J. T. MAHONEY.

SAFETY STARTING DEVICE.

APPLICATION FILED JUNE 22, 1911.

1,043,121.

Patented Nov. 5, 1912.

2 SHEETS—SHEET 1.

Fig. 1

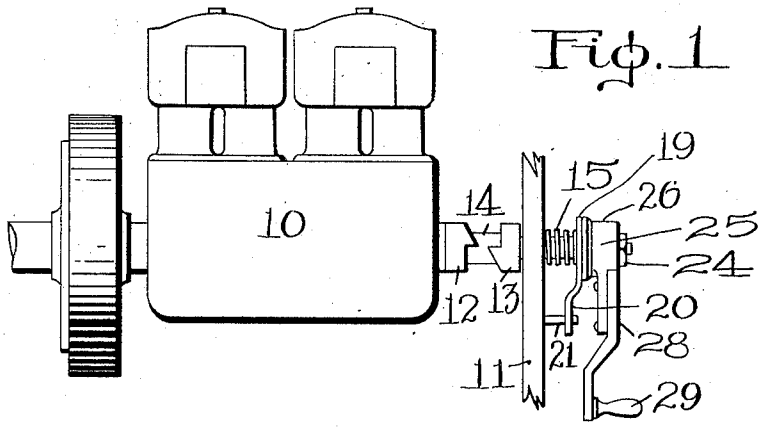


Fig. 2.

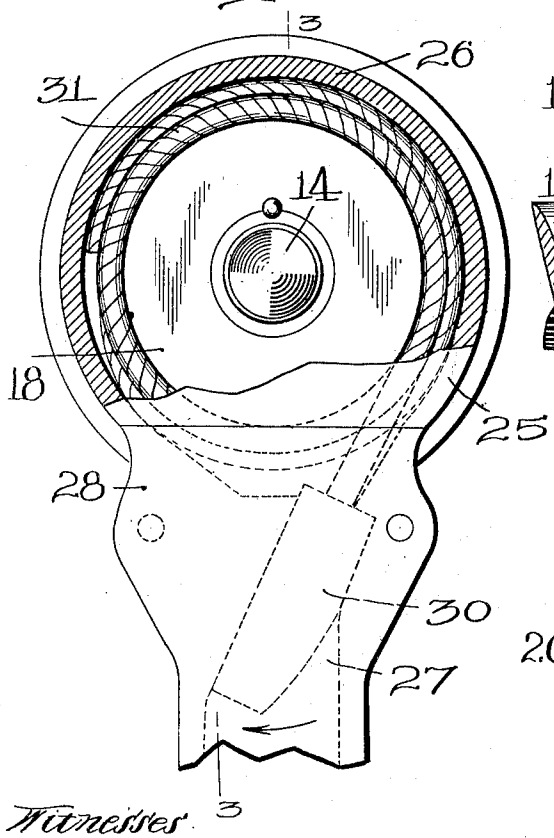
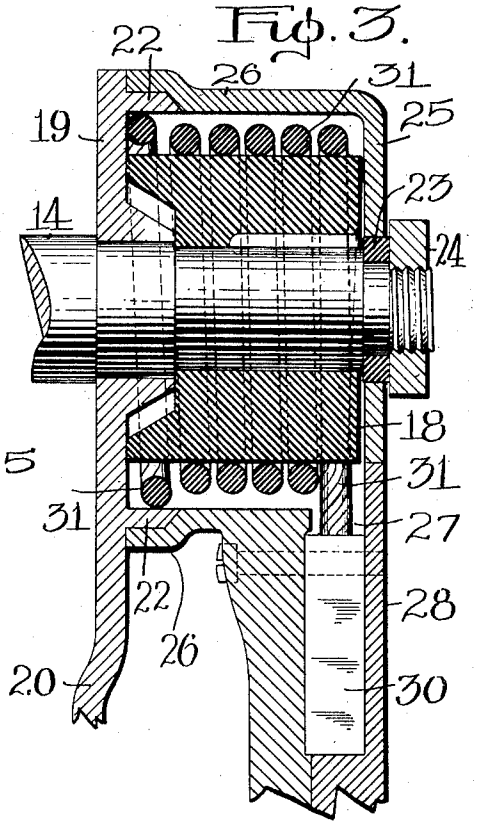


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

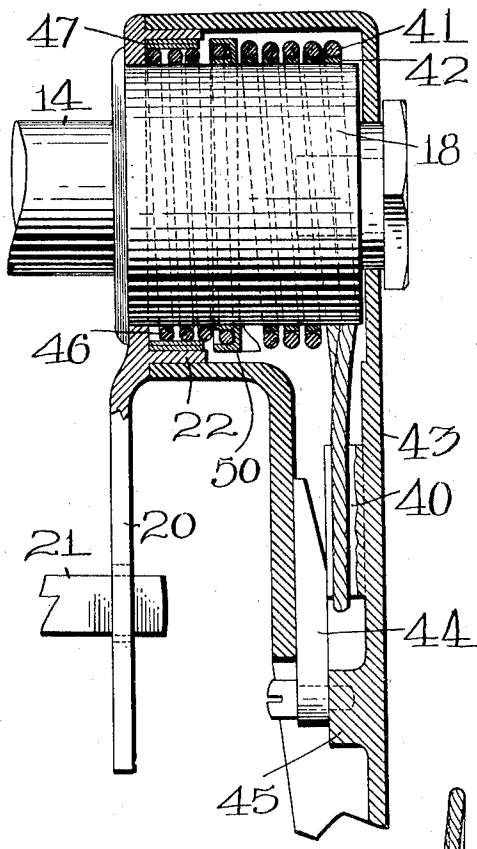


Fig. 5.

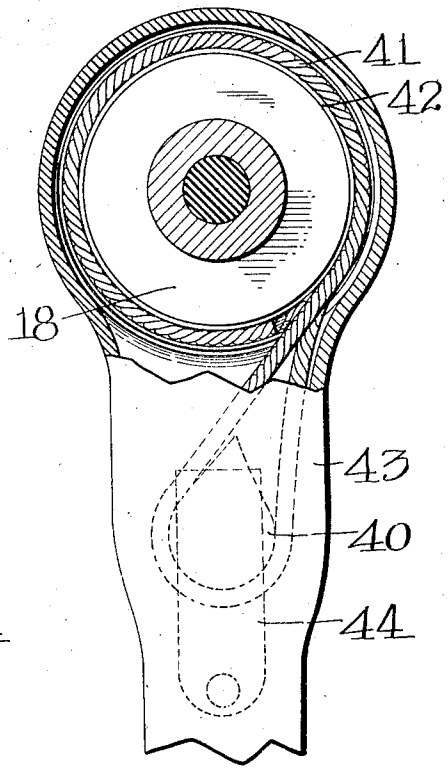


Fig. 6.

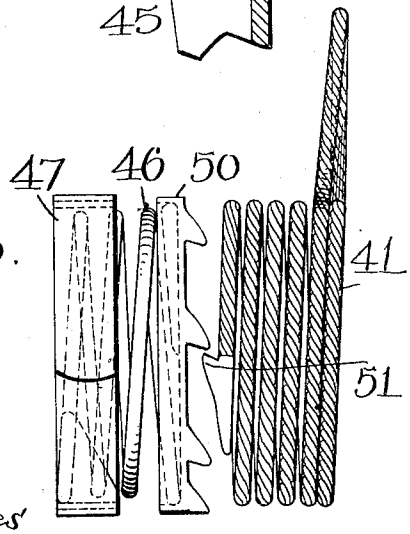
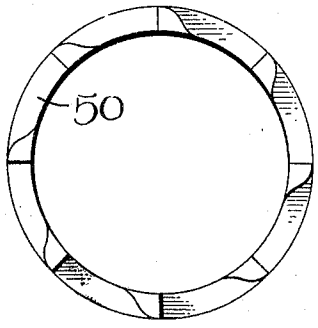


Fig. 7.



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UNITED STATES PATENT OFFICE.

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SAFETY STARTING DEVICE.

1,043,121. Specification of Letters Patent. Patented Nov. 5, 1912.

Application filed June 22, 1911. Serial No. 634,698.

To all whom it may concern:

Be it known that I, JAMES T. MAHONEY, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Safety Starting Device, of which the following is a specification.

Although this invention may be used on various kinds of machines in general, it is particularly applicable to starting devices for explosive engines or the like to prevent injury to the operator or mechanism in case the engine back fires, or otherwise reverses. But it may be used on any machine or mechanism where a release is useful in case of reversing, to prevent injury to the operator, or mechanism, or as may be otherwise required.

One of the objects of this invention is to provide such a mechanism in a starting or operating device that will automatically grip and rotate the shaft of the starting or operating device, or a member fixed thereon, when said device is manually or mechanically advanced, but should the explosive engine or other machine reverse, the gripping mechanism will automatically become released before the starting device is reversed enough to injure the operator or mechanism. Also when the explosive engine or other machine advances the grip will automatically become released and permit the explosive engine or other machine to rotate independently of the starting device. Also when the starting device is reversed the grip will automatically become released and permit it to be reversed without reversing the starting or operating shaft connected with the explosive engine or other machine thereby avoiding injury to the mechanism.

Further objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a side elevation of an automobile gasolene engine with one form of this invention applied thereto; Fig. 2 is an end elevation thereof on enlarged scale with parts shown in transverse section; Fig. 3 is a sectional view of the same on the line 3—3 of Fig. 2; Fig. 4 is a view similar to Fig. 3 showing another form in which this invention can be carried out, and in fact a better form; Fig. 5 is an end elevation of the same partly in transverse section; Fig. 6 is an elevation of the flexible member and its connections, and Fig. 7 is an end view of one of said connections.

Referring first to Figs. 1, 2 and 3, which illustrate a simple form of the invention, it will be seen that a gasolene engine 10 of a usual type is shown on a frame 11 and having clutch sections 12 and 13 on the shaft 14 thereof. This shaft is shown as provided with the usual spring 15. On this shaft is shown a member 18 keyed to rotate with the shaft. Also mounted on this shaft is a plate 19 which has a projection 20 fixed with respect to the frame 11 by means of a pin 21 projecting therefrom, so that it cannot be caused to rotate with the shaft but can move longitudinally thereof. This plate 19 is provided with a cup-shaped member 22 projecting from it. On the shaft is a collar 23 projecting out to receive the pressure of a nut 24 at the end of the shaft. Outside of this collar 23 is a casing 25 which has an outwardly extending flange 26 fitting over the cup-shaped member 22. This casing is provided with a recess 27 therein covered by a plate 28 and this plate extends outwardly to form a crank handle 29. Mounted in the recess 27 is a block 30 secured to the end of a flexible member 31 preferably in the form of a wire cable. This cable is coiled tightly on the outside of the member 18 and contained within the casing 25 and 26. At its end it extends into the cup-shaped member 22. A portion of this coil is normally of smaller diameter than the member 18 so that it tends to fit snugly thereon. The other portion is wound normally of larger diameter than the cup-shaped member, and frictionally grips its inner surface. This coil from the end which engages the cup-shaped member 22 is wound in the direction in which the shaft 14 rotates in order to crank up the engine. The free end of the cable extends outwardly so as to frictionally engage the inside of the cup-shaped member 22.

The operation of the device is very simple.

The handle 29 is grasped in the usual way and rotated. This results in drawing the flexible member 31 tightly around the member 18 and consequently the rotation of the handle will be transmitted directly to the shaft through the cable. At this time the resilient free end of the cable contracts and moves frictionally around in the cup 22 and assists in the friction of the flexible mem-

ber. On the other hand if the engine is reversed as in case of back-firing, the result will be to relax the contraction of the spring of the free end of the flexible member causing it to engage and grip the cup-shaped member 22, which being held stationary will prevent the flexible member from reversing. Consequently the continued reverse action of the shaft will uncoil the portion of the flexible member that grips said member 18 so as to loosen the grip and permit said member and shaft to reverse without reversing any of the other parts of the starting device, thereby preventing damage or injury to the operator or mechanism. It is to be observed that on account of the end of the cable extending into and engaging the cup-shaped member 22 the rotation of the shaft 13 in the reverse direction while cranking up, as for example, by back-firing, will result first in causing the friction end of the cable to expand and grip the inner surface of the cup 22. Then the continued backward rotation of the shaft will force the first convolution of the cable to uncoil until it binds on the entire inner surface of the cup 22. This gives a friction clutching action and holds this first convolution stationary. Then the adjacent convolutions of the cable uncoil sufficiently to lose their grip on the member 18. Then the shaft 14 is free to rotate reversely while the casing 25 and handle 29 are held stationary with the cup 22. Thus the back-firing cannot give the handle a material reverse rotation or cause any injury to the operator. This practically stops the cranking motion until the engine stops reversing, and also forms a brake. On the other hand when the engine starts ahead the flexible member is held by the end 30 which is secured to the casing 25, which uncoils the flexible member and releases the grip and allows the shaft to advance.

In the form of the invention shown in Figs. 4, 5, 6 and 7, the same principles apply, but more positive and effective means is provided for preventing the rotation of the shaft 14 in the wrong direction by the reverse operation of the crank handle. The cable 41 in this instance is shown as having an inner surface 42 formed of a thin piece of brass, brazed, soldered, welded or otherwise similarly secured on the cable to furnish a better surface for gripping the member 18. In this case the cable is held by a lug 40 cast on the inside of the casing 43. It is retained in position by a small plate 44 secured to a lug 45 on the casing. In this form the flexible member is divided into two parts, the part 41 just described and a second part 46 which is shown in the form of a brass spring having at the end thereof a brass flat spring 47 of one or more coils or fraction thereof secured to it for the purpose of engaging in the inside of the cup-shaped member 22. On the end of this spring toward the cable 41 is a ratchet ring 50 and on the end of the cable is a tooth 51 adapted to engage the same. The natural resiliency of both cable and spring force these two parts into engagement with each other so that under ordinary circumstances the tooth will grip the ratchet wheel and rotate the same with it, while when the handle is rotated in the wrong direction the tooth will ratchet over the teeth and there can be no rotation of the shaft caused by it and there can be no tendency also to buckle up the cable or otherwise injure the internal mechanism.

As stated, the first flexible member 41 in the present case is in the form of a wire cable having a runner or shoe soldered or otherwise suitably secured to its inner surface composed of brass or other suitable material, for the purpose of furnishing more and better gripping surface. One end is suitably secured to the starting device. The other end having one or more teeth 51 which engage in the teeth on the other flexible member 46—47—50 at their junction to form a coupling. The said member 41 is normally wound to be a free fit on the shaft or member 18 which allows it to turn in either direction freely without turning the shaft, but when it advances its teeth 51 engage the flexible member 46 by the teeth 50 thereon which holds the free end from turning. At the free end of the cable 41 it requires only a little power to hold the cable from slipping as there are several coils of the cable. Thus by pulling at the opposite end of the cable it will have a positive grip.

The flexible member 46 must be sprung open to place it in position, thereby gripping the member 18 so that it will not slip if it is pulled from the end, but in case the spring is pushed from the end it will uncoil the spring and allow the shaft to revolve frictionally. One end of this member 46 is provided with a coiled flat spring 47 which has one end soldered or otherwise suitably secured to said end of the member 46. The said open-ring flat spring engages with the cup-shaped member 22. The said spring is normally formed larger than the cup shaped member 22 and must be sprung to be placed in position, thereby forming a grip to the cup 22. When the starting crank or device is advanced this flat open ring spring 47 is pulled from the end and coiled smaller, which releases its grip from the cup 22 and allows it to rotate frictionally therein. But should the engine or other machine reverse as in the case of back firing or the like the flat springs being secured to the flexible member 46, will be uncoiled and be pushed outwardly. This causes it to chuck back and grip the cup shaped member 22 which is held from ro-

tating with its member 20 by the stud 21. As the flat ring spring 47 and the flexible member 46 are suitably secured the further reverse action of the engine or other machine will cause the flexible member to be uncoiled sufficiently to loosen its grip on the member 18, and allow the shaft to reverse frictionally. At the same time the flexible member 41 will reverse sufficiently to relieve the strain on its member 51 by the member 50 on the flexible member 46, and as the flexible member 41 is normally a free running fit on the member 18, the said shaft and engine or other machine will reverse without reversing the starting crank or device, thereby preventing injury to the operator or mechanism. It will be observed that the gripping does not disengage when the shaft is reversed but acts as a brake on the member 18 or shaft.

While I have illustrated and described two embodiments of the invention, I am aware that many other modifications can be made therein, and that the principles of the invention can be carried out in many other ways and applied to many types of gasolene engines other than the one illustrated, without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to all the details of construction herein shown and described, nor to the particular type of engine illustrated, but

What I do claim is:—

1. The combination with a gasolene engine, shaft, and starting device, of a flexible member comprising two parts connected at one end with the device and coiled around the shaft, each having one or more teeth, for connecting the parts of said flexible members, a handle with which one end of the flexible member is connected, and a stationary device which the flexible member frictionally engages at the other end whereby the reverse rotation of the starting device will have no effect on the shaft and will not injure the flexible member.

2. In a device of the character described, the combination of a rotatable member, a flexible member coiled thereon, a handle connected with the end of the flexible member and rotatable independently of the rotatable member, and a stationary device which the other end of the flexible member frictionally engages, said flexible member being divided into a plurality of parts having a ratchet connection between them.

3. In a device of the character described, the combination of a rotatable member, a cable coiled thereon, a handle rotatable independently of the rotatable member and connected with one end of the cable, the other end of the cable having a ratchet tooth, a cup-shaped stationary member, a spring coiled within the stationary member and frictionally engaging it, and a ratchet wheel on the end of the spring in position to be engaged and operated by said ratchet tooth.

4. In a device of the character described, the combination of a rotatable member, a hollow handle rotatable independently of the rotatable member, a flexible member coiled loosely on said rotatable member and having one end movably secured inside said hollow handle beyond the circumference of the rotatable member, and a stationary device which the other end of the flexible member frictionally engages.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

JAMES T. MAHONEY.

Witnesses:
ALBERT E. FAY,
C. FORREST WESSON.