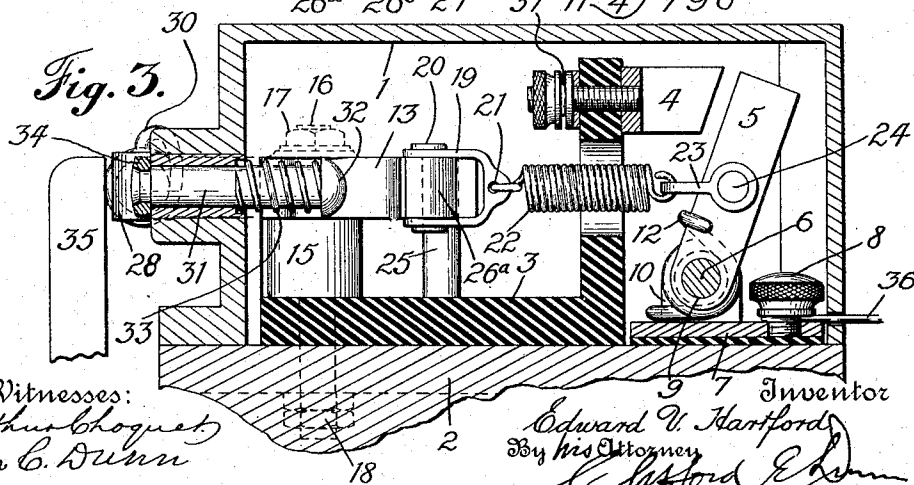
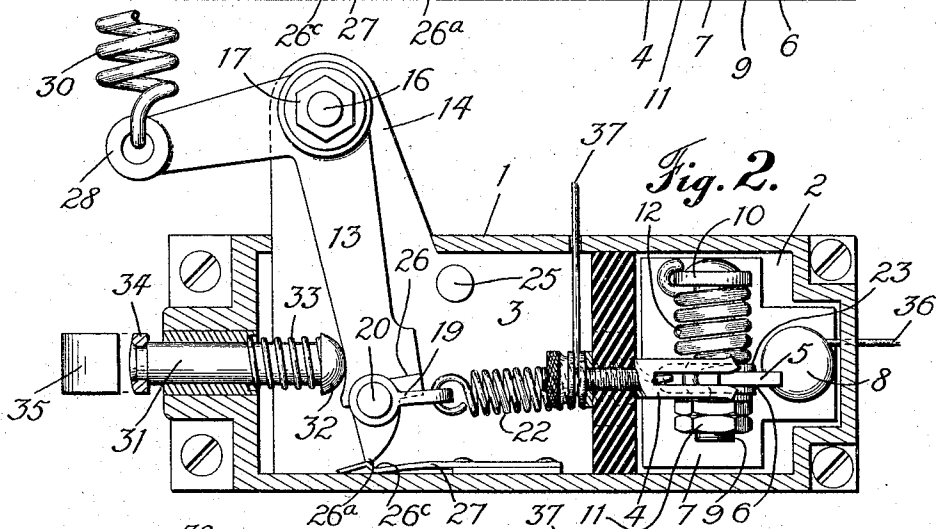
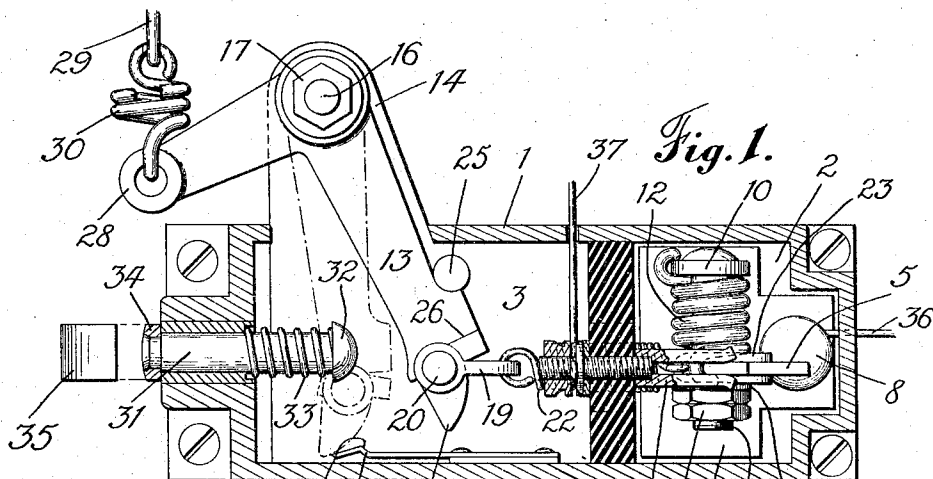


E. V. HARTFORD.
COMBINATION ELECTRICAL SWITCH AND CLUTCH ACTUATING MECHANISM.
APPLICATION FILED AUG. 9, 1913.

1,146,872.

Patented July 20, 1915.



Witnesses:
Arthur Choquet
Wm C. Dunn

Inventor
Edward V. Hartford
By his Attorney
Clifford E. Dunn

UNITED STATES PATENT OFFICE.

EDWARD V. HARTFORD, OF DEAL, NEW JERSEY.

COMBINATION ELECTRICAL SWITCH AND CLUTCH-ACTUATING MECHANISM.

1,146,872.

Specification of Letters Patent.

Patented July 20, 1915.

Application filed August 9, 1913. Serial No. 783,972.

To all whom it may concern:

Be it known that I, EDWARD V. HARTFORD, a citizen of the United States, residing at Deal, in the county of Monmouth, State of New Jersey, have invented a certain new and useful Combination Electrical Switch and Clutch-Actuating Mechanism, of which the following, taken in connection with the accompanying sheets of drawings, is a full, clear, and concise description thereof.

My present invention is particularly adapted for use in connection with electrical self-starters for automobiles in which a relatively small high-speed starter motor is employed for inaugurating the self-actuation of the vehicle engine, the starter motor being provided with a fly wheel by means of which kinetic energy is created to augment the electromotive force of the starter motor. Where a starter motor with a fly wheel is employed it has been suggested to interpose a suitable clutch mechanism between the fly wheel and the reduction gearing (which is operably associated with the crank shaft of the engine to impart thereto a relative slow crank shaft movement under the high speed actuation of the starter motor,) so that the starter motor may be energized and the fly wheel caused to assume high speed before being operably connected with the reduction gearing.

It is the purpose of my present invention to provide a mechanism which will sequentially cause the energization of the starter motor and the actuation of the clutch mechanism to couple the force or power with the work and particularly to insure a time interval in which the starter motor may be speeded up to the required degree before the clutch mechanism is actuated and a further object of my invention is to cause the clutch mechanism to be suddenly and abruptly thrown into a coupling or operative position, so as not to act as a drag or brake upon the momentum assumed by the fly wheel at the time when its power is most needed for the work, as would be the case if gradually applied or operated, which would decrease the efficiency of the starter motor.

In the accompanying drawings I have illustrated one preferable embodiment of my invention, which I disclose by way of example only, wishing it to be understood that I do not restrict myself to this specific structural embodiment as the same may be departed from and still come within the

spirit and scope of my invention as defined in the following specification and claims.

Referring to the drawings in detail, Figure 1 is a top plan view in cross-section of the switch mechanism incorporating the novel features of my invention. Fig. 2 is a similar view showing the trigger mechanism about to operate to effect the sudden application of the clutch mechanism through the operating plunger. Fig. 3 is a sectional view inside elevation the mechanism being in position shown in Fig. 1.

Within a suitable casing or housing 1 mounted upon a base 2, I provide an insulating L-shaped supporting member 3, the vertical projecting portion of which supports a stationary electrical contact 4, which consists of a pair of jaws between which the movable contact 5 is received to close the energizing circuit of the starter motor (not shown). The movable contact 5 is of the usual knife-blade type and is pivoted at 6 to a base member 7, the latter being provided with the usual form of binding nut 8 which clamps and holds the circuit wire. A screw threaded bolt 9 projecting through perforated ears or supporting projections 10 serves as the pivot member for the switch blade 5, suitable binding nuts 11, being provided to hold them in position. Mounted upon the bolt 9 and hooked around the switch blade 5 is a spring 12, under tension which normally causes the switch blade to assume its inoperative position. The casing or housing 1 is provided with a slot or aperture for the reception of the bell crank arm or lever 13, which is pivotally mounted upon a cylindrical support 15 fastened to a projecting support 14 formed integral with the base member 3, a screw bolt 16 and nuts 17 and 18 serving to hold the parts in position. One arm of the bell crank lever projects within the casing or housing and is provided with a yoke member 19 pivotally connected thereto at 20. This yoke is provided with a perforated ear 21, which receives one end of the expansion spring 22, the latter being fastened to a yoke 23, which straddles and is pivoted to the switch arm at 24, thus providing a yielding connection between the bell crank lever and switch arm. A stop taking the form of a pin 25, projects from the bottom of the base member 3 and serves to limit the rearward movement of the bell crank lever under the tension of the spring 22. At the end 26 of the arm of the bell crank

lever is pivoted a cam-shaped member 26^a which coöperates with a bent spring member 27 fast to the side of the casing 1, thus forming a trigger mechanism which serves to interrupt the movement of the bell crank lever until sufficient force has been exerted thereon to overcome the spring tension of the spring member 27 whereupon the applied force will cause an abrupt or rapid continued movement of the bell crank arm to effect a quick operation of the clutch mechanism, in the manner which will presently be described.

To the outer end 28 of the bell crank lever is connected an operating member which may take the form of a pull wire or cord 29 connected to an intermediate coil spring 30 serving as a yielding connection for a purpose which will be later explained. Slidably mounted in the casing 1 is a plunger 31 provided with a head 32. Interposed between the head 32 and the casing 1 is an expansion spring 33 normally tending to hold the plunger in its inoperative position. A suitable nut or other stop 34 is provided at the opposite end of the plunger 31 to limit the inward movement thereof.

35 indicates a clutch operating member which is engaged by the sliding plunger 31 to cause the clutch to be operated.

The operation of the mechanism is as follows: When a pull is exerted on the pull wire 29 the bell crank lever is swung and through the spring connection 22 the switch blade 5 is oscillated into engagement with the jaws of the contact 4. Immediately the current from the storage battery (not shown) passes through the conducting wire 36, knife blade 5, contact 4 and conducting wire 37 to the starter motor (not shown), the same being energized thereby. The movement of the bell crank lever is interrupted by the engagement of the cam-shaped end 26^a with the spring member 27.

This interruption takes place just as arm 26 of the bell crank lever is about to engage the head 32 of the plunger 31 causing an interval of time to lapse before the plunger 31 is thrown into engagement with the clutch operating member 35. This allows the energization of the starter motor and rotation of the fly wheel to high speed before applying the generated force or power to be expended in starting the vehicle engine. The retarding action of the spring 27 to the movement of the bell crank lever by its engagement with the cam shaped member 26^a necessitates an increased or greater pull to be exerted on the draw wire 29 to overcome the tension of this spring to depress it in order to permit the cam 26^a to pass. The cam 26^a rides up the incline surface 26^b and then the arm 26 engages the head 32 of the plunger 31; continued movement causes the plunger 31 to slide out-

wardly into engagement with the clutch operating member 35, which it engages to throw the clutch into its operative position. As soon as the pull on the draw wire 29 is released the bell crank is caused to assume its inactive or initial position under the tension of the springs 12 and 22. The cam 26^a swings on its pivot 20 in order that it might pass the engaging end of the spring 27 when it returns to the normal inoperative position as shown in Fig. 1.

The draw wire 29 may be actuated either by hand or by foot as desired. However operated there will be required two degrees of power or force to completely operate the mechanism. The applied power on the draw wire 29 causes the closing of the switch contacts 4 and 5 and the energizing of the starter motor then owing to the retardative action of the spring 27 when engaging cam 26^a an increase of power is required to overcome the tension of the spring so that the arm 26 may move the plunger 31 into engagement with the clutch operating member 35. It will be understood that as soon as the cam 26^a is caused to overcome the tension of the spring 27, the power applied to the bell crank lever to overcome this interruption in its movement is suddenly and abruptly directed against the plunger 31 forcing the latter against the clutch operating member 35, which will cause the clutch mechanism to be quickly thrown into operative position. The spring 30 accelerates the movement of the bell crank lever after it has overcome the tension of the spring 27.

The switch jaws 4 and contact 5 are so proportioned as to present a close fit between the parts in order that considerable force will be required to move the latter inwardly between the jaws 4. Thus an interval of time is obtained within which the starter motor is allowed to attain a speed to get the fly wheel under way or increased momentum.

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

1. A device of the character described, the combination of an electrical switch, a clutch operating means, common means for closing the switch and subsequently actuate the clutch operating member and means co-operatively associated with said first-mentioned means adapted to impart a quick abrupt movement to the clutch operating member.

2. A device of the character described, the combination of an electrical switch, a clutch operating means, a common means for closing the switch and operating the clutch operating means, means coöperating therewith for imparting a sudden or abrupt force to actuate the clutch operating means, and means for automatically opening the switch

and retracting to initial inoperative position the clutch operating member.

3. The combination of a switch mechanism, a clutch operating member, common
5 means for operating the switch mechanism and the clutch operating member, means for impeding the operation of the common operating means so as to apply an abrupt and sudden force to move the clutch operating
10 member.

4. A switch mechanism, an operating member yieldably connected therewith, a clutch operating member adapted to be operated by the operating member, a trigger
15 mechanism interposed between the switch mechanism, and the clutch operating member, whereby the clutch operating member may be suddenly and rapidly moved after the switch mechanism has been operated.

5. The combination of a switch comprising stationary and movable contacts, automatic means for normally retaining an open position of the switch, a bell crank lever having a yielding connection with the movable contact, a clutch operating plunger
25 adapted to be engaged by the bell crank lever after the switch has been closed, means for impeding the movement of the bell crank lever, and releasing the same to actuate the clutch operating member.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses this 31 day of July, 1913.

EDWARD V. HARTFORD.

Witnesses:

WILLIAM P. HAMMOND,
WM. C. DUNN.

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