, as well as the other parts associated therewith traveling rearwardly in the housing. The rearward movement of the parts is limited by a shoulder 32 in the housing. Inasmuch as the spring 13 is normally loose on the starting shaft, and the spring 19 is normally loose on the sleeve 18, the hand crank 7 is normally disconnected from the starting shaft. That portion of the screw 6 which passes through the hub of the hand crank is without threads, and it passes loosely through the hub so that the hand crank may have, a rotary movement independent of the movement of the starting shaft, the purpose of the screw being to prevent endwise separation of the hand crank and the starting shaft. When the hand crank is turned in the direction in which the engine shaft rotates when running it is automatically coupled to the starting shaft through the arrangement of springs and sleeves herein described. This coupling action is effected in the following manner: When the hand crank is turned in the direction stated, the shaft 5 and the parts mounted thereon are pushed inward against the spring 30 in order that the pin 9 may engage the slot 10 in the engine shaft 11, at the same time the disk 15 engages the pawls 27 and the torsion applied to the spring 19 by means of its connection with the sleeve 8, binds said spring on the sleeve 18, and the rotary movement of the sleeve 8 is thus transmitted to the sleeve 18. Inasmuch as the sleeve 18 is made fast to the spring 13, the rotary movement of said sleeve applies torsion to

the spring 13, and the latter therefore binds on the starting shaft 5, and said shaft now rotates with the hand crank, and thus rotates the engine shaft. The teeth of the ratchet disk 15 are so arranged that the pawls slip back, and thus permit the disk to rotate with the starting shaft. In case the engine should fire back, the ratchet disk prevents rotation of the revolving parts upon the starting shaft 5 in the reverse direction, and as said ratchet disk is fastened to the spring 13, it lessens the torsional resistance applied by the hand crank, and allows the starting shaft to slip in its grasp, thus protecting the operator against injury.

By providing the two springs 13 and 19 it is possible to turn the hand crank in a reverse direction, and place it in the most advantageous position, regardless of the position of the engine shaft. With a single spring it would be impossible to do this without turning the engine over, or releasing the pawls of the ratchet. The reverse movement of the hand crank does not twist the spring 19 so as to grip the sleeve 18 and it will therefore be evident that the hand crank may be placed in any position most convenient for starting the engine. It is only when the hand crank 7 is turned forwardly that the spring 19 grips the sleeve 18, the gripping action being increased in proportion to the power applied to the hand crank.

What is claimed is:—

1. The combination with a rotatable element, of a coiled spring encircling the same, a ratchet disk connected to one end of the spring, a sleeve encircling the spring, and connected to the other end thereof, a spring encircling the sleeve, a rotatable member connected to the second mentioned spring, a stationary member, and a pawl carried by said stationary member, said pawl engaging the aforesaid ratchet disk.

2. The combination with a rotatable element, of a resilient member encircling the same, a ratchet disk secured to one end of the member, a sleeve encircling the member, and connected to the same, a second resilient member encircling the sleeve, a rotatable member connected to the second mentioned resilient member, a stationary member, and a pawl carried by the stationary member, said pawl engaging the aforesaid ratchet disk.

3. The combination with a rotatable element, of a coiled spring encircling the same and held against rotary movement thereon, a sleeve encircling the spring, and connected to one end thereof, a spring encircling the sleeve, and a rotatable member connected to the second mentioned spring.

4. The combination with a rotatable element, of a resilient member encircling the

same and held against rotary movement thereon, a sleeve encircling the member, and connected to one end thereof, a second resilient member encircling the sleeve, and a
5. rotatable member connected to the second mentioned resilient member.

In testimony that I claim the foregoing

as my own, I have hereto affixed my signature in the presence of two witnesses.

SAMUEL T. REEVES.

Witnesses:

JOHN D. AYRES,
CHAS. A. FRENCH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."