

R. McKEE.
HAND STARTING DEVICE FOR EXPLOSIVE ENGINES.
APPLICATION FILED JULY 28, 1908.

Patented May 23, 1911.

2 SHEETS—SHEET 1.

993,090.

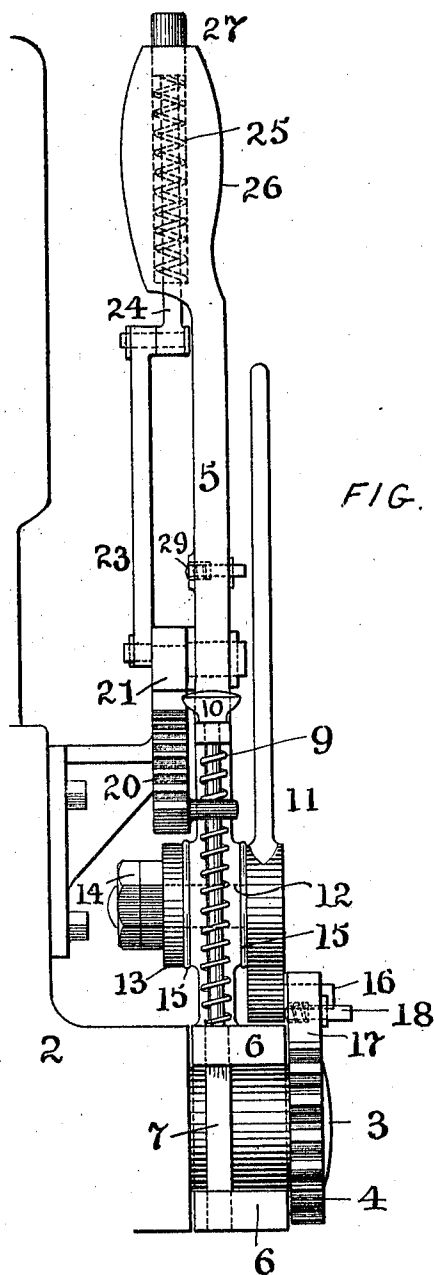


FIG. 1

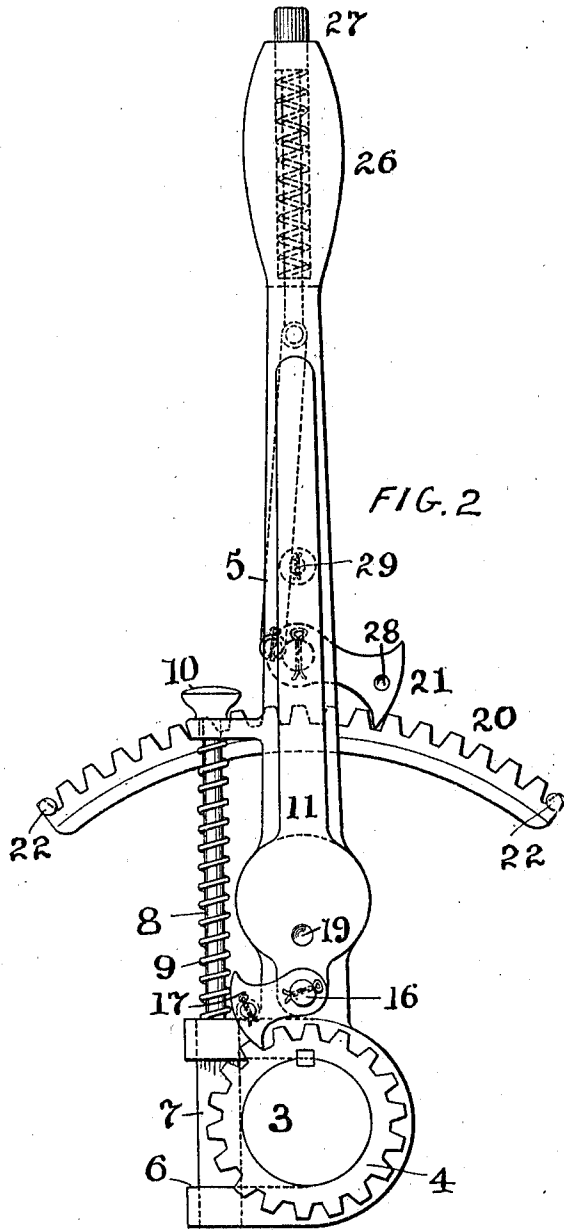


FIG. 2

Witnesses
A. M. Kelly
A. Rettig

Inventor
Robert McKee
By [Signature]
Attorney

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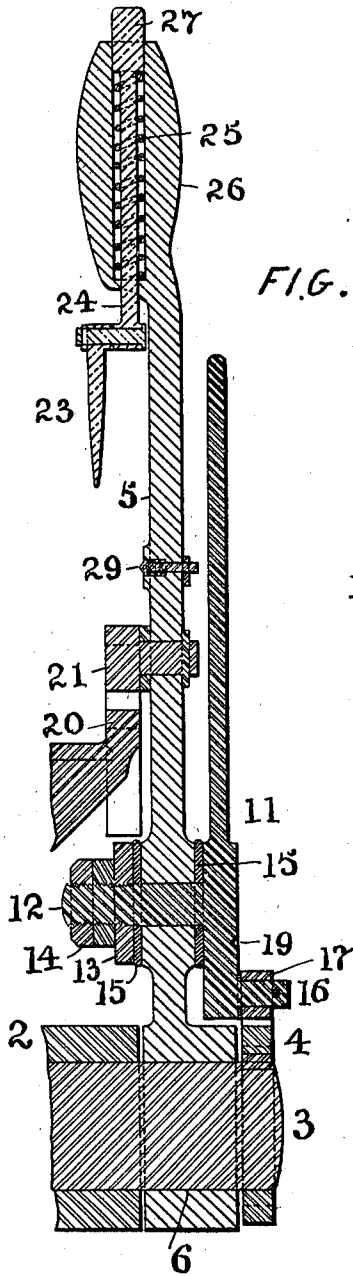


FIG. 3

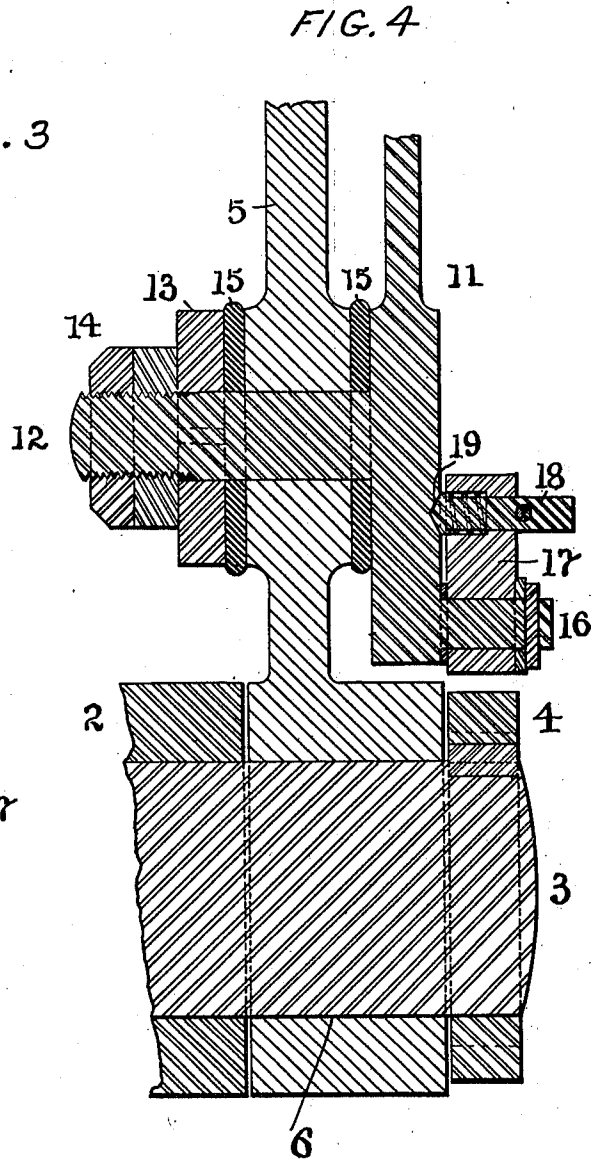


FIG. 4

Witnesses
B. M. Kelly.
A. Rettig

Inventor
Robert McKee
By J. M. McKee
Attorney

UNITED STATES PATENT OFFICE.

ROBERT McKEE, OF PHILADELPHIA, PENNSYLVANIA.

HAND STARTING DEVICE FOR EXPLOSIVE-ENGINES.

993,090.

Specification of Letters Patent.

Patented May 23, 1911.

Application filed July 29, 1908. Serial No. 445,862.

To all whom it may concern:

Be it known that I, ROBERT McKEE, a citizen of the United States, and resident of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Hand Starting Devices for Explosive-Engines, &c., of which the following is a specification.

My invention has reference to hand starting devices for explosive engines, &c., and consists of certain improvements which are fully specified in the following specification and shown in the accompanying drawings which form a part thereof.

My invention has particular reference to hand operated starting devices for motors or power mechanism that has a tendency to move in an opposite direction of rotation from the one desired, such as explosive engines, &c.

The object of my invention is to so construct a hand operated device, that no injury will occur to the operator, or to the device or other mechanism in case mechanism (explosive engines, &c.) should rotate in opposite direction from the one desired; also, to provide a device which can be operated in either direction.

With this object in view my invention consists in certain constructions and combination of parts as fully set forth and specifically claimed hereinafter, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation of a starting device embodying my invention; Fig. 2 is a front elevation of the same; Fig. 3 is a sectional elevation of the same; and Fig. 4 is an enlarged view of a portion of Fig. 3.

2 is the explosive engine or other mechanism to be started into operation and 3 is its shaft which is to be rotated by hand preliminary to such operation.

4 is a pinion or notched wheel and may be considered as a ratchet wheel.

5 is a detachable hand lever having a jaw 6 at the bottom adapted to fit over the motor shaft 3 between the bearing and the ratchet wheel 4. This lever may be locked to the shaft by a bolt 7 which is spring pressed into locking position by a spring 9 surrounding a rod 8 extending upward from the bolt and provided with a hand knob 10 at the top for withdrawing the bolt when it is desired to disengage the lever.

11 is an arm frictionally held upon the lever 5 by having a lateral stud 12 extended

through said lever and provided with nuts 14 and a washer 13. Between the arm 11 and the lever 5 and likewise, between the washer 13 and the lever 5, are arranged friction washers 15 of vulcanized fiber or other suitable material. The washer 13 is preferably held to the stud 12 by a spline so as to rotate with it and the arm 11, although my invention would be complied with by having the frictional resistance between the parts 5 and 11 in any manner. These parts are clamped so that a considerable force is required to rotate the arm 11 about the axis of its stud 12 by which it is pivoted to the lever 5.

Projecting from the arm 11, out of alignment with the axis of the stud 12, is a crank pin or stud 16 and this is normally arranged at a position immediately below the stud 12 and nearest the shaft 3 which is to be rotated. Pivoted upon this stud 16 is a reversible pawl 17 which may be thrown so as to engage the ratchet wheel 4 upon either side of the said stud 16, according to which direction the shaft 3 is to be rotated. When not in engaging position, the pawl 17 may be thrown upward and held out of action by a spring actuated detent 18 engaging a recess 19 in the face of the arm 11, as shown in Fig. 4.

It will now be understood that, if the parts are as shown in Fig. 2 and the shaft 3 is to be rotated to the left, the lever 5 will be pulled to the left and the pawl 17 will rotate the shaft 3 in that direction through its engagement with the ratchet wheel 4. If however, because of a premature explosion or from other reason, the shaft 3 was suddenly rotated to the right with great force, the pawl 17 would be also thrown to the left and, acting on the stud 16 would oscillate the arm 11 about the axis of its stud 12 by overcoming the frictional connection of arm 11 with the lever 5. Under these conditions, the pawl 17 would be moved around sufficiently to release the ratchet wheel 4; and the shaft 3 and ratchet wheel would be free to continue the rotation thus started without breaking any of the mechanism and without pulling the lever 5 out of the hand of the operator, or injuring his arm.

From the foregoing description it will be seen that, the essential feature of the invention is in providing a yielding couple with the shaft to be rotated so that the connection between the lever and shaft may give way in

case of an excessive and sudden reversal of rotation of the shaft being operated upon.

The type of starting lever constituting my invention may be varied in its details of construction and adapted to the shaft to be rotated in numerous ways and I wish, therefore, to point out that in illustrating the preferred form of my invention I do not restrict myself to the details or specific features disclosed therein, as my invention comprehends broadly any hand operated means adapted to an explosive engine shaft or equivalent part having connecting power transmitting devices frictionally held in operative relation and capable of being displaced or shifted to release the shaft from the hand operated means should an abnormal and sudden reverse rotation of the shaft take place.

In the mechanism shown, the lever 5 may be made operative in either direction by simply throwing the pawl 17 to one side or the other of the stud 16. To reset the arm 11, in case of displacement upon the lever 5, it is only necessary to loosen the nuts 14 and after readjusting the arm 11, to again tighten the nuts to create the desired friction between the parts 11, 13, 5 and 15. If desired, instead of loosening the nuts 14, the arm 11 may be forcibly returned to its normal position.

The hand lever may be allowed to remain in connection with the shaft, or may be detached by simply pulling the bolt 7 and withdrawing the yoke part of the lever from the shaft.

To overcome any strain whatever upon the arm of the operator due to the premature explosion, such as is likely to occur with a gas or explosive engine, I prefer to provide means which will lock the hand lever against movement at all positions under such conditions. This means comprises a rack 20 secured to the engine 2 or other part fixedly located with respect to the shaft 3 to be rotated, the said rack being preferably provided at each end with stops 22 to limit the throw of the hand lever 5; a pawl 21 pivoted to the hand lever and adapted to engage the rack 20, upon either side of the lever as may be desired, said pawl having a recess 28 which may engage a spring detent 29 whereby the pawl may be raised and supported out of contact with the rack when desired; a push pin 27 carried by the handle 26 of the hand lever and sustained by a spring 25; and a link 23 connecting the push pin and pawl. The spring 25 and push pin 27 are so made that the pawl 21 may be thrown over to reverse its connection with the rack without disconnecting any of the joints.

The operation of this locking means last described is as follows: Assuming as before that the operator is pulling the upper end of the hand lever 5 to the left, the pawl 21

will trip over the teeth of the rack without resistance. By pressing upon the spring push pin 27 the pawl 21 may be thrown out of engagement with the rack 20 when it is desired to return the lever to its starting position. Should, from any cause, the shaft 3 be suddenly rotated in a reverse direction the tendency to throw the lever 5 to the right will be resisted by the pawl 21 owing to its engagement with the rack 20. Under such conditions no objectionable jar or strain can be put upon the operator.

The invention in its broad aspect would employ the shaft to be rotated, combined with a hand operated part, and connecting means between said hand operated part and shaft to produce rotation in the latter and embodying releasing means operating under severe stress to modify or change the operative connection between the hand operated part and shaft, whereby said hand operated part may be held against movement in case of a sudden and violent reversal in the direction of rotation of the shaft.

While I have shown my invention embodied in the form which I have found to be excellently adapted for commercial use, I do not restrict myself to the details thereof, as they may be modified without departing from the spirit of the invention.

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

1. In apparatus of the character described, the combination of a shaft to be rotated, hand operated means, and connecting devices frictionally held upon the hand operated means and located between the shaft and hand operated means for rotating the shaft and yielding for displacing the parts constituting the connecting devices and permitting the shaft to be reversed under sudden and excessive stress without reversing the direction of movement of the hand operated means.

2. In apparatus of the character described, the combination of the shaft to be rotated, a hand lever journaled concentrically on the shaft, a ratchet wheel secured to the shaft, a frictionally held crank carried by the hand lever, and a pawl hinged to the crank and normally engaging the ratchet wheel.

3. In apparatus of the character described, the combination of the shaft to be rotated, a hand lever journaled concentrically on the shaft, a ratchet wheel secured to the shaft, a frictionally held crank carried by the hand lever, a pawl hinged to the crank and normally engaging the ratchet wheel, and means for locking the pawl out of engagement with the ratchet wheel.

4. In apparatus of the character described, the combination of the shaft to be rotated, a hand lever journaled concentrically

cally on the shaft, a ratchet wheel secured to the shaft, a frictionally held crank carried by the hand lever, a pawl hinged to the crank and normally engaging the ratchet wheel, a stationary rack, and a pawl carried by the hand lever for engaging the stationary rack to prevent sudden backward movement of the hand lever.

5. In apparatus of the character described, the combination of the shaft to be rotated, a hand lever journaled concentrically on the shaft, a ratchet wheel secured to the shaft, a frictionally held crank carried by the hand lever, a pawl hinged to the crank and normally engaging the ratchet wheel, a stationary rack, a pawl carried by the hand lever for engaging the stationary rack to prevent sudden backward movement of the hand lever, and means for throwing the pawl out of engagement with the rack.

6. In apparatus of the character described, the combination of a shaft to be rotated, a hand operated lever, connecting devices between the shaft and hand operated lever held in position by friction for rotating the shaft and having releasing mechanism overcoming the friction for displacing the parts constituting the connecting devices and permitting the shaft to be reversed under sudden and excessive stress without reversing the direction of or shifting movement of the hand operated lever, and means independent of the connecting devices for directly locking the hand operated lever against movement in a backward direction.

7. In apparatus of the character described, the combination of the shaft to be rotated, a hand lever, and connecting devices between the hand lever and shaft which consists of a ratchet wheel, a pawl engaging the ratchet wheel, and yielding connections between the hand lever and the pawl whereby the latter may have its position of connection with the hand lever shifted under the action of the ratchet wheel when suddenly reversed to throw said pawl out of operation.

8. In apparatus of the character described, the combination of the shaft to be rotated, a hand lever, and connecting devices between the hand lever and shaft which consists of a ratchet wheel, a pawl engaging the ratchet wheel, yielding connections between the hand lever and the pawl whereby the latter may have its position of connection with the hand lever shifted under the action of the ratchet wheel when suddenly reversed to throw said pawl out of operation, and means for locking the hand lever against movement during the time the yielding connections are being shifted.

9. In an apparatus of the character described, the combination of the shaft to be rotated, a ratchet wheel 4 therefor, a hand lever journaled adjacent to the shaft, an arm 11 frictionally held to the hand lever, and a pawl 17 hinged to the arm 11 to one side of its connection with the hand lever and engaging the ratchet wheel.

10. In an apparatus of the character described, the combination of the shaft to be rotated, a ratchet wheel 4 therefor, a hand lever journaled adjacent to the shaft, an arm 11 frictionally held to the hand lever by a stud 12, friction washers 15 through which the stud extends and arranged upon each side of the hand lever, a metal washer 13 pressing against one of the friction washers, nuts 14 for the stud for clamping the friction washers in place, and a pawl 17 hinged to the arm 11 to one side of its connection with the hand lever and engaging the ratchet wheel.

11. In an apparatus of the character described, the combination of the shaft to be rotated, a ratchet wheel 4 therefor, a hand lever journaled adjacent to the shaft, an arm 11 frictionally held to the hand lever, a pawl 17 hinged to the arm 11 to one side of its connection with the hand lever and engaging the ratchet wheel, a fixed rack 20, and a pawl hinged to the hand lever and engaging the rack.

12. In an apparatus of the character described, the combination of the shaft to be rotated, a ratchet wheel 4 on said shaft, a hand lever journaled adjacent to the shaft, an arm 11 frictionally held to the hand lever, a pawl 17 hinged to arm 11 to one side of the connection with the hand lever and engaging the ratchet wheel, a fixed rack 20, a pawl hinged to the hand lever and engaging the rack, and means on the hand lever for throwing the pawl out of engagement with the rack.

13. In an apparatus of the character described, the combination of the shaft to be rotated, a pivoted hand lever, power transmitting connections for rotating the shaft in one direction and releasing it in case of sudden reversal, a fixed rack, a pawl on the hand lever engaging the rack to prevent reversal of movement to the hand lever in case of sudden reversal of shaft, and means on the hand lever for throwing the pawl out of engagement with the rack.

In testimony of which invention, I have hereunto set my hand.

ROBERT McKEE.

Witnesses:

R. M. HUNTER,
R. M. KELLY.