July 7, 1959 F. HEBEL 2,893,531

IMPACT DISCONNECT ASSEMBLY

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Fig. 1

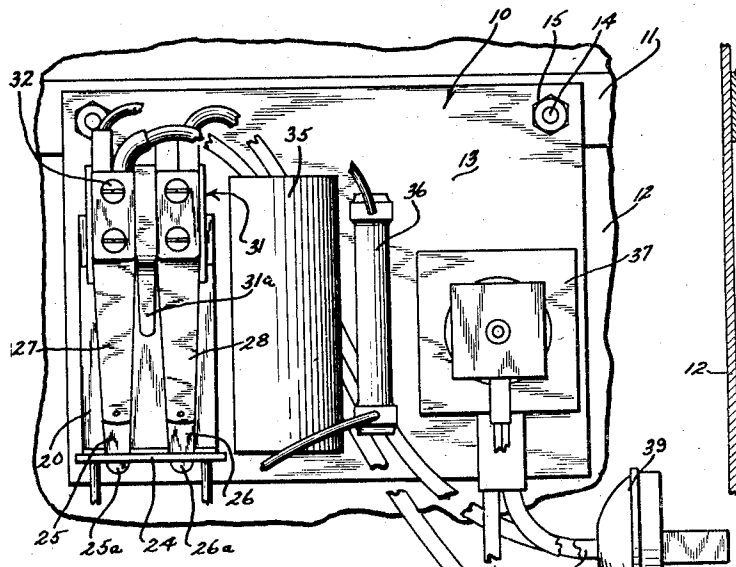


Fig. 2

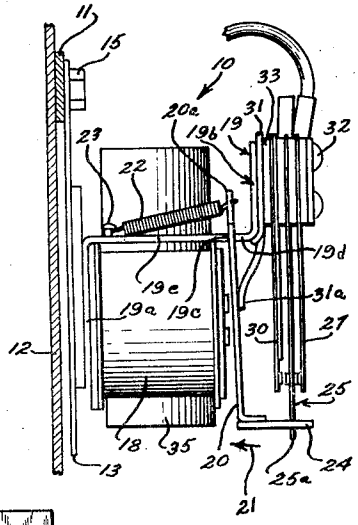


Fig. 3

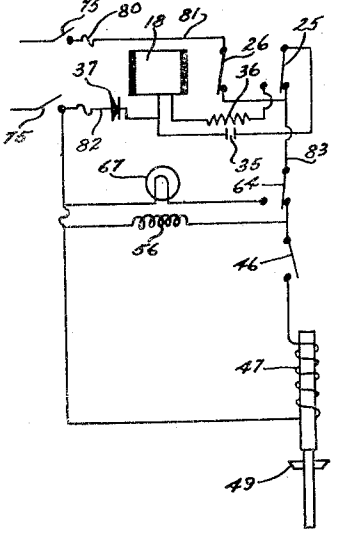
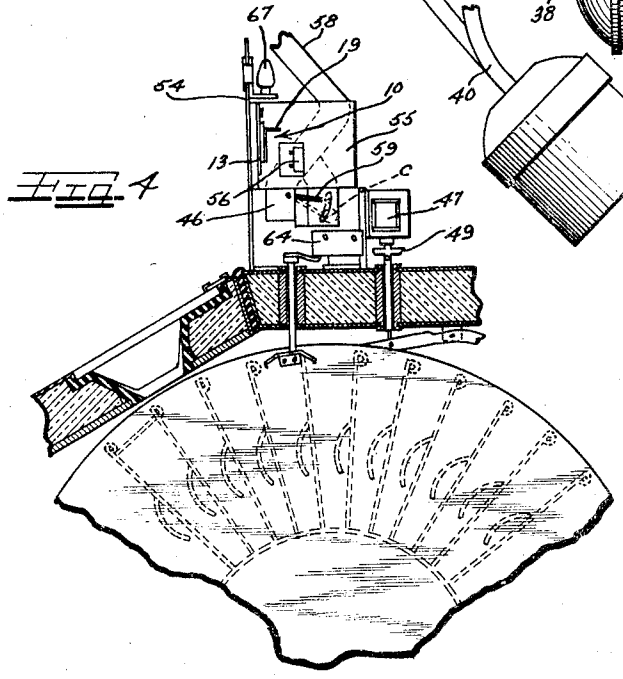


Fig. 4



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IMPACT DISCONNECT ASSEMBLY

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4 Claims. (Cl. 194—97)

This invention relates to an impact disconnect assembly and to a coin operated vending machine including impact disconnect means for preventing malfunctioning of the coin mechanism thereof.

It is an object of the invention to provide a novel impact disconnect assembly for coin operated vending machines and the like.

It is another object of the present invention to provide a novel coin operated vending machine having means for preventing malfunctioning of the coin mechanism.

A further object of the present invention is to provide an impact disconnect assembly for interrupting an electric circuit for a predetermined time period in response to an applied impact force.

It is another object of the present invention to provide an impact disconnect assembly which may be sold as a unit and readily applied to existing vending machines and the like.

Yet another object is to provide an impact disconnect assembly which is adequately sensitive for use in conjunction with coin operated machines and which is rugged and reliable.

Other and further important objects, features and advantages of the present invention will be apparent from the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a partial side elevational view of an impact disconnect assembly in accordance with the present invention applied to a coin operated mechanism;

Figure 2 is a partial vertical sectional view illustrating the impact disconnect assembly in end elevation;

Figure 3 is an electric circuit diagram illustrating the operation of the impact disconnect assembly in connection with the circuit of a coin operated mechanism; and

Figure 4 is a fragmentary vertical sectional view illustrating coin operated mechanism including an impact disconnect assembly in accordance with the present invention.

As shown on the drawings:

The impact disconnect assembly of the present invention has particular application to coin operated mechanism where it is desired to deenergize the mechanism upon the application of an impact force, for example to the front panel of the mechanism. Such impact forces are sometimes applied to an effort to operate the device without insertion of the proper coin or to cause multiple operations of the device for a single payment. The device of the present invention will prevent the operation of the device for a predetermined time period after any substantial impact has been applied to the machine, and thus insures against any malfunctioning of the machine. In turn, this serves as a protective feature for the machine since once it is realized that impacts deenergize the machine, the machine is less likely to be subject to such impacts.

In Figures 1 and 2, an impact disconnect device **10** in accordance with the present invention is illustrated as being secured to a reinforcing strip **11** extending at the rear of a front panel **12** of a coin operated machine. The

mounting plate **13** for the impact disconnect assembly may be secured to the reinforcing strip in any suitable manner, for example by means of screws **14** and nuts **15** as illustrated in Figures 1 and 2. In any event, the attachment of the impact disconnect mechanism to the machine is sufficiently rigid so that impact forces exerted on the machine will be transmitted to the assembly. Further, the assembly is so mounted that the mounting plate **13** will be disposed generally normal to the expected direction of impact forces applied to the machine.

The components of the impact disconnect assembly comprise a relay solenoid **18** carried by means of a bracket **19** secured at its leg **19***a* to mounting plate **13**. Bracket **19** further includes a leg **19***b* of reduced width providing shoulders as indicated at **19***c* on each side thereof. The relay assembly further includes an armature member **20** having a generally rectangular slot receiving the leg portion **19***b* in close relation but providing sufficient clearance to allow pivotal movement of the armature about the portion **19***d* of the leg **19***b* in the direction of the arrow **21**, for example when the solenoid **18** is energized. A spring **22** is connected between a pin **23** carried by the leg **19***e* of bracket **19** and a lug portion **20***a* extending from the armature **20** so as to tend to pivot the armature **20** away from the solenoid **18** in a direction opposite to the direction of the arrow **21**.

Secured to the armature **20** at the free end thereof is an insulating block **24** having a pair of apertures therethrough receiving the ends **25***a* and **26***a* of contact blades **25** and **26**. These contact blades carry contacts which are normally engaged with contacts of stationary contact arms **27** and **28** and which are movable when the armature **20** moves in the direction of the arrow **21** so that the contact arm **25** makes contact with a second stationary arm **30**. The stationary and movable contact arms are mounted in superimposed insulated relation on a plate **31** secured to the leg portion **19***b* of the bracket **19** by means of screws **32**. Insulating spacers such as **33** are interposed between plate **31** and the contact arms **26** and **30**, and between arms **30**, **25** and **27** and arms **26** and **28**. The plate **31** has a finger **31***a* which limits outward pivoting of the armature **20** under the urging of the spring **22**. The tension on the spring **22** is normally ample to maintain movable contact arms **25** and **26** in engagement with stationary contact arms **27** and **28** respectively and finger **31***a* may be slightly spaced from armature **20** in normal position depending on the rigidity of arms **27** and **28**. On the other hand, when the solenoid **18** is energized, contact arms **25** and **26** will move out of engagement with stationary arms **27** and **28** and contact arm **25** will move into engagement with stationary contact arm **30**.

Also mounted on the mounting plate **13** are a capacitor **35**, a resistor **36** and a rectifier **37** which serve a purpose to be hereinafter described in connection with Figure 3. Electrical current may be supplied to the impact assembly **10** by means of a conventional two wire cord **38** having a plug **39** at the end thereof which may be connected to a suitable 60 cycle 110 volt source. The established circuits of the coin operated mechanism may have a plug connected to the input thereof similar to plug **39** and the disconnect assembly has an output two line cord **40** with a connector socket **41** at the end thereof for receiving the input plug of the coin operated mechanism.

It will be observed that the armature **20** is held by means of the spring **22** against the shoulders **19***c* of the bracket **19** with the armature **20** clear of the extreme end of the solenoid assembly **18**. The mass of the armature **20** below the shoulders **19***c* as seen in Figure 2 together with the mass of the insulating member **24** is so disposed in relation to the mass of the armature above the pivot

shoulders 19c and the strength of the spring 22 that any substantial impact force exerted against the front panel 12 will cause momentary closure of contact 25 with contact 30. It will be observed that the impact force will be transmitted from the front panel 12 through reinforcing member 11 to mounting plate 13 and thence through mounting bracket 19 to the ends of the contact arms 25—28 and 30, secured to bracket 19. The result will be that these parts tend to be translated suddenly in a direction at right angles to mounting plate 13 and opposite to the direction of the arrow 21, while the inertia of the armature 20 below pivot shoulders 19c and the inertia of the insulating member 24 tend to cause the armature and the free ends 25a and 26a of contact arms 25 and 26 connected therewith to remain in the same position. This is accommodated by a slight pivoting of the armature 20 on the pivot shoulders 19c with a consequent slight elongation of spring 22 and flexing of the free ends 25a and 26a of contact arms 25 and 26, causing engagement of contact arms 25 and 30 and disengagement of arms 25 and 27 and arms 26 and 28.

Figure 3 illustrates the electric circuit of the impact disconnect assembly in operative relation to an electric circuit of a typical coin mechanisim to which the present invention may be applied. The parts of the coin mechanism electric circuit correspond to those illustrated in my Patent No. 2,776,035 issued January 1, 1957 and have been given the same reference numerals for convenience in comparison. In Figure 3, when switch arms 75 are closed, 110 A.C. voltage may be supplied through 10 amp. fuses 80 to lines 81 and 82 which would correspond to the lines within cord 38 in Figure 1. In normal operation voltage would be applied from the line 81 through contact 26 and line 83 to a switch arm 64 which is normally in the position shown but which is actuated when the coin operated mechanism is empty to light an empty light 67. Switch 46 is controlled by a conventional coin mechanism so as to be closed when the proper coin is inserted into the mechanism. A coin lockout relay 56 will only accept coins in its energized condition, so that when the machine is empty, and the switch 64 has lit empty lamp 67, lockout relay 56 will be deenergized to hold coins for return in the conventional manner. It will be noted that in this normal operating condition, capacitor 35 will be charged from line 81 through contacts 25 and 26 in their normal condition under the control of rectifier 37 so as to provide a unidirectional charging current to the capacitor. When the proper coin is inserted into the machine, switch 46 closes actuating solenoid 47 to raise armature 49 to actuate the machine to dispense an article or the like.

If, however, an impact force is applied to the front panel 12 of the machine, the contact arms 25 and 26 will momentarily open the previously described circuits, and contact arm 25 will close a circuit extending from capacitor 35 through resistor 36 and solenoid 18 to energize solenoid 18 and hold the contacts 25 and 26 in coin circuit interrupting position so long as sufficient current is flowing in the capacitor discharge circuit just mentioned. With the contact 26 in this actuated condition, the dispensing circuit of the machine is deenergized and lockout relay 56 will therefore be deenergized to provide for return of any coins which are inserted during the period of energization of relay 18.

Certain details of the machine of my aforementioned Patent No. 2,776,035 are illustrated in Figure 4 in order to show the relation between the coin mechanism 55 thereof and the impact disconnect assembly 10 of the present invention. Parts shown in Figure 4 have been given the same reference numerals as in my patent aforementioned for convenience of reference. Generally, it will be advantageous to mount the impact disconnect assembly of the present invention in proximity to the parts whose functioning is to be protected such as coin actuated lever 59 of coin switch 46 so that the impact disconnect assembly will receive generally the same impact forces as the mechanism to be protected from malfunctioning due to impact.

Summary of operation

Summarizing the operation of the impact disconnect assembly of the present invention, when an impact force is applied to the front panel 12 of the machine corresponding to panel 54 in Figure 4, this impact is translated to the mounting bracket 19 and to the base portions of the switch arms 25, 26, 27, 28 and 30 to suddenly displace these portions relative to the armature 20 and insulating member 24 associated therewith, which is connected with the free ends 25a and 26a of the movable contacts 25 and 26. The inertia of the lower end of armature 20 and insulating member 24 is sufficient to produce rotation of the armature 20 relative to the bracket 19 against the action of the spring 22 to momentarily close movable contact 25 with stationary contact 30, whereupon capacitor 35, Figure 3, discharges through solenoid 18 to hold the armature 20 against the solenoid 18 for a predetermined time period depending on the characteristics of capacitor 35, resistor 36, and solenoid 18. During the time that the solenoid 18 is energized, lockout relay 56 is deenergized so that coins are deflected by means of a reject pin (not shown) controlled by the lockout relay 56 into a coin reject path which is the left fork of the coin chute 58 as seen in dotted outline in Figure 4. When armature 20 returns to its normal position under the action of spring 22, lock-out relay 56 is again energized to prevent the reject pin from rejecting inserted coins, and coins followed the normal path through the device which comprises the right fork of coin chute 58 in Figure 4 to actuate coin switch 59 as indicated in dotted outline in Figure 4, the coin being indicated at C.

It will be apparent that many modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In combination in an impact disconnect assembly; mounting means; relay means carried by said mounting means including an energizing coil and an armature mounted in operative relation to said coil for movement between a normal position when the coil is deenergized and an actuated position when the coil is energized, a plurality of contacts controlled by said armature comprising a first pair of normally closed contacts for controlling an external circuit, a second pair of normally closed contacts and a pair of normally open contacts; capacitance means connected in series with said normally open contacts and said energizing coil; and a capacitance charging circuit connected with said capacitance means under the control of said second pair of normally closed contacts; whereby said external circuit is normally completed through said first pair of normally closed contacts and said capacitance means is normally in a charged condition; said armature being responsive to application of an impact force to said mounting means to momentarily shift to actuated position to close said normally open contacts connecting said capacitance means with said energizing coil to hold the armature in actuated position and interrupt said external circuit for a predetermined time period.

2. A coin operated mechanism comprising mounting means, a coin assembly on said mounting means including coin lock out relay means for controlling acceptance of coins inserted in said mechanism, control relay means on said mounting means having an energizing coil and an armature mounted for movement from a normal to an actuated position and controlling a plurality of pairs of contacts including a first pair of contacts, a second pair of normally open contacts and a third pair of normally closed contacts, a lock out relay energizing circuit controlled by said first pair of contacts of said control relay means, capacitance means connected in series with said

energizing coil under the control of said second pair of normally open contacts of said control relay means, and a capacitance charging circuit connected with said capacitance means under the control of said third pair of normally closed contacts for normally maintaining said capacitance means in charged condition, and said armature being responsive to an impact force applied to said mounting means to move to actuated position and thereby close said second pair of normally open contacts causing said capacitance means to discharge to hold the armature in actuated position and to cause said lock out relay to reject coins.

3. A dispensing machine comprising electrically operated means controlling a dispensing operation of said machine, mounting means, control relay means on said mounting means having an energizing coil and an armature mounted in operative relation to said energizing coil for movement between a normal and an actuated position and controlling a plurality of pairs of contacts including a first pair of contacts, a second pair of normally open contacts and a third pair of normally closed contacts, capacitance means connected in series with said energizing coil under the control of said second pair of normally open contacts of said control relay means, said first pair of contacts controlling said electrically operated means, and a capacitance charging circuit connected with said capacitance means under the control of said third pair of normally closed contacts for normally maintaining said capacitance means in charged condition, and said armature being responsive to an impact force applied to said mounting means to move to actuated position and

thereby close said second pair of normally open contacts causing said capacitance means to discharge and hold the aramature in actuated position and for preventing actuating said electrically operated means controlling a dispensing operation of the machine.

4. An impact disconnect assembly comprising mounting means, control relay means on said mounting means having an energizing coil, electrically operated switch means having first and second pairs of contacts and having an element mounted in operative relation to said energizing coil and movable between a normal and actuated position and controlling said pairs of contacts, an external circuit, said first pair of contacts controlling said external circuit and normally closing said circuit, energy storage means, said external circuit normally supplying energy to said energy storage means, an energy delivery circuit comprising said energy storage means in series with said energizing coil under the control of said second pair of contacts, and said element being responsive to an impact force applied to said mounting means to move to actuated position thereby closing said second pair of contacts to complete said energy delivery circuit for maintaining said electrically operated switch element in actuated position.

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