July 23, 1929. P. SUTER 1,722,117

CENTRIFUGAL SWITCH

Filed Oct. 9, 1928

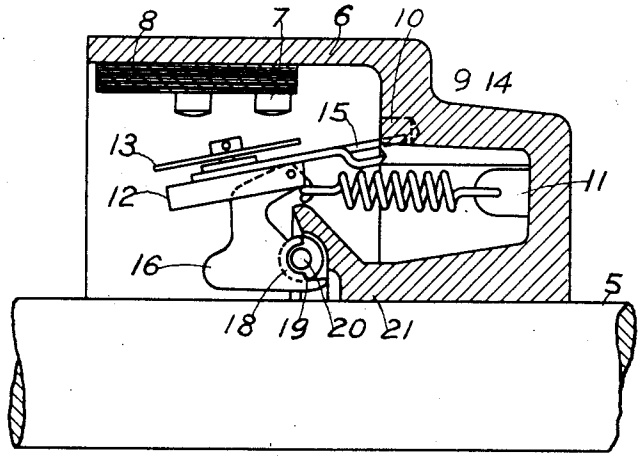


Fig. 1.

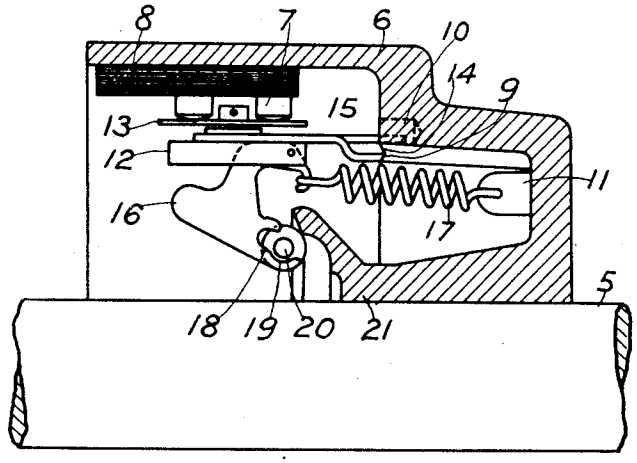


Fig. 2.

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Patented July 23, 1929. 1,722,117

UNITED STATES PATENT OFFICE.

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CENTRIFUGAL SWITCH.

Application filed October 9, 1928, Serial No. 311,265, and in Germany October 3, 1927.

This invention relates to switches operated by centrifugal force, especially to such switches adapted for mounting upon or in connection with an electric motor.

Centrifugal switches are usually so constructed that a switch lever provided with movable contacts, is kept in open position by a spring until rotation of the switch members produces centrifugal forces, sufficient to move the contacts, carried by the switch lever, into contact with fixed contacts against the action of the opposing spring. In consequence of this construction, the spring must be so proportioned that the force exerted thereby will maintain the switch in open position until a predetermined rotary speed of the switch members has been reached.

The above described construction, however, is subject to the disadvantage that the greater portion of the centrifugal force is required to overcome the action of the spring so that the movable contacts press very lightly against the fixed contacts. Another disadvantage of such construction is that the action of the movable contacts enclosing the circuit is comparatively slow thereby permitting the formation of arcs between the several contacting surfaces.

It is, therefore, among the objects of the invention to improve the action of the switch by providing a structure in which the movable contacts engage the fixed contacts by a continuous snapping action.

Another object of the invention is to increase the contact pressure between the various contacting surfaces to prevent arcing action therebetween.

A further object of the invention is to provide latching means which assist a spring in holding the movable contacts in open position until such time as the centrifugal force produced by rotation thereof is sufficient to overcome action of the spring.

Further objects and advantages will appear to those skilled in the art upon consideration of the following description and the drawings accompanying and forming a part of this specification.

In the drawings:

Fig. 1 is a longitudinal section showing the switch in open position.

Fig. 2 is a section similar to that shown in Fig. 1 showing the switch in closed position.

Referring to the drawing by characters of reference, 5 indicates a motor shaft carrying a housing 6. The housing 6 may be a portion of the motor housing or may be a separate housing intended merely to receive the switch mechanism, hereinafter described. The housing 6 is fixed to the motor shaft 5 to rotate therewith. A pair of fixed contacts 7 are secured to the housing 6 and are separated therefrom by insulation 8. The housing 6 is provided with a notch 9 and a socket 10 immediately over the notch 9. An extended portion of the housing forms a recess or socket with an ear 11 extending from the central portion of the bottom of the socket substantially parallel to the axis of rotation of the housing. The ear 11 is provided with an aperture the purpose of which will appear hereinafter.

A switch lever member 12 is provided with a movable contact member 13 adapted to bridge the fixed contacts 7. One end of the switch lever 12 is provided with a knife-edge portion 14 adapted to rest in the notch 9 and with an extension 15 arranged to extend into the socket 10, and to limit movement of the lever member 12.

A latch member 16 is pivotally secured to the side of lever member 12 opposite to movable contact 13. The end of latch member 16, adjacent the switch lever 12, is provided with a hook portion which is connected with the ear 11 by means of a spring 17. The lower end of the latch member 16 is provided with notches 18 and 19 in either of which a roller member 20 is adapted to rest, dependent on the position of the latch member. The roller 20 operates over the surface of a stop member 21, which is preferably formed from a portion of the housing 6, which is provided with a curved surface and a plane surface upon which the roller 20 operates.

In the open position of the switch as shown in Fig. 1, the roller 20 rests on the curved surface of the stop 21 and in the upper notch of the latch 16. In this position, the greater portion of the mass of the latch 16 is substantially parallel to the axis of rotation while the spring 17 is slightly biased thereabout. The resultant of these forces is such that the roller rests on the curved surface of the stop member immediately adjacent the plane surface thereof. When the predetermined speed for operation of the switch is approached, the centrifugal force acting upon the latch causes the same to swing outwardly, whereupon the

roller axle rests in the lower notch of the latch. Increase of speed, with resultant increase of centrifugal force, continuing until the full predetermined speed for operation of the switch has been reached, causes the roller to move to the plane surface of the stop member under the combined action of centrifugal force upon the latch member and the spring 17.

This combination of forces produces quick release of the roller from the plane surface and provides continuous closing movement, which takes place very quickly, due to the combined action of centrifugal force and the spring. The lever pivots about the knife-edge 14 to the closed position shown in Fig. 2. It will be seen that, in the closed position, the spring is substantially parallel to the axis of rotation and at a slight angle with the lever. The contacts are therefore pressed close together not only by the action of centrifugal force on the latch member but also by the action of the spring and the combination of the forces preventing separation of the contact points, due to slight variations of speed, with the consequent formation of arcs therebetween.

It will be clearly apparent that the above construction and action provides a centrifugal switch which not only closes with a quick continuous snapping action but also retains the contact points of the switch in closed position until a predetermined reduction of speed causes the reverse movement of the switch mechanism to take place.

Although I have illustrated only one embodiment of my invention, it will be apparent to those skilled in the art that various changes may be made therein, without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. In a switch operable by centrifugal force, a housing, fixed contact members secured on said housing, a lever member pivotally engaging said housing, a contact member mounted upon said lever member and movable therewith to bridge said fixed contact members, a latch member movably attached to said lever member and contacting with said housing, and a spring for retaining the said latch member in engagement with said housing.

2. In a switch operable by centrifugal force, a rotatable housing, fixed contact members secured on said housing, a lever member contacting with said housing in pivotal engagement thereon, a contact member mounted upon said lever member and movable therewith to bridge said fixed contact members, a latch member movably attached to said lever member and contacting with said housing, and a spring for retaining the said latch member in engagement with said housing.

3. In a switch operable by centrifugal force, a rotatable housing, fixed contact members secured on said housing and insulated therefrom, a lever member in pivotal engagement on said housing, the end of said lever member extending into a socket formed in said housing to limit movement thereof, a contact member mounted upon said lever members and movable therewith to bridge said fixed contact members, a latch member movably attached to said lever member and contacting with said housing, and a spring for retaining the said latch member in engagement with said housing.

4. In a switch operable by centrifugal force, a rotatable housing, fixed contact members secured on said housing, a lever member pivotally engaging said housing, a contact member mounted upon said lever member and movable therewith to bridge said fixed contact members, a latch member movably attached to said level member and contacting with said housing, said lever member having the greater portion of its mass substantially parallel with the axis of rotation when the contacts are in open position, and a spring for retaining said latch member in engagement with said housing, said spring being arranged substantially parallel to the axis of rotation of said housing.

5. In a switch operable by centrifugal force, a rotatable housing, fixed contact members secured on said housing, a lever member pivotally engaging said housing, a contact member mounted on said lever member and movable therewith to bridge said fixed contact members, a latch member movably attached to said lever member and contacting with said housing, said latch member having notches in one end thereof, a freely movable roller arranged to rest in different notches in said latch member dependent on the different positions of said lever member, and a spring for retaining said latch member in engagement with said housing below predetermined rotary speeds thereof.

6. In a switch operable by centrifugal force, a rotatable housing, said housing having two sockets and an intermediate notch formed in the internal end portion thereof, fixed contact members secured on said housing, a lever member pivotally engaging in said intermediate notch of said housing, said lever member having a portion of the end thereof extending into the upper socket in said housing, a contact member mounted upon said lever member and movable therewith to bridge said fixed contact members, a latch member movably attached to said lever member and contacting with said housing, and a spring secured at one end to a hooked portion of said lever member and at the other end to an ear extending parallel

with the axis of rotation from the bottom of the lower socket in said housing to retain said latch member in engagement with said housing.

7. In a switch operable by centrifugal force, a rotatable housing, fixed contact members secured on the interior wall of said housing, a lever member pivotally engaging said housing, a contact member mounted on said lever member and movable therewith to bridge said fixed contact members, a latch member movably attached to said lever member and contacting with said housing, said housing having a portion adjacent the central portion thereof formed as a stop for said latch member, said stop portion of said housing having a portion of the surface thereof curved and a portion of the surface thereof plane to provide different contacting positions for said roller in different positions of said latch member, and a spring secured between said latch member and said housing for retaining the former in engagement with the latter.

In testimony whereof I have hereunto subscribed my name this 24th day of September, A. D. 1928.

PHILIPP SUTER.