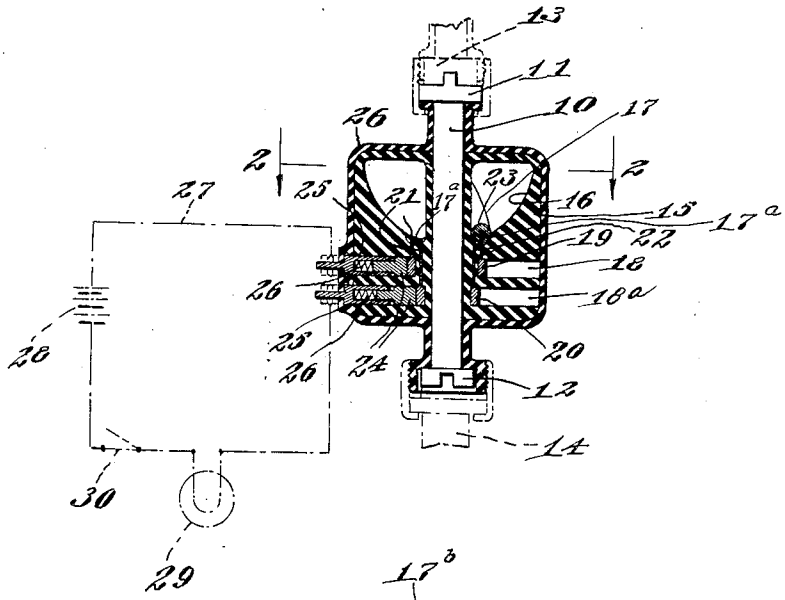
Feb. 4, 1936. G. S. MOORE 2,029,632

CENTRIFUGAL ELECTRICAL MERCURY SWITCH

Filed Jan. 5, 1934

Fig. 1.



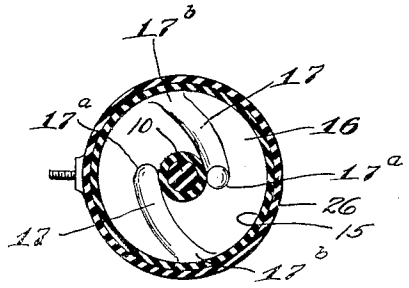


Fig. 2.

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Patented Feb. 4, 1936 2,029,632

UNITED STATES PATENT OFFICE

2,029,632

CENTRIFUGAL ELECTRICAL MERCURY SWITCH

Guy S. Moore, Salem, Mass., assignor of fifty-one per cent to Eugene B. Fraser, Lynn, Mass., and twenty-four per cent to Fred H. Rowe, Gloucester, Mass.

Application January 5, 1934, Serial No. 705,407

4 Claims. (Cl. 200—80)

My present invention relates to electric switches and more particularly to an automatic electrical switch centrifugally operated by rotating bodies.

The present application is to be identified with my previous application filed May 9, 1933, Serial Number 670,095. The present invention is designed to operate centrifugally using mercury as a medium for contacting or opening and closing an electrical circuit. Under some conditions an ordinary cup shaped cavity might be satisfactory but where precision is necessary it has been found that a rotating cup is more or less unreliable with respect to quick action due to the fact that the cup starts rotating first while the ball of mercury is more sluggish and the centrifugal effect produced on the mercury ball at the bottom of the cup is sometimes delayed causing electrical circuit to be opened a few seconds after the cup starts rotating and while this lapse of time if always constant might be compensated for otherwise it has also been found that such lapse of time is irregular and undependable; therefore

The principal object of my invention is an improved centrifugally operated mercury switch for electrical contacts and the like;

Another object is an improved centrifugal mercury cup adapted to discharge the mercury upwardly from the lower gravity position which it normally resides in at rest immediately when the cup starts to rotate, and

Other objects and novel features comprising the construction and operation of my invention will appear as the description of the same progresses.

In the drawing illustrating the preferred embodiment of my invention,

Fig. 1 shows a typical and substantially vertical cross section of the revolving cup and drive shaft surrounded by a casing and a dotted line circuit for an incandescent lamp illustrating one of its uses, and

Fig. 2 is a cross section taken on the line 2—2 of Fig. 1 and showing the complete symmetrical cross sections thereof.

Referring more in detail to the drawing 10 indicates a rotatable shaft link preferably composed of fibre having male and female end portions 11 and 12 respectively to which may be connected driver or driven shafts 13 and 14 either of a rigid or flexible nature. Solidly attached to shaft link 10 is a cup member 15. The cup member 15 is preferably made of some insulating material such as bakelite, hard rubber or the like and may be if desired moulded to the link 10 or if desired it may attached by any other means. Cup member 15 is provided with a cup shaped cavity 16 adjacent its top portion being closed on all sides and provided at its curved sides with a pair of spirally located grooves 17 one end of the groove 17 starting at the lowermost point of the cup cavity 16 as indicated by the numeral 17*a* and extending up the side walls of the cavity 16 spirally to the point 17*b* adjacent the top of the cavity 17 at which point the groove 17 fades out into the surface plane of the cavity 16 at that point. Below the cavity 16 of the cup 15 are located two annular grooves 18 and 18*a*. On the inner periphery of the grooves 18 and 18*a*, I have moulded in annular rings 19 and 20. The rings 19 and 20 are further provided with contact pins 21 and 22 which are projected upwardly through the composition of the cup 15 into the lower ends of the groove 17*a* in the cup cavity 16 such that when the cup is at rest a ball of mercury 23 will connect the pins 21 and 22 and thereby close an electrical circuit through stationary brush members 24 which are maintained in a stationary position with respect to rotation in their respective housings 25 solidly embedded in the stationary outer casing 26 which is composed of insulating material such as moulded bakelite and surrounds the shaft 10 and the cup 15. The brush housings 25 are provided with an internal cavity in which is located brush springs 26 adapted to resiliently maintain contact between the brushes 24 and the contact rings 19 and 20.

One of the improvements of my present invention over the previous application aforesaid and to which I wish to refer is the design of the circuit contacts. In actual practice it has been found that where a mercury ball continually revolves around a contact shaft or similar device there develops a surface scale of insulation such that an electrical contact between the mercury and the shaft is imperfect and irregular at times particularly after the device has been used for a time. In my present device, I have obviated this condition by providing separate positive and negative contacts which are embedded through the surface of the mercury ball to its interior when such ball has come to rest thereby not having to depend on a purely surface contact of the mercury ball. It has also been found in practice that rotating objects such as shaft 10 are not always reliable as contacting mediums in the use of a single circuit where the rotating shaft is used as a ground.

In the above description of my invention I have shown in dotted lines an electrical circuit 27, an

electrical source of energy such as a battery 28, and a series connected incandescent lamp 29 as an illustration of one application of my switch. When the shaft 10 is at rest, the ball of mercury 23 seeking its lowest level will be deposited in one of the ends of the groove 17 as illustrated in Fig. 1, at such time the incandescent lamp 29 having an electrical circuit provided therethrough will be illuminated but when the shaft 10 is rotated the groove 17 offers an obstruction against the rotation of the mercury on the surface 16 and because of this obstruction and the centrifugal force set up by the spinning of the cup and mercury ball together, the mercury ball is deflected upwardly in the cup and away from the contacts 21 thereby opening the circuit to the lamp 29.

If it be assumed that the shafting 13 and 14 represents the cable of a speedometer in a moving vehicle and the incandescent lamp 21 a stop light on the rear of the vehicle it will readily be apparent that when such vehicle is slowed down to a predetermined speed stop light 29 will automatically become illuminated. A simple switch 30 may be provided if desired to open the electrical circuit at any time when the vehicle is not in use.

It is to be understood that and it is readily apparent that, my switch is not limited in its use to a motor vehicle but could be used on stationary machinery or any other place where a warning signal might be desired to indicate a change of speed and it is also apparent that the contacting of the mercury may be regulated with respect to the speed of the rotating cup by designing the cup cavities with different degrees of pitch thereby varying the centrifugal force effect on the mercury ball with respect to its outward movement such that a slow speed of the shaft with a flat angle on the side would cause the ball of mercury to move outwardly while a steeper pitch of the cavity 16 would maintain a contact and a closed surface at the same shaft speed and is therefore understood that I may vary the design and proportion of my invention within wide limits without departing from the spirit thereof.

Having thus described my invention what I claim is:

1. An improved electrical switch comprising an internally cup-shaped rotor, a stationary casing enclosing said rotor, brush contact members mounted in said casing, annular rings embedded in said rotor adapted to engage said brushes, mercury located in the cup cavity of said internal cup shaped rotor, a spiral groove located in the surface of said cavity, electrical contacts located in the bottom of said spiral groove and connecting with said rings, mercury located in said cavity adapted to engage said contacts in said grooves when said rotor is at a rest position.

2. An improved electrical switch comprising a rotor, a cup-shaped cavity located in said rotor, electrical contact rings connecting said cavity in said rotor, a casing surrounding said rotor, electrical contact members attached to said casing adapted to engage said contact rings in said rotor, mercury located in the cavity of said rotor, guide members located on the internal surface of said cavity adapted to guide said mercury upward and outward by means of centrifugal force when said rotor is revolved.

3. In a centrifugal mercury operated switch, a rotor having an internally disposed cup-shaped cavity adapted to maintain a small portion of mercury therein, a guide member located on the inner surface of said cup-shaped cavity for the purpose of deflecting said mercury upward and outward when said rotor is rotated and to prevent the rotation of said cup-shaped cavity from surface slippage on said mercury, electrical contact members connected with the said cavity for the purpose of closing a circuit through said mercury when said rotor is at rest.

4. In a centrifugally operated mercury switch, a hollow rotor, a deflector member located on the inner surface of said hollow rotor adapted to displace a mercury ball by means of centrifugal force when said rotor is rotated, electrical contact means connecting said cavity of said rotor, and a stationary casing adapted to enclose said rotor and hold said contact members.

GUY S. MOORE.