# United States Patent

[11] 3,560,681


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[54] **IMPACT CIRCUIT BREAKER FOR MOTOR VEHICLES**
**6 Claims, 11 Drawing Figs.**


[52] **U.S. Cl.** ..... **200/61.45**
[51] **Int. Cl.** ..... **H01h 35/14**
[50] **Field of Search** ..... 200/61.45; 200/61.53, 76; 340/262



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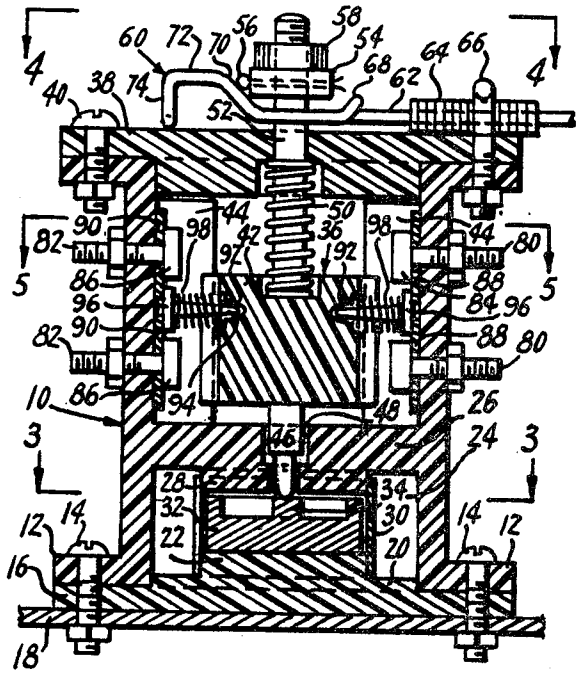
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**ABSTRACT:** A vertical casing is provided therein with a vertically movable unit including a body operatively connected preferably at opposite sides to normally closed circuit breaking elements to properly complete the circuit from the positive sides of the generator and battery. The unit is normally supported in circuit closing position by an inertia element arranged in the bottom of the casing and adapted to be displaced laterally due to an impact occurring if the vehicle is in an accident. Under such conditions, a biasing spring moves the unit downwardly to break the circuits preferably from both the generator and battery. Manually operable means is provided for moving the unit upwardly to break the circuit to prevent the theft of the vehicle.

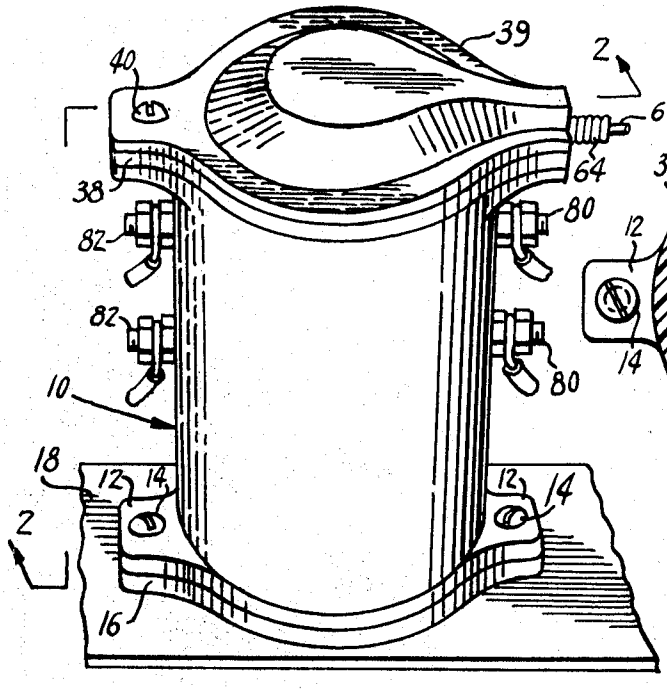


FIG. 1

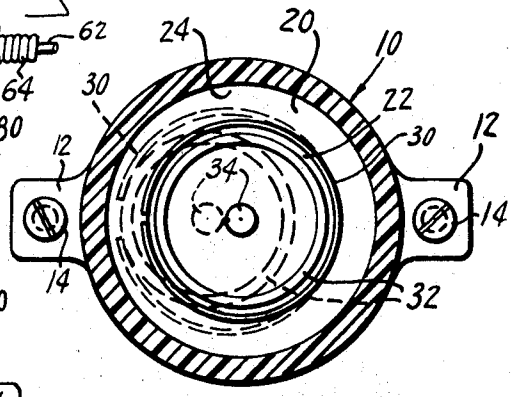


FIG. 3

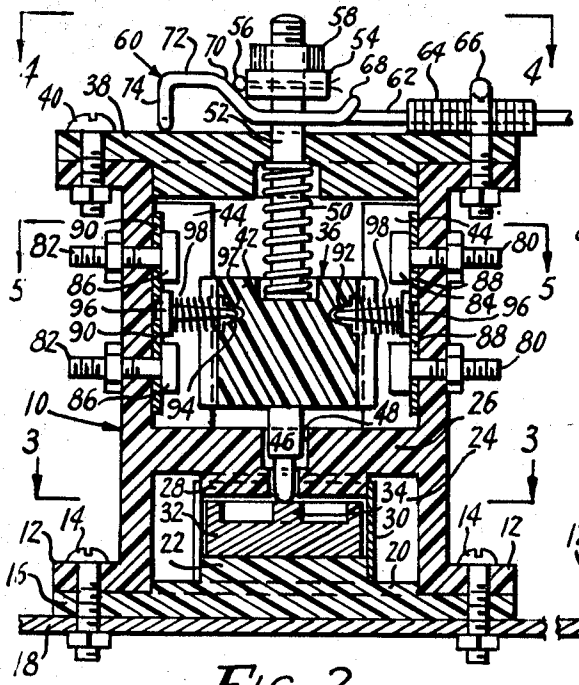


FIG. 2

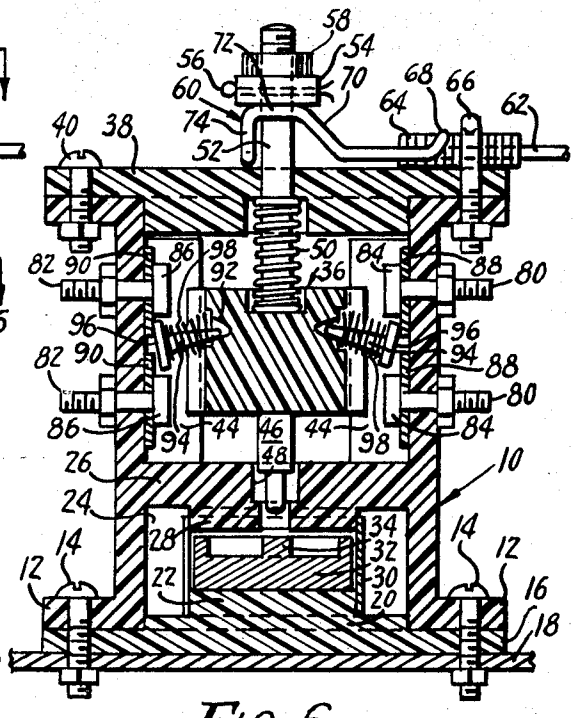


FIG. 6

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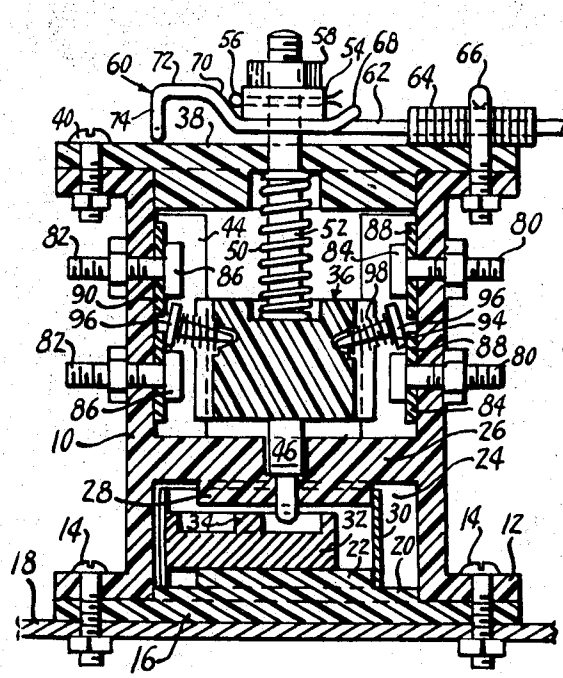


FIG. 7

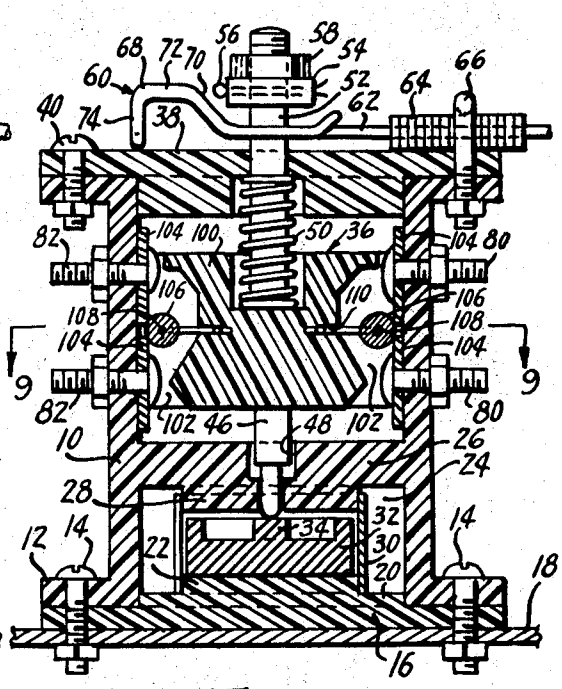


FIG. 8

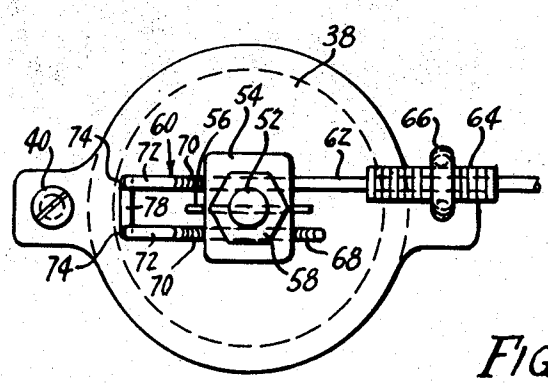


FIG. 4

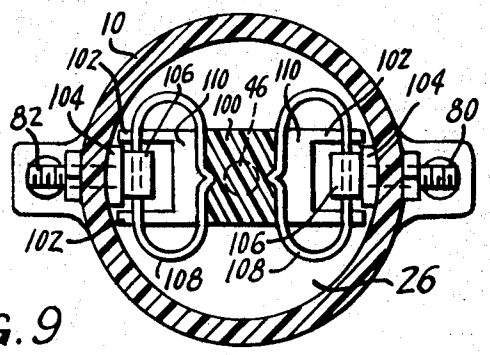


FIG. 9

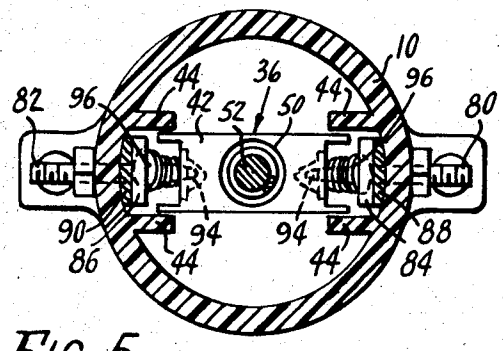


FIG. 5

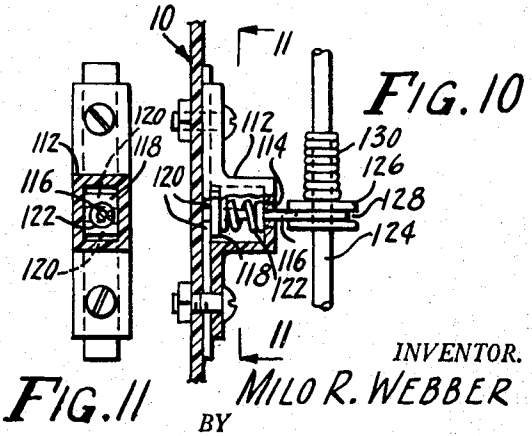


FIG. 10

FIG. 11

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# IMPACT CIRCUIT BREAKER FOR MOTOR VEHICLES

## BACKGROUND OF THE INVENTION

A number of efforts have been made to provide means for breaking the ignition circuit of a motor vehicle upon a collision impact. Such devices for the most part are open to a number of objections. In the first place they are difficult to reset, if desired, after the danger of fire has passed following a collision. In the second place, these devices usually break only the battery circuit, leaving the generating circuit intact.

## SUMMARY OF THE INVENTION

A vertical hollow and preferably cylindrical casing is closed at the top and bottom respectively by a cap and a base. Preferably at each side of the casing a pair of vertically spaced binding posts project through the casing and each is connected to a contact, the contacts on each side of the casing being separated. Each such pair of contacts is normally bridged by a circuit making and breaking element, so that the circuitry of the motor vehicle is normally completed. An axial unit is mounted for vertical movement in the casing and includes a portion intermediate its ends having recesses into which project stems on the circuit making and breaking elements. These elements are normally biased to closed position with respect to their contacts by springs urging them radially outwardly. Upon vertical movement of the axial unit in either direction, the circuit making and breaking elements will be rocked, each on one of its contacts, to break the circuit to the associated contact.

The casing is provided with a horizontal apertured portion through which projects a stem portion of the axial unit, and the lower end of this stem portion is supported by an inertia block biased to a coaxial position relative to the casing to support the vertically movable unit. Under a collision impact, the inertia block will be jolted laterally of the casing against its biasing means to allow the axial unit to drop downwardly and break the circuit, the axial unit being biased for such downward movement.

Cam means is provided above the cap of the casing for two purposes. Operation of this cam means when the parts are in normal position will move the axial unit upwardly to rock both circuit making and breaking devices to break the circuits, thus preventing the vehicle from being started by unauthorized persons. In the second place, if the inertia block has been laterally deflected by a collision and it becomes safe to start the vehicle, the cam means may be operated to lift the axial unit, whereupon the inertia block will be returned to its normal position.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the device;

FIG. 2 is a section on line 2–2 of FIG. 1, showing the parts in normal positions;

FIG. 3 is a section on line 3–3 of FIG. 2;

FIG. 4 is a plan view of the device;

FIG. 5 is a section on line 5–5 of FIG. 2;

FIG. 6 is a vertical section similar to FIG. 2, showing the parts in manually circuit-broken positions;

FIG. 7 is a similar view showing the parts in circuit-breaking position when a collision impact occurs;

FIG. 8 is a section similar to FIG. 2 showing a modified form of the invention;

FIG. 9 is a section on line 9–9 of FIG. 8;

FIG. 10 is a fragmentary section of a modified form of the invention; and

FIG. 11 is a detail section on line 11–11 of FIG. 10.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1 to 7, inclusive, the numeral 10 designates the vertical cylindrical housing flanged at its lower end as at 12 to be attached as at 14 to a base 16. The attaching means 14 may be bolts as shown, which may extend through a horizontal element 18 of the motor vehicle to fix the device with respect thereto.



The base 16 is provided with an axial shallow projection 20 fitting within the casing 10 to center the base 16 relative to the casing, and centrally of the projection 20 a centering cam 22 projects upwardly. This element is circular and concentric with the casing 10. The base forms with the casing 10 a lower chamber 24 the upper extremity of which is defined by a horizontal partition 26 having a downwardly projecting centering cam 28 the same size as and concentric with the centering cam 22. The cams 22 and 28 are surrounded by a tempered steel split ring 30 as clearly shown in FIG. 3, and within this split ring is arranged an inertia block 32 having an upwardly projecting central lug 34 for a purpose to be described. The inertia block 32 seats on the upper surface of the centering cam 22.

An axially movable unit indicated as a whole by the numeral 36 is arranged in the casing 10, the top of which is closed by a cap 38, above which is a cover 39, secured thereto by bolts or other fastening elements 40. The unit 36 comprises a block 42 prevented from rotation by vertical guides 44 and provided with a depending stem 46 projecting through an opening 48 in the partition 26. The lower end of the stem 46 is reduced and bears upon the upward projection 34 so that the entire unit 36 is normally supported by the inertia block 32. The unit 36 is biased downwardly by a compression spring 50, the upper end of which seats against the cap 38, the spring surrounding a central stem 52 forming a part of the unit 36.

On the upper end 52 of the stem 46 (FIGS. 2, 4, 6, 7 and 8) is arranged a plate 54 fixed to the stem preferably by a cotter pin 56. A nut 58 is threaded on the stem 52. The plate 54 is adapted to be raised by a cam indicated as a whole by the numeral 60. This cam includes a straight lower shank 62 (FIG. 4) arranged to one side of the stem 52 and projecting through a sleeve 64 fixed as at 66 to the cap 38 and the upper end of the casing 10. The cam 60 is in the form of a relatively stiff wire and includes an arm 68 at the side of the stem 52 opposite the arm 62. Both arms of the cam, at the right side of the stem end 52 as viewed in the drawings, slope upwardly as at 70, then extend horizontally parallel to each other as at 72 and then downwardly vertically as at 74, the two arms being integrally connected at their extremities as at 78 (FIG. 4). The cam arm or rod 62 extends away from the device to be manually operated to be moved to the right as in FIG. 6 to lift the axial unit 36, or to the left as in FIG. 1 to lower the axial unit 36, for a purpose to be described.

Each side of the device is provided with binding posts, for example, as at 80 and 82, one set of these posts being arranged in the positive battery line and the other in the positive generator line. Binding posts 80 and 82 are provided with inner heads 84 and 86 and these heads respectively clamp in position contacts 88 and 90. The contacts 90 are spaced from each other, as is true also of the contacts 88 so that the contacts of each pair must be bridged across to close their associated circuits.

The body 42 of the axial unit is provided with diametrically opposite conical recesses 92 in each of which is arranged a stem 94 carrying a conducting head 96, each of which is adapted to bridge across a pair of the contacts 88 or 90. The heads 96 are biased radially outwardly by springs 98. It will be apparent that if the unit 36 moves downwardly as in FIG. 7, the stems 94 will be rocked downwardly to disconnect the heads 96 from the upper contacts 88 and 90. If the unit 36 moves upwardly as in FIG. 6, the heads 96 will be rocked to disengage them from the lower contacts 88 and 90. These operations take place as described below.

A modified form of the invention is shown in FIGS. 8 and 9 in which parts common to the form of the invention previously described are indicated by the same reference numerals. In this case, the unit 36 is provided with a body 100 flanged at opposite sides as at 102 to be vertically guided by engagement of such flanges with contacts 104 corresponding to the contacts previously described. Each pair of contacts is engaged by a roller 106 carried by a wire loop 108, portions of which are

arranged in grooves **110** in the flanges **102**. These rollers **106** normally bridge across the contacts with which they are associated as shown in FIG. **8**.

In FIGS. **10** and **11**, another modification of the invention is shown wherein walls of the casing **10** carry small housings **112** slotted as at **114** for the projection therethrough of stems **116**. Each of these stems carries a head **118** engageable with contacts **120** similar to the pairs of contacts previously described. A spring **122** in each housing **112** tends to maintain the associated head **118** in engagement with its contacts **120**. Only one of the stems **116** is shown together with its associated mechanism including the contacts **120**, but it will be apparent that the same assembly will be used at the opposite side of the housing **10**. In this case, the axial unit comprises principally a rod **124** carrying a circular flange **126** grooved as at **128** to receive the radially inner ends of the stems **116**. The stem **124** is surrounded by a spring **130** corresponding to the spring **50** previously described.

## OPERATION

The device is fixed to a stationary part **18** of the vehicle with the cylinder or casing **10** in vertical position. The pairs of binding posts **80** and **82** will be connected respectively in the battery and generator cable lines. The parts normally occupy the positions shown in FIG. **1** with the heads **96** engaging their associated contacts so that the circuits of the vehicle can be completed. The inertia block **32** will be arranged axially in the chamber **24** and the center projection **34** will support the body **42** with the parts in the normal positions referred to.

Assuming that he desires to break the circuits through the device to prevent unauthorized use of the vehicle, the operator will exert a pull on the cam device **60**, thus elevating the head **54** to the position shown in FIG. **6**. The cam device lifts the body **42** and rocks the stems **94** to disengage the heads **96** from their associated contacts. Accordingly, the ignition cannot be turned on and the vehicle engine cannot operate.

If the vehicle becomes involved in an accident, the impact will cause the inertia block **32** to shift laterally of its axis in one direction against the tension of the split collar **30**. For example, the collar **30** may be distorted by movement of the inertia block **32** to the position shown in FIG. **7**. The projection **34** thus will be moved from beneath the bottom of the stem **46** and the spring **50** will move the body **42** downwardly to the position shown in FIG. **7**, thus rocking the stems **94** to disconnect the heads **96** from the upper contacts **88** and **90**. Thus the battery circuit will be broken together with the ignition circuit and the vehicle engine will stop.

The resiliency of the split collar **30** tends to return the inertia block **32** to normal position, but the central projection **34** will engage the side of the lower end of the stem **46** and the body **42** will remain in its circuit breaking position. When any danger of fire has passed, the device readily may be reset by exerting a pull on the cam device **60**, thus elevating the body **42** against the loading of the spring **50** whereupon the resilient collar **30** will return the inertia block to its normal axial position shown in FIG. **6**. The cam device will then be released by moving it to the position shown in FIG. **1**, whereupon the spring **50** will move the body **42** downwardly to engage the lower end of the stem **46** with the projection **34**. The parts will now occupy the normal position shown in FIG. **1**, and the ignition switch may be turned on to start the vehicle engine.

The operation of the form of the device shown in FIGS. **8** and **9** is substantially identical with that described. Whereas the heads **96** are prevented from being dislodged vertically by the bolt heads **86** in the form of the invention previously described, this operation is not necessary in FIGS. **8** and **9** since the spring clips **108**, portions of which are arranged in the slot **110**, will hold the rollers **106** against vertical movement. Upon impact due to a collision, the inertia block and body **42** will operate as before, and the rollers will move downwardly over the lower contacts and out of engagement with the upper contacts. The rollers **106**, in the normal positions of the parts, move slightly radially outwardly between the upper and lower contacts, and when these rollers are moved upwardly or downwardly, they flex inwardly to a slight extent to roll over the upper and lower contacts, this movement being permitted by the resiliency of the wire clips **108**. In the same manner as before, the device may be operated manually to break the battery and generator circuits by pulling the cam device **60** to the position shown in FIG. **6**, the rollers **106** then moving out of engagement with the lower contacts.

In FIGS. **10** and **11**, the body **42** is eliminated and housings **112** are arranged at opposite sides of the interior of the sides of the casing **10**. The annular flange **126** has a groove **128** engaging the inner ends of the stems **116** to rock them upon vertical movement of the rod **124** to connect or disconnect the heads **118** relative to the contacts **120**. The lower end of the stem **124** will be arranged in the same manner as the stem **48** to engage the projection **34** of the inertia block. The spring **130** will be arranged in the same manner as the spring **50** and will function in the same manner and for the same purpose.

From the foregoing it will be apparent that the present device functions instantly to break both the battery and generator circuits when a collision occurs. Such circuits readily may be broken manually by operation of the cam device **60** to prevent unauthorized use of the car. The cam rod **62** may be connected to a flexible rod operable from the dash of the vehicle and locked in the position shown in FIG. **6** to prevent the closing of the ignition circuit. It also will be apparent that when the circuits have been broken by impact, they readily may be manually reset by operation of the cam device **60**.

From the foregoing it will now be seen that there is herein provided an improved impact circuit breaker for motor vehicles which accomplishes all of the objects of this invention and others, including many advantages of great practical utility and commercial importance.

As various embodiments may be made of this inventive concept, and as many modifications may be made in the embodiments hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative, and not in a limiting sense.

I claim:

**1**. An impact circuit breaker for motor vehicles comprising an upright casing, a stem mounted for vertical reciprocation in said casing, means in said casing normally biasing said stem downwardly in said casing, at least one pair of vertically spaced electrical contacts mounted in said casing, a switch element normally engaging both of said contacts, means on said stem engaging said switch element of for disengaging said switch element from one of said contacts upon movement of said stem upwardly or downwardly in said casing, an inertia block mounted in said casing underlying said stem for movement in any direction within a fixed horizontal plane, a lug projecting upwardly from the center of said block to normally engage the lower end of said stem to support said stem in a position for the switch element to engage both of said contacts, means in said casing normally biasing said block centrally of said casing, said block being moveable upon impact in any horizontal direction to move said lug out of supporting relation to said stem to permit said stem to move downwardly in said casing to disengage said switch element from one of said contacts, and hand actuated means for raising said stem in said casing to permit said block to return to central position in said casing.

**2**. Apparatus according to claim **1** wherein said switch element is provided with a switch element stem, with said means on said stem having a recess in which the radial inner end of said switch element stem is engaged to rock said switch element upon vertical movement of said stem from its normal position, and a spring between said switch element and said means on said stem to bias said switch element radially outwardly toward said spaced contacts.

**3**. Apparatus according to claim **1** wherein said means for biasing said inertia block to its normal position comprises a split ring engaging said casing and normally surrounding and

centering said inertia block, horizontal movement of said inertia block flexing said split ring.

4. Apparatus according to claim 1 wherein said casing is provided at diametrically opposite points with a pair of housings, said pair of spaced contacts mounted in each housing, each switch element having a radially inwardly extending stem, said housing being provided with a slot longitudinally of said casing through which said stem projects, and said means on said stem including a flange having a groove in which the radially inner ends of said switch element stems are engaged and including means whereby said switch elements are rocked by their stems when said first named stem moves vertically.

5. A device as claimed in claim 1 wherein said switch element includes a roller normally engaging both contacts.

6. A device as claimed in claim 1 wherein the hand actuated means for raising said stem from in said casing includes a sliding cam engaging an upper end of said stem for camming said stem upwardly with respect to said casing disengaging said switch element from one of said contacts.