Aug. 3, 1943. K. A. EDSTROM 2,325,908

INERTIA SWITCH

Filed Sept. 21, 1939

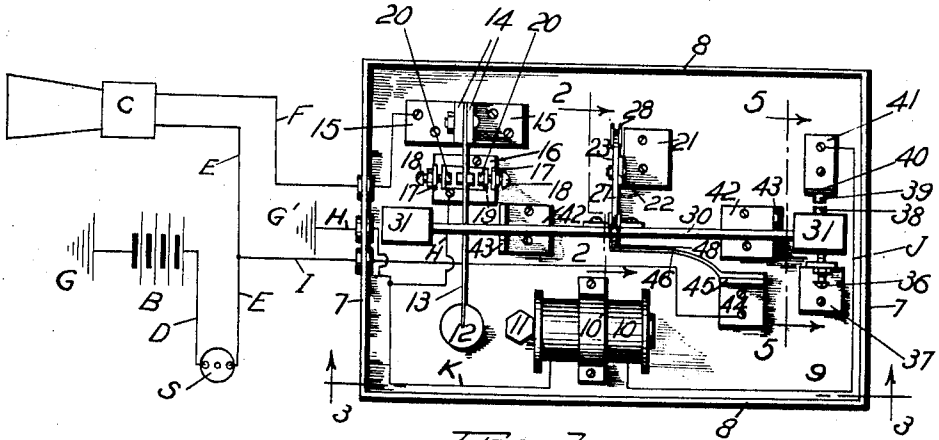


Fig. 1.

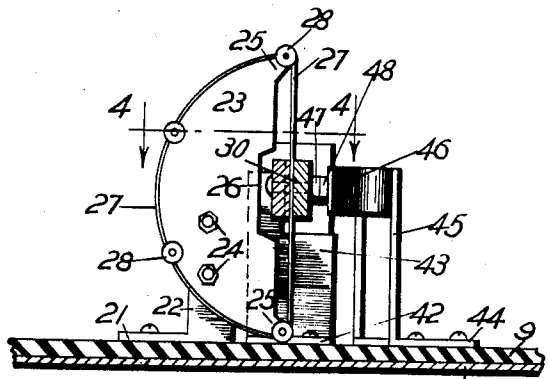


Fig. 2.

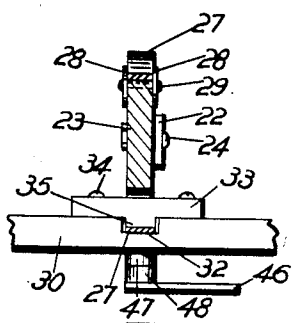


Fig. 4.

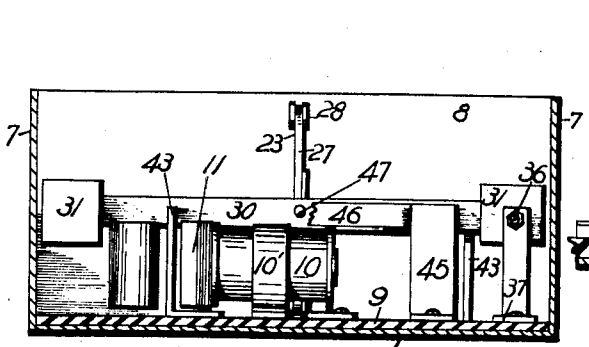


Fig. 3.

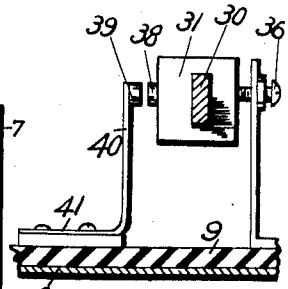


Fig. 5.

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Patented Aug. 3, 1943 2,325,908

UNITED STATES PATENT OFFICE

2,325,908

INERTIA SWITCH

Karl A. Edstrom, Denver, Colo., assignor to The Electric Alarm Company, Inc., Denver, Colo.

Application September 21, 1939, Serial No. 295,851

2 Claims. (Cl. 200—52)

This invention relates to improvements in theft alarms and has reference to an improved signal control mechanism responsive to mechanical vibrations, and relates more particularly to an improved vibration responsive switch device for use in a mechanism of the general type disclosed and claimed in United States Letters Patent No. 1,983,932, issued December 11, 1934.

Devices of the type to which this invention relates are primarily intended for use on automobiles and must therefore be so constructed that they will not be rendered inoperative by reason of the constant vibrations to which they are subjected during the operation of the automobile.

This invention relates more particularly to an improved switch mechanism employed for closing an electric circuit when the device is vibrated and which serves to initiate the functioning of a signal or alarm.

The principal object of this invention is to produce a vibration-responsive switch which is mounted on a flexible resilient pivot that will not bind or wear to any appreciable extent and which permits the inertia member carried thereby to operate freely.

Other objects and advantages reside in details of design and construction which will be more fully disclosed in the following description and in the drawing wherein like parts have been similarly designated and in which:

Figure 1 is an elevation view of the device, the electrical wires, battery and horn being shown diagrammatically;

Figure 2 is a section taken on line 2—2, Figure 1, and shows the manner in which the inertia member, of the vibration-responsive switch, is supported;

Figure 3 is a section taken on line 3—3, Figure 1;

Figure 4 is a section taken on line 4—4, Figure 2; and

Figure 5 is a section taken on line 5—5, Figure 1.

In the example herewith illustrated, that embodies the present invention, reference numeral 6 designates the back of a sheet metal box whose ends have been designated by numeral 7 and sides by numeral 8.

Supported on the back is a base 9 of insulating material, such as hard rubber, fiber or Bakelite. The several parts are attached to the base by screws, or other suitable means, in such a way that they are electrically insulated from each other.

Reference numeral 10 designates an electromagnet and numeral 11 the pole piece thereof. An armature 12 is attached to the lower end of a flat spring 13, whose upper end is clamped between the vertical limbs of two angular brackets 14 whose bases 15 are secured to the insulating base 9, thus forming a pendulum.

Located below the brackets 14 is a U-shaped plate 16 having at each end a vertical arm 17 to which an adjusting screw 18 is threadedly connected. Plate 16 is also provided with two vertical arms 19 whose outer sides are engaged by the screws 18. Each arm 19 is provided with a contact point 20. The spring arm 13 of the pendulum is provided with contact points that are opposite to the contact points 20, but normally out of engagement with them. The contact points 20 are so adjusted with respect to the contact points on the pendulum that when the latter vibrates beyond a certain minimum amplitude, they will establish electrical connection with contacts 20.

A battery B, or other source of electrical current supply, has one pole grounded at G and the other pole connected with one terminal of an electric switch S by means of a conductor D. The other terminal of the switch is connected to the horn C by means of a conductor E while conductor F extends from the horn to the bracket 15. A conductor H grounds the plate 16 at G'.

It is now evident that each time the contact points on the pendulum engage a contact point 20 the horn will sound. It is also evident that if the electromagnet 10 is momentarily energized, it will attract the armature 12 and immediately release the same thereby permitting it to vibrate freely and actuate the circuit to the horn.

In order to so energize the electromagnet 10, the circuit to said electromagnet is controlled by a vibration-responsive switch mechanism which will now be described, and which embodies the improvement over the disclosure of the patent above identified.

A bracket having a base 21 and an arm 22 is secured to the base 9 so that said arm 22 is located substantially midway between the ends of said base. A segment-shaped plate 23 is fastened to the arm 22 by means of bolts 24 and positioned with its chord side perpendicular to the base. The tips 25 of the plate 23 project beyond the chord side thereof, and the latter has a central notch 26.

A steel band or ribbon 27 encircles the plate 23, and is held in position on the edge of the plate by washers 28 secured to the plate by rivets 29. A switch arm 30 is mounted on the ribbon 27 and is provided at each of its ends with a

weight 31, and at its center point with a notch 32 which receives the straight portion of the band or ribbon 27.

A plate 33 is secured to the switch arm by means of screws 34 and is provided on its under side with a projection 35 that extends into the notch 32 and serves to clamp the band in position.

The weights 31 are so positioned and proportioned that the center of mass of the weights 31 and arm 30 is at the center point of the torsion pivot band 27, and therefore, the arm 30 will always remain in equilibrium regardless of the inclination of the base 9. The torsion effect of the pivot serves to stabilize the arm 30 and weights 31.

The upper surface of one of the weights 31, is provided with a contact point 38 which is normally spaced a short distance from a contact point 39 carried by a flexible arm 40 of a bracket whose base has been designated by numeral 41.

Cooperating with the switch arm are stops of angular shape whose bases have been designated by numeral 42. Each stop has an arm 43 that extends vertically from the base. The upper ends of arms 43 are provided with notches. These stops limit the turning of the switch arm in a counter-clockwise direction when viewed as in Figure 1.

A bracket having a foot 44 and an arm 45 is fastened to the base 9 by screws or other suitable means, and carries a spring 46 that is attached to the arm near its top.

The switch arm 30 is provided at its center with a contact point 47 and the spring 45 carries a similar contact point 48 that is held in engagement with the contact point 47 by the action of the spring 46.

An electrical conductor I extends from conductor E to the bracket 44, and another conductor J extends from the bracket 41 to one terminal of the electromagnet while conductor K connects the other end of the electromagnet coil with the ground wire H.

When switch S is closed, the pendulum 12—13 and the switch arm 30 are connected with the ungrounded pole of the battery while the contact 18 and one terminal of the electromagnet 10 are grounded. The electromagnet has been shown as secured to the base 9 by a strap 10'.

When the device is vibrated so as to bring the contact point 38 on weight 31 into electrical engagement with the contact point 39, a circuit is established from the battery B to the ground G', through the electromagnet 10 which is energized thereby and attracts the armature 12 thereby closing the circuit to the horn. The electromagnet almost immediately is de-energized, and releases the armature 12, which has mass, and which continues to vibrate for a short time with the result that the current to the horn is made and broken several times.

If the vibration of the device ceases, the electromagnet will remain de-energized and the operation of the horn will cease as soon as the pendulum 12—13 ceases to vibrate beyond a minimum amplitude. If the vibration of the device is repeated, the operation described will also be repeated.

The switch S is so located that only those initiated will know its position, and therefore, if an unauthorized person attempts to drive a car provided with this alarm, the horn will continue to sound a succession of short blasts which will attract the attention of the police or passersby.

The means provided for the suspension of the switch arm 30 gives the latter a maximum freedom of movement and offers the minimum resistance to such movement. The freedom of movement permits the contacts to have relative movement which keeps them clean and assures an electrical connection at each contact. The band 27 has a tendency to hold the switch arm in a given position because it acts like a torsion spring. Since the pivot for the switch arm 30 has no friction, it cannot gum and bind on account of lack of lubrication.

Extensive tests have shown that the means illustrated in the drawing, and described herein has given reliable service, and has required no adjustment.

The example of reduction to practice of the present inventive concept, as herein illustrated and described, is not intended to express or imply any limitation to the present invention, the scope of which is, in reality, measured by the appended claims.

Thus the stated object and other advantages of this invention are fully accomplished, and while this specification discloses preferred means for reducing the present invention to practice and a preferred embodiment of the invention, changes may occur to those skilled in the art and may be made within the scope of the appended claims, without departing from this inventive concept.

What I claim and desire to secure by Letters Patent is:

1. An inertia switch comprising a base, a support element thereon having spaced projections, a resilient ribbon providing a torsion pivot supported on said projections, an inertia actuated switch arm attached near its center of mass, to the ribbon for pivotal angular movement therewith, an inertia element having mass positioned at one end of the switch arm, a second inertia element having substantially the same mass positioned adjacent the other end of said switch arm, a spring-urged electrical conductor positioned against the arm adjacent its pivotal axis, an electrical contactor positioned on the switch arm remote from its pivotal axis, and another relatively stationary electrical contactor positioned in spaced relationship to the contactor on the switch arm and adjacent thereto for contact therewith when the switch arm is moved.

2. An inertia switch comprising a base, a segment-shaped support on the base having a chord-like boundary along one side thereof and having projections extending beyond said chord-like boundary positioned at opposite ends thereof, a resilient ribbon providing a torsion pivot supported on said projections and extending substantially around said support, means on the support for holding said ribbon on the support, an inertia actuated switch arm attached near its center of mass to the ribbon for pivotal angular movement therewith, an inertia element having mass positioned at one end of the switch arm, a second inertia element having substantially the same mass positioned adjacent the other end of said switch arm, a spring-urged electrical conductor positioned against the arm adjacent its pivotal axis, an electrical contactor positioned on the switch arm remote from its pivotal axis, and another relatively stationary electrical contactor positioned in spaced relationship to the contactor on the switch arm and adjacent thereto for contact therewith when the switch arm is moved.

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