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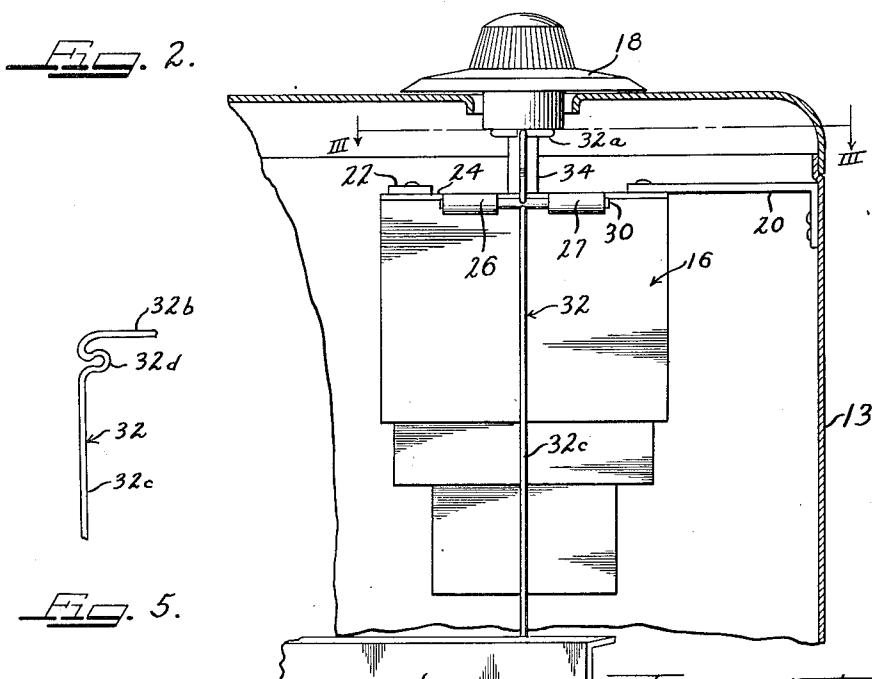
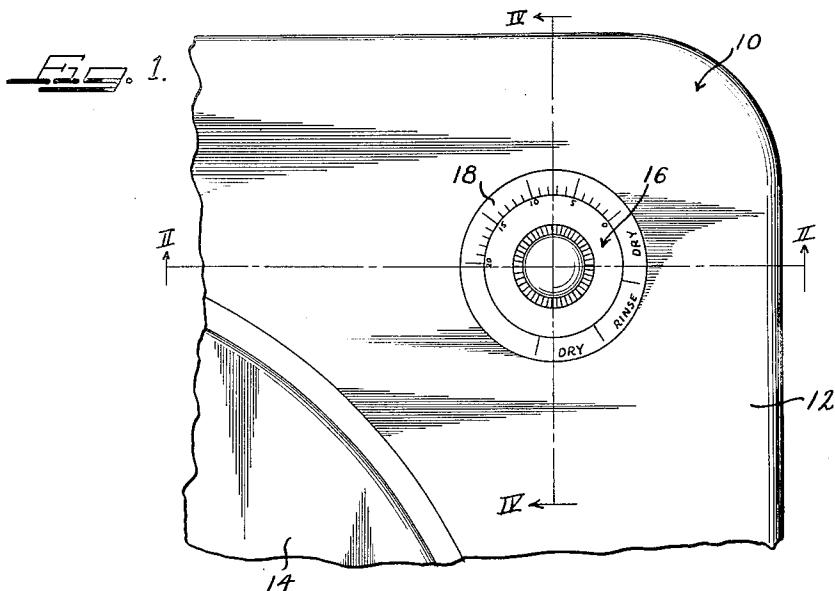
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SAFETY SWITCH CUTOUT FOR AUTOMATIC LAUNDRY MACHINES

Filed Nov. 8, 1947

3 Sheets-Sheet 1



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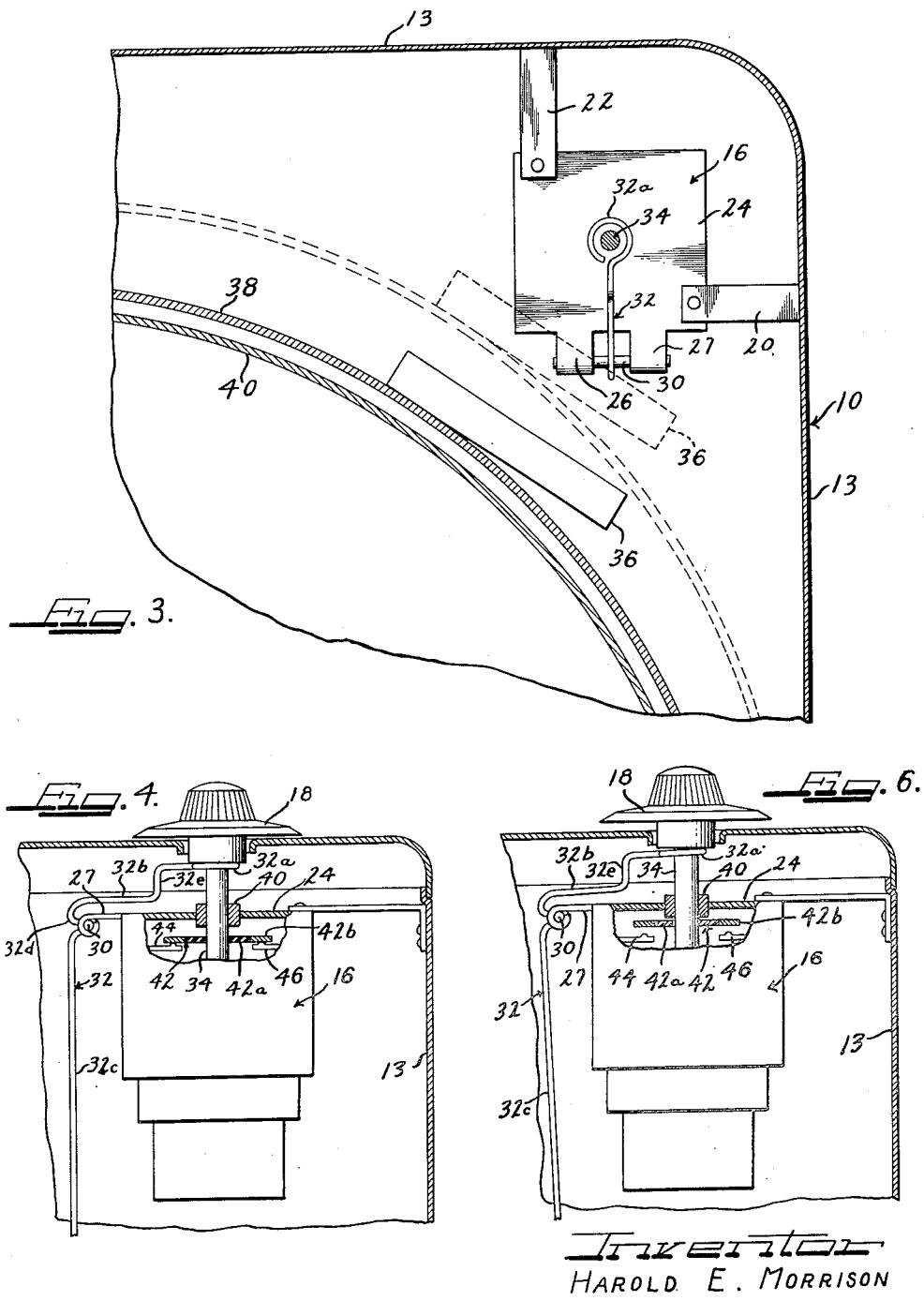
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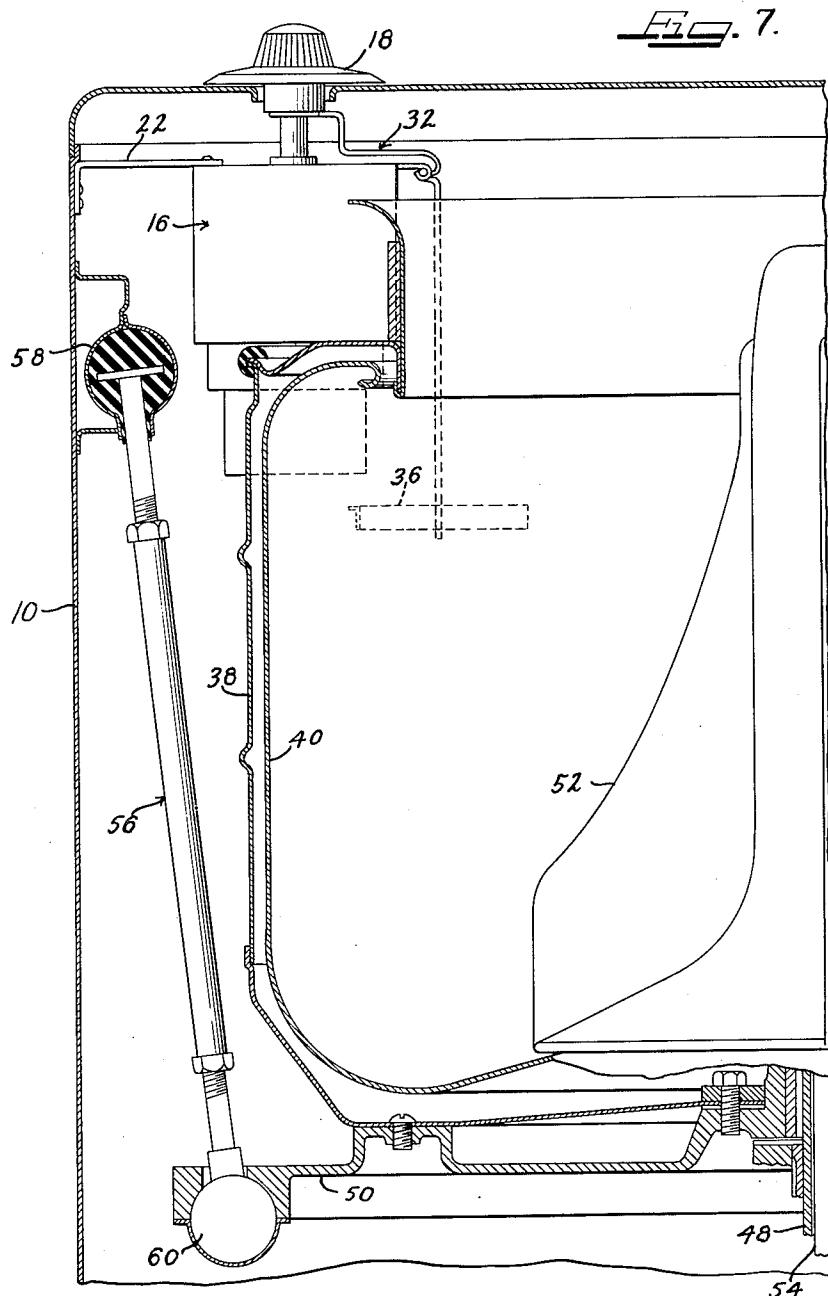
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## UNITED STATES PATENT OFFICE

2,624,464

## SAFETY SWITCH CUTOUT FOR AUTOMATIC LAUNDRY MACHINES

Hareld E. Morrison, St. Joseph, Mich., assignor to Whirlpool Corporation, a corporation of New York

Application November 8, 1947, Serial No. 784,918

2 Claims. (Cl. 210—63)

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My invention relates to safety switch cutouts and more particularly to an improved safety cutout operable to energize a laundering machine when unbalanced loads exist therein.

In one form of laundering machine, the clothes being laundered are partially dried by disposing them in a rotatable basket and rotating the basket at high speed to generate centrifugal forces to force out the water retained by the clothes. In a practical home laundering machine, the basket used for this purpose is relatively large in order to accommodate a large number of clothes. If the clothes are unevenly distributed within the basket, therefore, it is possible for the center of mass of the clothes to be displaced to a considerable degree from the axis about which the basket rotates, thus causing the generation of large unbalanced vibratory forces which overload the machine and are transmitted to the floor upon which it rests.

In accordance with the present invention, elements are provided to deenergize a laundering machine if the unbalanced load in the rotating basket thereof exceeds a predetermined maximum value. To this end, a bell crank arm is formed with one end to engage the energizing switch for the machine and the other end to engage the member which sustains the rotating basket. The switch is mounted on the housing of the machine from which the basket support member is yieldingly sustained, this causing the pivot point of the bell crank to be relatively fixed and causing the crank arm to be struck and deflected when the rotating basket vibrates more than a predetermined amount. This deflection engages the energizing switch to cause axial shift thereof and deenergize the entire machine, thus indicating to the user the unbalanced condition of the basket and preventing damage.

The device of the present invention is particularly useful in connection with automatic laundering machines of the type wherein a complete clothes washing, rinsing, and drying cycle is automatically carried out. With these machines, the user may start the machine in the washing part of the cycle and leave the machine to carry out the remainder of the cycle. The apparatus of the present invention automatically deenergizes the machine if the unbalance of the clothes in the basket exceeds a safe amount even though the operator is not present, and thus prevents damage that might otherwise occur with the unattended machine. Ordinarily, the user is not aware of the unbalanced load of the clothes basket portion of the mechanism during

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the washing part of the cycle, since the clothes basket is not then under rotation. Moreover, it is possible for the load to become unbalanced while washing is taking place.

It is accordingly a general object of the present invention to provide an improved safety cutout for laundering machines.

Further it is an object of the present invention to provide an improved safety switch cutout particularly useful in connection with automatic laundering machines and which may be applied thereto with maximum ease.

Another object of the present invention is to provide an improved switch-actuating device operable upon a predetermined displacement between two relatively movable members.

Yet another object of the present invention is to provide an improved safety cutout particularly suitable for use with switches operable upon axial shifting of the shaft thereof.

It is still another object of the present invention to provide an improved safety cutout having features of construction, combination, and arrangement rendering it simple and inexpensive in construction and reliable in operation to the end that a unit of maximum utility is achieved.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing in which:

Figure 1 is a fragmentary top plan view of a portion of an automatic laundering machine incorporating the features of the present invention.

Figure 2 is a fragmentary cross-sectional view through the axis II—II, Figure 1, but showing the time switch, bell crank, and actuator bar in side elevation.

Figure 3 is a cross-sectional view through the axis III—III, Figure 2.

Figure 4 is a fragmentary cross-sectional view through the axis IV—IV, Figure 1, and showing the timer switch housing broken away to expose the switch elements.

Figure 5 is a fragmentary side elevation view of the eyelet portion of the bell crank.

Figure 6 is a view like Figure 4 but showing the switch in the tripped condition.

Figure 7 is a fragmentary axial cross-sectional

view showing in further detail the construction of an automatic laundering machine of the type to which the present invention is applicable.

In the fragmentary top plan view of Figure 1 there is shown the corner of the outer housing or shroud 10 of an automatic laundering machine. The edges of this housing are rounded off as indicated to form a horizontal top portion 12. This portion forms a circular opening at the center thereof, which opening provides access to a vertically disposed rotatable clothes basket on the interior of the machine for adding clothes thereto or removing clothes therefrom. A cover 14 fits on top portion 12 to cover the opening when clothes are not being transferred therethrough.

A cycle control switch, indicated generally at 16 and having knob 18, extends through an opening in the upper surface 12 of the housing 10. This switch controls the automatic operations of the unit and rotates with time to achieve this control. As is described in further detail hereafter, the knob 18 of this switch is depressed or lowered to energize the laundering machine and commence the automatic cycle of operations and may be lifted or raised at any time to deenergize the unit and stop all further operation.

As will be evident from Figure 2, the switch 16 is supported from the vertical wall or skirt 13 of the housing 10 by a pair of brackets 20 and 22 which are attached by spot welding or other suitable fashion to the housing 10 and to the switch 16. These brackets are shown in top plan view in Figure 3.

As will be evident from Figures 2, 3, and 4 the top plate 24 of the switch 16 extends over the side thereof to form two spaced tongues 26 and 27. These are bent to form looping portions which define a pair of aligned tubes through which extends the shaft 30. This shaft forms the pivot shaft about which the bell crank portion of the mechanism rotates.

The bell crank portion of the mechanism is indicated generally at 32, Figure 2, and includes a horizontal loop portion 32a which nearly encircles the shaft 34 of the switch 16 as will be evident from the view of Figure 3. As indicated in Figures 2, 4, and 6 this loop bears against the under surface of knob 18. The bell crank 32 extends from the loop portion 32a in a substantially horizontal direction as indicated by the portion 32b, Figure 4, but having an offset portion 32c to raise it to bearing relation with the under surface of knob 18. It is then bent downwardly to form the lengthy downwardly extending portion 32c which may be seen in the views of Figures 2 and 4 and which is engaged or struck by the arm 36 to tilt the bell crank 32 and deenergize the machine.

The bell crank 32 is attached to the shaft 30 for pivotal movement thereabout by the portion 32d which is bent to form an eyelet encircling this shaft as indicated in Figure 5.

The bell crank 32 may be constructed of any suitable material. One material that is particularly suitable for this purpose is ordinary steel wire or rod which may be bent to the shape indicated and which has sufficient rigidity to trip the switch 16 when the lower portion 32c is struck.

The arm 36 which actuates the bell crank 32 is attached to the tub 38, Figure 3, by spot welding or other suitable means. As indicated in the view of Figure 2, this arm is of angle iron. The tub 38 encircles the basket 40 and constitutes a rigid support member therefor so that as the basket 40 vibrates due to unbalanced load of clothes, the

tub 38 partakes of this vibration and arm 36 likewise moves. As is pointed out in further detail hereafter, the tub 38 is yieldably suspended from the housing 10.

The eyelet portion 32a of the bell crank 32 fits snugly underneath the knob 18 of the switch 16 as indicated in Figure 4. When the lower portion 32c of bell crank 32 is struck by the arm 36, the bell crank swings about the axis of shaft 30 to the position indicated in Figure 6. In undergoing this movement the portion 32a of the bell crank swings upwardly to raise or lift the knob 18 of switch 16 and cause the latter to deenergize the laundering machine.

The switch 16 may be any one of many constructions. In the particular form shown in the drawings, this switch includes a shaft 34 which is supported from the plate 24 by the bearing 40. A flexible disk 42 having an inner insulating portion 42a, Figure 4, and an outer annular conducting portion 42b, Figure 4, rides on the shaft 34 and is fixed for upward and downward movements therewith. A pair of contactors 44 and 46 are fixedly mounted in the switch 16 by suitable means (not shown) to be engaged by the disk 42 when in the depressed position of Figure 4 and to be free of disk 42 in the raised position of Figure 6.

The switch formed by the contactors 44 and 46 and the annular conducting disk 42b is interposed in electrical circuit relationship between the motor and other portions of the automatic washing machine and the source of power therefor, thus causing the machine to be energized when the mechanism is in the depressed or lowered position of Figure 4 and to be deenergized when in the raised or lifted position of Figure 6.

It is the function of the bell crank 32 to shift the switch 16 from the depressed or lowered position of Figure 4 to the raised or lifted position of Figure 6 when the unbalanced load in the basket 40, Figure 3, exceeds a predetermined amount. This operation takes place by reason of the fact that the basket 40, together with the tub 38, is mounted from housing 10 on a yieldable mounting capable of moving in accordance with the unbalanced or vibratory forces associated with rotation of the basket 40 when carrying an unbalanced load. When these forces are sufficient to cause movements of the tub 38 and the arm 36 to the positions indicated by the dotted lines of Figure 3, the arm 36 engages the lower portion 32c of the bell crank 32 to tilt that crank about the axis of shaft 30 and thus raise or lift the portion 32a thereof. The engagement between the portion 32a of the bell crank 32 and the under side of knob 18 causes the former to push the knob 18 upwardly and thereby shift the switch 16 from the condition indicated by the view of Figure 4 to that indicated by the view of Figure 6.

Figure 7 is a fragmentary cross-sectional view of a laundering machine of the type to which the principles of this invention may be advantageously applied. As indicated in this view, the basket 40 may be a well known form of perforate basket similar to that shown and described in Patent No. 2,521,159, which was issued to P. E. Geldhof and Luther Ringer on September 5, 1950, and is no part of my present invention which is not herein shown nor described. The basket 40 is disposed within the tub 38 and is attached to the outer shaft 48 for rotation therewith. This shaft is sustained within the tub 38 by the support plate 50 which likewise sustains tub 38. An agitator 52 may be disposed on shaft 54 to

agitate clothes within the basket 40 when the tub 38 is filled with water, thereby agitating the clothes in washing movements when washing is desired. Extracting water from the clothes may be accomplished by rotating the shaft 48, and hence the basket 40, at high speed with no water in the tub 38 and discharging the water extracted from the clothes through the perforate wall of the basket.

The assembly comprising the agitator 52, the basket 40, and the tub 38 is yieldingly supported within the housing 10 for movements relative thereto. Such support may, for example, comprise a plurality of resilient mountings 56 located at intervals about the periphery of the tub 38 and held by resilient end supports 58 and 60 which are anchored to the housing 10 and the tub 38 respectively. These mountings provide vibration isolation between the tub 38 and the housing 10 by permitting movement of the former without imparting substantial forces to the latter.

It will be evident from the foregoing that when the basket 40 is in an unbalanced condition and rotated at high speed, relatively large vibrational forces are imparted to the tub 38 which imparts like forces to the mountings 56. These forces are transmitted to some extent to the housing 10 and to the support for the machine, and, if of excessive magnitude, may cause unpleasant effects and possibly damaging of the equipment. However, with the mechanism of the present invention, when these forces reach a dangerous value, as indicated by the movements of tub 38, the unit is deenergized by lifting of the knob 18 of switch 16, which occurs when bar 36 engages the bell crank 32.

While I have shown a particular embodiment of my invention, it will, of course, be understood that I do not wish to be limited thereto since many modifications, both in the elements employed and their cooperative structure, may be made without departing from the spirit and scope of my invention. I, of course, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a laundering machine of the type having a housing with a substantially horizontal top portion and a clothes-containing basket disposed in said housing; a support plate resiliently supported from said housing to support said basket for rotational clothes-drying movement about a substantially vertical axis and having a non-rotatable tub mounted thereon and extending upwardly along the outside of said basket; a switch mounted on said housing and having an operating knob extending upwardly for operation from said top portion of said housing, said knob being operable in the depressed condition to energize said machine to impart said movements to said basket and in a lifted condition to

deenergize said machine, said switch further having a pair of spaced tongues extending over one side thereof and bent to form a pair of aligned tubes to receive a common shaft; a shaft disposed in said tubes; and a bell crank comprising a rod bent to form an eyelet to bear underneath said knob and form one arm of said crank, said rod having another portion extending downwardly to form the other arm of said crank to be engaged by said tub, and having an intermediate portion bent to form a loop about said shaft in the space between said tongues to form a pivotal support for said crank, whereby said crank lifts said knob upon predetermined relative movement between said support plate and said housing.

2. In a safety cut-out adapted to cut out power from a drive member for a gyratory body, upon excessive gyratory movement thereof, a support frame, a non-rotatable base member flexibly suspended therefrom and having the gyratory body rotatably journaled thereon and also having an arm mounted thereon, a depressible switch mounted on said frame adjacent the top thereof and including a top plate having a vertically movable plunger movable therein and having an operating knob on the upper end thereof accessible from the top of said frame, a bell crank member journaled on said top plate for movement about a horizontal axis and having one lever arm extending in a substantially horizontal plane along said top plate and encircling said plunger in position to engage said knob, and another arm depending from said top plate in a generally vertical direction for engagement with said arm on said flexibly mounted base member upon excessive vibrating movement thereof, and moved by said arm to pivot said bell crank in a direction to engage the bottom of said knob and raise said knob and plunger to open said switch upon excessive vibration of said base member effected by excessive gyratory movement of said gyratory body.

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