

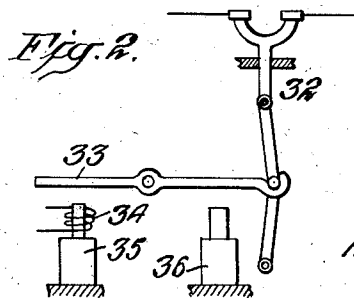
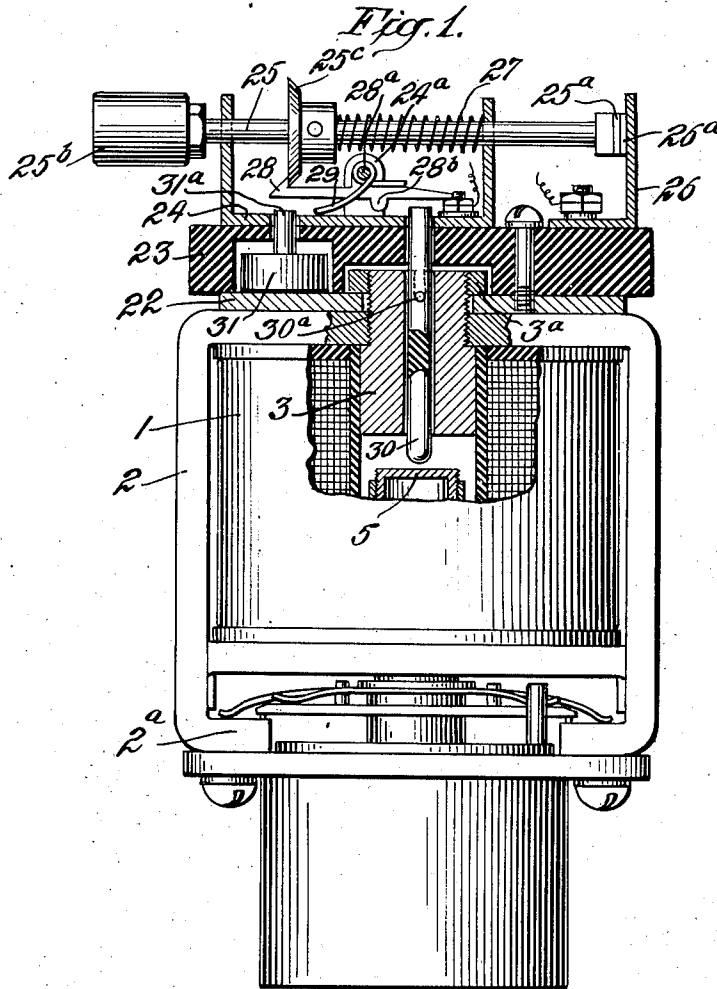
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DEVICE FOR OVERCOMING EFFECTS OF SHOCKS

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DEVICE FOR OVERCOMING EFFECTS OF SHOCKS

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This invention relates to mechanisms and devices, such as electromagnetically operated relays and circuit breakers which are subject to shocks and jars which might cause their improper operation and interfere with the normal functioning of the parts. The invention is generally applicable to various types of apparatus wherein certain parts are actuated or tripped in response to the occurrence of certain conditions and where actuation or tripping of the parts is to be avoided under mechanical shocks and jars to which the apparatus might be subjected.

This application is a division of my original pending application Serial No. 386,672, filed April 3, 1941.

The main object of the invention is to provide auxiliary means for counteracting the effects of shocks and jars so as to avoid undesired actuation or tripping of the parts. Another object is to accomplish this by the provision of means which may be readily applied to various forms of apparatus and which will be dependable in operation over long periods of use without requiring frequent inspections or adjustments. Other objects and advantages will be understood from the following description and accompanying drawing.

Fig. 1 is a side view, partly in section, showing one embodiment of the invention as applied to a time delay relay; and Fig. 2 is a general view indicating a circuit breaker and tripping magnet with counteracting means applied thereto for overcoming the effect of shocks and jars.

In Fig. 1, the solenoid coil 1 is shown embraced by an inverted U-shaped magnet frame 2 having downwardly projecting legs. The lower ends 2a are turned inwardly and the upper central portion of the frame is provided with a downwardly extending iron or steel plug or core 3, the lower end of which projects within the upper portion of the coil. The upper portion of the core has a screw engagement with the frame and projects upwardly a short distance beyond the same. The relay is of the form more particularly shown, described and claimed in my said original pending application and need not be particularly described herein, as the subject matter of this application is generally applicable to various forms of relays and similar devices. It is sufficient to state that in this relay the element or unit 5 is raised in response to certain current conditions in the winding 1 as controlled by a dashpot action to engage and move upwardly the vertically movable rod 30 of insulating material. This is freely movable through the plug 3 and its upper end is a short distance below the tail of the latch 28 in its normal position. Its lower end is normally a short distance above the top of the element or tube 5

of the movable unit and in some cases may rest on the top of this element. The rod is held in its normal position by a cross-pin 30a through the rod, the cross-pin normally resting in the bottom of a vertical slot across the top of the plug 3.

The parts controlled by the relay are shown mounted on and above the magnet frame. The metal plate 22 rests on top of the magnet and is held in place by a nut 3a on the top portion of the plug 3. A block of insulation 23 is fixed to the plate 22. A metal frame 24 with upwardly extending ends is fixed to the block 23 and carries an auxiliary movable rod 25 having a movable contact 25a at one end and a handle 25b at the other. An angular metal piece 26 supports the fixed contact 26a. The rod 25 has fixed thereto a disk 25c having a beveled edge; and between the hub of the disk and one end of the frame 24 a spring 27 encircles the rod and tends to move the disk outwardly to separate the contacts. The edge of the disk 25c is normally engaged by a latch 28 for the purpose of holding the contacts in engagement against the pressure of the spring. The latch is pivotally mounted on a pin 28a which is supported by ears 24a upturned from the frame 24. A spring 29 encircles the pin and has a portion engaging the base of the frame 24 and another portion engaging the tail of the latch and serves not only to cause the latch to engage the disk when reset by the handle but to impose a clockwise moment on the latch tending to keep it in normal engagement with the disk against the effect of vibrations. Also the engagement of the latch with the disk is below the axis of the pin 28a and, due to the pressure of the disk against the latch, another clockwise moment is imposed on the latch tending to keep it in engagement with the disk. A downward projection 28b from the tail portion of the latch limits the upward movement of the latch end when released so it may be engaged readily by the disk in resetting.

When the element 5 is moved upwardly, the rod 30 will be engaged by the end of the element and cause the tripping of the latch and the opening of the contacts of the controlled circuit. Instead of opening such a circuit, the parts may obviously be arranged to close a circuit, or to open one or more and close one or more, or to actuate a part for a mechanical control.

Although in the normal functioning of the parts the tripping of the relay is dependent upon the upward movement of the tripping rod 30 by the element or plunger 5, the tripping may occur due to an upward movement of the tripping rod 30 independently of the movement of the element 5 when the apparatus is subjected to violent shocks or jars. Such an undesirable action is

avoided by the provision of auxiliary counter-acting means. In Fig. 1 there is shown a weight or plunger 31 seated on the plate 22 and housed within the insulating block 23. This weight or mass 31 is provided with an upward projection 31a of reduced diameter, the top of which is positioned a short distance below the latching end of the latch 28. Sufficient upward movement of the weight 31 is permitted to cause the projection 31a to engage the bottom of this end of the latch. Thus when any extreme shock or jar is imposed upon the relay such as to cause the rod 30 to move upwardly and trip the relay, such action is avoided and counter-acted by the weight 31 because it likewise moves upwardly on account of receiving the same shock or jar and thereby holds the latch closed; and as soon as the shock is over, the parts drop to their normal position. The mass 31 should weigh the same or more than the weight of the part or parts to be counter-acted in case they act on opposite sides of the pivot at the same distance from the axis of the latch, so that the moment of the mass will equal or exceed the moment of the part or parts acting on the tail of the latch. If the line of action of the mass is at a less distance from the pivot of the latch than that of the opposing moment, the weight of the mass should be made correspondingly greater than that of the part or parts to be counter-acted; and similarly its weight may be made correspondingly less in case its line of action is at a greater distance from the pivot of the latch. That is, the moment of the mass should equal or exceed the moment of the counteracted parts to insure against undesired tripping of the latch in uses where the relay may be subjected to extreme shocks or jars. The distance between the end of the projection 31a of the mass and the end of the latch 28 should preferably be less than the movement of the rod 30 in tripping the parts so as to insure that the mass will engage the latch before the movement of the tripping action has been completed. That is, the required movement of the mass for preventing the tripping action should be less than the required movement of the rod 30 and of the latch to complete the tripping action.

Fig. 2 shows this method of overcoming the effects of shocks or jars as applied to the tripping relay of a circuit breaker. The breaker 32 is indicated in a general way as being restrained in its closed position by a pivoted latch 33. The trip coil 34 is diagrammatically indicated for controlling its armature or plunger 35 indicated in its unattracted position. On the opposite side of the latch pivot and spaced a little below the latch arm is a weight 36 indicated in its normal at rest position. It is evident that any movement of the plunger 35 due to shocks which might trip the latch will be accompanied by a counter-acting movement of the weight 36, maintaining the latch closed. Thus this principle may be applied in many cases to counteract the movement of any part or parts of a tripping device by applying a movable mass in such a manner that its moment about the pivot of the latching means opposes and counteracts the moment of the actuating part or parts of the relay when subjected to shocks or jars.

Although certain embodiments of this invention have been shown and described, it will be understood that various modifications and adaptations thereof may be made without departing from the scope of the invention.

I claim:

1. A mechanism having a device to be controlled, restraining means for said device, a movable element normally at rest and movable independently of said restraining means for releasing said restraining means when actuated, said movable element being movable under mechanical shocks, a device for actuating said movable element for releasing said restraining means, and a second movable element acting on said restraining means for counter-acting the releasing action of said first named element when the mechanism is subjected to mechanical shock and thereby preventing the release of said restraining means.

2. A mechanism having a device to be controlled, a latch for restraining said device, a movable element normally at rest and movable independently of said latch for releasing said latch when actuated, said movable element being movable under mechanical shocks, a device for actuating said movable element for releasing said latch, and a second movable element acting on said latch for counter-acting the releasing action of said first named element when the mechanism is subjected to mechanical shock and thereby preventing the release of said latch.

3. A mechanism having a device to be controlled, a pivoted latch for restraining said device, a movable element normally at rest and movable independently of said latch for releasing said latch when actuated by engaging said latch at one side of the latch pivot, said movable element being movable under mechanical shocks, a device for actuating said movable element for releasing said latch, and a second movable element acting on the latch at the other side of said pivot for counter-acting the releasing action of said first named element when the mechanism is subjected to mechanical shock and thereby preventing the release of said latch.

4. A mechanism having a device to be controlled and biased to move in one direction, a pivoted latch for restraining the movement of said device, the engagement of said latch with said device being to one side of the pivot of the latch to form a moment in a direction tending to maintain said latch in engagement with said device, a movable element normally at rest and movable independently of said latch for releasing said latch when actuated, said movable element being movable under mechanical shocks, a device for actuating said movable element for releasing said latch, and a second movable element acting on said latch for counter-acting the releasing action of said first named element when the mechanism is subjected to mechanical shock and thereby preventing the release of said latch.

5. A mechanism having a movable element to be controlled, restraining means for holding said element in a fixed position, a second movable element normally at rest and movable independently of said restraining means for releasing said means when actuated to permit said first named element to move to another position, said movable releasing element being movable under mechanical shocks, a device for actuating said movable releasing element for releasing said restraining means, and means for counter-acting the releasing action of said movable releasing element when the mechanism is subjected to mechanical shock and thereby preventing the release of said restraining means.

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