

April 29, 1958

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2,832,208

ADJUSTABLE VIBRATION SENSING MEANS FOR LAUNDRY MACHINE

Filed Aug. 3, 1955

2 Sheets-Sheet 1

FIG. 1

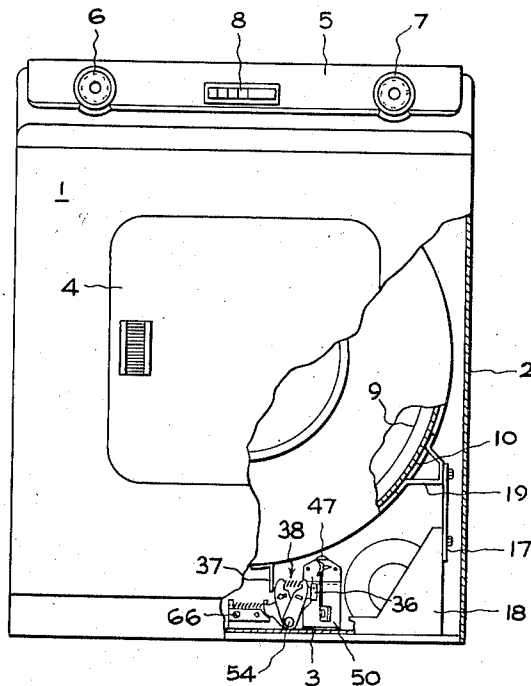
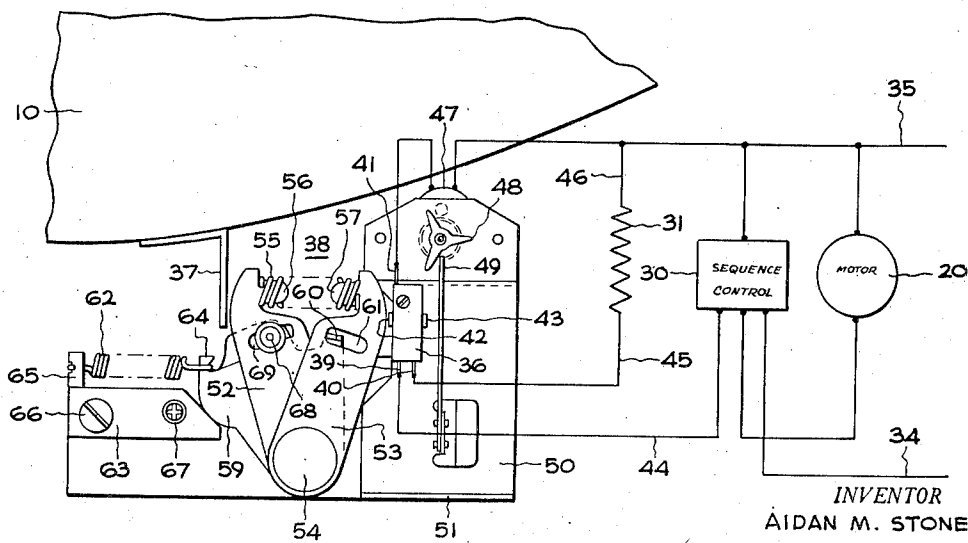


FIG. 4



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FIG. 2

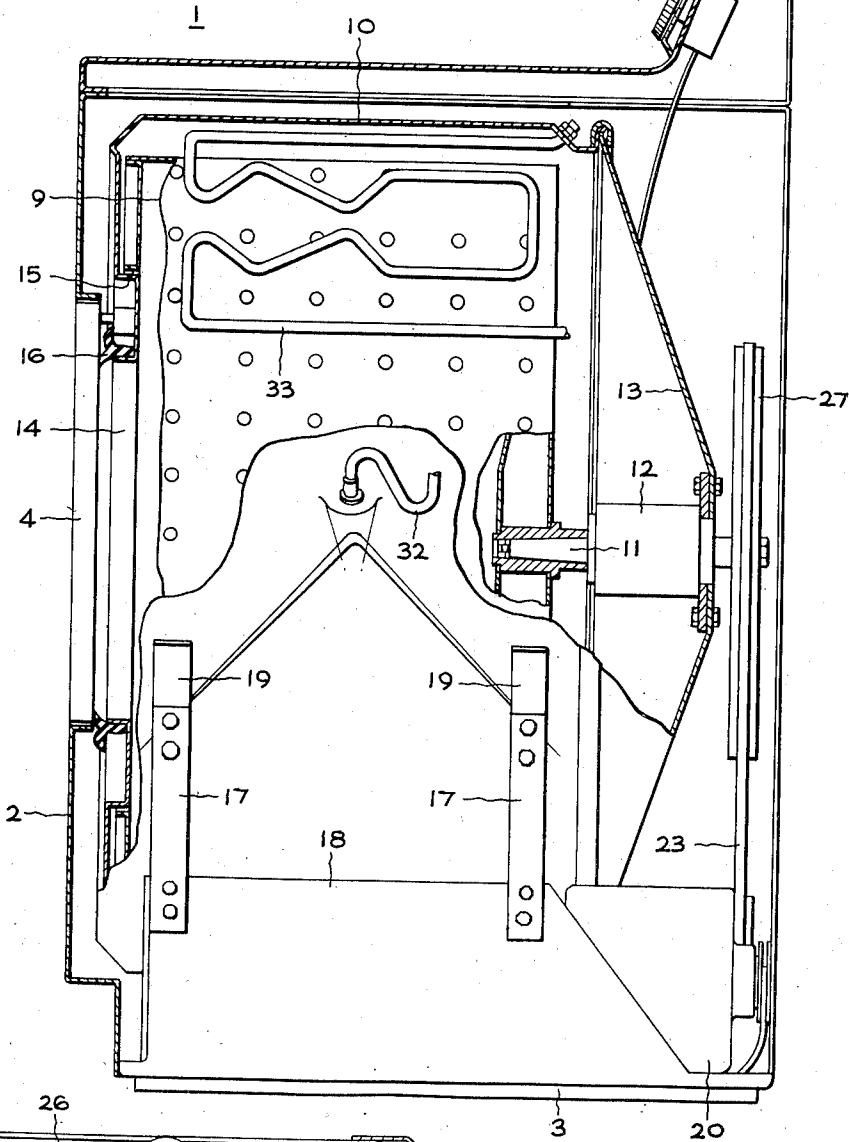
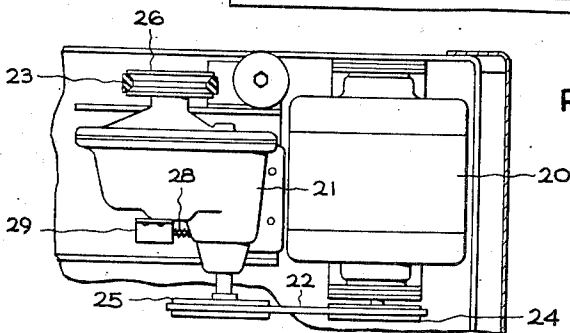


FIG. 3

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ADJUSTABLE VIBRATION SENSING MEANS FOR LAUNDRY MACHINE

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Application August 3, 1955, Serial No. 526,104

4 Claims. (Cl. 68—24)

My invention relates to automatic laundry machines of the type in which the clothes basket is rotated at one speed for clothes tumbling and at a higher speed for centrifugal extraction; and more particularly it relates to the means included in such machines for preventing the higher speed rotation until the clothes are properly balanced to eliminate excessive vibration.

When an automatic laundry machine of the rotating basket type proceeds from a washing or rinsing step into a centrifugal extraction step, vibration of the rotating basket and its enclosing tub structure increase substantially unless the clothes distribute themselves evenly around the basket. Unless the clothes are approximately evenly distributed, the basket is dynamically unbalanced and depending upon the degree of unbalance, excessive vibration may occur. To prevent excessive vibration one method of control has been to measure or sense the vibration as the basket proceeds into the higher speed operation. If the vibration is excessive, a suitable switch is automatically operated so as to return the basket to its lower speed. This gives the clothes a chance to re-orient themselves within the basket at the lower speed. After a suitable time delay the switch is operated reversely so as to attempt again the higher speed of operation. Usually, the clothes will then distribute properly so that the centrifugal extraction may proceed without delay. If, however, they do not, the basket is once more returned to the lower speed operation to allow them to re-orient again. This action is repeated until the clothes do distribute evenly enough to reduce vibration to an acceptable level.

To form a suitable control the vibration sensing or unbalance switch may be so arranged that it is operated on a predetermined amplitude of vibration of the tub structure relative to the stationary base of the machine. In a simplified arrangement the switch is either mounted on the stationary base of the machine and operated by means mounted on the vibrating tub, or else it is mounted on the vibrating tub and is operated by its own movement against means secured on the base. The actuating means secured to the opposite member from the switch may for example comprise a bracket or an integral portion of the base or the tub structure.

For proper operation in this type of arrangement the switch on the tub or the base and the bracket or other actuating means on the opposite member must be so associated that a predetermined amount of vibration results in the switch being thrown. If the relationship of the switch and the actuating means is not determined accurately, either a small, acceptable vibration of the tub will throw the switch, or else too great a vibration will be required before the switch is operated. In the mass production of laundry machines it is extremely difficult to build the machines so that the spacing between the actuating means and the switch is exactly the same from machine to machine. The sizes of parts and the work of assemblers vary somewhat from machine to machine so that slight differences occur in the spacing between the

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actuating means and the switch. Further, even if the actuating means and the switch are properly positioned and aligned after the machines are assembled, shocks occurring during shipment may throw them out of their original relationship.

In the co-pending application of John Bochan and John W. Toma S. N. 526,103, filed concurrently herewith and assigned to the same assignee as the present invention, there is described and claimed a switch operating device for obviating this difficulty. This device comprises an adjustable scissors device which is disposed between the actuating means for the switch and the switch itself, and which may be simply and easily adjusted after shipment to correct for variations in spacing and insure operation of the switch at a predetermined amount of vibration of the tub. The scissors device may be placed in its final adjustment after shipment simply by the loosening and tightening of a single screw.

The present invention relates to and has as its principal object the provision of a simplified and improved scissors device of this type. In the scissors disclosed in the above-mentioned application S. N. 526,103, the pivoted arms of the scissors are locked together after final adjustment and over-travel of the tub and the scissors beyond the amount necessary to actuate the switch is provided for by means of a spring biased plunger mounted on one of the arms. This plunger is moved against the switch by the scissors to actuate it, and upon subsequent over-travel of the tub and the scissors, damage to the switch is avoided by relative movement between the plunger and the scissors. The spring disposed between the arms of the scissors serves only as a means for biasing one of the arms against the actuating means during the final adjustment of the device.

By this invention the two arms of the scissors are not locked together after the final adjustment of the device. Rather the spring between the arms, in addition to serving as a biasing means during the final adjustment, also serves as the means whereby the actuating arm moves the actuated arm; and it is thus possible for relative movement to occur between the two arms by compression of the spring. This allows any over-travel of the tub after the unbalance switch is operated to be taken care of by movement of the one arm relative to the other and obviates the need for a spring biased plunger. The spring between the arms yields once the switch has been operated and thereby provides for further travel of the tub without damage to the switch.

To explain briefly the features and operation of my new and improved switch operating device it will be understood that it is intended for use in a laundry machine which has a clothes basket rotatable at a plurality of speeds and which is provided with a vibration-sensing switch for returning the basket temporarily to its lower speed if excessive vibration occurs as it is shifted to the higher speed. The switch is mounted either on the tub structure enclosing the basket or on the stationary base structure of the machine, and suitable actuating means are provided on the other of these structures. My improved switch operating device is disposed between the switch and the actuating means and is mounted on the same one of the tub and base structures as the switch. This scissors-type device includes a first pivoted arm for engaging the actuating means and a second pivoted arm for operating the switch. A spring disposed between the two arms biases the first arm toward the actuating means and, as explained above, this spring also serves as the means by which the first arm moves the second arm. A third pivoted member provides for pre-setting the normal position of the second or actuated arm relative to the switch and suitable means are included for intercon-

necting this third pivoted member with the first or actuating arm.

To adjust the device so that the switch is operated at the selected amplitude of vibration of the tub, the normal position of the second scissors arm relative to the switch is pre-set at the factory so that the second arm operates the switch when relative movement occurs therebetween equal to the selected amplitude. Then, after shipment, the means connecting the third pivoted member with the first scissors arm is first released and then retightened. The release of the connecting means allows the spring between the arms to move the first arm against the actuating means without changing the pre-set relationship between the second arm and the switch, and the re-tightening locks the first arm to the third member thereafter. This corrects for changes in spacing between the switch and the actuating means caused by shipment. After the switch is adjusted in this manner, the first arm then moves the second arm by means of the spring whenever vibration of the tub occurs. If overtravel of the tub and the first arm should occur beyond the pre-selected amount required to operate the switch, the first arm does not push the second arm against the switch hard enough to break it, but rather moves relative to the second arm by compressing the spring. In this manner the switch is not damaged by the overtravel.

The features of my invention which I believe to be novel are set forth with particularity in the appended claims. My invention itself however, may be best understood by the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a front elevational view of a domestic laundry machine incorporating my improved vibration sensing means, certain surfaces of the view being broken away in order better to illustrate details;

Fig. 2 is a side elevational view of the machine with the side panel removed, the view being partially in section and having certain surfaces broken away to illustrate details;

Fig. 3 is a fragmentary plan view of the drive means included in the machine; and

Fig. 4 is an elevational view of a preferred embodiment of my new and improved switch operating device, the view also showing schematically a control circuit for the laundry machine.

Referring now to Fig. 1 I have shown therein a domestic laundry machine 1 comprising a combination washer and dryer. The machine 1 includes an outer cabinet 2 which is mounted on a supporting base structure 3. Access to the machine for the loading and the unloading of clothes is provided by a hinged door 4 disposed in the front wall of the cabinet. A backspasher 5 mounted at the top of the cabinet serves as a mounting means for suitable operator controls for the machine. These controls may, for example, comprise the rotatable dials 6 and 7 and the push buttons 8.

The machine 1 is of the type which includes a clothes basket rotatable about a non-vertical axis. Specifically, it includes a perforated basket 9 which is disposed for rotation about a generally horizontal axis. The basket 9 is mounted within an imperforate tub structure 10 which encloses it on all sides. The basket is rotatably supported from the tub structure by a horizontally extending shaft 11 which is mounted in an elongated bearing 12 hung from the rear wall 13 of the tub structure (see Fig. 2). The shaft 11, as well as supporting the basket, also serves as a means for turning it during the operation of the machine. The tub and the basket are provided respectively with openings 14 and 15 in the front walls thereof, which are aligned with the door opening in the front wall of the cabinet 2 so that clothes may be placed into or removed from the basket. The door 4 seals against a gasket 16 around the tub opening 14 to close off the tub completely during operation of the machine.

The tub 10 is supported from the base 3 by means of

a plurality of brackets or arms 17 which are mounted on upstanding plates 18 fixedly attached to the base 3. Four of these arms 17 are provided, two being secured to each side of the tub. The arms on the opposite side of the tub are spaced apart as shown in Fig. 2 so that the tub in effect is supported near its front and near its rear on each side thereof. Although the arms 17 can be secured directly to the wall of tub 10, preferably and as shown, the arms 17 are attached thereto by means of suitable brackets 19. With the tub 10 supported in the manner shown, it is able to vibrate sideways in a plane parallel to the front of the machine if the basket 9 should be unbalanced during a high speed rotation thereof. The arms 17 are relatively long compared to their width and they flex so as to allow slight sideways vibration of the tub relative to the base 3. However the arms 17 are effective substantially to prevent vibration of the tub both from front to rear and in the vertical direction. The arms are not at all flexible in those directions so that normally front to rear and up and down vibration of the tub cannot occur. Only sidewise vibration can occur. As is more fully explained hereinafter, I provide new and improved means for sensing the amount of sidewise vibration thereby to prevent that vibration from ever becoming great enough to damage the machine or cause it to move on the floor.

During the operation of the machine the basket 9 is driven from an electric motor 20 through a drive including a transmission assembly 21 and a pair of flexible belts 22 and 23 (see Figs. 2 and 3). The belt 22 connects the output pulley 24 of the motor to the input pulley 25 of the transmission assembly. The belt 23 connects the output pulley 26 of the transmission assembly to a basket drive pulley 27 mounted on the shaft 11 of the clothes tumbling basket 9. The transmission assembly 21 is of the multiple speed type, that is, the ratio thereof can be changed so that the basket is driven at two different speeds. The transmission assembly thus provides one basket speed for clothes tumbling and another basket speed for centrifugal extraction. The ratio of the transmission assembly is changed by means of a suitable spring biased, solenoid actuated plunger 28. When the electrically operated solenoid 29 controlling the plunger 28 is de-energized, the transmission ratio is such that the basket is driven at a suitable speed for washing and tumbling clothes, for example, 44 revolutions per minute. However when the solenoid 29 is energized, the plunger 28 changes the ratio of the transmission so that the basket is driven at a suitable speed for centrifugal extraction, for example, 200 revolutions per minute.

During the operation of the machine the various electrical components thereof are under the control of a timer operated sequence control indicated schematically at 30 in Fig. 4. A suitable sequence control and a complete circuit for the machine 1 are shown in the copending application of Walter E. Gray, Jr. S. N. 512,612 filed June 2, 1955, and assigned to the same assignee as the present invention. In Fig. 4 we have shown the sequence control 30 schematically and have illustrated therewith only those electrical components which are necessary to the understanding of our invention. The components shown include the main drive motor 20 and the actuating coil 31 of the transmission assembly solenoid 29.

Besides the elements illustrated it will be understood that the sequence timer 30 also controls suitable means whereby water is admitted to and discharged from the machine, and suitable heating means within the machine. A water inlet connection 32 and a sheathed type resistance heater 33 are both shown in Fig. 2. Any suitable electrically actuated means, such as a drain pump (not shown), can be used to control the discharge of water from the machine.

The sequence control 30 is energized by means of a pair of supply conductors 34 and 35. During the operation of the machine a suitable switch or switches within

the control are closed so that the motor 20 is continuously energized to rotate the basket 9. The switch means within the sequence control connects one side of the motor to the line 34 and the other side of the motor is connected directly to the supply line 35. As mentioned above, the clothes basket 9 is rotated at a relatively low speed for tumbling the clothes, which tumbling action is employed during the washing, the rinsing and the fluff drying steps of the machine. However, in order to extract water from the clothes within the basket by centrifugal extraction the basket 9 is rotated at a higher speed for certain periods during the operation of the machine. To cause rotation of the basket at this higher speed the sequence control closes switch means therein so as to energize the coil 31 of the transmission assembly solenoid and shift the transmission assembly to its higher speed ratio. The circuit through which the sequence control energizes the solenoid coil 31 will be explained hereinafter.

As soon as transmission is shifted, the basket 9 begins to rotate at its higher speed, for example 200 revolutions per minute. If the clothes within the basket distribute approximately evenly, the higher speed rotation does not cause any objectional vibration of the basket and its supporting tub. However, if the clothes distribute unevenly as the higher speed rotation begins, the resulting dynamic unbalance causes a noticeable vibration of the basket and the tub. In fact, if the distribution of the clothes around the basket is sufficiently uneven, the vibration may be excessive, sufficient to damage the machine or cause it to move on the floor if continued.

In order to prevent excessive vibration from occurring when the basket is shifted to its higher speed, I have provided a switch for temporarily de-energizing the solenoid coil 31 if the vibration exceeds a pre-selected, permissible limit, for example thirty (30) thousandths of an inch in amplitude. This vibration sensing or unbalance switch 36 is shown in Figs. 1 and 4. The switch 36 is operated by means of the relative movement occurring between the tub 10 and the base 3. In my preferred embodiment the switch is mounted on the base 3, and is actuated by means of a depending bracket 37 on the tub. Between the bracket and the switch there is interposed a novel switch operating device 38 embodying my invention, this device 38 being operative to transmit the motion of the bracket to the switch. The device 38, which may be described hereinafter, may be simply and easily adjusted to correct both for production variations in the spacing between the bracket and the switch and for changes in the spacing caused by shipment. Thereby it is insured that the unbalance switch 36 is operated exactly at the limit of the permissible vibration of the tub.

The switch 36 is provided with three terminals 39, 40 and 41 and includes a contactor (not shown) which is movable between two positions. In one of the positions of the contactor the terminals 39 and 40 are connected together and in the second position thereof the terminals 39 and 41 are connected together. When a button or actuator 42 on one side of the switch is pressed, the contactor is moved so as to open the terminals 39 and 40 and close the terminals 39 and 41; whereas when a button or actuator 43 on the opposite side of the switch is pushed, the contactor is moved so as to close the terminals 39 and 40 and open the terminals 39 and 41.

The switch 36 is connected serially in the circuit for coil 31, or more exactly the circuit for coil 31 extends through switch 36 by means of terminals 39 and 40. Commencing with supply line 34 the circuit for the coil extends to the switch terminal 39 through sequence control 30 and a line 44. The circuit is completed from the switch terminal 40 through a line 45, the coil 31 itself and a connection 46 to the supply line 35. With the coil 31 and the switch 36 connected in this manner, it will be seen that when the switch terminals 39 and 40 are connected together, the solenoid coil 31 can be energized by

the sequence control. Conversely when these terminals are disconnected, the solenoid coil cannot be energized.

To initiate centrifugal extraction the sequence control closes suitable switch means therein so as to energize the coil 31 through switch 36. If excessive vibration occurs as the basket shifts to its higher speed, the switch button 42 is actuated by bracket 37 and operator 38 so as to disconnect the terminals 39 and 40 and connect the terminals 39 and 41. This de-energizes the solenoid coil 31 and allows the basket to return to its lower speed rotation. The clothes then have an opportunity to re-orient themselves within the basket at the lower speed. After a short period, the coil 31 is again energized to attempt the higher speed rotation. In order to attempt again the higher speed rotation after the lower speed rotation, I have provided suitable means for re-setting the switch 36. This means comprises a timer motor 47 which is connected between the terminal 41 of switch 36 and the supply line 35. When the switch 36 is thrown so as to deenergize the solenoid coil 31, it simultaneously closes the terminals 39 and 41 and energizes the timer motor.

The timer motor 47 drives a star wheel 48 through reduction gear means (not shown). The star wheel 48 rotates counterclockwise as viewed in Fig. 4 and is adapted to engage the upper end of a leaf spring 49 which is fixedly mounted at its lower end on the switch mounting bracket 50. As the star wheel 48 rotates, it bends the upper end of the leaf spring 49 to the right (as viewed in Fig. 4). This bending of the leaf spring continues until such time as the spring is bent far enough that the engaging arm of the star wheel can slip over its top. At that time the spring moves quickly in the opposite direction striking the button 43 of the switch. The button 43 is thereby actuated and connects together the terminals 39 and 40 and disconnects the terminals 39 and 41. This stops the rotation of the timer 47 and closes the circuit to solenoid 31.

The solenoid then once again shifts the transmission so that the clothes basket rotates at its higher speed. If the clothes this time distribute evenly around the basket, the rotation will continue until such time as the sequence control 30 opens the circuit to the solenoid coil 31. If however the clothes still do not distribute evenly, the same steps will occur again. In other words the unbalance switch 36 will be operated by vibration of the basket and the tub so as to return the basket temporarily to its lower speed and then will be re-set so as to return the basket to its higher speed. Ordinarily a single return of the basket to its lower speed is sufficient to re-distribute the clothes properly, but infrequently several tries may be required before the basket will rotate at the higher speed without excessive vibration.

In my preferred embodiment illustrated in the drawings, the unbalance switch 36 is mounted on the base 3 of the machine by means of an upstanding plate or bracket 50 which is attached to the base 3 by means of a flange 51 formed thereon. The actuating means for the switch, i. e. bracket 37, is mounted on the tub 10 so that upon relative vibration occurring between the tub and the base the actuating means moves relative to the switch and operates the button 42. In order that the switch 36 will always be operated at the limit of the permissible vibration of the tub it is necessary that a predetermined movement of the tub and the actuator relative to the base results in the operation of the switch. Since it is extremely difficult if not impossible to construct laundry machines in mass production so that the actuator 37 and the switch button 42 are always positioned the same distance apart, and since even if they are so adjusted in the factory, handling during shipment may result in the relationship being changed, I have positioned between the actuator 37 and the switch 36 an improved, easily adjustable switch operating device 38 for operating the switch 36 upon the predetermined motion of the actuator 37. This switch

operating device 38 embodies my invention in one form thereof.

The switch operating device 38 is mounted on the base 3 of the machine by means of the aforesaid support bracket 50. The device comprises an adjustable scissors arrangement including a pair of pivoted arms 52 and 53. These arms are both pivotally mounted on a pin 54 which is supported by means of the bracket 50. The one arm 52 of the scissors 38 engages the bracket 37 on the tub so as to be moved thereby, and the other arm 53 is actuated by the arm 52 so as to operate the switch button 42 upon a sufficient movement of the tub. In order to transmit the movement of the arm 52 to the arm 53 there is disposed between the arms a coil spring 55. This spring 55 is mounted by means of bosses 56 and 57 formed respectively on the two arms, and it is strong enough so that it is not ordinarily compressed by the movement of the arm 52. Rather it transmits the motion of the arm 52 to the arm 53 so that the arm 53 is moved thereby against the switch button 42.

In order to adjust the scissors device 38 so that the switch 36 will be operated upon a predetermined vibration of the tub, the normal position of the arm 53 is pre-set so that there is a predetermined relationship between it and the switch button 42. Depending upon the permissible vibration of the tub and the distance the button 42 must be pushed into the switch housing before operating the switch, the arm 53 may be pre-set with a predetermined gap between it and switch button 43, or it may be set so that it directly engages the switch button. The latter setting would be used when the distance the button must be pushed into the switch housing to operate the switch is equal to the amplitude of the maximum permissible vibration of the tub.

In order to pre-set the position of the arm 53 there is provided a third pivoted member 59 which is also mounted by means of the pin 54. This pivoted member 59 is provided with a tab 60 which extends into a curved slot 61 in the arm 53. The spring 55 biases the arm 53 to the right as viewed in Fig. 4 so that normally the tab 60 is engaged with the extreme left hand end of the slot.

With this relationship between the arm 53 and the member 59, it will be seen that by adjusting the position of the member 59 the normal position of the arm 53 may be changed. To determine the normal position of the member 59 I have provided adjusting means including a spring 62 and an adjustable stop 63. The spring 62 is disposed between a hook 64 on member 59 and a projection 65 on support member 50 and it pulls member 59 into contact with the stop 63. In the embodiment illustrated the stop 63 comprises a movable slide which may be adjusted by means of a screw 66. The screw 66 has an eccentric shoulder (not shown) and the eccentric shoulder directly engages the slide so that as the screw is turned, the slide is moved to the left or right as viewed in Fig. 4. A tightening screw 67 is provided for holding the slide in its final position of adjustment. Since the spring 62 biases the pivoted member 59 against the stop or slide 63, adjusting the position of the slide also adjusts the normal position of the pivoted member; and due to the engaging means 60 and 61 between the member 59 and the arm 53, this also results in an adjustment of the normal position of the arm 53 relative to the switch button 42 of switch 36.

The setting of the arm 53 by means of the member 59 and the adjustable stop 63 is performed at the factory when the machine 1 is assembled. In other words the arm 53 is pre-set at the factory before shipment of the machine. It is, of course, set so that it will operate switch 36 after moving a distance equal to the amplitude of the maximum permissible vibration of the tub.

Since the arm 53 and the switch 36 are both mounted on the base structure 3, this relationship does not change during shipment of the machine. Even though the machine may be subjected to dropping or other severe

shocks, the relationship of the arm 53 and the switch does not change. However the spacing between the tub bracket 37 and the switch 36 may change somewhat during shipment. There is a possibility that the arms 17 or other supporting members will take on a permanent deflection and cause a slight change in the gap between the actuator 37 and the switch. For this reason it is desirable that the final adjustment of the scissors arrangement 38 not be completed at the factory. Rather, to insure operation of the switch at the selected tub vibration, the adjustment should be completed when the machine 1 is set up at its ultimate place of use.

In my improved switch operating device this final adjustment is effected merely by loosening a screw 68 and then re-tightening it. As shown, the screw 68 is mounted in the member 59 and extends through a curved slot 69 in the arm 52. The screw thus normally locks member 59 and arm 52 together. However when it loosened to effect the final adjustment of the switch, the arm 52 is freed so that it may be moved by the spring 55. The machine is normally shipped from the factory with arm 52 retracted from bracket 37 so that screw 68 is at the left end of slot 69 when viewed in Fig. 4. Then upon the loosening of the screw the spring 55 biases the arm 52 into direct engagement with the bracket 37. Once this movement of the arm has been completed, the screw 68 is then retightened so as to lock the arm 52 and the member 59 together again. This completes the adjustment of the switch. The spring 62 is stronger than the spring 55 and thus the arm 53 does not move when the screw is loosened. Rather the arm 53 remains in its same pre-set relationship relative to the switch. With the same pre-set relationship existing between the arm 53 and the switch button 42 and with the arm 52 resting directly against actuator 37, it will be seen that the switch will be actuated at the exact amount of tub vibration which was selected when the arm 53 was positioned relative to the switch 36 at the factory. In other words, a movement of the actuator equal to the amplitude of the selected, maximum permissible vibration of the tub will thereafter operate the switch.

My improved switch operating device thus provides for an accurate actuation of the unbalance switch 36. It not only corrects for variations in tub and base spacings occurring in the assembling of the machine, but also it corrects for variations caused by shipment or other handling of the machine.

Although the scissors device 38 is set to open the unbalance switch 36 at the limit of the permissible vibration of the tub 10, there is a possibility that the tub may vibrate once or twice beyond that limit before the basket 9 returns to its lower speed rotation. Particularly this may occur when a serious unbalance condition exists within the basket. By my invention, however, the spring 55 between the two arms takes care of this overtravel of the tub 10 beyond the prescribed limit of vibration. If the tub should vibrate beyond the amount necessary to open the unbalance switch, the spring 55 permits relative movement to occur between the arms 52 and 53. Once the arm 53 has operated the switch, the switch acts as a stop limiting its movement. If motion of the tub and the arm 52 continues in that direction, the spring 55 yields so that the arm 52 moves relative to the arm 53 rather than forcing it further to damage the switch. Relative movement of the member 59 attached to arm 52 is also provided for since the slot 61 allows the tab 60 to move therein without transmitting any force to the arm 53. Thus with this arrangement the arm 53 is not forced hard enough against the switch 36 to damage it; rather the overtravel of the bracket 37 and arm 52 is taken up by the spring 55.

The spring 55 thereby serves two purposes. It serves as a biasing means for effecting the automatic adjustment of the arm 52 when screw 68 is loosened, and it serves as a yieldable means for transmitting the motion of the one

arm to the other, which means allows relative movement between the arms upon overtravel of the tub thereby to prevent damage to the switch. The spring 55, it will be noted, must be stronger than any spring means within the switch 36 so that the switch will be operated before the spring 55 begins to give to allow relative movement between the arms of the scissors.

In the above-description and in the drawings I have shown the unbalance switch and my improved scissors device 38 as mounted on the base 3 and the switch actuator 37 as mounted on the tub 10. However, it is obvious that their positions could be reversed and the same results would be obtained. In other words the unbalance switch and the scissors device can be mounted on the tub and the actuator on the base. The switch is still actuated by relative movement between the tub and the base, and the scissors device is equally effective to insure operation of the switch at the selected amplitude of the vibration.

While in accordance with the Patents Statutes I have shown what at present is considered to be the preferred embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from my invention, and I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

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

1. In a laundry machine, a base structure, a rotatable clothes basket, a tub structure enclosing and rotatably supporting said basket, means supporting said tub structure from said base structure, drive means for driving said basket at a plurality of different speeds, electrically actuated means for shifting said basket from a lower speed to a higher speed, a switch mounted on one of said structures for controlling said electrically actuated means upon the occurrence of excessive vibration of said tub structure when said basket is shifted to said higher speed, switch actuating means on the other of said structures, and an adjustable scissors mounted on said one structure and disposed between said actuating means and said switch for operating said switch upon excessive vibration of said basket and tub structure, said scissors including a first pivoted arm for engaging said actuating means, a second pivoted arm for operating said switch, a spring disposed between said arms for moving said second arm from said first arm upon movement of said first arm by said actuating means, a third pivoted member having means forming an operative connection with said second arm for pre-setting the normal position of said second arm relative to said switch, adjustable means for pre-setting the normal position of said third pivoted member and thereby said normal position of said second arm, and means interconnecting said first arm and said third member and releasable to allow said spring to bias said first arm against said actuating means, whereby the adjustment of said scissors is completed, said first arm compressing said spring and moving relative to said second arm upon overtravel of said tub structure after said switch is actuated, whereby said spring takes up the overtravel of said first arm and said switch is not damaged thereby.

2. In a laundry machine, a base structure, a rotatable clothes basket, a tub structure enclosing and rotatably supporting said basket, means supporting said tub structure from said base structure, drive means for driving said basket at a plurality of different speeds, electrically actuated means for shifting said basket from a lower speed to a higher speed, a switch mounted on one of said structures for controlling said electrically actuated means upon the occurrence of excessive vibration of said tub structure when said basket is shifted to said higher speed, switch actuating means on the other of said structures, and an adjustable scissors mounted on said one structure and

disposed between said actuating means and said switch for operating said switch upon excessive vibration of said basket and tub structure, said scissors including a first pivoted arm for engaging said actuating means, a second pivoted arm for operating said switch, a spring disposed between said arms for moving said second arm from said first arm upon movement of said first arm by said actuating means, a third pivoted member having means forming an operative connection with said second arm for pre-setting the normal position of said second arm relative to said switch, an adjustable stop and spring means for determining the normal position of said pivoted member and thereby said normal position of said second arm, and means interconnecting said first arm and said pivoted member and releasable to allow said spring to bias said first arm against said actuating means, whereby the adjustment of said scissors is completed, said first arm compressing said spring and moving relative to said second arm upon overtravel of said tub structure after said switch is actuated, whereby said spring takes up the overtravel of said first arm and said switch is not damaged thereby.

3. The combination of claim 2 including a slot in said second arm and a tab on said third pivoted member engaging said slot, said tab and said slot comprising an operative connection therebetween whereby the setting of said third member determines said normal position of said second arm, said tab moving freely in said slot upon overtravel of said tub structure after said switch is actuated, whereby said third member moves relative to said second arm with said first arm upon said overtravel.

4. In a laundry machine, a rotatable clothes basket, a tub structure enclosing and rotatably supporting said basket, means supporting said tub from the base of said machine, drive means for said basket including a multi-speed transmission, electrically actuated means for shifting said transmission from a lower speed to a higher speed, a switch mounted on said base for de-energizing said electrically actuated means upon the occurrence of excessive vibration of said tub when said transmission is shifted to said higher speed, means for resetting said switch after a predetermined interval again to shift said transmission to said higher speed, switch actuating means mounted on said tub, and an adjustable scissors mounted on said base and disposed between said switch actuating means and said switch for operating said switch upon the excessive vibration of said basket and said tub, said scissors including a first pivoted arm for engaging said actuating means, a second pivoted arm for operating said switch, a first spring disposed between said arms for moving said second arm from said first arm upon movement of said first arm by said actuating means, means including a third pivoted member, a stop, and spring means for pre-setting the normal position of said second arm relative to said switch, said third pivoted member having means forming an operative connection with said second arm whereby the setting of said third arm determines said normal position of said second arm, and means including a screw interconnecting said first arm and said third member, said last mentioned means upon the loosening of said screw allowing said first spring to bias said first arm against said actuating means, whereby the adjustment of said scissors is completed, said first arm compressing said first spring and moving relative to said second arm upon overtravel of said tub structure after said switch is actuated, whereby said spring takes up the overtravel of said first arm and said switch is not damaged thereby.

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