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ROTOR STARTING MECHANISM

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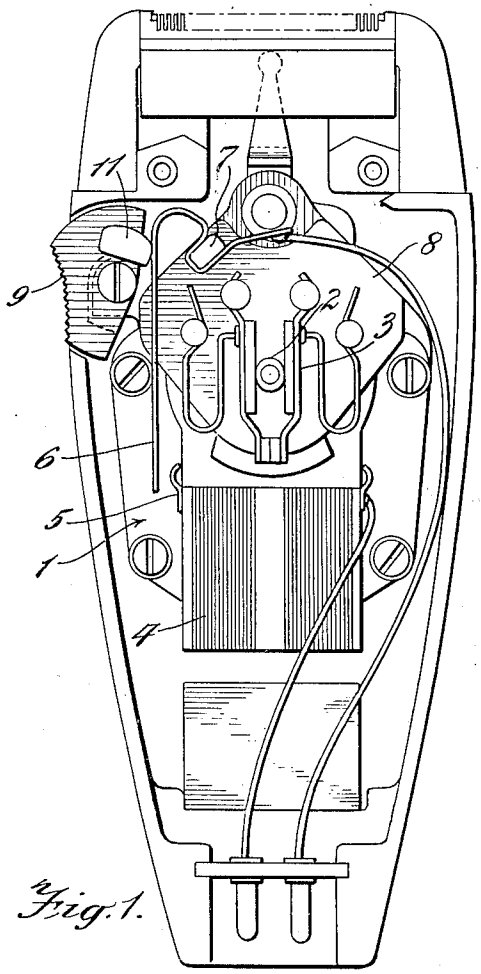


Fig. 1.

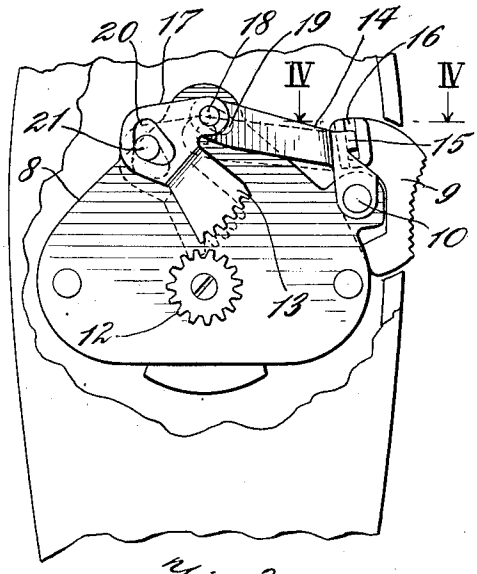


Fig. 2.

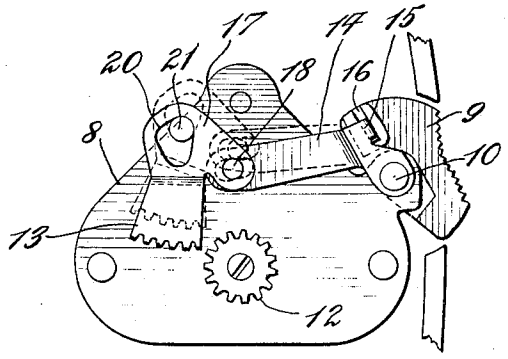


Fig. 3.

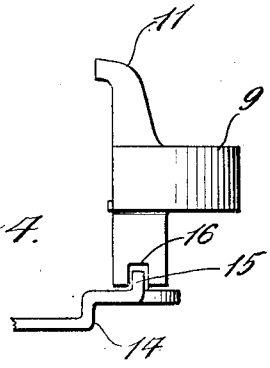


Fig. 4.

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ROTOR STARTING MECHANISM

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7 Claims. (Cl. 172—36)

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Various types of rotary machines are required to be given an initial spin in order to start or to facilitate or ensure their starting, an example being the familiar electric shaver equipped with an impulse type motor. Unless their contact mechanism is manually pre-positioned or happens to be positioned to provide the necessary favorable conditions, such motors are not self-starting when current is supplied to them, and the common practice has been to provide a starter wheel, secured to the armature shaft and having a portion exposed for turning by the finger or thumb to supply the initial spin.

The present invention, which is particularly useful for the starting of such motors, provides a push button type of starting device which is of simple, trouble-free construction and which lends itself to combination with a switch, when desired, for closing and opening the circuit coincidentally with the manipulation of the button to start and stop the motor.

The invention will be readily understood from the following description of the accompanying drawings in which it is shown in preferred form applied to a well-known make of electric shaver.

In the drawings,

Fig. 1 is an elevation of the starter-equipped shaver, one half of the case being removed to show the interior construction;

Fig. 2 is a broken out view of the opposite side of the shaver, showing the starter mechanism itself;

Fig. 3 is another view of the starter mechanism indicating other positions of the parts; and

Fig. 4 is a detail of the push button and associated lever viewed as on the line IV—IV of Fig. 2.

The motor 1 of the illustrated shaver includes an armature shaft 2 and cam-operated contact mechanism 3 by which the circuit of the field coil 4 is made and broken, all arranged and operating in the usual manner. In this preferred form the field circuit is arranged to be controlled by a switch consisting of a fixed contact 5 and a spring blade 6 which is biased to open-circuit position. As shown, the switch blade is located by a boss 7 upstanding from the customary insulating bridge piece 8 in which the armature shaft is journaled and on which the contact mechanism is mounted.

The motor is controlled by a thumb-operated button 9 pivotally connected by a stud 10 with the bridge piece 8, the button moving between the "stop" and "start" positions illustrated in Figs. 2 and 3, respectively.

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From one face of the starter button there projects a lug or arm 11 (Figs. 1 and 4) which serves to flex the switch blade into engagement with contact 5 when the starter button is moved from "stop" to "start" position and to permit the blade to disengage itself from the contact and break the motor circuit when the starter button is moved in the opposite direction.

The starting movement of the button is also adapted to impart a spin to the armature shaft coincidentally with the closure of the switch. It will presently be apparent that, by appropriate adjustment of the parts, the actual engagement of the switch blade 6 with contact 5 can be made to occur at such time, relatively to the spinning of the armature, as may be most appropriate for the particular motor design.

The armature shaft is rotated by a pinion 12 secured to one end of the shaft and a button-operated, gear quadrant 13, the parts being so organized that, when the push button is moved to start the motor, the quadrant moves into mesh with the gear and sweeps through a sufficient arc to pass clear of the gear on the far side; but, when the push button is moved to stop the motor, the quadrant moves back to its initial position along a different path to avoid clashing with the teeth of the still-rotating gear, the motor actually being stopped as the result of the breaking of the circuit by switch 5—6.

Mounted to pivot about the axis of stud 10 is a first lever 14, of cranked form and having a laterally bent ear 15 which is engaged in a slot 16 formed in one side of the starter button, so that movement of the button from "stop" to "start" position swings lever 14 counter-clockwise about stud 10.

To the outer end of lever 14 is attached an extension, in the form of a second lever 17, which has a yieldable, friction-pivot connection with the first lever. The connection includes a stud 18, located in a hole in lever 17 and in a slot 19 in lever 14, and a friction or spring washer of any suitable form (not shown) so that the two levers are movable as a unit or relatively to each other, depending upon the freedom of movement of lever 17. It will be noted that lever 17 is a two-armed, crank lever, the lower arm carrying the gear quadrant mentioned above; and more or less at the junction of the two arms of lever 17 is an internal cam or triangular slot 20 which encircles a stud 21 upstanding from the insulating bridge piece 8. Slot 20 constitutes a track which, by engagement with stud 21, limits the bodily movement of lever 17 and, at appropriate

times, causes it to pivot about stud 21, as follows.

The initial movement of the starter button swings lever 14 from the full to the dotted line position shown in Fig. 2 and, throughout this movement, lever 17 moves bodily (as an extension of lever 14) from its full to dotted line position as shown in Fig. 2. At this juncture, the gear quadrant will have engaged pinion 12 and the upper "corner" of the cam slot will have engaged stud 21. Thus, bodily movement of lever 17 is arrested; and, as the movement of the starter button is continued, the friction-pivot connection between the two levers yields (stud 18 sliding in slot 19) and lever 17 is rotated about stud 21 and the gear quadrant swept through the pinion teeth to spin the armature shaft. The limit position of the parts at the end of this movement of the starter button is shown in full lines in Fig. 3. The armature having been spun and the switch coincidentally closed, the motor is thus set in operation.

When the starter button is moved in the opposite direction to stop the motor, the initial movement, as before, is of levers 14 and 17 as a unit (swinging clockwise about pivot stud 10). This bodily movement of the two levers results in the gear quadrant being lifted clear of the teeth of pinion 12 and continues until stud 21 is engaged by the lower "corner" of cam slot 20. At such time the parts are in the dotted line position shown in Fig. 3.

As the starter button movement continues, the friction pivot connection yields and lever 17 rotates about stud 21, returning finally to the position shown in full lines in Fig. 2. Coincidentally with the foregoing, arm 11 will have been withdrawn, permitting the switch blade 6 to move to open-circuit position (Fig. 1) and the motor thereby stopped.

While only a preferred embodiment of the invention has been described, it will be understood that the principles of the invention are susceptible of application in various forms and to modification as the requirements of any particular installation may render desirable.

In the light of the foregoing, the following is claimed:

1. A starting device comprising the combination of a manually operable first lever, an extension of such lever in the form of a second lever having a yielding, friction-pivot connection with the first lever, whereby said levers are movable as a unit in response to initial movement of the first lever, means for limiting such unit movement and inducing movement of the second lever relatively to the first in response to continued movement of the first lever, said means comprising a fixed pivot encircled by a slot in the second lever on the side of said connection remote from the first lever, a starter extension associated with said second lever, and a shaft to be rotated positioned for engagement by said starter extension when the said fixed stud is in one of its limit positions in the track slot.

2. A starting device comprising the combination with a shaft to be rotated, of a pivoted starter button movable back and forth between stop and start positions, a first lever associated with said button for movement thereby, a second lever having a friction-pivot connection with the first lever and having a track slot, a fixed stud projecting into the track slot, and a shaft actuating arm projecting laterally from the secured lever into proximity with, but spaced from, the shaft when the button is in its said stop position, a wall of the track slot being located to engage the said stud when the said button is positioned between its said stop and start positions.

3. A starting device comprising the combination with a shaft to be rotated and a pinion secured thereto, of a two-armed crank lever having a gear quadrant on one arm thereof and a track slot formed at the junction of the crank lever arms, a stationary pivot stud in said track slot, a manually operable starting lever, and a friction-pivot connection between the starting lever and the other arm of the said crank lever.

4. In a starter mechanism, a composite, bodily-movable lever unit comprising a manually operable first lever and an extension connected thereto by a friction-pivot joint, said extension having a laterally projecting starter arm and a track slot at the junction of the extension and the starter arm, and means for breaking said joint and rotating said starter arm comprising a stationary stud located in said track slot.

5. In a starter for a motor having a circuit and a switch in such circuit: a composite, bodily-movable lever unit comprising a manually operable first lever and an extension connected thereto by a friction-pivot joint, said extension having a laterally projecting starter arm, means for breaking said joint and rotating said starter arm, and a push button operatively associated both with said switch and with said first lever.

6. In a starter for a motor having a circuit and a switch in such circuit: a composite, bodily-movable lever unit comprising a manually operable first lever and an extension connected thereto by a friction-pivot joint, said extension having a laterally projecting starter arm and a track slot at the junction of the extension and the starter arm, means for breaking said joint and rotating said starter arm comprising a stationary stud located in said track slot, and a push button operatively associated both with said switch and with said first lever.

7. In a starter of the kind described, a composite, bodily-movable lever unit comprising a manually operable first lever and an extension connected thereto by a friction-pivot joint, said extension having a laterally projecting starter arm, means for breaking said joint and rotating said starter arm, and a push button operatively associated with said first lever.

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