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SAFETY DOOR INTERLOCK

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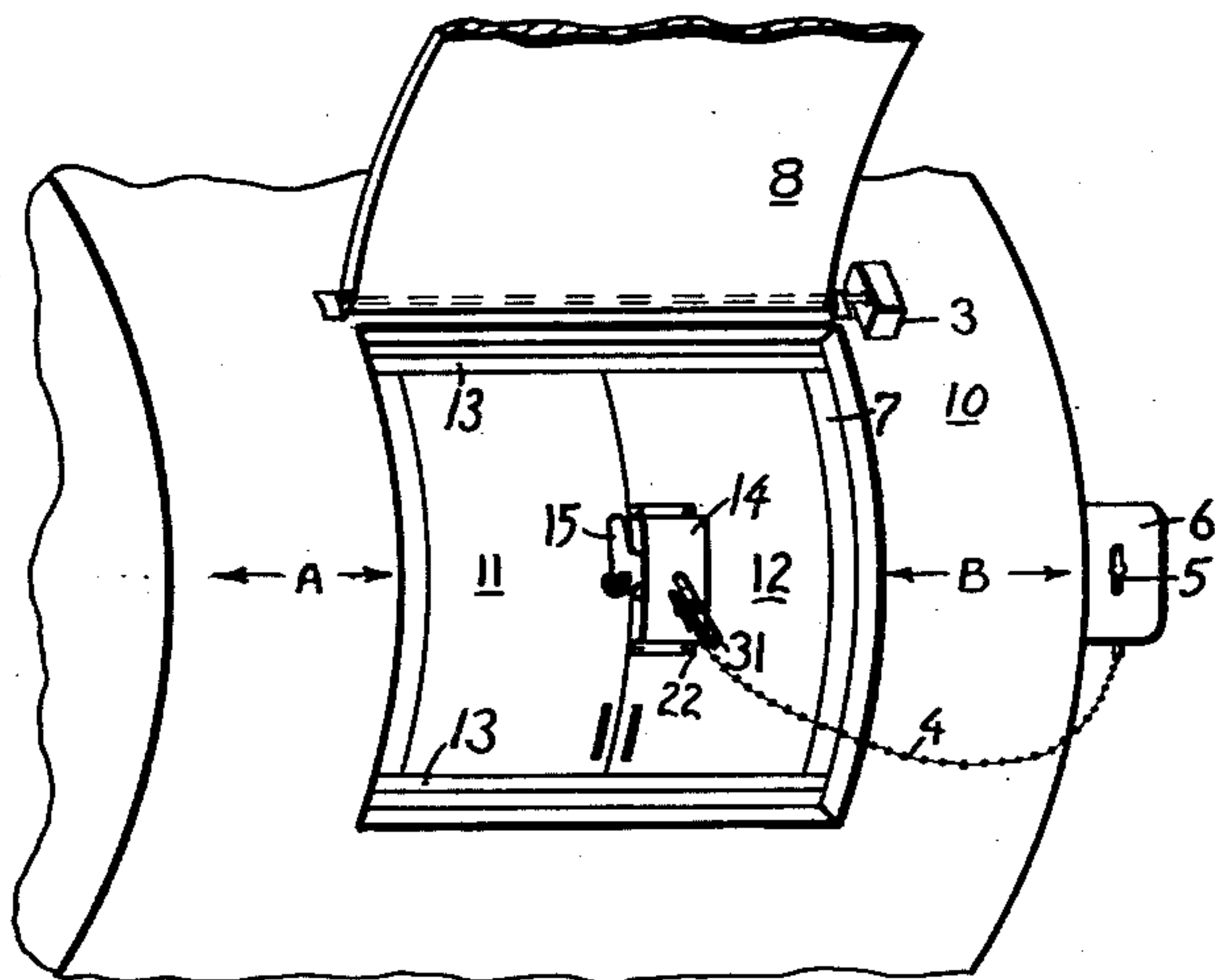


FIG. 1

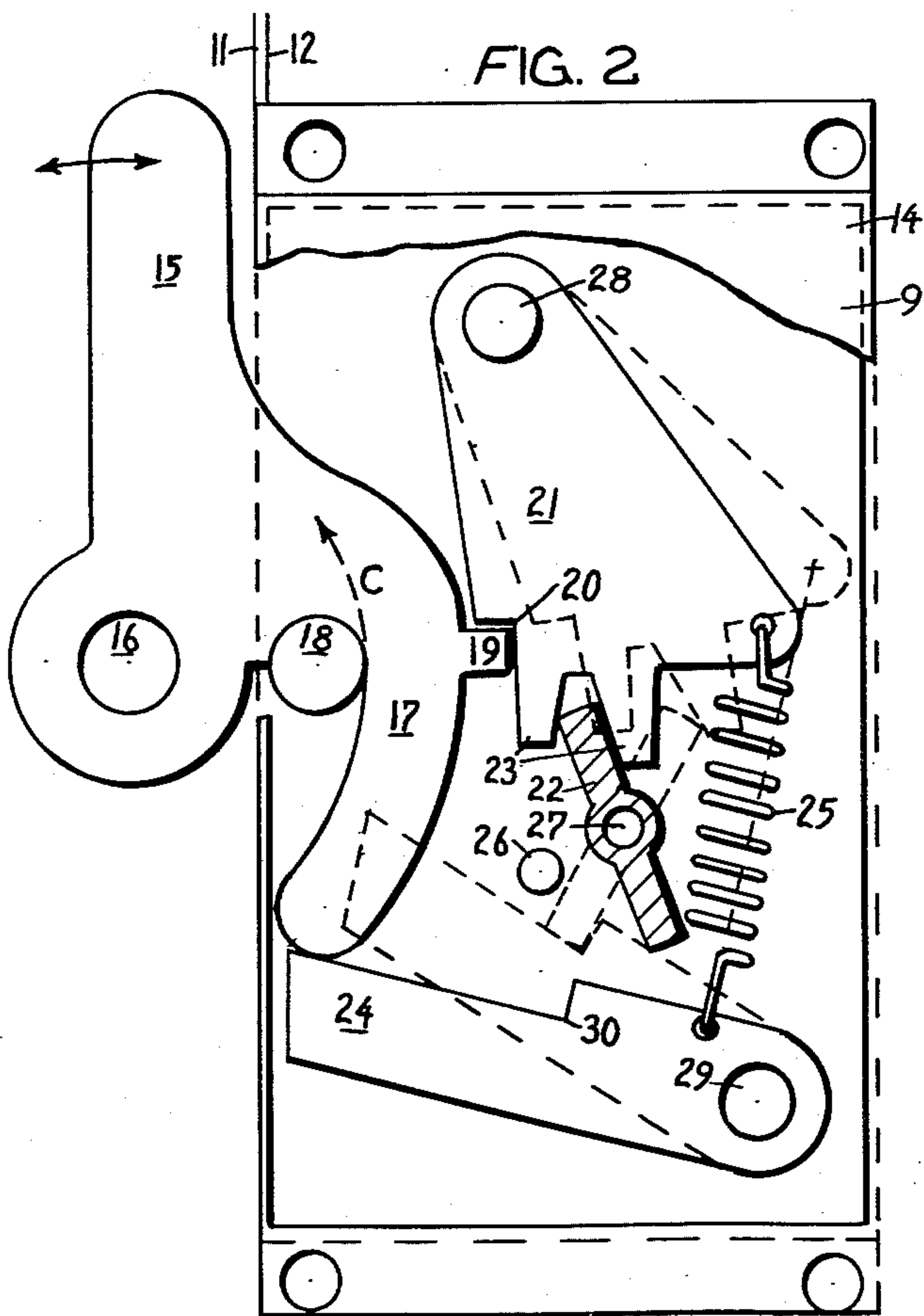


FIG. 2

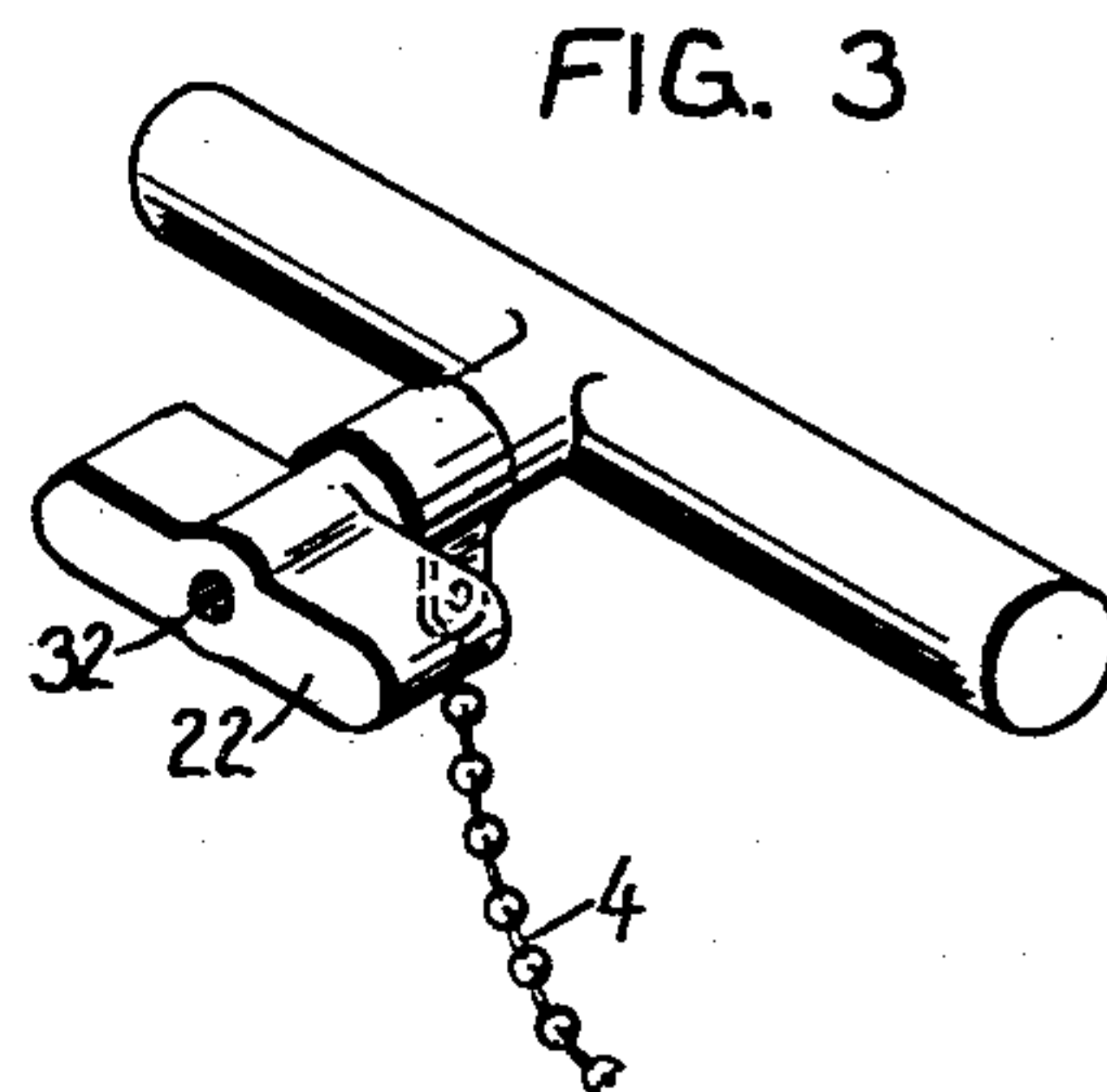


FIG. 3

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2,953,012

SAFETY DOOR INTERLOCK

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5 Claims. (Cl. 70—100)

This invention relates to washing machines or the like, and in particular, to the interlock on the door of such machines.

In large commercial washing machines, such as are used in present day laundries, it is customary to provide a drum which is preferably formed of corrosion resistant metal and has the cylinder wall thereof perforated to permit relatively free passage of water into and out of the drum as the washing operation takes place. It is customary to place the clothes to be laundered interiorly of the drum and to facilitate this, it is usual to provide a door or doors having a configuration substantially similar to one wall of the drum on which it is mounted.

Heretofore various types of latches and locks have been presented which, although effective and substantially simplified, have presented certain drawbacks, such as for example, threaded wing nuts to be unscrewed by the operator, or eventual wearing of parts so that the effect of the lock is impaired and the device could conceivably fail.

It is a prime object of the present invention to provide for a safety door interlock which is positive acting so that, should any of the parts eventually wear, the locking mechanism will not fail.

Another object of the present invention is to provide a safety door interlock having as few moving parts as possible, yet which is inherently efficient and effective.

Other features and objects will become apparent from the following specification when read with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a portion of a washing machine with the outer door open showing part of the drum therein, the doors mounted on transversely disposed tracks and showing the interlock of this invention.

Figure 2 is a plan view of the present invention showing the top cover of the interlock cut away exposing the parts therein, and, by means of dotted lines, the position of the parts when the interlock is in the open position.

Figure 3 illustrates the key used for actuation of the safety interlock.

While the present invention is useful for a variety of applications, the following specification will describe its use as applied in a washing machine, and a clearer understanding of the invention may be had by reference to the following detailed description.

With reference to Figure 1, a portion of a commercial washing machine 10 is shown having its outer door 8 open. The main switch 6 is suitably mounted in a convenient place on the machine 10 and is also wired in series to the interlock switch 3 on the hinge of door 8. Within the machine 10, a drum is rotatably mounted on a driven axle, not shown, and has a left door 11 and a right door 12 mounted so as to open by sliding in the directions of arrows A and B. These doors are slidably mounted in parallel tracks 13, being transversely disposed

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at the upper and lower edges of doors 11, 12. An embodiment of the invention of a safety door interlock 14 is mounted on door 12 substantially at the place where door 11 abuts door 12, the doors being closed. Handle 15 is mounted on pivot 16 on door 11 so as to be in position for engaging interlock 14. Key 22, fastened to switch 6 by chain 4 is engaged in hole 31 in interlock 14.

This key is for the actuation of the interlock 14 along with handle 15, and main switch 6 as will be further described in greater detail.

Referring now to Figure 2, an embodiment of the interlock 14 is shown preferably mounted on the right hand door 12 and having the outer cover 9 cut away, illustrating the disposition of the parts therein. A lock 21 is pivotally fastened at point 28. At the lower end of lock 21 is fastened a spring 25, the other end of which is suitably fastened to a lifter 24, which is pivotally fastened at point 29. A cam 17 integral with the handle 15 is pivotally mounted to the left hand door 11 by the pivot 16 so that, in the locked position, as shown, cam 17 is at rest against stop pin 18. Cam 17 also has a lug 19 which is engaged by a step 20 in lock 21 when in the locked position. Cam 17 may be rotated in either direction by moving handle 15 as shown by the arrow at the upper end of handle 15. As shown in Figure 3, the key 22 has a hole 32 in one end thereof which is adapted to be inserted in the key hole 31 in cover 9 on interlock 14. A stud 27 is located so that when key 22 is inserted in hole 31, hole 32 in key 22 receives stud 27 therein and is thus adapted to pivot about the axis of stud 27 and permit key 22 to exert leverage to actuate the interlock mechanism.

The lower end of spring 25 is attached to a lifter 24, as described above, which lifter 24 has a step or notch 30 on one side so disposed that, with the interlock in the open position, the notch 30 is in engagement with one end of key 22. A portion of key 22 is shown in cross section in operating position in the interlock in Figure 2.

With reference to Figure 2, the operation of the safety door interlock will be described as follows:

After the operator has placed clothes to be laundered in drum 10, left hand door 11 and right hand door 12 are moved transversely on the drum in tracks 13 and toward each other until their inner edges abut, thus aligning the handle 15 with cam 17 thereon so that it may be engaged with interlock 14.

For convenience in reference to the drawing, and as the interlock is shown in the locked position, this description will encompass the process of unlocking and opening the interlock. It will therefore be assumed that the machine is operating, with the outer door 8 shut and switch 3 actuated. The key 22 is in the keyhole 5 of switch 6 and turned so as to actuate the switch. Interlock 14 is locked and the drum is rotating. With the main switch 6 on, power is supplied to the means (not shown) for controlling the cycle of the various stages of operation of the machine. Upon completion of the cycle, or at any other time it is desired to open the inner doors 11 and 12, the rotation of the drum is halted, and the outer door 8 is opened. As door 8 is opened, switch 3 shuts off the power between the main switch 6 and the machine, preventing accidental operation of the machine while the outer door is open. It is then necessary to turn switch 6 to the Off position by means of the key 22 in order to remove the key 22 from the key hole 5. The key may then be inserted in the key hole 31 of the interlock 14. The handle of the key 22 thus protruding outwardly through the opening 7 of the outer shell of the machine 10, makes it impossible to close

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the outer door 8 while the key 22 is in key hole 31, therefore making it impossible to complete the circuit through switch 3. It is furthermore impossible to close switch 6 inasmuch as the key 22 therefor is in the interlock 14. When it is desired to unlock interlock 14, the operator merely inserts key 22 in key hole 31, so that stud 27 engages the hole 32 in the key. Cam 17 is at rest against stop pin 18, with handle 15 in a substantially vertical position. Step 20 of lock 21 is thus engaged with lug 19 on cam 17. Lifter 24 is held upwardly against the end of cam 17 by the tension of spring 25, which also holds lock 21 with step 20 against lug 19. The key 22, thus inserted in key hole 31, and in a position to exert leverage against the cogs 23 at the lower end of lock 21, is turned or rotated in a clockwise direction about the axis of stud 27. The end of the key 22 thereby engages with the cogs 23 of lock 21, moving lock 21 to the right to the position indicated by the dotted lines, and thereby leaving key 22 in the position indicated by its respective dotted line. With the lock 21 in its new position, step 20 is removed from engagement with lug 19, permitting the operator to grasp handle 15 and move the handle and cam 17 thereon in the direction indicated by the arrow at the upper end of handle 15. The operator thus moves handle 15 until cam 17 is entirely disengaged from the interlock 14. As cam 17 moves upwardly in the direction indicated by arrow C, the spring 25 causes the end of lifter 24 to follow the cam 17 upwardly until notch 30 in lifter 24 engages the end of key 22 as shown by the dotted lines. In this way, when the interlock is in the open position, the key 22 remains in the interlock 14, and the notch 30 on lifter 24 maintains the key 22 in position after being turned in the interlock. It is readily apparent that the key 22 cannot be withdrawn from key hole 31 without locking the interlock 14, which first requires closing of doors 11 and 12.

After it is desirable to again lock the doors on the washing machine, the operator grasps handle 15 and swings it in a clockwise direction, moving cam 17 downwardly, the end of cam 17 thereby being forced against the end of lifter 24, forcing the lifter downwardly and ultimately releasing the key 22 to be rotated. When cam 17 has been moved so that it is at rest against stop pin 18, lug 19 is in a position to engage step 20 in lock 21. The key 22 is then turned counterclockwise from the dotted line position, releasing the leverage against cogs 23, and moving lock 21 to the left so that step 20 engages lug 19, thereby locking the interlock 14. The key 22 may then only be removed from engagement with stud 27 and withdrawn from key hole 31. The spring 25 exerting tension on the lifter 24 and lock 21 aids in maintaining the mechanism in frictionally tight engagement.

It will be readily seen that when key 22 has been turned clockwise, it holds the lock 21 in frictional disengagement with cam 17 or lug 19. Thus, when cam 17 is moved, either upwardly or downwardly, substantially no wear on any of the parts can occur, such as between the end of lug 19 and the side of lock 21. This is further advantageous as there is no possibility of small metal shavings or the like from the locks to get into the other parts of the washing machine due to friction of the parts within the interlock. Due to the simplicity of construction, there is no need for any lubrication, which in the form of grease, graphite, or the like would be harmful to clothing being cleaned by the machine and would necessitate costly sealing of the lock against the escape of any lubricant therefrom.

The key 22 is fastened to the body of main switch 6 by means of a small bead chain 4 or the like to aid in preventing accidental loss of the key by the operator such as dropping the key between the drum and the outer body casing of the machine.

Since, while the doors are unlocked and open, the key

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22 is held within the lock 14 by the mechanism being engaged with the key, it is readily obvious that the key cannot be used for starting the machine. Main switch 6 can be turned on or otherwise actuated only by inserting the key 22 in key hole 5 in the switch 6. The switch 6 can be any conventional motor starting or other type switch adapted to be actuated only by the key 22 as is used for the interlock. A further safety advantage resides in the fact that the drum doors 11 and 12 may not become opened during operation with unbalanced loads within due to accidental slipping of the interlock because the parts are maintained at all times in frictionally tight engagement.

With the lock locked, the key is withdrawn and inserted in the key hole 5 in the switch 6. Yet another feature is immediately apparent. The outer door 8 must be closed in order to start the machine in operation. The interlock 3 is an electrical switch connected in series with the main switch 6 and is opened when the door 8 is opened. However, the interlock 14 must be locked and the key withdrawn from the interlock in order to close the outer door 8. Thus, when the door is closed after locking the inner doors 11 and 12 and removing the key 22 from the interlock 14 the main switch 6 may be turned on with the key 22 to start the machine.

Having thus particularly described one modification of the invention in a safety door interlock, it is to be understood that changes may from time to time be made which do not depart from the true spirit and scope of the invention as disclosed in the appended claims.

What is claimed is:

1. A door interlock comprising in combination, a pivotally mounted lock having a step thereon, cogs on said lock, a pivotally mounted lifter having a notch thereon, a pivotally mounted cam, a lug formed on said cam and engageable by said step of the lock for preventing rotation of the cam in one direction, a stop pin engageable by said cam and preventing rotation thereof in an opposite direction, spring means operatively connected between said lock and lifter urging the same toward each other, a key pivotal on said interlock and engageable with said cogs for rotating said lock against said spring means and permitting rotation of said cam in said one direction, said lifter being lockingly engageable with said key at the notch thereof for retaining the key on said interlock, said cam being rotatable in said opposite direction and engageable with said lifter to permit rotation of said key to a position permitting removal of the same from said interlock.

2. In a machine having an outer shell and an opening therein and an outer door for said opening, said machine having a rotating drum inside said outer shell and slidable doors on said drum adapted to abut each other when closed, and said machine being characterized by having an interlock switch actuated when said outer door is closed and a main switch in series with said interlock switch for actuation by a key for causing operation of said machine only when said outer door is closed; a safety door interlock for said slidable doors comprising, a pivotally mounted lock having a step formed thereon, cogs formed on said lock, a pivotally mounted lifter having a notch formed thereon, a pivotally mounted cam engageable with said lifter, a lug formed on said cam engageable by said step on said lock, a stop pin engageable by said cam, a spring connected between said lock and said lifter exerting tension downwardly against said lock and upwardly against said lifter, a key engageable with said cogs for moving said lock into or out of engagement with said cam and lockingly engageable with said lifter notch; whereby when said interlock is locked, said key is removed from said interlock for actuation of the main switch of said machine, said key preventing activation of said interlock switch when engaged with said lifter and the outer door is held open by said key.

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3. The structure of claim 1 in which said lock, lifter and cam are mounted on parallel axes of rotation, said step on said lock overlying said lug of the cam when in locked position, said cogs depending from said lock and for receiving said key therebetween.

4. The structure of claim 3 in which said notch on the lifter is on an upper surface portion thereof in underlying relation to said cogs, said step and said lug being disposed on opposed respective side portions of said lock and cam.

5. The structure of claim 1 in which said cam includes a manually engageable handle for rotating the cam.

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