Oct. 17, 1939. J. A. MAUGHT 2,176,770

CIRCUIT BREAKER

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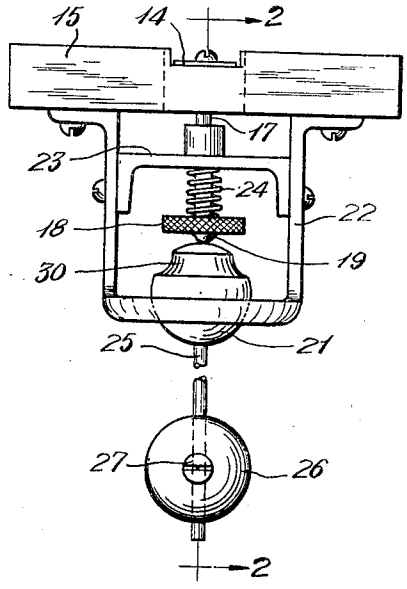


FIG. 1

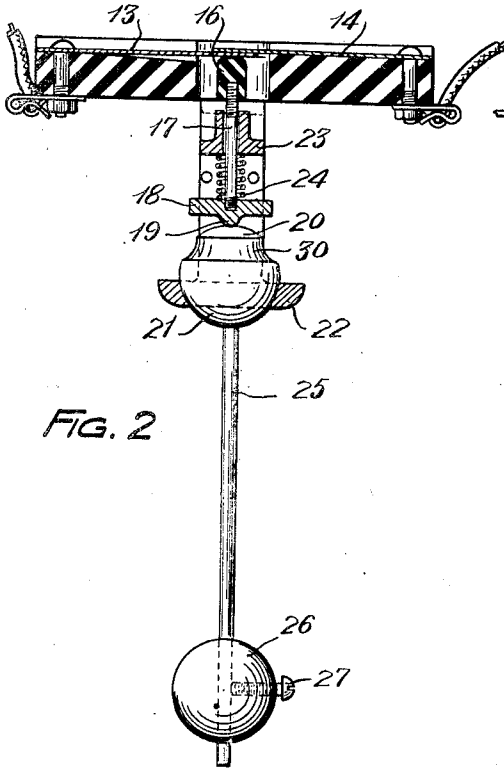


FIG. 2

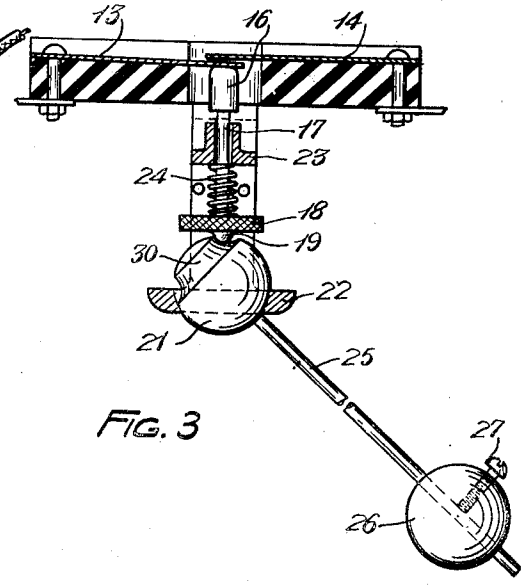


FIG. 3

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CIRCUIT BREAKER

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2 Claims. (Cl. 200—52)

The present invention relates to automatic safety switches or circuit breakers particularly adapted to be connected in the electric system of a vehicle or the like and automatically operated upon collision of the vehicle with some other object, or upon the vehicle being partially or completely overturned.

An object of the invention is the provision of a novel switch or circuit breaker adapted to be operated upon impact or collision of a vehicle or object to which it is attached with another object regardless of the direction of impact, or upon the vehicle being overturned or partially overturned for any reason.

Another object of the invention is the provision of a novel safety switch or circuit breaker of the character aforesaid which will be simple and rugged in construction, positive in operation, and inexpensive to manufacture.

The present invention resides in certain details of construction, in certain combinations and arrangements of parts, and further objects and advantages thereof will be apparent to those skilled in the art to which it relates from the following description of the preferred embodiment hereinafter described with reference to the accompanying drawing forming a part of this specification, in which similar reference characters designate corresponding parts throughout the several views, and in which:

Fig. 1 is a side elevation of a safety switch or circuit breaker embodying the present invention;

Fig. 2 is a section on the line 2—2 of Fig. 1, and

Fig. 3 is a view similar to Fig. 2 but showing the parts in a different operating position.

Safety switches or circuit breakers of the type to which the present invention relates, are primarily intended to be connected in the electric systems of vehicles such as automobiles, busses, trucks, aeroplanes, dirigibles, etc., and operate automatically to open the circuit in which they are connected in the event of impact or collision, or the overturning or partially overturning of the vehicle, thus preventing fire which might otherwise occur caused by the operation of some part of the electric system, such as the ignition system, or by a short circuit in the system. Preferably the device is located in a protected place and connected in the electric system as near the battery or source of electrical energy as possible. However, this location is not exclusive and the device may be connected in any other part of the circuit deemed satisfactory or so proven by experience. In the case of automobiles, trucks, etc., the device may conveniently be connected beyond the starting circuit because of the heavy current occurring in said circuit, and the fact that most, if not all of the trouble which the device is intended to prevent, is occasioned by the electric system other than the starting circuit which is relatively heavily insulated.

Referring to the drawing, the reference characters 13 and 14 designate resilient contact members carried by a block 15 of insulation material, and adapted to be connected in the electrical circuit which it is desired to open upon collision, etc., as stated. The contact members 13 and 14 are spring biased open and are adapted to be held in engagement with each other to complete the circuit in which they are connected by a member 16 also of insulation material, carried on the upper end of the pin or rod 17, the lower end of which pin or rod is fixed to a knurled disk 18 having a rounded projection 19 on the under side thereof which rides on the upper dome or cap-like surface 20 of a sphere 21 rotatably supported in a bracket 22 fixed to the under side of the block 15. The assembly comprising the insulated member 16, the pin or rod 17 and the knurled disk 18 is slidably supported for vertical movement by a bracket 23 fixed to the bracket 22 and is continuously urged in a downwardly direction by a compression spring 24 surrounding the rod 17 and interposed between the knurled disk or member 18 and the bracket 23. The sphere 21 forms one element of a pendulum comprising a rod 25 fixed to the underside of the sphere 21 and a weight 26 adjustable along the rod 25. As shown, the weight 26 is in the form of a sphere and is adapted to be secured in various positions along the rod 25 by a jammed screw 27.

The sphere 21 rotates universally in the bracket 22 and has an annular groove 30 formed in the upper side thereof into which groove the projection 19 on the underside of the knurled disk 18 will drop, see Fig. 3, when the vehicle to which the device is attached reaches a predetermined angle with relation to the vertical, or when the pendulum assembly is swung to a predetermined angle by the inertia thereof in the event the vehicle is involved in a collision or the like. The construction is such that during normal operation the projection 19 rides on the cap or dome-like surface 20 of the sphere 21 and the contacts 13 and 14 held closed, but when the projection 19 drops into the groove 30 the insulating member 16 no longer presses the lower contact member 13 against the upper contact member 14 and

the contacts are permitted to open. The groove 30 is so shaped that the projection 19 will be retained therein once it has dropped off of the surface 20 until the device is reset. In the embodiment shown, this is accomplished by manually raising the knurled disk 18 against the action of the spring 24, thus permitting the pendulum to return to its normal position. As will be readily understood, the position of the groove 30 on the surface of the sphere 21 may be changed to increase or decrease the sensitivity of the device and means other than manual may be employed for resetting the same.

Any suitable frame or bracket may be provided for mounting the device in the vehicle, the principal requirement being that the projection 19 on the knurled disk 18 contact or ride on the dome-like surface 20 of the sphere 21 about the center thereof when the vehicle is level and the pendulum in a vertical position. It will also be understood that the pendulum must be free to swing in all directions. If desired a part or all of the device may be enclosed in a case for protecting the same against dirt, grit, etc.

It has heretofore been suggested that switches of the type referred to be used to make a circuit in the event of collision, etc., rather than open a circuit, thus applying brakes or the like. If such operation is desired, it will be apparent that the preferred embodiment of the present invention shown and described herein may be readily modified to make or close a circuit rather than break or open a circuit, by biasing the contacts closed instead of open and causing the member 16 to lift the upper contact from the lower one as distinguished from the present construction wherein the lower contact is raised or held in contact with the upper contact by the member 16.

From the foregoing description of the preferred embodiment of the invention, it will be apparent that the objects of the invention have been attained and that a novel safety switch or circuit breaker of the type referred to have been provided, which is simple and rigid in construction, positive in operation, requires minimum maintenance, and is inexpensive to manufacture, etc.

The device is equally applicable to all sizes and types of vehicles and may readily be made to handle any amount of current, etc. The location of the groove on the surfaces of the sphere, the length and weight of the pendulum, the type of electric contacts or switch depending upon the character of the current to be interrupted, the length and size of the spring operated assembly, and many other parts may be varied as to character and relation with each other to meet practical conditions, all within the scope of this invention.

While the preferred embodiment of the invention has been described in considerable detail, I do not wish to be limited to the particular construction shown, which as previously stated, may be varied within the scope of the invention, and I particularly point out and claim as my invention the following:

1. A safety switch of the character described comprising a frame, a pendulum comprising a spherical member pivotally supported in said frame for universal movement and having an annular groove in the upper surface thereof forming a dome or cap-like surface inside the same, a pair of contacts carried by said frame, means for opening and closing an electric circuit comprising said contacts, said means comprising a vertically reciprocable member the lower end of which rides on the dome or cap-like surface on said spherical member and is adapted to engage in said groove when said pendulum is swung to a predetermined angle and retain the pendulum at said angle, and spring means for continuously urging said vertically reciprocable member in the direction of said surface.

2. A safety switch of the character described comprising a frame, a pendulum comprising a spherical member pivotally supported in said frame for universal movement and having an annular groove in the upper surface thereof forming a dome or cap-like surface inside the same, a pair of contacts carried by said frame, means for opening and closing an electric circuit comprising said contacts, said means comprising a vertically reciprocable member the lower end of which rides on the dome or cap-like surface on said spherical member and is adapted to engage in said groove when said pendulum is swung to a predetermined angle and retain the pendulum at said angle, spring means for continuously urging said vertically reciprocable member in the direction of said surface, and means for releasing said member from said groove.

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