

Nov. 20, 1962

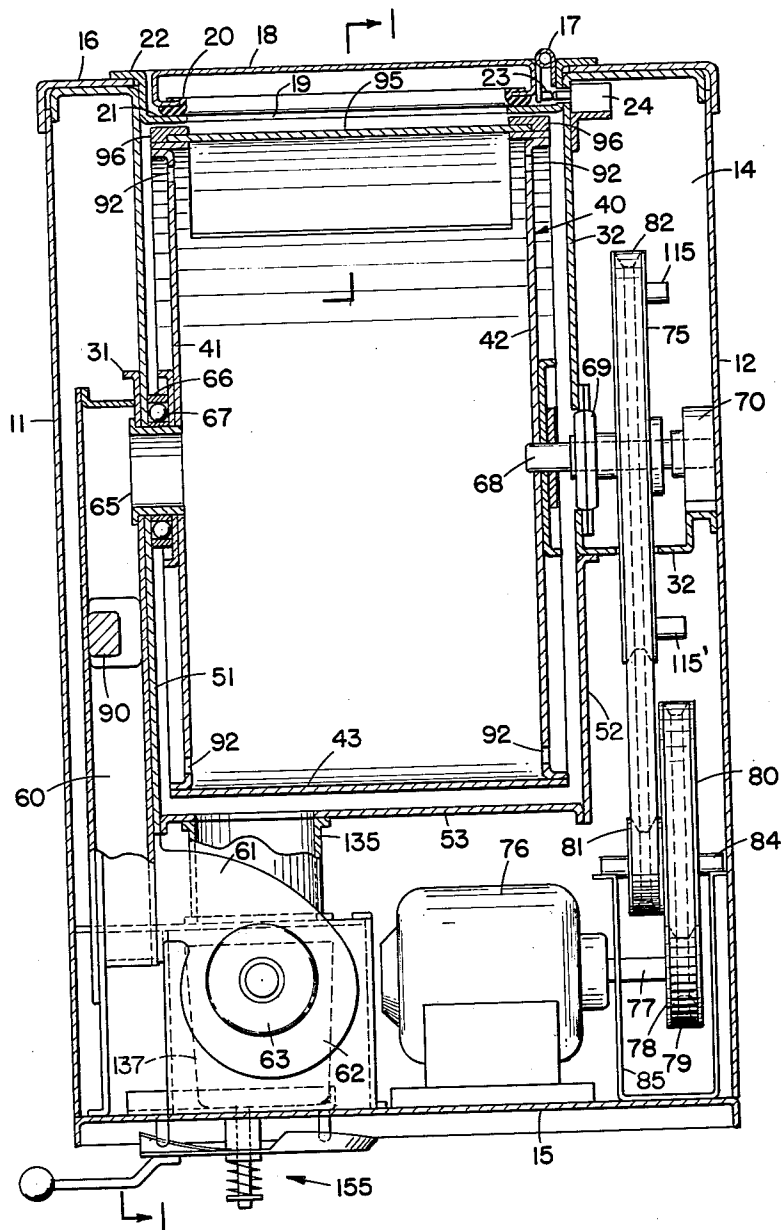
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3,064,359

MACHINE FOR PROCESSING SURGICAL GLOVES

Filed July 10, 1959

3 Sheets-Sheet 2



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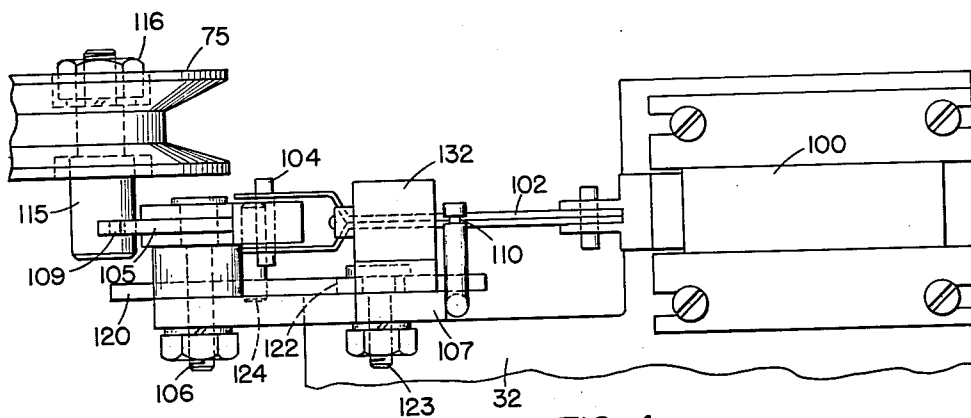


FIG. 4

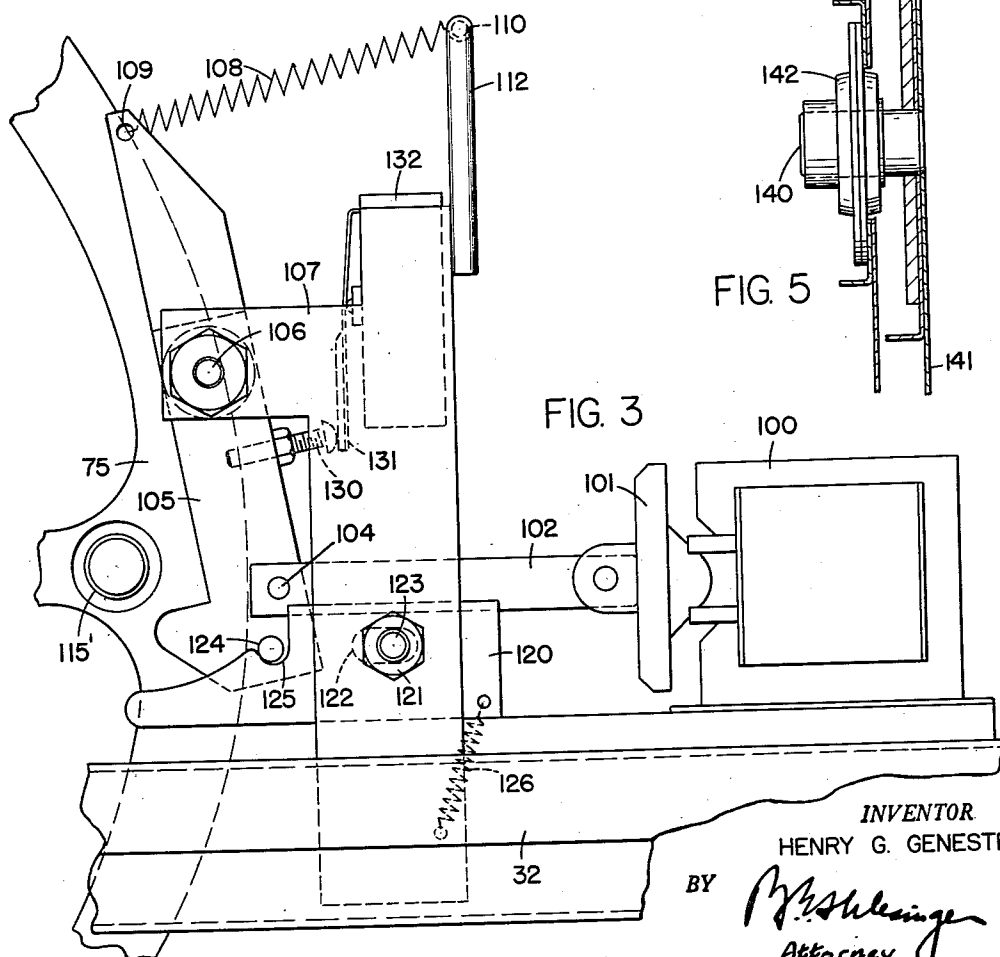


FIG. 3

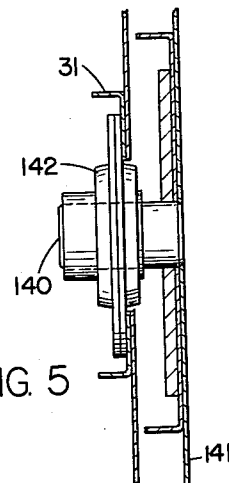


FIG. 5

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MACHINE FOR PROCESSING SURGICAL GLOVES
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Filed July 10, 1959, Ser. No. 826,158

3 Claims. (Cl. 34—87)

The present invention relates to machines for processing surgical gloves after washing, and more particularly to driers for drying surgical gloves, although in one phase the invention relates, also, to machines for powdering surgical gloves after drying and prior to use.

The conventional method of drying surgical gloves is to mount the gloves on pegs on racks. The mounting of the gloves on the pegs, and their removal therefrom is not only likely to damage the gloves, but is also time-consuming. The gloves have to be mounted, then turned inside out, and mounted again. For drying one hundred fifty gloves it takes about forty-five minutes of an efficient operator's time.

For these reasons attempts have been made to dry surgical gloves in drying machines. Such machines as have been on the market heretofore have been designed, however, to dry and then powder the gloves. Therefore, the drying of the gloves had to be completed before powdering them. This means that in case of mechanical trouble, not only is the drying operation stopped, but also the powdering, and vice versa. Furthermore, an expensive machine has to be bought, only half of which is operating at a time.

Conventional drying machines, moreover, have side doors for loading and unloading. This means that there has to be considerable stooping done to load and unload a machine. At times, also, in loading or unloading, gloves may fall into the bottom of the machine from where they cannot be retrieved unless the entire unit is dismantled. Further than this these drying machines usually are built with a drum in which the gloves are tumbled during drying. The end walls of the drum are perforated to admit the hot drying air into the drum. However, even if the end wall of the drum is 60% perforated, due to the speed of rotation of the drum, its end wall acts almost as an imperforate end wall, and only about 25% of the time does the drying air get into the drum. Furthermore, in conventional driers all excess water remains in the machine and must be entirely eliminated by evaporation. Thus previously-known drum-type glove drying machines are slow and inefficient in operation.

A primary object of the present invention is to provide a machine for rapidly and efficiently drying articles such as surgical gloves.

Another object of the invention is to provide a machine of the character described which will be easy to operate, and which can be loaded and unloaded from the top, thus avoiding the back-breaking stooping necessary with side door models, and also practically eliminating the possibility of lost gloves.

Another object of the invention is to provide a machine of this character which will revitalize the rubber of the gloves, and considerably reduce replacement charges for gloves.

Another object of the invention is to provide a machine of the character described in which the excess water will be collected from the gloves in the very first minutes of the drying operation, leaving all the rest of the operating time for evaporation of the remaining moisture.

Another object of the invention is to provide a machine of the character described which will operate more effectively and at lower temperatures than conventional machines.

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Other objects of the invention will be apparent herein-after from the specification and from the recital of the appended claims when taken in conjunction with the accompanying drawings.

In the drawings:

FIG. 1 is a vertical section taken approximately on the line 1—1 of FIG. 2, looking in the direction of the arrows;

FIG. 2 is a vertical section taken substantially at right angles to FIG. 1 and on approximately the vertical center line of the machine, at least for the major portion thereof;

FIG. 3 is a fragmentary side elevation on an enlarged scale of the means for stopping the rotation of the drum on completion of the drying operation;

FIG. 4 is a fragmentary plan view of this mechanism; and

FIG. 5 is a fragmentary view showing the substitute bearing, which is employed at one end of the drum when the machine is built as a powderer.

The machine shown in the drawings is of the drum type. It comprises a cabinet in which a drum is mounted to rotate on a horizontal axis. Access is had to the drum, to load and unload it, through an opening in the top of the cabinet that is normally closed by a door that is hinged to the top of the cabinet, and through an opening in the periphery of the drum that is normally closed by a door that is slidable on the periphery of the drum. The drum is motor-driven; but a stop mechanism is provided, which is operable automatically when the door in the cabinet is opened, to stop the drum with the door in the drum in registry with that opening so that the access can readily be had to the interior of the drum. When the invention is embodied as a drier, a fan blows air continuously over an enclosed finned-type heater, to heat the air, and directly into the drum through one of the bearings that support the drum for rotation. Thus, the warm air is blown continuously into the drum, and not intermittently as is the case where the warm air penetrates the drum only through holes in its wall. When the invention is embodied as a powderer, the fan and heater are omitted, and a solid bearing is substituted for the bearing through which warm air is blown when the invention is embodied as a drier.

Referring now to the drawings by numerals of reference, and first to FIGS. 1 to 4 inclusive, 10 denotes generally the cabinet of the drier. This cabinet has a front wall 11, a rear wall 12, side walls 13 and 14, a bottom wall 15, and a top wall 16. Hinged to the top wall 16 by means of a hinge 17 is a door 18, which closes the opening 19 through which access can be had to the drum of the drier. The door 18 is generally rectangular shaped and has a rubber gasket 20 secured around its underface to engage the flange 21 of the door frame 22. Door frame 22 is welded or otherwise secured in the top wall 16. A protrusion 23 on one leaf of the hinge 17 is positioned to engage the plunger of a conventional normally-open limit switch 24, that is, a switch which is spring-biased to open, so that when the door is closed, a circuit is maintained to a solenoid 100 which is energized and holds the stop for the drum in inoperative or free-rolling-drum position, as will be described hereinafter. When the door 18 is opened, the plunger of the limit switch 24 is released, and this circuit is broken, causing the stop dog 105 to be released to stop the machine.

Welded or otherwise secured to a panel 51, which depends from the top wall 16 of the cabinet and which is integral therewith or secured thereto, is a front bearing support 31. Spaced from front bearing support 31 and depending from the top wall 16 of the cabinet, and integral therewith, or secured thereto in any suitable manner, is a rear bearing support 32.

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The drum, in which the gloves are tumbled for drying, is denoted as a whole at 40. It has a front end wall 41, a rear end wall 42, and a peripheral wall 43. The drum is partially enclosed by a shield which includes as a front wall the panel 51, and which has a rear wall 52 that is welded or otherwise secured to the rear bearing support 32. This shield has a bottom wall 53 that is welded or otherwise secured to the front and rear walls 51 and 52 of the shield and that is welded or otherwise secured at its ends to the side walls 13 and 14 of the cabinet.

Supported from the base 15 of the machine is a vertical duct 60. Bearing support 31 forms the rear wall of this duct. This duct is connected adjacent its lower end to the supply port 61 of a fan 62, which is driven by a motor 63. The duct work 60 is of irregular shape, as shown in FIG. 1, and has a trunnion or sleeve 65 welded therein adjacent its upper end.

The drum 40 is rotatably mounted at one side on the hollow trunnion 65 by means of cage 66 of a ball bearing 67. Cage 66 is welded to side 41 of the drum. At its opposite side the drum has a shaft 68 welded thereto which is mounted by means of axially-spaced ball bearings 69 and 70 on the bearing support 32.

Secured to the shaft 68 intermediate its ends is a pulley 75, which is driven from a motor 76 that is mounted on the base of the machine, through the armature shaft 77 of this motor, a pulley 78 which is secured to this shaft, belt 79, pulley 80, pulley 81, belt 82 and pulley 75. The pulleys 80 and 81, are secured to a jack shaft 84, which is disposed parallel to the shafts 77 and 68 and which is journaled in the cabinet on a bracket 85. Belt 79 connects pulleys 78 and 80. Belt 82 connects pulleys 81 and 75.

Mounted in the duct work 60 is a conventional finned heater 90 which extends across the full width of the duct work, and which is connected in any suitable manner to a source of electricity. The fan 62 in operation blows air across the fins of this heater and through the trunnion 65 into the rotating drum on the very center of rotation of the drum. The warm, drying air is, therefore, supplied continuously to the drum without interruption. The end walls 41 and 42 of the drum are perforated, as indicated by the holes 92 (FIG. 1), to permit the air to escape from the drum.

The drum is adapted to be closed by a sliding door 95, which slides in grooved guides 96, that are secured at opposite sides to the peripheral wall 43 of the drum. The lid or cover 95 is recessed as indicated at 97 to provide a grip for sliding the cover back in the guideways 96.

To stop the drum in a position where the cover 95 will register with the opening 19 in the top of the cabinet, a stop mechanism is provided such as shown in FIGS. 3 and 4. This stop mechanism comprises a solenoid 100, which is electrically connected in a circuit that includes the limit switch 24 (FIG. 2). The armature 101 of this solenoid is pivotally connected to a link 102 which in turn is pivotally connected at 104 to a stop dog 105. This stop dog 105 is pivotally mounted on a stud 106 carried by a bracket 107 which is fastened to the bearing support 32 of the machine.

Stop dog 105 is constantly urged clockwise about its pivot, as viewed in FIG. 3, by a spring 108 which is secured at one end in a hole 109 in the upper end of the dog, and which is connected at its other end to a pin 110 that is welded or integral with a rod 112 which, in turn, is welded or otherwise fastened to the bracket 107. (Spring 108 is omitted in FIG. 4.) The stop dog 105 is adapted to engage one of two pins 115, 115' which are secured by means of nuts 116 to the pulley 75 in diametrically opposite positions to project beyond one side of the pulley. Pin 115' is longer than pin 115, that is, it projects a greater distance than pin 115 beyond said one side of the pulley. The stop dog 105 is held out of engagement with these two pins by a latch 120 which is mounted on the bracket 107 for sliding and pivotal movement thereon.

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A bolt 123, that passes through an elongate slot 122 in the latch and that is secured by nuts 121 in the bracket 107, serves as a pivot and guide for the latch, and also, in cooperation with slot 122 as a means for limiting the longitudinal movement of the latch. The stop dog 105 carries a pin 124 which normally engages in a notch 125 in the latch 120.

When the solenoid 100 is energized, the lower part of the stop dog 105 is pulled to the right in FIG. 3, and the pin 124 pulls the latch or detent 120 to the right. When the solenoid 100 is deenergized, as by opening the door 18, the coil spring 126, which is secured at its upper end to the latch or detent 120 and at its lower end to the bracket 107, pulls the detent to the left, to put it in position to be engaged by the pin 115' when next it passes. When the pin 115' engages the detent, it rocks the detent about the bolt 123, disengaging the notch 125 from the pin 124. This releases the stop dog 105; and it is swung by the spring 108 into position to engage the other pin 115 when the drum has revolved through another 180°.

There is a pin 130 threaded into the stop dog 105, which is adapted to engage a spring strap member 131. This spring strap member is adapted to engage the plunger of a conventional, normally open limit switch 132. The limit switch 132 is wired into the circuit of the drive motors of the machine. When the stop dog 105 is released, then, the strap member 131 releases the plunger of the limit switch 132, and this limit switch opens, breaking the circuits to the motors 76 and 63, so that the drum is only coasting when it is stopped by dog 105.

The wiring is such that when the door 18 is opened, the limit switch 24 is disengaged and breaks the circuit to the solenoid 100, deenergizing this solenoid. This releases the latch 120, which moves into position to be engaged by pin 115' of the pulley 75 as the pin rotates past it. The pin 115' rocks latch 120 about its pivot 123 against the resistance of spring 126 and disengages the latch from the pin 124 of the dog 105, releasing the dog. The dog in turn is swung by its spring 108 into position to engage the pin 115, to stop the drum with the door 95 of the drum in registry with the opening 19 in the cabinet. At the same time that dog 105 swings to operative, drum-stopping position, the limit switch 132 is allowed to open, stopping the motors.

There is an opening in the bottom 53 of the drum shield. A conduit 135 (FIGS. 1 and 2) conducts any excess water from the drum through this conduit to a removable receptacle 137 which is disposed beneath the bottom end of the conduit.

By a slight modification, this machine can be built as a powderer. For this purpose, the motor 63, the fan 62, duct 60, heater 90, and duct 65 can be eliminated. In place of the duct 65 a solid shaft 140 (FIG. 5) is secured to the wall 41 of the drum. This shaft is journaled in a ball bearing 142 which is secured to the bearing support 31 of the machine.

For powdering the gloves, a small amount of powder is placed in the drum. Preferably a drum is used which has closed end walls instead of the perforated end walls 41 and 42. One of the end walls of the drum of the powdering machine is shown at 141 in FIG. 5. To prevent the powder from blowing all over the place, the receptacle 137 is preferably moved up into sealing engagement with the duct 135. For this purpose, there is provided a foot-operated rotary lifting member as denoted at 155 (FIG. 2). This member forms no part of the present invention, and so is not described in detail.

With a drier built according to the present invention, the tumbling of the gloves in the drum and the circulating warm air revitalize the rubber of the gloves. This reduces considerably the need for replacement of gloves, since they regain their original elasticity and shape.

A drier built according to the present invention dries better than known machines because of the receptacle

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which collects all excess water from the gloves in the very first few minutes of the drying process, leaving the rest of the drying time for the evaporation of the remaining moisture. In other driers, all excess water remains in the machine and must be entirely eliminated by evaporation. Furthermore with the drier of the present invention, as stated above, the warm air is blown continuously and directly into the inside of the drum, and not intermittently through holes in one end wall of the drum. These special features of applicant's machine allow the gloves to be dried more effectively and at a lower temperature than in other driers.

With the machine of the present invention gloves can be dried in thirty minutes, inside and out, without any detriment. This time can further be reduced if the gloves are passed through a wringer before being put in the drier.

Conventional glove driers are bulky, and will accommodate fewer gloves than a machine built according to the present invention of the same size. Moreover, conventional driers, as stated above, are coupled with a powdering unit so that the drier and powderer cannot be used simultaneously. By placing a drier and a powderer built according to this invention side by side, there is no need to wait for the end of a drying process on the batch of gloves to be completed before starting the powdering machine to powder already dried and tested gloves. Furthermore, since inspection of the gloves is made after drying and before powdering, the testing equipment can be placed in a logical position between the drier and the powderer, thus saving motion, space and time. In case of mechanical trouble, only one operation is stopped instead of two.

By making the powderer of substantially the same basic construction as the drier, the cost of the two machines is appreciably reduced. For the powderer, the receptacle 137 may be a measuring receptacle, and the powder can be used over and over again. The powderer, like the drier, has the same advantage that when the machine is stopped, the door 95 of the drum registers with the opening 19 of the cabinet so that access can readily be had to the gloves in the drum.

While the invention has been described in connection with particular embodiments thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth, and as fall within the scope of the invention or the limits of the appended claims.

Having thus described my invention, what I claim is:

1. A machine for processing surgical gloves comprising

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a cabinet having an opening in the top thereof, a door for closing said opening, a drum mounted in said cabinet beneath said opening for rotation about a horizontal axis, said drum having an opening in its periphery, a second door movably mounted on said drum for closing said drum opening, an electric motor operatively connected to said drum to rotate said drum, a first normally-open switch in the circuit to said motor, a stop for stopping said drum with said two doors in registry, a solenoid operatively connected to said stop and adapted when energized to move said stop to drum-disengaging position, a second normally-open switch connected in series with said solenoid to energize said solenoid when closed and positioned to be closed when the first-named door is closed, to permit the drum to be power-driven, a spring constantly urging said stop to drum-engaging position, means connected to said stop for holding said first-named switch closed when said stop is in drum-disengaging position and permitting said first-named switch to open when said stop is moved to operative drum-engaging position, whereby when said first-named door is opened said solenoid is deenergized thereby to permit said stop to be moved toward drum-engaging position and said motor to be stopped.

2. A machine for processing surgical gloves according to claim 1, wherein said drum has two pins spaced angularly about its axis of rotation, one of which is longer than the other, said stop comprises a pivoted dog which is held out of drum-engaging position by said solenoid and which, when in drum-engaging position is positioned to engage the shorter of said pins to stop said drum, and means supplemental to said solenoid is provided for holding said dog in drum-disengaging position, and said longer pin is positioned to disengage said supplemental holding means from said dog after said solenoid has been deenergized.

3. A machine for processing surgical gloves according to claim 2, wherein said supplemental holding means includes a latch which is pivotally and slidably mounted in said cabinet, means releasably connecting said dog and said latch, said last-named means being disposed so that said latch is moved with said stop when said solenoid is energized, and a second spring constantly urging said latch into position to be engaged by the longer of said pins to be pivoted thereby to release said dog when said solenoid is deenergized, whereby the first-named spring may move said dog to drum-engaging position.

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