Jan. 6, 1970 J. C. MELLINGER 3,488,463

LID AND UNBALANCE SWITCH MECHANISM

Filed April 29, 1968 2 Sheets-Sheet 1

Fig. 1

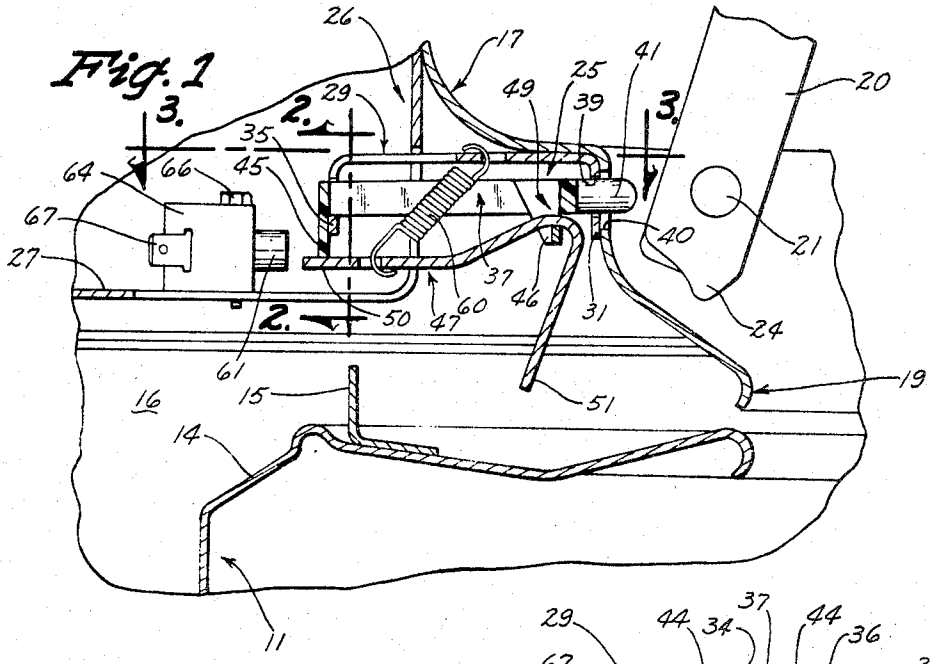


Fig. 2

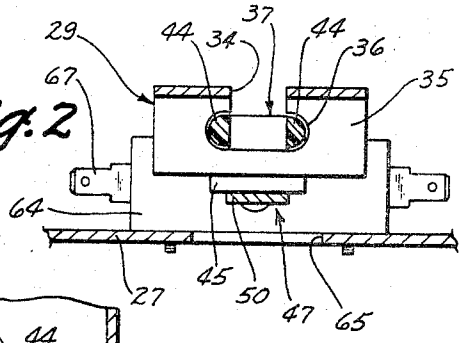
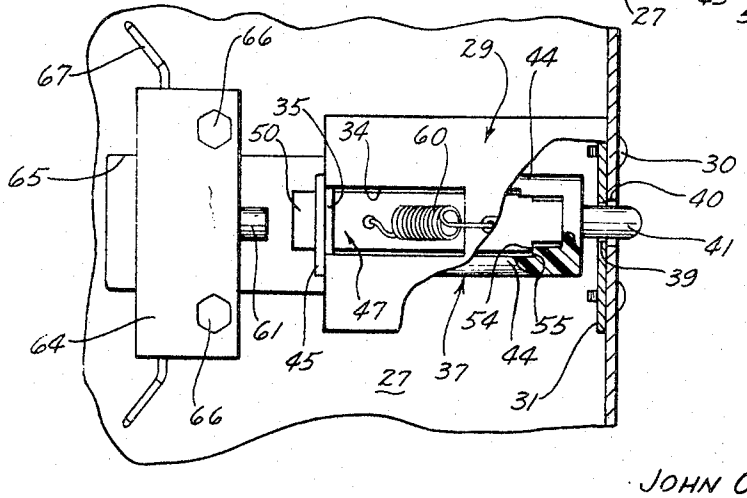


Fig. 3



INVENTOR.
JOHN C. MELLINGER
BY William G. Landwier
AGENT

Jan. 6, 1970 J. C. MELLINGER 3,488,463

LID AND UNBALANCE SWITCH MECHANISM

Filed April 29, 1968 2 Sheets-Sheet 2

Fig. 4

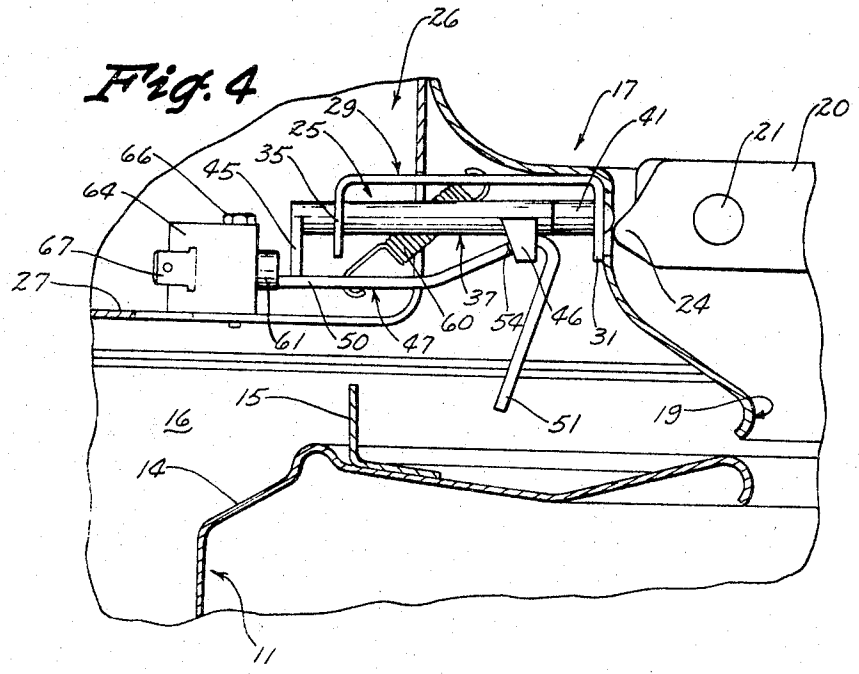
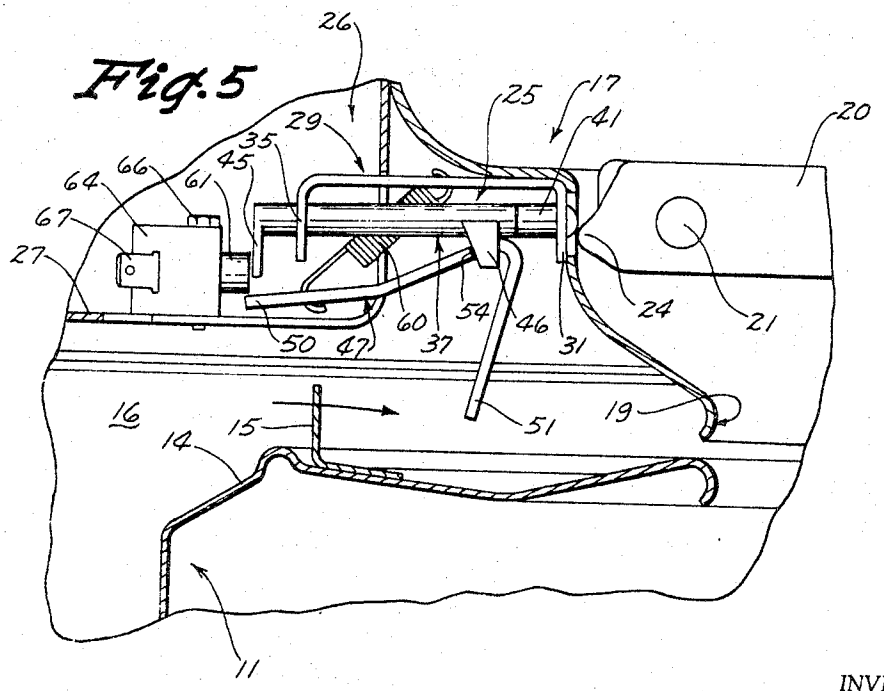


Fig. 5



INVENTOR.
JOHN C. MELLINGER

BY
William G. Landwier
AGENT

United States Patent Office 3,488,463
Patented Jan. 6, 1970

3,488,463

LID AND UNBALANCE SWITCH MECHANISM

John C. Mellinger, Newton, Iowa, assignor to The Maytag Company, Newton, Iowa, a corporation of Delaware

Filed Apr. 29, 1968, Ser. No. 725,028
Int. Cl. H01h 3/16
U.S. Cl. 200—61.76 13 Claims

ABSTRACT OF THE DISCLOSURE

A control mechanism for a centrifugal extractor is disclosed that includes a switch device responsive to opening of a movable lid or to excessive unbalance vibrations of the extractor for de-energizing the extractor. The control mechanism further includes a biased plunger operable upon opening and reclosing of the lid following de-energization caused by the unbalance vibrations for resetting the mechanism and re-energizing the extractor.

BACKGROUND OF THE INVENTION

Field of the invention

The instant invention relates to a control mechanism for a centrifugal extractor and more particularly to a lid-responsive and vibration-responsive switch mechanism for controlling energization of a centrifugal extractor.

Description of the prior art

Many different types of switch mechanisms have been designed for centrifugal extractors such as washing machines operable through wash and spin dry cycles of operation. During the spin dry operation, if an extreme unbalance condition occurs due to the uneven distribution of clothes, the tub may gyrate excessively. It is therefore necessary to provide an unbalance responsive switch for opening the circuit to effect de-energization of the machine. The operator may then redistribute the clothes and restart the operation.

Prior art patents in this area of unbalance switches or combination lid and unbalance switch mechanisms for centrifugal extractors indicate a continuing attempt at providing a simple, low cost, and yet dependable, arrangement. In at least two prior art patents, a plunger member extends directly between the lid and a switch device. In one of these patents, U.S. 2,882,360 issued to K. O. Sisson, the plunger is kicked up out of alignment between the lid and the switch for actuating the switch in response to an unbalance condition. In the other patent, U.S. 2,957,959 issued to J. C. Mellinger, the switch device is itself moved away from the plunger. There are disadvantages or compromises associated with these movements. For example, the mechanisms disclosed in both of these patents require at least two spring members to return and maintain proper positioning of the operative parts of the mechanism.

SUMMARY OF THE INVENTION

It is an object of the instant invention to provide an improved lid and unbalance switch mechanism for de-energizing an electrically controlled device under predetermined conditions.

It is a further object of the instant invention to provide an improved control mechanism for de-energizing a centrifugal extraction machine responsive to the opening of an access panel or to the occurrence of an excessive unbalance condition.

It is a further object of the instant invention to provide an improved control mechanism for a centrifugal extractor operable for de-energizing the extractor upon the opening of the lid or upon occurrence of an excessive unbalance vibration and further responsive to the opening of the lid and reclosing of the lid for conditioning the mechanism for re-energizing the extractor.

It is a still further object of the instant invention to provide a control mechanism that is automatically reset upon opening of the lid after the machine has been de-energized.

It is a still further object of the instant invention to provide a combination lid and unbalance control mechanism that is simple and low cost in construction yet positive and dependable in operation.

Briefly, the instant invention achieves these objects in a control mechanism that includes a switch member electrically positioned in the circuit of a centrifugal extractor and that is operable for interrupting operation of the extractor upon actuation of the switch. A plunger is responsive to lid operation and is associated with an actuator engageable with the switch member and responsive to an excessive unbalance vibration for operating the switch member to effect the de-energization of the washing machine. Opening of the lid resets the mechanism for re-energization of the apparatus upon closing of the lid. The unbalance and lid switch mechanism is constructed so that the opening of the lid of the extractor at any time will interrupt the operation of the extractor.

Further objects, advantages and details of this invention will become evident as the description proceeds and from an examination of the accompanying two pages of drawings which illustrate a preferred embodiment of the invention and in which similar numerals refer to similar parts throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a fragmentary elevational view of a washing machine partially in section to show the control mechanism of the instant invention;

FIGURE 2 is a fragmentary sectional view taken along line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary top plan view of the control mechanism illustrated in FIGURE 1 and taken along line 3—3 of FIGURE 1;

FIGURE 4 is a view similar to FIGURE 1 illustrating the control mechanism in an operative condition; and

FIGURE 5 is a view similar to FIGURE 1 illustrating the position of the control mechanism after encountering an excessive unbalance vibration and before the resetting of the control mechanism.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is shown a fragmentary portion of a centrifugal extractor such as employed in a vertical axis clothes washing machine which includes a nutationally supported tub **11** within which is journalled a rotatable clothes basket (not shown). The tub **11** includes a tub cover **14** on which is fixed a bumper **15** that moves with the tub **11** and tub cover **14**. The position of the bumper **15** with respect to the cabinet **16** therefore is determined by the gyration of the tub **11** when the extractor is energized. The entire washing machine is supported on a frame (not shown) and enclosed by cabinet **16**.

The cabinet structure **16** includes top cover portion **17** having an access **19** through which fabrics may be inserted or removed from the rotatable clothes basket. The access opening **19** is closed by a panel or lid **20**. The lid **20** is pivoted about a fulcrum **21** spaced a short distance from the rear end **24** of the lid. The rear end **24** of the lid **20** functions as a lever with respect to the fulcrum **21** for engaging the switch operating mechanism indicated generally as **25** and controlling the extractor operation as will be more fully shown hereinafter. The top

cover 17 further includes a control housing 26 having a bottom mounting plate 27 for supporting various control components.

The control mechanism forming the subject matter of the instant invention is supported by the top cover 17 and includes an inverted U-shaped bracket 29 attached to the top cover 17 by a pair of screw members 30 extending through the top cover 17 and threadingly engageable with a downwardly extending front flange portion 31 of the bracket 29. As best shown in views 1, 2 and 3, the bracket 29 includes a rearwardly positioned slot or cutout 34 that exposes other components of the control mechanism.

The rear flange 35 of the bracket 29 includes a horizontally elongated opening 36 for slidingly supporting the rear end of a plunger 37. The front end of the plunger is supported by an opening 39 in the front bracket flange 31 and extends through a similar but larger opening 40 in the top cover 17 adjacent the rear end 24 of the lid member 20. The plunger 37 is therefore slidingly supported by the top cover 17 through the inverted U-shaped bracket 29 and positioned for engagement by the rear end 24 of the lid member 20 as it is pivoted into the closed position.

The front end of the plunger is in the form of a projecting nose 41 extending through the aligned holes 39 and 40 of the bracket flange 31 and top cover 17. The plunger 37 further includes a pair of spaced apart side rails 44 joined at the front and rear. The rear end of the plunger 37 includes a downwardly extending flange portion 45 engageable with the rear side of the bracket rear flange 35 when the plunger 37 is in its forward position as shown in FIGURE 1. The plunger 37 also includes an undercarriage portion 46 for pivotally supporting the actuator member 47 on the plunger 37. The undercarriage portion 46 is integral with the plunger 37 and defines a pivot slot 49 for receiving the actuator member 47.

The actuator member 47 is pivotally supported by the plunger undercarriage portion 46 and includes a rear end 50 engageable with the bottom edge of the rear flange portion 45 of the plunger 37. The actuator member 47 further includes a depending lever end portion 51 extending substantially downwardly from the pivot connection between the actuator member 47 and the plunger 37. The portion between the rear end and the lower end of the actuator member will be referred to as the pivot portion and includes a pair of shoulders 54 facing toward the right in FIGURE 3. The shoulders 54 are engageable with abutments 55 on the undercarriage portion 46 and that face toward the left. The actuator member 47 is therefore axially movable with the plunger 37 and pivotally movable with respect thereto.

The depending lever portion 51 of the actuator member 47 is positioned for engagement by the bumper 15 upon excessive gyration of the tub 11. Whenever a predetermined unbalance condition causes the tub 11 to excessively gyrate, the bumper 15 mounted on the tub 11 is moved so as to engage the depending lever portion 51 and pivot the actuator member 47 in a counterclockwise direction so that the rear end 50 of the actuator 47 is moved downwardly from the plunger rear flange 45. The operation of the actuator member 47 responsive to an unbalance is shown in FIGURE 5.

A biasing spring 60 is disposed between the inverted U-shaped bracket 29 and the actuator member 47. This angularly disposed biasing spring 60 provides upwardly and forwardly directed components of biasing force. The upwardly directed component of force maintains the rear end 50 of the actuator member 47 against the plunger rear flange 45 or against the lower side of a switch button 61 as will be more fully shown hereinafter. The forwardly directed component of force biases the actuator member 47 in a forward direction to maintain engagement of the shoulders 54 against the plunger abutments 55. This also, then biases the plunger 37 in a forward direction limited by engagement of flange 45 against the bracket flange 35 or by engagement of the plunger nose 41 with the lid 20.

A switch 64 is attached to the top cover 17 over the cutout 65 in the top cover mounting plate 27 and attached to the mounting plate 27 by a pair of threaded members 66. The switch 64 includes a pair of connector terminals 67 by which the switch 64 may be connected into the circuitry of the extractor drive motor. In the instant embodiment, the switch 64 includes a pair of contacts operable to the open position upon the releasing of the switch button 61 for effecting de-energization of the motor. The switch button 61 is biased to the right so that, in the absence of an externally applied force toward the left, the button 61 will automatically return under the spring biasing to the normal position shown in FIGURES 1, 3, and 5.

From the foregoing description, it is believed that the operation of the control mechanism of the instant invention is apparent. When the operator raises the lid 20 of the washer to insert clothes, the mechanism assumes a position as shown in FIGURE 1. In this position, the lid 20 is open, the plunger is moved to the forward position, and the rear end 50 of the actuator 47 is against the stop flange 45 aligned with the switch button 61 but spaced therefrom. With the control mechanism in this position, the motor and extractor are de-energized. When the operator has completed the loading, the lid 20 is closed and the rear lever end 24 of the lid engages the projecting nose 41 of the plunger 37 and, upon continued movement of the lid 20, the plunger 37 and the actuator 47 moved toward the left to a position as shown in FIGURE 4. In this position, the contacts of the switch 64 are closed and the circuit is completed across the terminals 67 for energizing the motor. The lid 20 may be opened while the control mechanism is in the condition as shown in FIGURE 4 to effect de-energization of the extractor apparatus.

If a condition of unbalance should occur during operation of the extractor while the lid 20 is closed and the control mechanism 25 is in the position as shown in FIGURE 4, the tub 11 will gyrate and the bumper 15 will engage the downwardly projecting lever portion 51 of the actuator 47. Should the unbalance become excessive, the bumper 15 will move the actuator 47 in a counterclockwise direction to effect movement of the rear end 50 of the actuator 47 downwardly from the plunger flange 45 and out of alignment with the switch button 61 to a position below the button 61. This action will allow the switch button 61 to move toward the right and effect opening of the switch contacts and de-energization of the apparatus. Since the movement of the actuator 47 effected by the bumper 15 is temporary, the actuator 47 will return in a clockwise direction so that the rear end 50 of the actuator 47 is moved in an upwardly direction. Since the switch button 61 has moved outwardly, however, upward movement of the rear end 50 of the actuator 47 will be limited by the switch button 61 itself.

The apparatus will be maintained de-energized until the control mechanism 25 is reset. The resetting is accomplished automatically upon the opening of the lid 20 by the operator. Opening of the lid 20 releases the plunger 37 so that the plunger 37 and actuator 47 move axially toward the right under biasing force of the spring 60 to position the plunger 37 in its forward position and to position the actuator rear end 50 in substantial alignment with the switch button 61 as shown in FIGURE 1. This control mechanism is now operable for re-energizing the extractor apparatus upon the closing of the lid 20 as previously described.

Thus, if the operator observes that the machine has been stopped during the centrifugal extraction operation due to an unbalance, it is only necessary to lift the lid 20 and close it again to restart the machine. This is a convenient operation since the procedure is ordinarily followed in order to manually redistribute the clothes

within the basket to eliminate the conditions causing the unbalance.

It is therefore seen that the instant invention provides an improved combination lid and unbalance control mechanism that is simpler in construction and includes fewer components than required for prior art devices. Furthermore, this device, through its improved construction provides for long term dependable and positive operation. The requirement for the balancing of spring forces as found in some prior art patents has been eliminated. The disadvantages of moving the switch member and the associated flexing of the leads connected thereto have been eliminated.

In the drawings and specification, there has been set forth a preferred embodiment of the invention and although specific terms are employed, these are used in a generic and descriptive sense only, and not for purposes of limitation. Changes in form and the proportion of parts, as well as the substitution of equivalents are contemplated, as circumstances may suggest or render expedient, without departing from the spirit or scope of this invention as defined in the following claims.

I claim:

1. In combination: a supporting structure; a movable member movably mounted on said supporting structure; switch means mounted on said supporting structure and operable between first and second electrical conditions; elongated plunger means slidably mounted on said supporting structure for engagement by said movable member and axially movable from a first biased position to a second position responsive to movement of said movable member; an actuator member engageable with said switch means; means included in said plunger means supporting said actuator member and operable for effecting movement of said actuator member in the general direction of movement of said plunger means to actuate said switch means from said first electrical condition to said second electrical condition responsive to movement of said plunger means to said second position; and means separate from said plunger means for moving said actuator member relative to said plunger means and out of operative engagement with said switch means to effect operation thereof to said first electrical condition.

2. In a combination of the character described in claim **1** wherein said switch means includes a pair of biased contacts for effecting operation of said switch means from said second electrical condition to said first electrical condition responsive to operative disengagement of said actuator member from said switch means.

3. In a combination of the character described in claim **1** wherein said plunger means includes a stop portion for axially locating said plunger means in said first position and for locating said actuator member for engagement with said switch means upon movement of said plunger means toward said second position.

4. In a combination of the character described in claim **3** and further including spring means for biasing said plunger means toward said first position and for biasing said actuator member against said plunger stop portion.

5. In a combination of the character described in claim **4** wherein said means supporting said actuator member on said plunger means defines a pivot for said actuator member and wherein said actuator member is pivotally movable away from said plunger stop portion and out of operative engagement with said switch means responsive to said means for moving said actuator member.

6. In combination: a supporting structure; a movable member movably mounted on said supporting structure; switch means mounted on said supporting structure spaced from said movable member and operable between first and second electrical conditions; elongated plunger means mounted on said supporting structure for engagement by said movable member and slidingly movable from a first to a second position responsive to movement of said movable member; an actuator member; means included in said plunger means defining a pivot support movably supporting said actuator member; a biasing spring connected between said supporting structure and said actuator member for biasing said plunger means to said first position and for biasing said actuator member into operative alignment with said switch means; means included in said actuator member engageable with said switch means, said actuator member being operable for effecting operation of said switch means from said first electrical condition to said second electrical condition responsive to movement of said plunger means to said second position; and means for moving said actuator member relative to said plunger means and against the biasing of said biasing spring to effect operative disengagement of said actuator member from said switch means to permit operation of said switch means to said first electrical condition.

7. In a combination of the character described in claim **6** wherein said actuator member includes a depending portion responsive to said means for moving said actuator member to effect movement of said actuator member out of said operative alignment with said switch means.

8. In a combination of the character described in claim **7** wherein said plunger means includes a stop portion engageable by a portion of said actuator member responsive to the opening of said movable member for realigning said actuator member with said switch means and facilitating operation of said switch means to said second electrical condition by said actuator member upon the reclosing of said movable member.

9. In combination: a supporting structure; a movable member mounted on said supporting structure and movable between a first open and a second closed position; plunger means slidably mounted on said supporting structure and movable from a first to a second position responsive to movement of said movable member to said closed position; an actuator member; means included in said plunger means defining a pivot support supporting said actuator member for movement thereof from a first posture to a second posture relative to said plunger means; switch means associated with said actuator member; means for biasing said actuator member toward said first posture and said plunger means toward said first position, means for operating said switch means from a first electrical condition to a second electrical condition responsive to movement of said movable member to said closed position and movement of said plunger means to said second position with said actuator member in said first posture; and means separate from said plunger means for moving said actuator member to said second posture, and effecting operation of said switch means from said second electrical condition to said first electrical condition.

10. In a combination of the character described in claim **9** wherein said plunger means includes a portion engageable by said movable member upon movement of said movable member to said closed position and wherein said actuator member is aligned with said switch means in said first posture and engageable with said switch means upon movement of said plunger means to said second position.

11. In an electrically controlled centrifugal extraction apparatus, the combination: enclosure means enclosing said apparatus; a panel movably mounted on said enclosure means; plunger means slidably mounted on said enclosure means and movable from a first to a second position responsive to closure of said panel; an actuator member; means included in said plunger means defining a pivot support supporting said actuator member for movement thereof from a first posture to a second posture relative to said plunger means; switch means mounted on said enclosure means and aligned with said actuator member in its first posture; means for biasing said actuator member toward said first posture and said plunger means toward said first position; means included in said actuator member for operating said switch means from a first electrical condition to a second electrical condition re-

sponsive to closure of said panel and movement of said plunger means to said second position with said actuator member in said first posture for energizing said apparatus; and means for pivotally moving said actuator member relative to said plunger means for movement to said second posture and thereby effecting operation of said switch means from said second electrical condition to said first electrical condition for de-energizing said apparatus, said biasing means being operable for returning said plunger means to said first position and said actuator member to said first posture upon opening of said panel.

12. In an electrically controlled centrifugal extraction apparatus as defined in claim **11** wherein said means for moving said actuator member includes means on said apparatus engageable with said actuator member responsive to an excessive unbalance condition of said centrifugal extraction apparatus for effecting pivotal movement of said actuator member to said second posture for de-energizing said centrifugal extraction apparatus.

13. In an electrically controlled centrifugal extraction apparatus as defined in claim **12** wherein means are provided whereby said actuator member is responsive to said unbalance condition and is maintained operatively disengaged from said switch means until said panel is moved to the open position and wherein said switch means is operated to said second condition upon reclosing of said panel.

References Cited

UNITED STATES PATENTS

2,391,231	12/1945	Edwards	200—61.77
3,149,212	9/1964	Smith	200—61.70

ROBERT K. SCHAEFER, Primary Examiner

M. GINSBURG, Assistant Examiner