June 18, 1935. C. M. OTIS 2,005,386

DRYING TUMBLER

Original Filed July 17, 1931 6 Sheets-Sheet 1

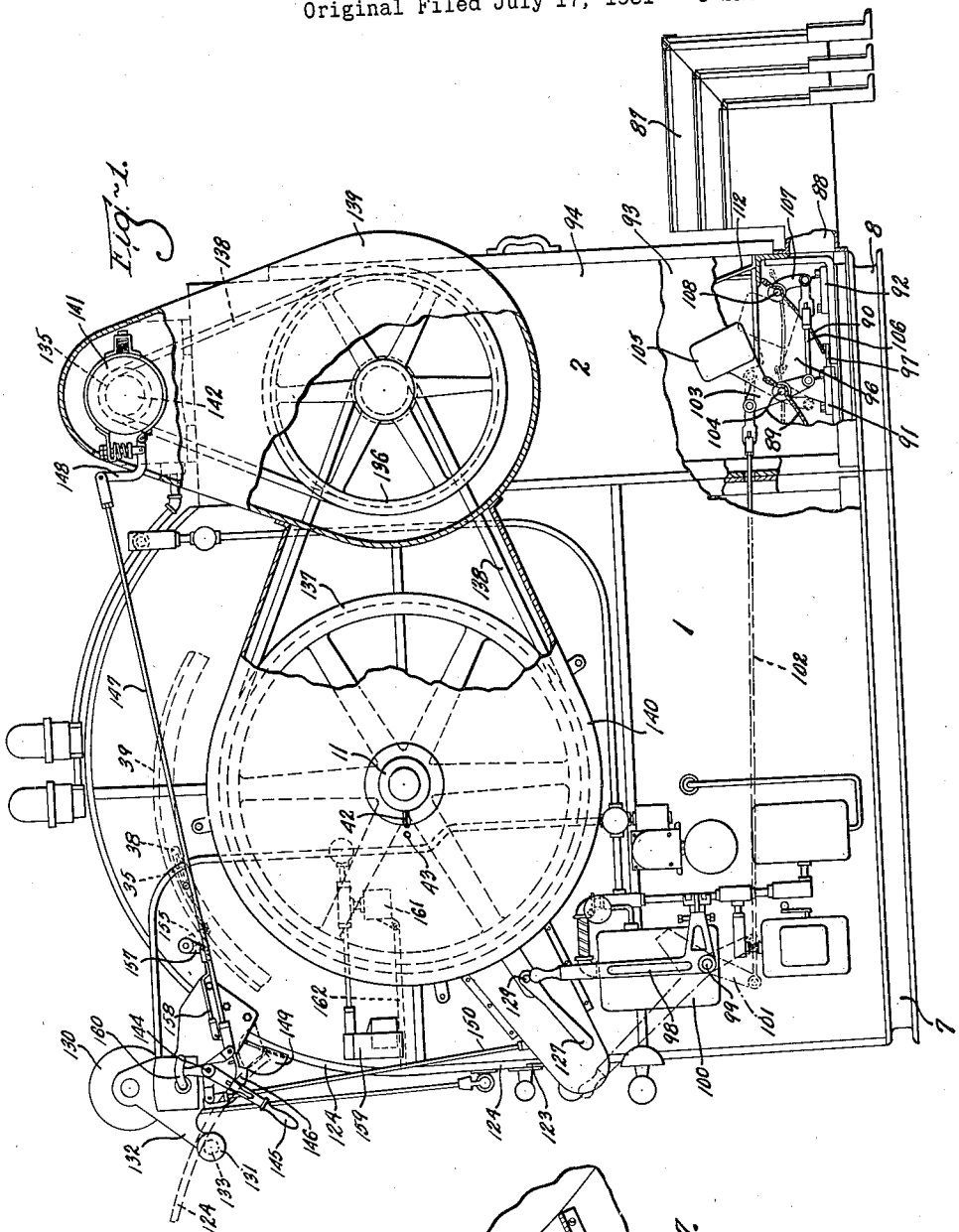

Fig. 1.

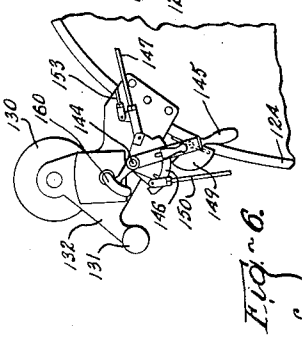

Fig. 6.

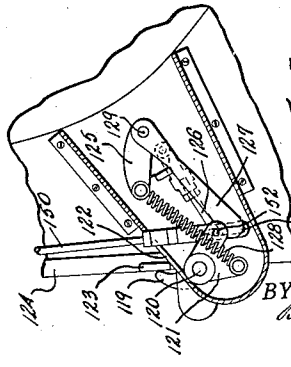

Fig. 7.

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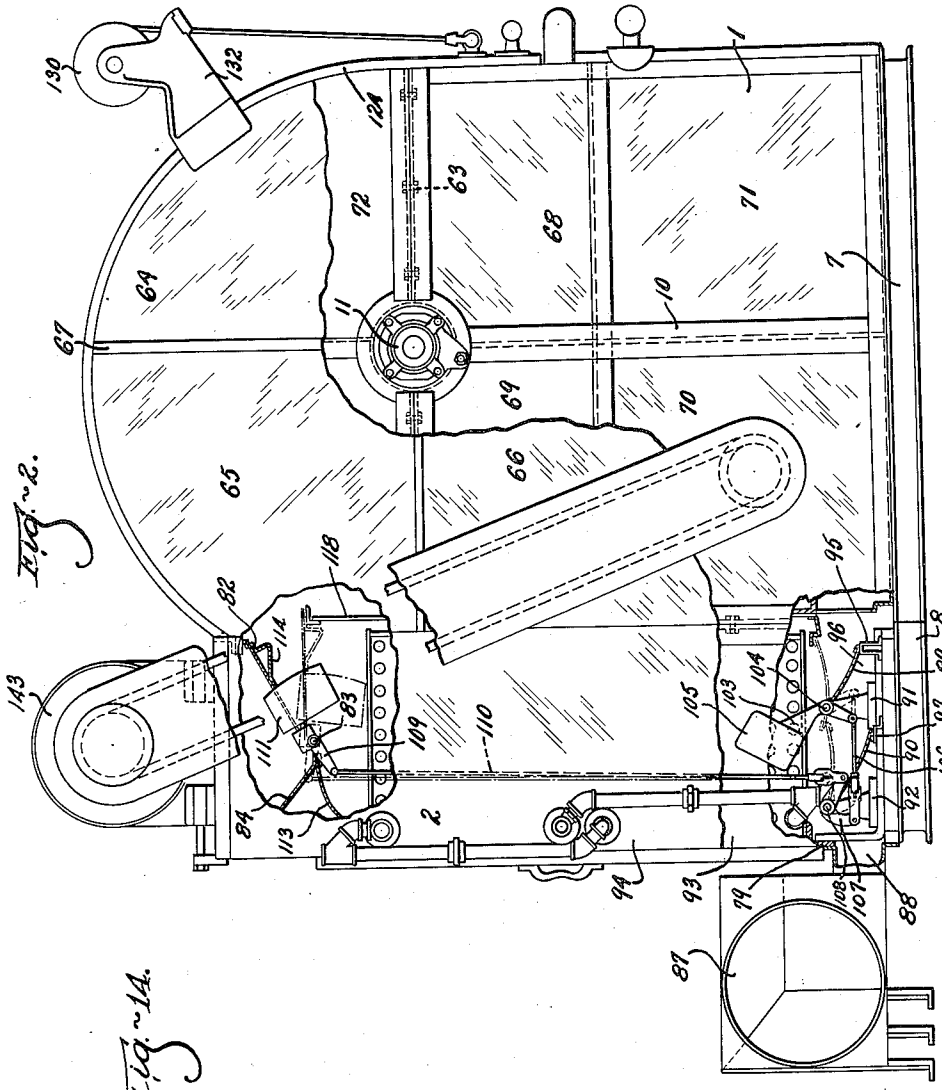

Fig. 2.

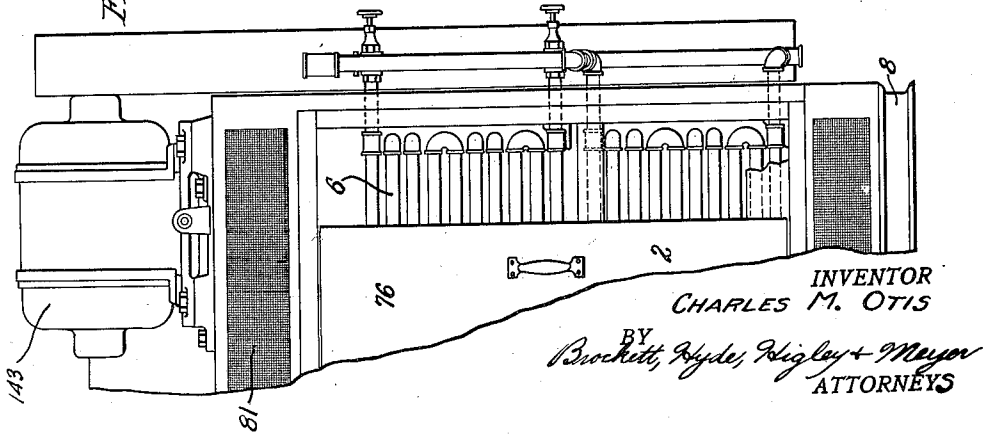

Fig. 14.

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DRYING TUMBLER

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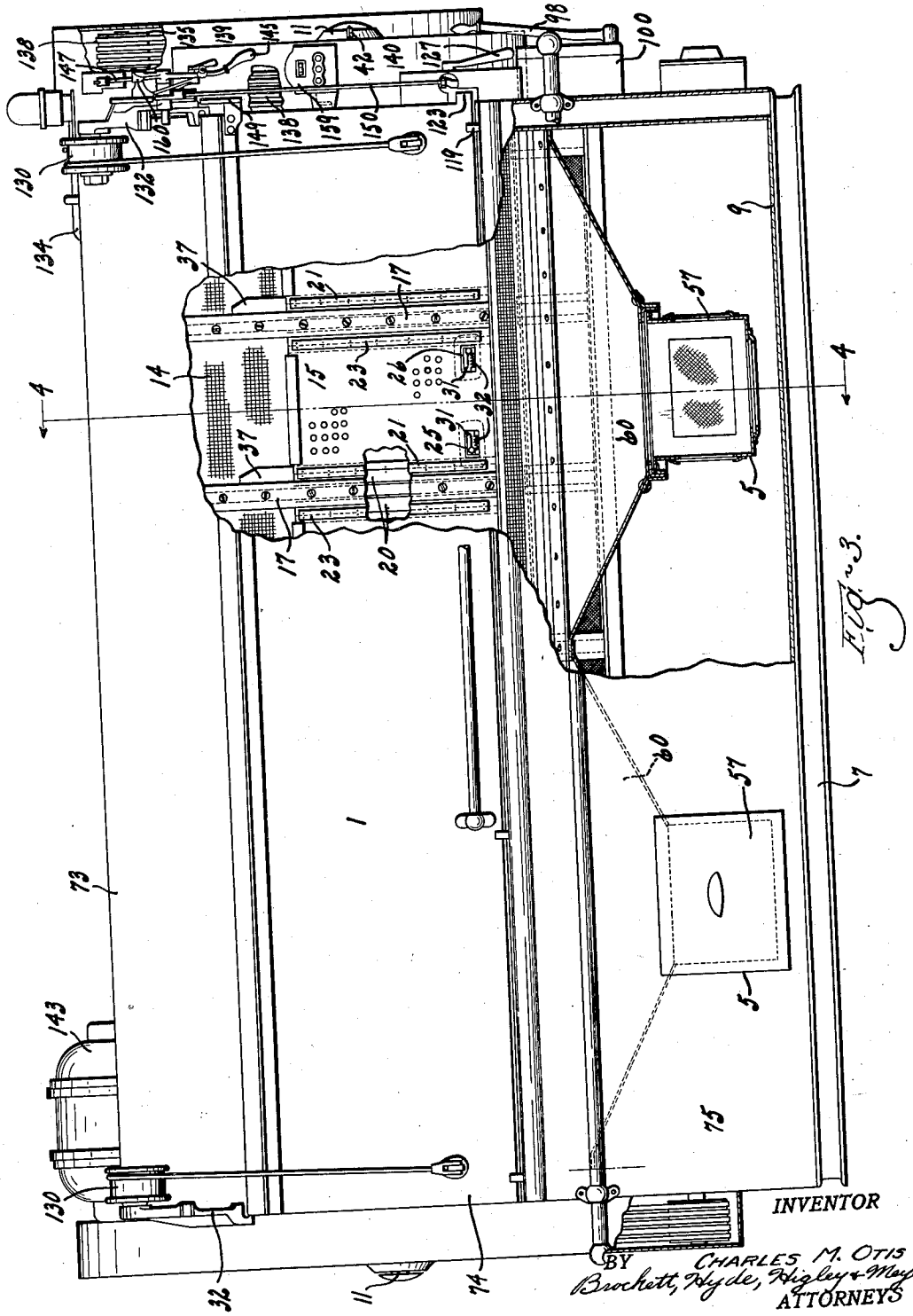

FIG. 3.

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Original Filed July 17, 1931 6 Sheets-Sheet 4

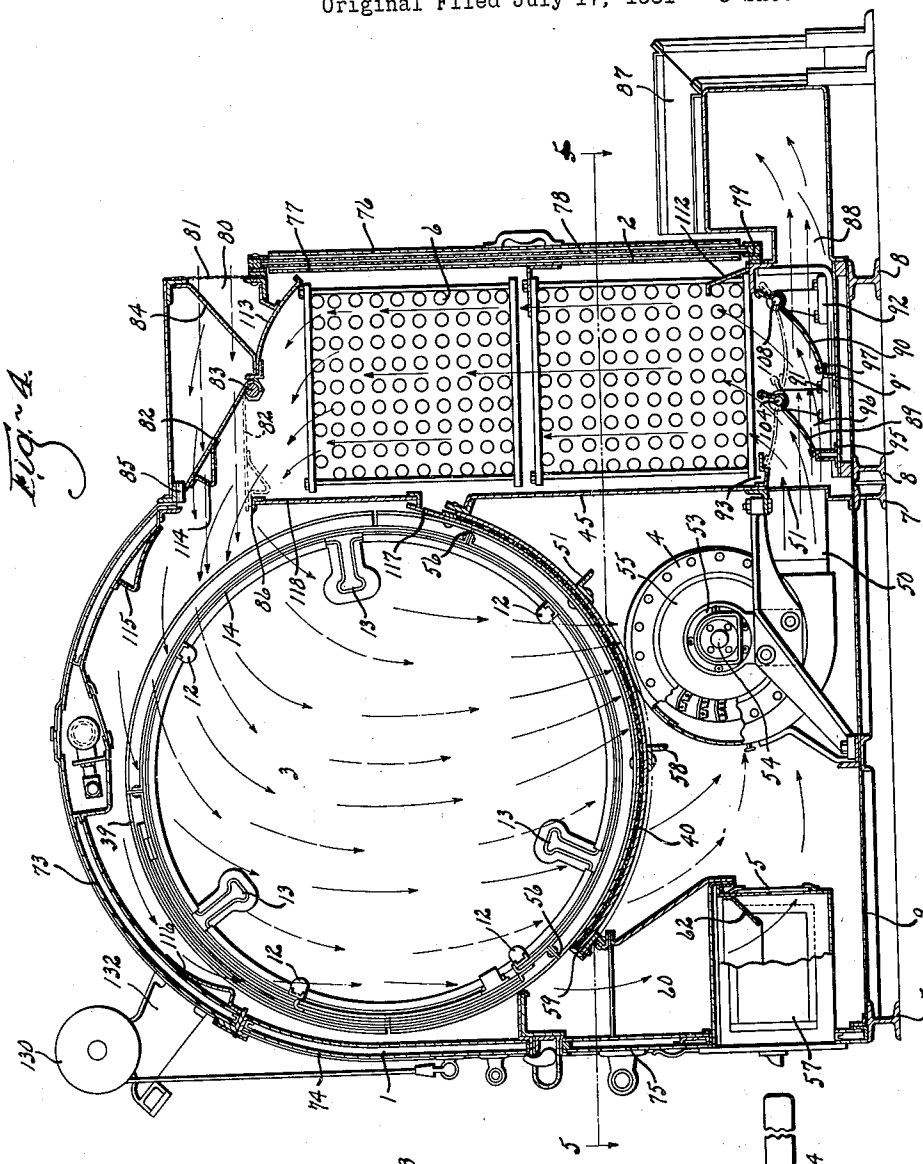

Fig. 4.

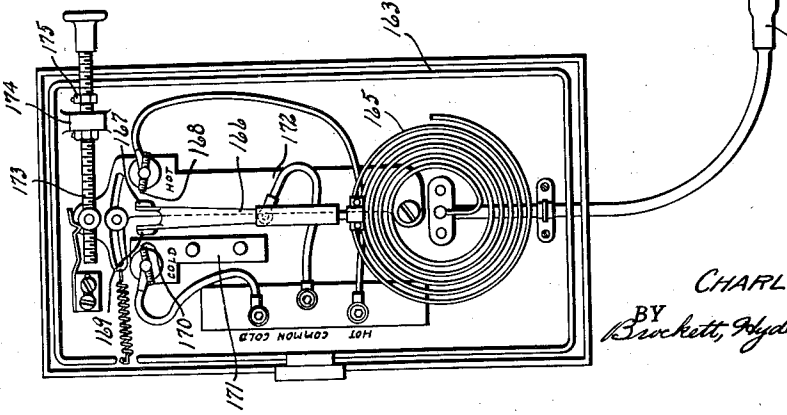

Fig. 15.

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Original Filed July 17, 1931 6 Sheets-Sheet 5

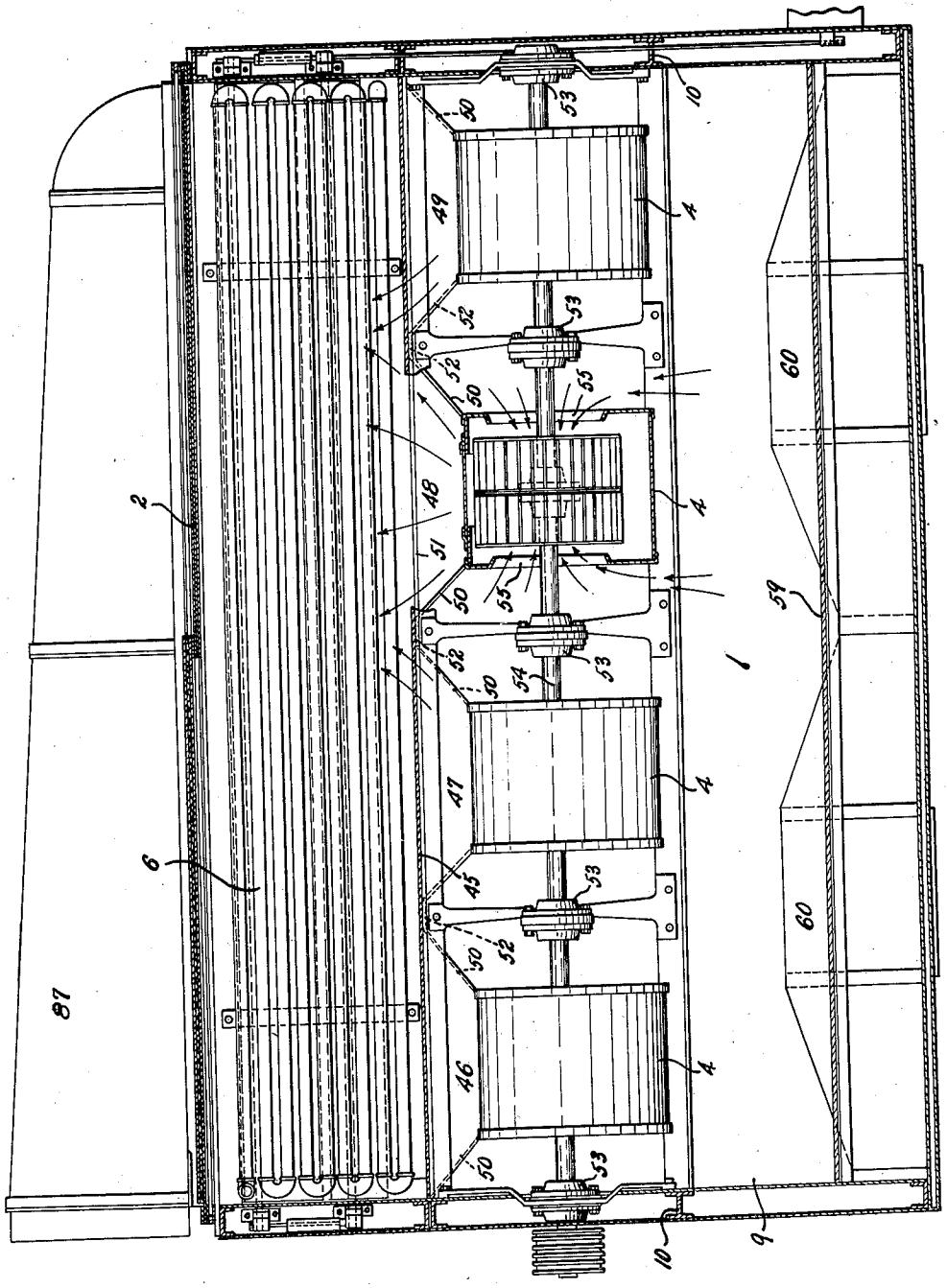

Fig. 5

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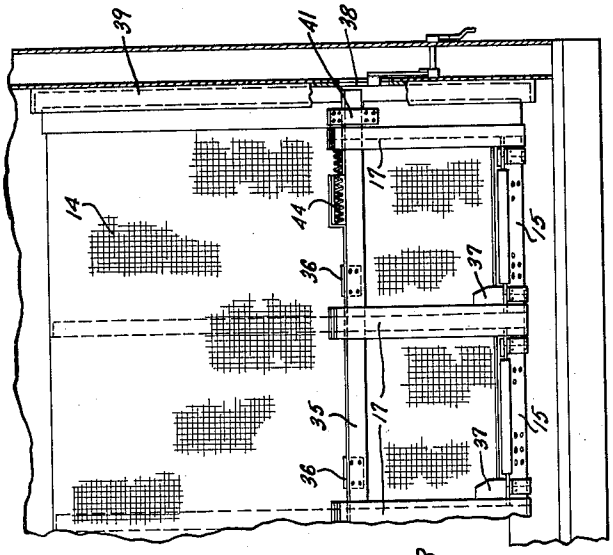

Fig. 8

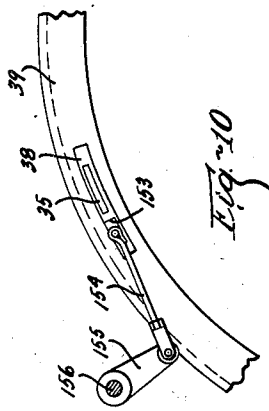

Fig. 10

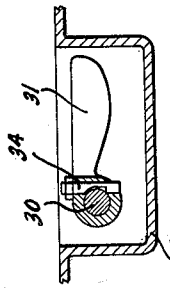

Fig. 12

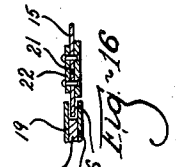

Fig. 16

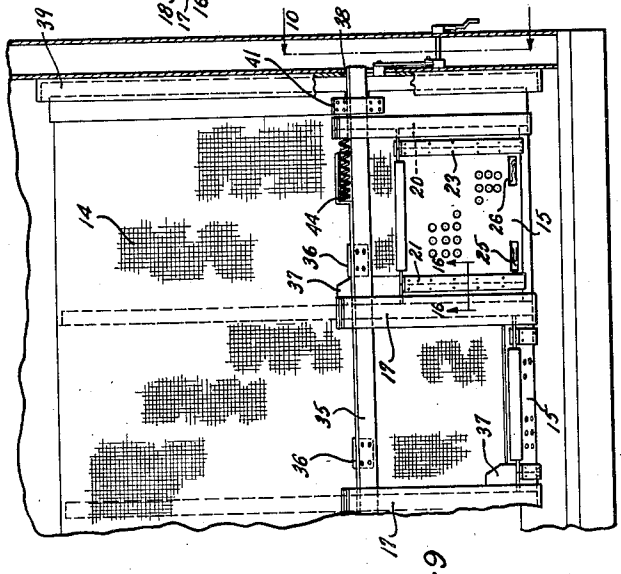

Fig. 9

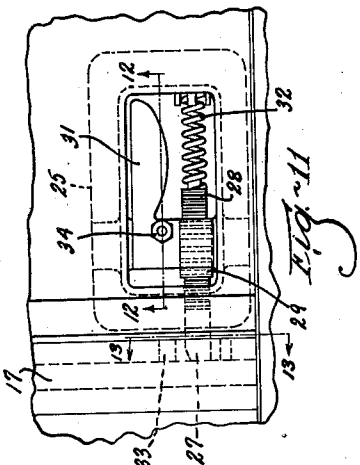

Fig. 11

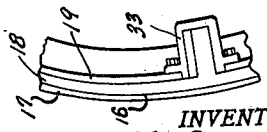

Fig. 13

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Patented June 18, 1935

2,005,386

UNITED STATES PATENT OFFICE

2,005,386

DRYING TUMBLER

Charles M. Otis, Cincinnati, Ohio, assignor to The American Laundry Machinery Company, Cincinnati, Ohio, a corporation of Ohio

Original application July 17, 1931, Serial No. 551,403. Divided and this application March 17, 1933, Serial No. 661,362

5 Claims. (Class 192—135)

My invention relates to drying machines of the tumbling type and, particularly, to that type used in laundries in which clothes, wearing apparel or textiles are placed in a revolving cylinder and tumbled through currents of air.

This application is a divison of application Serial No. 551,403, filed July 17, 1931, for Drying tumbler.

It is well known that drying is the removal of a liquid from another substance or from an object by vaporization and it is generally known that, when a gaseous substance such as air moves across the wet surface of an object, a film of air exists on the surface of the object, the character of the film being entirely different from the main air body and forming a boundary or zone between the moving main air body and the object. Such film acts towards the transportation of heat, vapor, and matter from the object to the moving main air body as though it were a separate material and vapors can escape through this film only by conduction or diffusion.

Thus, surface evaporation of water from an object such as a piece of cloth is a diffusion of water vapor from the surface of the cloth through a relatively stationary air film in contact with the cloth to the surrounding air into which further dissemination is rapidly effected by convection, and the factors controlling the rate of such surface evaporation are the velocity of the air passing through the machine and over the surface of the goods, the amount of heat supplied to the goods, and the amount of surface of the goods exposed to the heat. The fact that the amount of water vapor leaving a wet object depends upon the temperature of the object and the surrounding atmosphere is well known.

One object of my invention is to provide a drying machine of the above type so constructed and arranged as to produce the largest amount of drying action with the greatest possible efficiency and economy.

Another object of my invention is the provision and arrangement of a means within the drying machine for directing currents of air through a heating means so as to obtain the greatest amount of heat therefrom and to produce a path of air currents through the heating means and the clothes containing means which will approach an ellipse in form and be free from sharp bends and reverse curves.

Still another object of my invention is to provide a delinting device in the machine which will maintain the circulatory air path in a "free from lint" condition and will positively collect any lint removed from the air path in a readily accessible location.

A further object of my invention is to provide means, in this instance, a wiper or wipers and baffles, that will provide a positive block against the escape of air currents around the outside of the cylinder at all times during rotation thereof and will definitely direct the currents of air into the cylinder.

A still further object of my invention is to provide a lock for the rotating cylinder door such that opening of any one cylinder door when the cylinder is in loading or unloading position will prevent the operation of the control for rotating the cylinder, and likewise, will prevent the rotation of the cylinder regardless of the control. In addition to this safety arrangement, it is a still further object of my invention to provide a means for preventing operation of the machine until the outside case door is in closed position and to prevent opening of the case door when the cylinder is rotating.

A still further object of my invention is to provide wear strips on the doors of the cylinder which receive all of the wear due to sliding and which may be easily and readily renewed, thereby eliminating the necessity of scrapping the doors due to wear at their edges.

A still further object of my invention is to provide a machine of the above type in which the controls for the complete operation thereof are located at one end of the machine in such position that an operator is not required to move from one position to operate any part.

Other objects and advantageous features of my invention may be seen in the following description and one embodiment thereof may be seen in the accompanying drawings wherein similar characters of reference designate corresponding parts, and wherein:

Fig. 1 is an elevation of one end of a drying tumbler, parts of the guard being broken away to show the drive and parts of the frame being broken away to show the damper operating means. The above figure shows a view of the control and of a drying tumbler constructed in accordance with my invention showing the brake operating and control mechanism and the thermo-control mechanism.

Fig. 2 is an elevation of the opposing end of the drying tumbler shown in Fig. 1, parts of the guard being broken away to show the fan driving means, parts of the outside channels being broken away to show the construction of the frame, and other

parts of the frame being broken away to show the damper operating mechanism.

Fig. 3 is an elevation of the drying tumbler showing the various control means for the device and the drive for the cylinder at one end of the machine and the drive for the fan at the opposing end thereof. This view also shows the cylinder doors and the delinting apparatus forming a part of my invention.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4.

Fig. 6 is a detail view of the brake operating and control lever in a position in which the brake is released and a cylinder is rotated.

Fig. 7 is a detail view of the outer case door locking mechanism.

Fig. 8 is a view showing the extreme top of the cylinder door in closed position and also the cylinder bar locking mechanism for preventing rotation of the cylinder when any one or all of the doors are in open position.

Fig. 9 is a view similar to Fig. 8 showing a cylinder door in open position and the cylinder bar locking mechanism in locked position.

Fig. 10 is a view taken on the line 10—10 of Fig. 9.

Fig. 11 is a detail view of one of the cylinder door latches showing the wedge type construction of the latch bolt.

Fig. 12 is a view taken on the line 12—12 of Fig. 11.

Fig. 13 is a view taken on the line 13—13 of Fig. 11.

Fig. 14 is a detail view taken at the rearward side of the drying tumbler and showing the steam coils in the manner in which they are supplied with steam and in which they are drained.

Fig. 15 is a view of the temperature control switch or thermo-control.

Fig. 16 is a sectional view taken on the line 16—16 of Fig. 9 and showing the wear strips that form a part of the cylinder doors.

Referring to the drawings and particularly Figs. 1 and 4 thereof, I have shown one embodiment of my invention as comprising a drying tumbler embodying a forward section 1 and a rearward section 2, the forward section 1 consisting of a casing covering a drying cylinder 3, a plurality of fans 4, and an air delinting device 5 and the rearward section 2 consisting of a casing covering a heating unit 6.

The forward and rearward sections 1 and 2 are mounted upon and secured to I-beam bases 7 and 8 respectively and the bottom of the forward and rearward sections consists of a heavy piece of sheet metal 9 supported above the floor of the rooms in which the drying tumbler and heating unit are disposed the height of the I-beam bases 7 and 8 to provide a dead air space between the bottom of the drying tumbler casing and the floor of the room to form an insulation reducing the loss of heat from the drying tumbler at this point. As shown in Fig. 2, the end frames of both the front and rear sections are made up of a plurality of lengths of channel iron 10 in a net work of cross beams and vertical beams properly secured together.

The drying cylinder 3 may be of any size necessary to get the maximum of exposed surface of material to be dried and is of the usual construction in this type of machine and mounted in bearings 11 that are preferably of the self-aligning type of tapered roller bearings. Generally, the cylinder is composed of end heads or transmitters having gudgeons secured thereto for support in the bearings 11 and connected together by means of channels 12 and radially extending ribs 13. The main function of the ribs 13, as is well known in the drying tumbler art, is to effect the raising and subsequent tumbling of the material during the rotation of the cylinder. As shown best in Figs. 8 and 9, the frame work making up the end heads or transmitters and the channels and ribs are covered with heavy woven mesh wire 14 providing a strong and durable cylinder and one which will offer the least resistance to the passage of air therethrough.

Referring to Figs. 8 and 9, the cylinder 3 is provided with a plurality of sliding doors 15 of perforated sheet metal formed to the curvature of the cylinder and adapted to slide in guideways 16 formed by circular straps 17, 18 and 19, and since a cylinder door that has been in operation over a long period of time becomes thin and worn at the edges which engage the guideways 16, finally becoming so loose and noisy as to require renewal, wear strips 20 are provided which lie in alignment with the door sheet and are held in place by straps 21, 22, 23 and 24 as shown in Figs. 9 and 16. Thus, the total width of the door is made up of the door body and a wear strip 20 at each side thereof whereby it is only necessary to replace the wear strips when they become worn and the necessity of renewing the entire door is eliminated.

As shown in Fig. 3 of the drawings, each cylinder door is provided with spring actuated latches 25 and 26 that are identical in construction and, as shown in Fig. 11, comprise a bolt 27 having rack teeth 28 thereon to cooperate with a gear segment 29 mounted on a shaft 30. Such gear segment is rotated by a handle 31 secured to the shaft 30 and causes the bolt 27 to either move against the pressure of a spring 32 and out of engagement with a latch keeper 33 or permits the latch bolt to be moved into the latch keeper 33 by the pressure of the spring. As shown, the bolt 27 is tapered at its end and the inner surface of the latch keeper is correspondingly tapered whereby a tight and solid fitting door is obtained.

The tightness and solidity of the fit between the latch bolt and latch keeper is dependent upon the operating handle which limits the movement of the bolt into the keeper by having its rotative movement in one direction limited and, to provide adjustment for wearing of the parts, the handle 31 is adjustably mounted on the shaft 30 as shown in Fig. 12. That is, the pin 34 which holds the handle in definite fixed relation to the shaft 30 is notched whereby the handle may be set to a new position to allow the latch bolt to make a deeper or shallower contact with the latch keeper.

In order to prevent rotation of the cylinder when any one cylinder door is in open position, a bar lock is provided as shown in Figs. 8 and 9, which comprises a bar 35 adapted to slide in slots formed in the straps 17, 18 and 19 and provided with a block 36 for each cylinder door disposed a short distance away from the guideway straps. It will be noted that the under strap 37 forming connection between the door and the wear strip at the left side of the door is longer than the other guideway strap and is beveled at its uppermost end to engage the blocks 36 in certain positions of the door and move the bar 35 longitudinally into engagement with a slot 38 in one of a pair of arcuate angle irons 39 disposed at each

end of the cylinder, the lower arcuate angle irons forming a support for a delinting screen 40 that conforms to the shape of the cylinder. The rod 35 is further guided by a strap 41 bent to fit over the end of the bar as shown in Figs. 8 and 9.

In operation of the cylinder doors, assuming that the cylinder doors are in aligned position with the usual outer casing door opening which is indicated as shown in Fig. 1 by an indicator 42 in registration with a point 43, when a cylinder door is raised a beveled edge of the strap 37 will engage one of the blocks 36 and move the bar 35 longitudinally against the resistance of a spring 44 into a slot 38 hereinbefore described. With the bar 35 in engagement with the slot 38, it will be apparent that rotation of the cylinder will be prevented while any one of the cylinder doors is in open position. On closing of all cylinder doors and disengagement of the strap 37 with the block 36, the spring 44 will move the bar 35 longitudinally out of engagement with the slot 38 whereby the cylinder may be rotated. However, it will be noted that opening of any one of the cylinder doors will cause movement of the bar 35 into engagement with the slot 38 and that all of the cylinder doors must be closed before the cylinder may be rotated.

As shown in Figs. 4 and 5, a plurality of axially aligned fans 4 are located approximately midway of the front and rearward side of the drying tumbler, considering the machine as a whole, and are arranged a short distance forwardly of the rear wall 45 that separates the forward and rearward sections 1 and 2 and it will be understood that the number of fans required is proportional to the length of the machine and the proper distribution is dependent on the distance they are spaced apart, the number of fans thereby being preferably variable.

The fans 4 are connected as one integral part to the separate wall or panel 45 by means of ducts 46, 47, 48 and 49 having diverging walls 50 extending from the fan housing openings to a rectangular opening 51 and the diverging walls are interconnected as at 52 to form practically a single fan discharge the entire length of the machine.

In the operation of the fans which are mounted in aligned bearings 53 and on a single shaft 54 and driven by suitable means hereinafter described, air is drawn through openings 55 on opposing sides of each fan and is then forced out into the heating unit 6 and thence to and through the cylinder 3, the air being then drawn back into the fans 4.

Numerals 40 and 56 to 62 refer to the delinting device claimed in said divisional application.

The outer casing of the forward section 1 of the drying tumbler is divided at a horizontal center line of the bearing 11 which supports the cylinder 3 and these two parts are suitably secured together by means of bolts 63 as shown in Fig. 2. Likewise, the outer casing of the forward section 1 and the rearward section 2, which contains a heating element 6 consisting, in this instance, of a series of parallel pipes through which the heating medium is passed, are similarly separable and suitably secured together by means of bolts. In the construction of the apparatus casing forming the forward section 1, the inside and outside of the end frames made up of the channel irons 10 are covered with panels such as 64, 65, and 66, such panels being preferably of sheet iron and overlapped on the outside of each end frame of the apparatus and raised at certain of their edges to form a bead 67. A dead air space is provided in the walls by having inside panels 68, 69, 70, 71 and 72 that abut each other and are securely fastened in place on the supporting framework. Likewise, the top, front and door panels 73, 74 and 75 are all of double thickness of metal separated by an air space which is not free to outside circulation and acts as an insulation against loss of heat, see Fig. 4. Thus, the greater portion of the outer casing of the forward section 1 is heat insulated.

As shown in Fig. 4, a sliding door is supported in guideways at the rear of the apparatus to provide access to the steam coils which make up the heating unit 6, this door being made up of double walls 76 and 77 and provided with heat insulating material 78 between the walls. A strip of felt 79 is preferably secured to the inner wall 77 to provide a sealing means between the portions of the door which overlap the edges of the opening in the casing and to provide a cushioned surface to prevent scratching of the contacting surfaces when the doors are moved.

The outer casing forming a part of the rearward section 2 is provided above the top edge of the door just described with a rectangular opening 80 extending the full length of the apparatus and covered with a wire mesh screen 81 which serves the purpose of partially straining the fresh air entering the apparatus throughout the entire cycle of operation. A damper 82 that serves to regulate the amount of outside air entering the apparatus extends the full length of the apparatus and is pivotally mounted on a shaft 83 which is supported at intervals by brackets 84. When the damper 82 is in the full line position shown in Fig. 4, only a small amount of air may enter the apparatus through the restricted opening 85. However, when the damper is in the position shown by the dot-dash lines in which it rests on brackets 86, the maximum amount of outside air may enter the apparatus through the substantially rectangular opening 80. Likewise, the damper 82 serves to regulate the amount of heated air entering the cylinder compartment in comparison to the outside air permitted to enter as will be clearly seen in Fig. 4.

Below the lowermost edge of the sliding door hereinbefore described another opening is provided through which an amount of air equal to that entering the apparatus through the opening 80 may be exhausted out of the apparatus. For this purpose, a duct 87 is provided and extends outwardly from the exhaust opening 88 of the apparatus. If it is desired, a similar duct may be secured in place over the inlet opening 80 through which the outside air is admitted.

The amount of air discharged from the apparatus is regulated by dampers 89 and 90 which like the damper 82 extend substantially the full length of the apparatus and fit snugly against the inside panels of the casing as shown in Fig. 5. Brackets 91 and 92 that serve to support the dampers 89 and 90 respectively are mounted in the space between the inside panels 93 and the outside panels 94 which make up the end coverings of the rearward section 2 in that space which is a dead air space. This construction provides snug fitting and practically air tight dampers.

Damper 89 is limited in its downward movement by brackets 95 spaced within the length of the apparatus whereby a narrow rectangular opening is provided between the outermost end of the damper 89 and the bottom 9' of the appa-

ratus through which air may be discharged during the drying period in an amount comparable to the outside air entering the apparatus through the opening 80 during the drying period. The full line positions of the dampers 89 and 90 designate their positions during the drying period wherein the damper 89 splits the draft of air created by the fans 4 and directs a portion of it to the forward section of the heating unit 6 and another portion to the rearward section. The remainder of the heated air passes outwardly to the exhaust duct 87 through an opening 96 which results from the damper 89 being limited in its downward movement by the bracket 95 and the damper 90 being limited in its downward movement by a bracket 97, the amount of air discharged being substantially equal to the outside air entering the apparatus through the opening 80. Thus, during the drying period in which heated air is circulated through the apparatus by the action of the fans 4, a continual discharge of moisture laden air from the apparatus takes place as well as a continual admittance of dry, relatively cool make up air from the outside.

In the above method of drying which may be termed the recirculation method, the heated air passing through and over the wet material contained in the rotating cylinder 3 picks up water from the material and when the air is gone into the fans 4 to be forced back into circulation through heating unit, that which is heavily laden with moisture is thrown outwardly and follows a path along the outer periphery of the fan housings and thence along the floor line of the apparatus and out through the exhaust duct 87 by way of the opening 96. The remainder of the air is split by the damper 89, passing first through the heating unit 6 and thence through the cylinder 3 and back to the fans 4, that air which is lost through the discharge duct 87 being made up by outside air through the opening 80. Thus, the air is recirculated and the great amount of heat which would be lost if the entire draft of air were passed only once through the apparatus and then discharged is saved and a maximum of heat is obtained from a minimum of heat energy expended.

The dot-dash line positions of the dampers 82, 89 and 90 are the positions which they assume during the cooling period when outside air is circulated but once through the apparatus and then totally discharged, the operation of these dampers being controlled by a single operating lever 98 as shown in Fig. 1.

The shaft 99 on which the damper operating lever 98 is mounted extends through a box or casing 100 and into the dead air space between the panels forming one end wall of the apparatus as shown in Figs. 1 and 5. An arm 101 is rigidly mounted on the shaft 99 and connected by means of a link 102 with an arm 103 rigidly mounted intermediate its ends on the shaft 104 on which the damper 89 is mounted, the arm 103 having a weight member 105 on one end thereof which normally tends to maintain the dampers 89 and 90 in cooling position as shown by the dot-dash lines in Fig. 4, the lower end of the arm 103 being connected by a link 106 with another arm 107 rigidly secured at one of its ends to the shaft 108 on which the damper 90 is mounted. The full line position of the weight 105 is that position it assumes when the operating lever 98 is in full line or vertical position and in which the dampers 89 and 90 are in the full line position as shown in Fig. 4 or the drying period position, the dot-dash line position of the various parts being their position during the cooling period.

As shown best in Fig. 2, the arm 107 is connected to an arm 109 rigidly secured on the shaft 83 which supports the damper 82 by means of a link 110 that passes upwardly through the dead air space between the panels forming one end of the rearward section 2. Another weight 111 is mounted on the arm 109 in such manner as to tend to normally maintain the damper 82 in full open or cooling period position and all of the dampers are similarly connected by similar operating means at both ends of the shafts on which the dampers are mounted. Thus, means is provided for simultaneously operating the dampers controlling the intake and discharge of air into and out of the apparatus so that the amount of air taken into the apparatus will be comparable to that amount which is exhausted and relieve the necessity of the individual operation of two sets of dampers by means of separate operating means.

Another feature of my invention consists in the provision of baffles 112, 113, 114, 115 and 116 at intervals on the inside of the casing, considering it as a whole, which will insure that the entire draft of air currents are first directed through the heating unit 6 and then through the cylinder 3 and to evenly distribute the air currents through the apparatus and particularly through the cylinder. Also, the heating unit in the rearward section 2 is isolated from the forward section 1 containing the cylinder 3 by means of the sheet metal panels 45, 117 and 118. It will further be noted that the baffle 114 is carried by the damper 82 and located on its under side.

In Fig. 7 of the drawings, the mechanism for controlling the locking and releasing of the door in the outer casing forming a part of the forward section 1 is shown, the principle of this locking mechanism being embodied in my Patent No. 1,815,724, issued July 21, 1931 for a "Casing door lock". As shown, locking fingers 119 are spaced at intervals on a shaft 120 extending substantially the entire length of the apparatus and having a lever 121 rigidly mounted on one end thereof.

Such control mechanism embodies a means for moving the control mechanism to locked position after it has been operated to release the case door by movement of the case door to closed position. As shown, an extension 122 on the lever 121 is adapted to be engaged by a projecting lug 123 on the case door 124 to rotate the lever 121 and shaft 120 in clockwise direction as the case door is closing thereby moving the operating parts to locked position and the locking fingers 119 into engagement with the outer surface of the case door.

The manually operable parts which consist of a bell crank 125 having one of its branches connected to a branch of the lever 121 by means of a link 126, an operating handle 127 and a spring 128 connecting the other branch of the bell crank 125 with another branch of the lever 121 are mounted upon a shaft 129. With this operating mechanism, movement of the operating handle 127 in a counter-clockwise direction will serve to rotate the lever 121 in a counter-clockwise direction and move the case door slightly outwardly, the locking fingers 119 being moved out of cooperative relation with the case door at the same time.

In the operation of this part of the apparatus, the handle 127 is rotated in counter-clockwise direction to release the locking fingers 119 from the

case door and when the end of the bell crank 125 connected to the link 126 has rotated past its dead center the spring 128 automatically takes up the task of rotating the lever 121 to release the locking fingers 119 from the case door. At the point of release, a door starts to move into open position under the action of spring retrievers 130 that are well known in the art and then may be further manually moved to open position with practically no effort. As shown in Fig. 1, a spring latch 131 supported in the retriever bracket 132 is provided as an additional holding means to safely maintain the door in open position which is shown by the dotted lines. To lower the case door, the latch 131 must be grasped and moved laterally until the edge of the door will clear a pin 133 on the latch and when the door is lowered the lower edge thereof will clear the locking fingers 119, the locking fingers being moved into locked position after the edge of the door has passed thereover by means of the lug 123 engaging the extension 122 as hereinbefore described.

The cylinder 3 of the apparatus is driven by means of a motor 134 as shown in Fig. 3 through a system of pulleys 135, 136 and 137 interconnected by belts 138 from which the operator is protected by sheet metal guards 139 and 140 and a braking means is provided for stopping rotation of the cylinder after the motor is turned off, the braking element being disposed on a braking drum 141 and a shaft 142 that carries the pulley 135 as shown in Fig. 1. Such braking mechanism may be of any well known form. Likewise, the fans 4 are driven by a motor 143 through a system of pulleys and a belt as shown in Fig. 2.

The operating mechanism for the brake structure and the shaft 142 consists of a short shaft 144 supported in the retriever bracket 132 and having a brake operating lever 145 and a sector 146 rigidly mounted thereon so that the lever and sector operate simultaneously as a unit. As shown, a connecting link 147 connects one extremity of the sector 146 with an operating arm 148 for causing the band of the brake structure to grasp the brake drum thereof or release the same in the well known manner. Thus, movement of the operating lever 145 in one direction or the other will cause application or release of the brake.

In order to prevent operation of the apparatus and rotation of the cylinder 3 when the outer case door is in open position, the sector 146 is so disposed relative to the case door that the outer edge of the sector is concentric with its pivotal point and lies in alignment with a bracket 149 on the door. In the full line position shown in Fig. 1, the operating power is off and the brake is set whereby the door 124 may be raised to the position shown by the dotted lines because the bracket 149 in its rotating movement with the door clears the outer edge of the sector 146 at all points. However, should the brake operating mechanism be in released position as shown in Fig. 6, the bracket 149 will contact with the outer edge of the sector 146 to prevent opening of the case door 124. Likewise, with the door in open position as shown by the dotted lines in Fig. 1, the brake operating and control lever 145 can not be moved rearwardly to release the braking means since the outer edge of the sector 146 would strike against the bracket 149. Thus, a means is provided for positively preventing rotation of the cylinder 3 when the outer case door 124 is in open position.

As an additional means for preventing opening of the outer case door when the cylinder 3 is rotating, a connection between the sector 146 and the lever 121 is provided which consists of a link 150 pivotally connected at one of its ends to the sector 146 and having a sliding connection by means of a slot 151 and a pin 152 with the lever 121. As shown in Fig. 7, when the link 150 is in its lowermost position representing the brake operating lever 145 in released position, the pin 152 engages the upper end of the slot 151 in the link whereby counter-clockwise movement of the lever 121 to release the locking fingers 119 and the case door as hereinbefore described is prevented However, when the brake operating lever 145 is in a position representing the brake in operation, the link 150 will be raised to such an extent that the lever 121 may be rotated counter-clockwise to release the locking fingers and permit the outer case door to be opened.

A means has also been provided for locking the driving parts against operation when any one of the doors of the cylinder 3 are in open position. As hereinbefore described, when such open condition of the cylinder doors exists, the locking bar 35 engages a slot 38 in the arcuate angle iron 39. The slot 38 is longer than the width of the bar 35 and normally extends forwardly of the bar when such bar is in locking position, the slot also containing a lug 153 which is connected by means of a link 154 and lever 155 to a short shaft 156. The shaft 156 extends outwardly and has another lever 157 pinned thereon and connected by a link 158 to the brake operating link 147. Thus, when the bar 35 is disposed in the slot 38 indicating that one or more of the cylinder doors are in open position, movement of the operating lever 145 to release the brake hereinbefore described is prevented because movement of the lever 145 to effect this will be blocked by the lug 153 engaging the bar 35.

As shown, the starting and stopping of the motor 134 is preferably controlled by a push button locked on a control box 159 as is the starting and stopping of the motor 143 for operating the fans 4. Starting and stopping of the motor 134 is further controlled through a circuit which is made and broken by operation of the brake operating lever 145 by means of a cam extension 160 which operates a switch for opening the circuit to the motor or power unit 134 when the brake is set and closes the circuit when the brake is released. By this arrangement the cylinder may be inched as is usual in the art, to align its doors with those of the casing, simply by manipulation of the lever 145. Operation of the motor 134 is further controlled by an elevator switch 161 as shown in Fig. 1, the connecting arm 162 of which is moved by opening of the case door to break the motor circuit and by closing of the case door to complete the motor circuit.

A thermostatic temperature indicator that may, in some instances, be used as a thermostatic temperature control means is provided, this thermostatic means having the same principle as disclosed in the patent to E. J. Carroll, No. 1,786,191, of Dec. 23, 1930.

Referring to the drawings and the preceding description, it will be seen that I have provided a drying tumbler embodying numerous novel and advantageous features. For instance, I have provided a tumbler so constructed that the goods within the apparatus will be subjected to the greatest amount of drying action with a minimum of heat energy expended and have provided a drying apparatus in which all known laws

governing the evaporation of moisture from an object are followed to the greatest possible extent.

Another advantageous feature of my invention resides in the fact that I have provided numerous safety arrangements to prevent injury to the apparatus or to the operator thereof. For instance, means have been provided whereby it is necessary to stop the operation of the apparatus and particularly the rotation of the cylinder before the outer case door may be opened and to prevent operation of the apparatus when any one of the cylinder doors is in open position. This has been accomplished by interconnecting brake operating apparatus with the outer case door and providing a bar lock on the cylinder which will engage the outer casing when any one of the cylinder doors is in open position.

A still further advantageous feature of the invention resides in the provision of a lighting means at the top of the casing as clearly shown in Fig. 4 which, under certain conditions, is adapted to illuminate the interior of the casing whereby an operator may readily discern when all of the fabric or goods have been removed from the cylinder or the conditions within the cylinder.

What I claim is:

1. Apparatus of the class described, comprising a casing having a door opening therein, a rotatable goods containing cylinder in said casing, a plurality of aligned doors in said cylinder, and a common locking member carried by said cylinder and movable into locked position by opening of any one of said cylinder doors, whereby to prevent rotation of said cylinder when any one of the doors thereof is in open position.

2. Apparatus of the class described, comprising a casing having a door opening therein, a rotatable goods containing cylinder in said casing, a plurality of aligned doors in said cylinder, a locking member carried by said cylinder, and a locking member receiving means in said casing, said locking member being movable into locked position by opening of any one of said cylinder doors, whereby to prevent rotation of said cylinder when any one of said doors is in open position.

3. Apparatus of the class described, comprising a casing having a door opening therein, a rotatable goods containing cylinder in said casing, a plurality of aligned doors in said cylinder, a locking member carried by said cylinder, and a locking member receiving means in said casing adjacent the door opening therein, said locking member being movable into locked position by opening of any one of said cylinder doors, whereby to prevent rotation of said cylinder when the said cylinder doors are aligned with the casing door opening and any one of said cylinder doors is in open position.

4. In a machine of the class described and having a rotatable cylinder and a casing therefor, with registrable sliding doors in said parts, driving means and brake means for said cylinder, control means for said cylinder arranged for selective alternate energization of said driving means and application of said brake means, and means associating said cylinder door with said control means and arranged to prevent opening of said door unless said brake be applied, and to prevent release of said brake unless said door be closed.

5. In a machine of the class described and having a rotatable cylinder and a casing therefor, with registrable sliding doors in said parts, driving means and brake means for said cylinder, control means for said cylinder arranged for selective alternate energization of said driving means and application of said brake means, and means associating said doors with said control means and arranged to prevent opening of either door unless said brake be applied, and to prevent release of said brake unless both doors be closed.

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