Sept. 19, 1939. W. S. THOMAS 2,173,543

CENTRIFUGAL SWITCH

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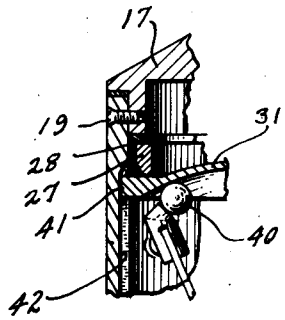


Fig. 3.

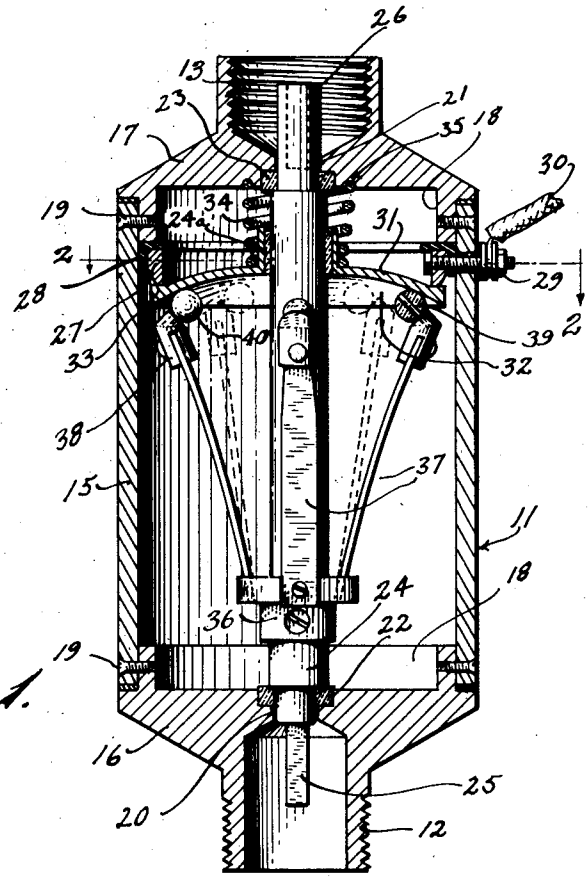


Fig. 1.

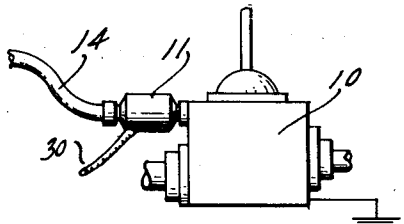


Fig. 4.

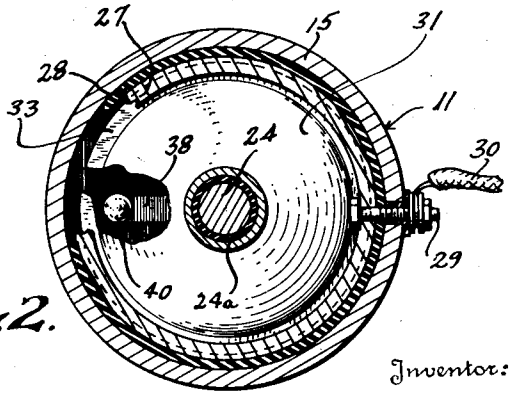


Fig. 2.

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CENTRIFUGAL SWITCH

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Application October 17, 1938, Serial No. 235,479

6 Claims. (Cl. 200—80)

This invention relates to a centrifugal switch and it consists in the construction, arrangements and combinations herein described and claimed.

It is an object of the invention to provide a switch which will be stable and positive in operation and one in which a wiping contact is avoided, insuring longer life to the switch contact.

It is a further object of the invention to provide a switch in which the rotating shaft is supported in bearings of glass, jewels or similar materials, obviating the need for lubricating the bearings of the shaft.

It is a still further object of the invention to provide a centrifugal switch in which the weighted throw levers of the governor mechanism may be changed to effect actuation of the switch at predetermined speeds.

Additional objects, advantages and features of invention will be apparent from the following description and accompanying drawing, wherein

Figure 1 is a vertical sectional view of a switch constructed in accordance with my invention.

Figure 2 is a cross section on the line 2—2 of Figure 1, with portions broken away.

Figure 3 is a detail of a modified form of the switch contact members.

Figure 4 is a side elevation of a transmission of a vehicle having my device installed.

The switch here disclosed may be employed in various situations, but for the sake of illustration is here shown associated with a motor vehicle transmission, indicated at 10 in Figure 4, the switch 11 having a threaded stud 12 for attachment to a threaded aperture of the transmission housing.

The opposite end of the switch has an interiorly threaded boss 13, for reception of a speedometer drive shaft cable 14.

Referring in detail, to Figure 1, the switch 11 comprises a cylindrical casing 15 open at its ends for reception of respective closure plugs 16 and 17. Each of the plugs 16 and 17 have a circumscribing flange 18 adapted to snugly fit within the respective ends of the casing, the plugs being secured by means of set screws 19. The plug 16 has an axial bore 20 and the plug 17 is similarly formed with a bore 21, the bores being in alignment. Around respective bores 20—21 an annular seat is provided, receiving therein respective jewel bearings 22 and 23. The bearings 22—23 have apertures aligned with bores 20—21 and revolubly support a governor shaft 24.

The shaft 24 has one end formed with a flat tongue 25 for establishing connection with a driven shaft of the transmission, the other end having a squared socket 26 for reception of the flexible drive shaft of a speedometer.

A contact ring 27 is secured in the casing 15 adjacent the closure plug 17, insulated from the casing by a ring 28. The ring 27 may be secured to the casing in any approved manner and electrically connected with the ring 27 there is a binding post 29 one end of which is disposed outwardly of the casing, forming a connection for an electrical cable 30, leading from an electromagnetic valve (not shown) which will be in circuit with an electromotive source.

A contact plate 31 is reciprocably mounted upon the shaft 24 by means of a jewel collar 24a, the plate adapted to engage the contact ring 27, at times, as will be explained. The contact plate 31 has a concave surface 32, the plate being of a diameter the same as that of the contact ring 27, the upper edge of the plate at its periphery being flattened, as at 33, to smoothly contact the ring 27.

In order that the contact plate 31 will be held away from the contact ring, except under certain conditions of operation, a helical spring 34 is interposed between the base of the plug 17 and the upper surface of the plate, and preferably the spring will be frictionally seated in a groove 35 formed in the base of the plug, the opposite end of the spring frictionally binding upon the collar of the contact plate 31 and by reason of this frictional engagement, rotary movement, if any, will be overcome, and it will be obvious that the spring 34 will exert a pressure holding the plate 31 separated from the contact ring 27.

Adjacent the closure plug 16 a collar 36 is secured to the shaft 24 and from this collar a plurality of resilient spring arms 37 are fixed, the upper free ends having a weight 38 detachably secured thereto. The weights 38 extend in the longitudinal axis of the arms and upon the inner side thereof there is a pintle 39, extended at an angle to the axis of the arms. Upon each pintle a ball 40 is revolubly mounted, the outer end of the pintle being peened for securement of the ball to the pintle, although other means may be employed as desired. The balls 40 may be formed from any hard substance, such as agate, which is desirable, due to the rolling contact between the balls and the concave surface 32 of the contact disk.

Normally, the spring arms 37 will assume a position substantially parallel to the shaft 24, in which position the spring 34 will hold the contact disk 31 separated from the contact ring 27. However, upon imparting rotation to the shaft 24

beyond a predetermined speed, the arms 37 will be forced outwardly, due to centrifugal force, and since the balls 40 engage the concave face 32 of the contact disk 31, the disk will be caused to move upwardly longitudinally of the shaft 24 against the action of the spring 34. Such movement continues until the critical speed has been attained, at which time the circuit between the contact ring 27 and the disk 31 has been made. The lead 30 may be connected to an electromagnetic valve for controlling the flow of gasoline to any engine of a motor vehicle, and since the lead 30 is electrically connected with the contact ring 27 the circuit to the valve is completed, causing actuation of the valve to prevent further passage of gasoline to the engine of the vehicle. However, as soon as the speed of the vehicle has decreased below the critical point, the governor parts return to normal position, breaking contact between the ring and disk, thereby de-energizing the electromagnetic valve, restoring flow of gasoline to the engine.

Numerous means for varying the speed at which the contact between the ring and disk can be made may be employed, and this is desirable, for State laws requiring operation of a governor vary, and moreover, truck speeds vary as regards pleasure vehicles. Thus, the speed at which the governor functions may be varied by changing the radius of the contact disk; by changing the size of the balls or weights; or by changing the size and tension of the spring arms. In this instance, the weights 38 are shown as detachable, permitting ready change of the weights according to a desired speed operation.

In Figure 3, I have illustrated a modified form of contact disk, positively held against rotary movement. In this form, the disk 31 is provided upon its periphery with a lug 41 slidably engaged in a slot 42 formed longitudinally of the casing 15. Obviously, the disk 31 may partake of longitudinal sliding movement within the casing imparted thereto by reason of the spring arms 37 and the helical spring 34.

While I have shown and described preferred forms of the invention, this is by way of illustration only, and I consider as my own all such modifications in structure as fairly fall within the scope of the appended claims.

I claim:

1. A centrifugal switch comprising a rotary shaft, a fixed contact ring, a contact disk slidably mounted on the shaft of a diameter to contact the ring at times, spring arms fixed to the shaft and rotatable therewith, the upper ends of the arms being in bearing contact with the disk.

2. A centrifugal switch comprising a casing, a rotary shaft therein, a fixed contact ring within the casing, a contact disk longitudinally slidable upon the shaft, the disk having a diameter to contact the ring at times and having a concave underface, centrifugally actuated means fixed to the shaft, laterally moving portions of said means contacting the concave underface of the disk.

3. A centrifugal switch comprising a casing, a rotary shaft therein, a fixed contact ring within the casing, a contact disk longitudinally slidable upon the shaft, the disk having a diameter to contact the ring at times, and having a concave underface, a collar fixed to the shaft, a plurality of resilient arms fixed to the collar, and bearings carried by the free ends of the arms and contacting the concave surface of the disk.

4. The structure of claim 3 in which the bearings are revoluble agate members.

5. A centrifugal switch comprising a casing having end closure caps, the caps having aligned bores, an apertured jewel bearing in each bore, a shaft revolubly mounted in the bearings, the shaft having means at the ends for connection with a driving and driven shaft respectively, an annular contact ring fixed within the casing adjacent one end, the ring being insulated from the casing, a binding post electrically connected with the ring, a contact disk longitudinally movable on said shaft, the disk having a concave underface, and a flat peripheral contact face, the latter being adapted to engage the contact ring at times, spring means interposed between the disk and the adjacent closure cap, a collar fixed to the shaft opposite the contact disk, spring arms carried by the collar and extended in the direction of the contact disk, a detachable weight member on the free end of each arm, each weight having an angularly extended pin, and a revoluble agate ball on each pin, said balls being in rolling engagement with the concave surface of the contact disk.

6. A centrifugal switch comprising a casing having end closure caps, the caps having aligned bores, an apertured jewel bearing in each bore, a shaft revolubly mounted in the bearings, the shaft having means at the ends for connection with a driving and driven shaft respectively, an annular contact ring fixed within the casing adjacent one end, the ring being insulated from the casing, a binding post electrically connected with the ring, a contact disk having an axial collar, a jewel sleeve therein for reception of the shaft therethrough, the disk further having a concave underface, and a flat peripheral contact face, the latter being adapted to engage the contact ring at times, spring means interposed between the disk and the adjacent closure cap, a collar fixed to the shaft opposite the contact disk, spring arms carried by the collar, and extended in the direction of the contact disk, a detachable weight member on the free end of each arm, each weight having an angularly extended pin, and a revoluble agate ball on each pin, said balls being in rolling engagement with the concave surface of the contact disk.

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