

Nov. 22, 1960

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2,960,778

DOOR MECHANISM FOR ROTATING DRUM

Filed June 17, 1958

6 Sheets-Sheet 1

FIG. 1.

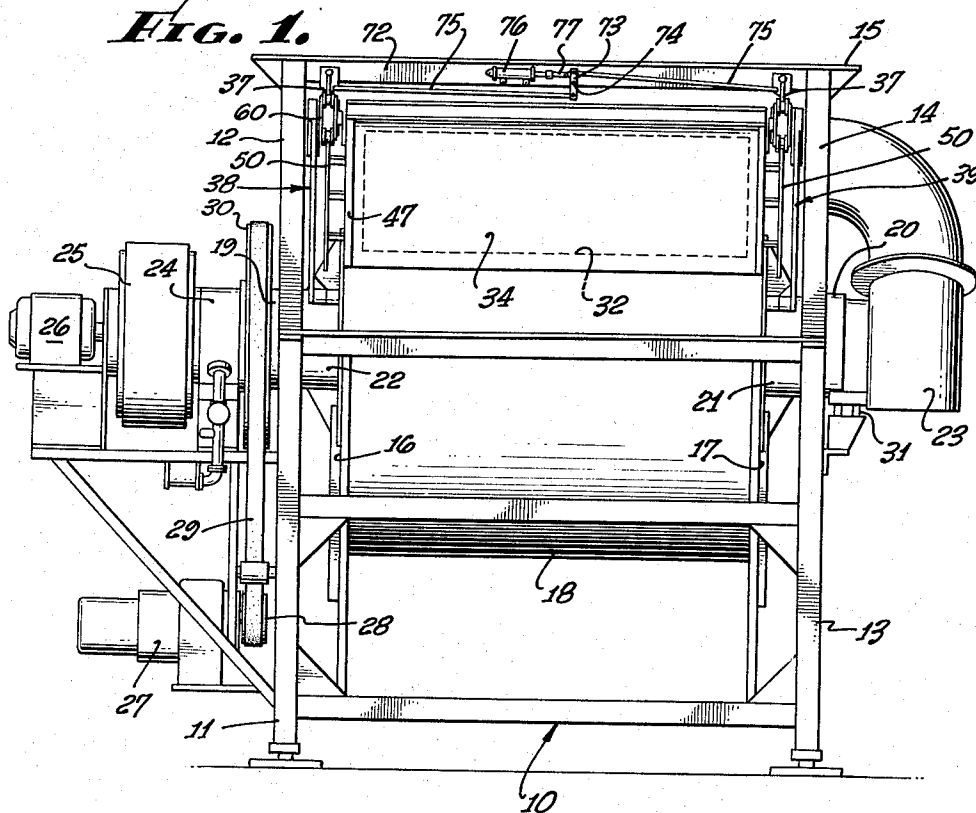
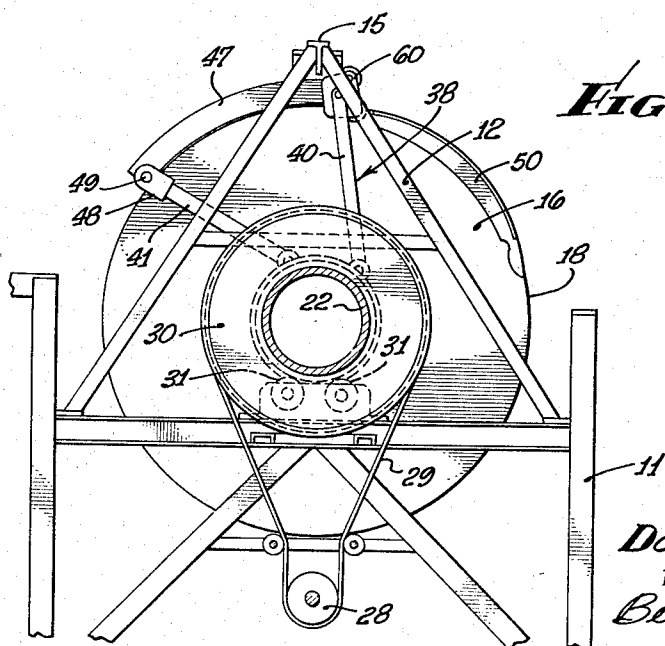


FIG. 2.



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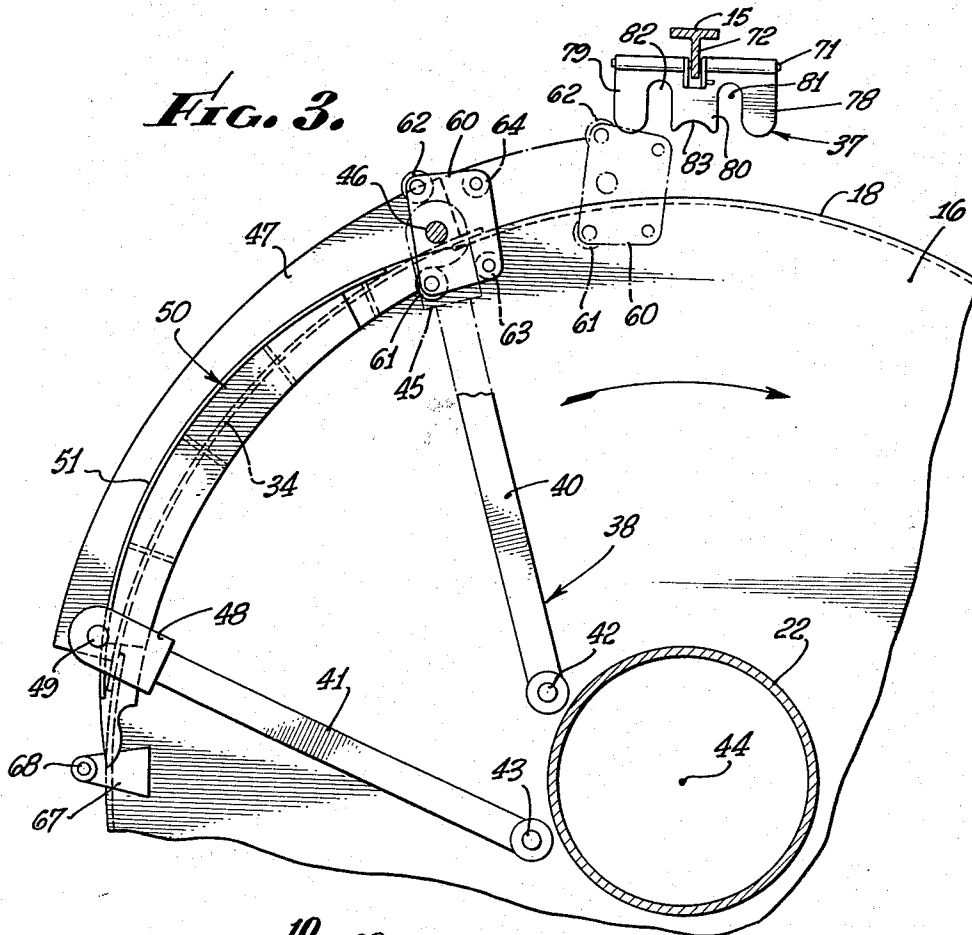
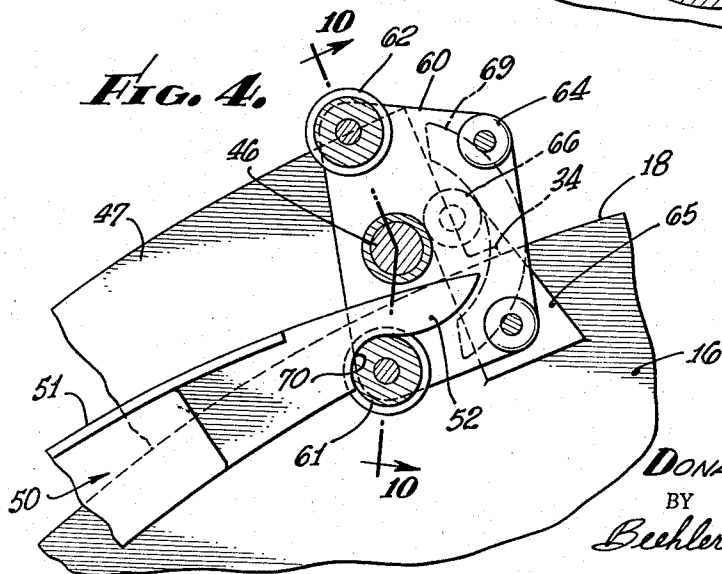
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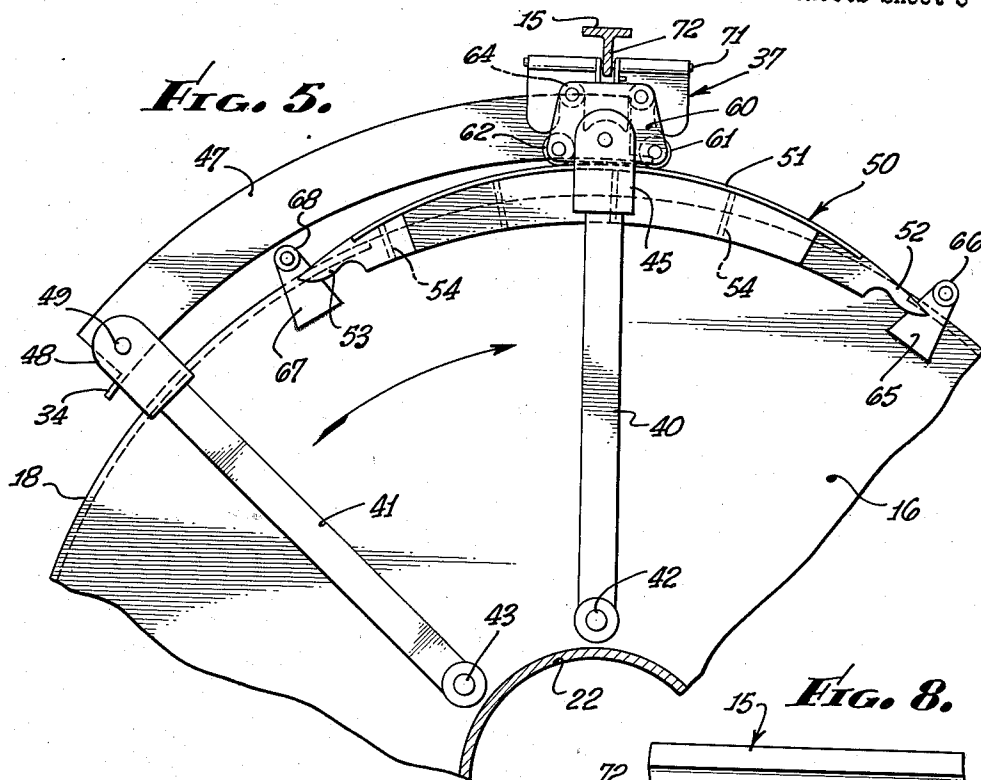


FIG. 7

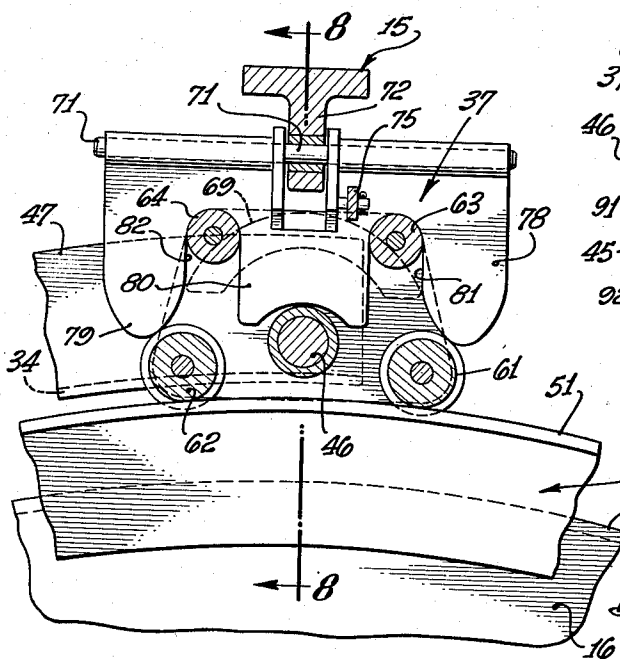
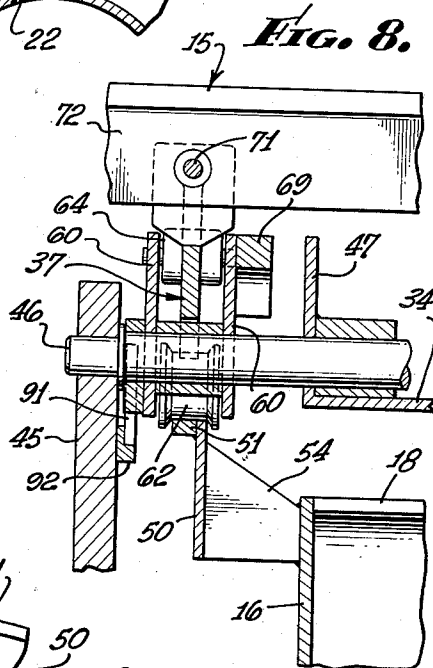


FIG. 8.



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FIG. 11.

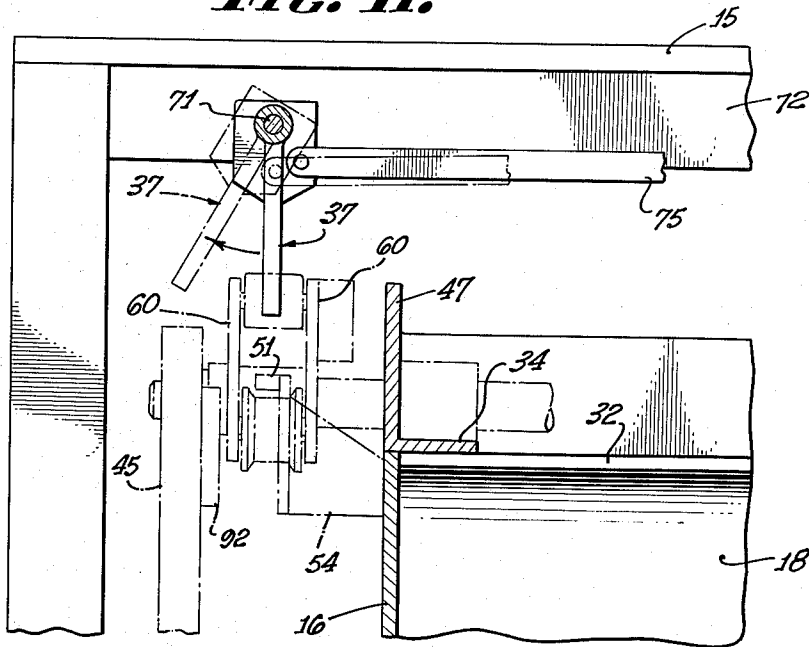


FIG. 12.

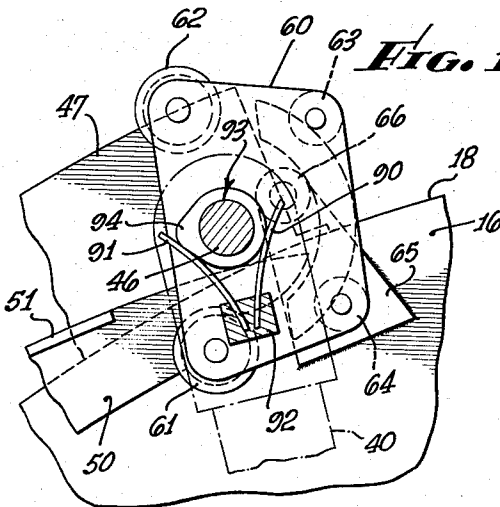
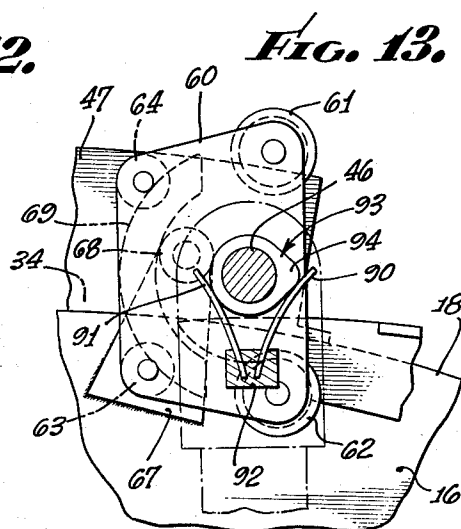


FIG. 13.



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DOOR MECHANISM FOR ROTATING DRUM

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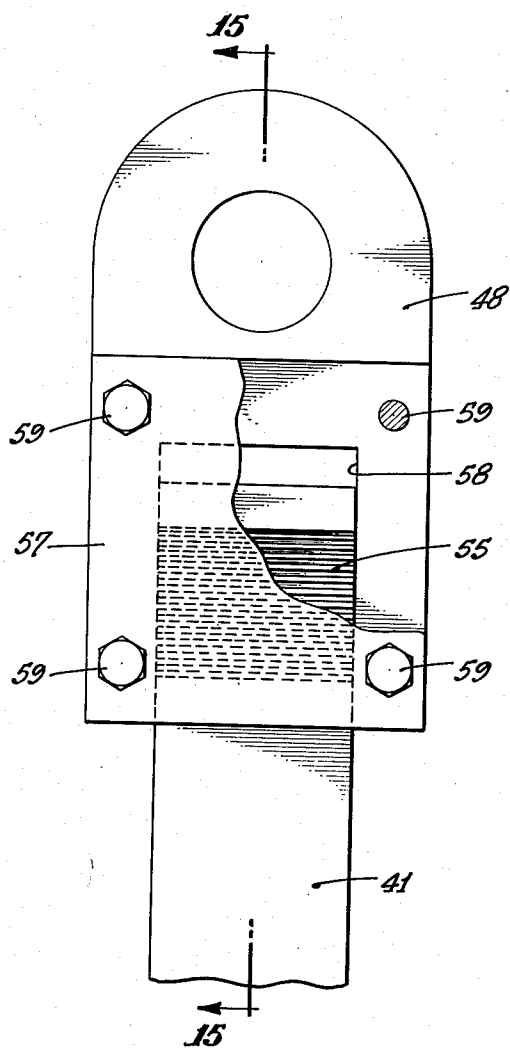


FIG. 14.

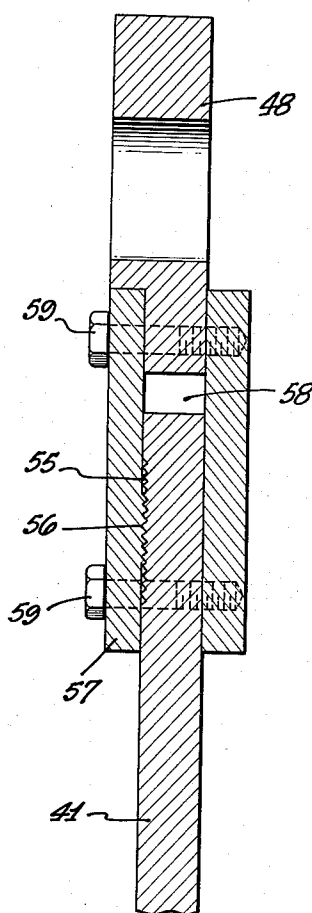


FIG. 15.

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DOOR MECHANISM FOR ROTATING DRUM

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Filed June 17, 1958, Ser. No. 747,101

13 Claims. (Cl. 34—130)

The invention relates to rotating drums and has particular reference to a door mechanism by means of which a door at the side of the drum can be opened and closed by virtue of a special latching arrangement. Rotation of the drum upon its normal axis of rotation is made use of in opening and closing the door.

The invention here involved is of importance in the operation of machinery typified by laundry tumblers, driers, washers, and the like, of exceptionally large capacity where the door must rotate with a rotating drum during operation and be capable of opening wide at frequent intervals for loading and unloading operations.

Typical of machines in which the mechanism is useful are tumbler driers of sundry kinds which have been in use in large laundry and cleaning establishments where they are called upon to quickly and effectively dry damp materials by use of steam or hot gases so as to maintain a relatively high production rate of drying. The machines are of such large capacity in some instances that special door mechanisms have become necessary. Among special doors heretofore in vogue have been those whereby the door is attached by some conventional hinge pin to the structure of the drum in a position such that it can be opened and closed, the door being accompanied by an attendant latching mechanism requisite for holding the door securely in a closed position while the tumbler is rotating. Because of the heaviness of the machinery and the peril which would attend inadvertent opening of the door during operation, latching devices heretofore used have been massive, heavy and consequently hard to manipulate. Furthermore, on those occasions where hinged doors have been resorted to, there has been ever present the problem of so locating the door that when in open position, the door itself will not stand in the way of effective loading and unloading operations.

Further still, when hinged doors have been used, some special safety measures have to be employed to make certain that, through some inadvertent rotation of the drum while the door is open, the door itself will not become dangerously shifted or slammed while operators are working in and around the machine.

More frequently where doors of sliding types have been resorted to, because of the heaviness of the structures involved, the slide ways have been such as to become badly worn due to the many openings and closings over relatively short periods of time. Frequent overhauling and servicing caused by wear often renders the machinery subject to long periods of unproductive idleness. Also wear on sliding doors and latches causes the latches to work loose and on occasions causes jamming of the door in closed position.

It is therefore among the objects of the invention to provide a new and improved door mechanism for a rotating drum which is so mounted that it is actually lifted from its closed position to a location entirely removed from the door opening and thereafter reset in a closed position without employment of sliding parts or the commonly used expedient of a hinged connection.

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Another object of the invention is to provide a new and improved door mechanism for a rotating drum which embodies parts in such a relationship that a slow rotation of the drum in one direction or another assisted by a suitable trip device can be relied upon for both opening and closing the door.

Another object of the invention is to provide a new and improved door mechanism for a rotating drum which is possessed of an effective latching and unlatching device such that the door can be opened and closed in virtually a minimum length of time, thereby greatly improving the speed of handling of materials into and out of the drum.

Still another object of the invention is to provide a new and improved rotary tumbler drier machine which makes use of the passage of hot gases through the center of rotation of a drum, the drum being equipped with a special door mechanism such that the door can be lifted and entirely removed from the door opening by a quick and effective operation, thereby providing a minimum amount of obstruction to use of the doorway for loading and unloading the drum.

Still another object of the invention is to provide a new and improved door mechanism for a rotating tumbler drier by virtue of which an arcuate substantially rectangular door can be set upon the perimeter of the door opening without the employment of any sliding part and which mechanism is readily operated by rotation of the drum itself in company with an attendant trip to lift the door from its closed position and to reset it against the exterior surface of the drum in an entirely open and removed position to give access to the interior of the drum, the mechanism being such that by a simple, reverse rotation of the drum, the door can be reset in closed position and the mechanism be made immediately available for its normal drying operation.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a side elevational view of a centrally heated rotary tumbler drier in which the door mechanism is installed.

Figure 2 is an end elevational view of the drum portion of the tumbler drier of Figure 1.

Figure 3 is a fragmentary end elevational view showing the door in closed position.

Figure 4 is a fragmentary cross-sectional view of a portion of the latching mechanism drawn to a larger scale and with certain portions removed to show details of the operating parts.

Figure 5 is a fragmentary end elevational view similar to Figure 3 but showing the door mechanism in a partially open position.

Figure 6 is a fragmentary end elevational view similar to Figures 3 and 5 but showing the door in full open position.

Figure 7 is a fragmentary cross-sectional view through the latch and trip mechanism as shown in the upper portion of Figure 5 with parts removed to improve the view of the interior.

Figure 8 is a fragmentary longitudinal sectional view taken on the line 8—8 of Figure 7.

Figure 9 is a plan view of the mechanism shown in Figure 7 but with the trip removed for clarity in showing the latch mechanism.

Figure 10 is a longitudinal sectional view taken on the line 10—10 of Figure 4.

Figure 11 is a fragmentary longitudinal sectional view taken on the line 11—11 of Figure 6.

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Figure 12 is a fragmentary cross-sectional view showing a temporary detent mechanism associated with the latch in door closed position.

Figure 13 is a fragmentary cross-sectional view similar to Figure 12 showing the latch in door open position, and with the latch adjusted to a latching position.

Figure 14 is a fragmentary elevational view partly broken away showing the adjusting structure of one of the arms.

Figure 15 is a longitudinal sectional view taken on the line 15—15 of Figure 14.

In an embodiment of the invention chosen for the purpose of illustration and shown particularly in Figure 1 is a frame 10 comprising an end structure 11 surmounted by an A frame 12 and an opposite end structure 13 surmounted by an A frame 14. A superstructure 15 joins the apexes of the A frames. A tumbler drier comprising end walls 16 and 17 and a cylindrical wall 18 is rotatably mounted upon the end structures 11 and 12 by means of bearings 19 and 20. Central stub shafts 21 and 22 provide passageways into and out of the drum for the passage of heated gases which travel from an inflow pipe 23 into the drum and thereafter through an outflow pipe 24 and suction fan 25 of conventional construction to a point of exit (not shown).

A motor 26 drives the suction fan and a motor 27 operating through a pulley 28 and belt 29 serves to rotate the drum by contact of the belt 29 with a large pulley 30 which is fastened to the central stub shaft 22. Rollers 31 appropriately mounted on the end structures cradle and support the drum in rotating relationship. In the chosen embodiment normal rotation of the drum during a drying operation is counter-clockwise, as viewed in Figure 2.

In the side of the cylindrical wall 18 is an opening 32 shown by the broken lines in Figure 1 to comprise a substantially elongated rectangular opening approximately as long as the entire breadth of the cylindrical wall and having a substantial width. A substantially rectangular arcuate door 34 overlies the opening 32 in such fashion that edges of the door 34 overlie edges of the opening 32. The location of the opening 32 in Figure 1 may be construed as a station for loading and unloading.

Attention is called to the door shown in closed position in Figure 3. This is the position of the door when the drum 18 is ready for rotation and before trip brackets 27 have been pivoted out of the way. When the drum is rotating free, the trip brackets are removed from the position of Figure 3 by appropriate mechanism.

To support the door there is provided a set of arms comprising pairs 38 and 39 of arms at opposite ends of the rotating portion of the device or drum which is formed of the end walls 16 and 17 and the cylindrical wall 18. The pairs 38 and 39 of arms are identical except for being arranged as rights and lefts and hence details only of the pair 38 are herein described in detail. When considering the direction of rotation of the arms during a door opening operation, the pair 38 of arms comprises a leading arm 40 and a trailing arm 41. The arms are equal in length and attached at inner ends by pivot pins 42 and 43, respectively, to the end wall 16 of the drum at a location removed from the center of rotation 44. An enlargement 45 at the outer end of the leading arm 40 is attached by means of a pin 46 to an arcuate beam 47. At the outer end of the trailing arm 41 is a similar enlargement 48 which is attached by means of a pin 49 to the beam 47 at its opposite or trailing end. The beam 47 forms part of the end structure of the door 34.

It should be noted at this point that, inasmuch as the length of the arms 40 and 41 between the inner pivot pins and the outer pins is greater than the radial distance from the inner pivot pins and the circumference of the end wall 16, when the arms shift in position from the position shown in Figure 3 to the position shown in Figure 5, the beam 47 and hence the door 34 is elevated a

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substantial distance outwardly from the circumference of the cylindrical wall 18.

Figures 14 and 15 show one of the arms 41 provided near the outer end with a series of teeth 55. These mesh with teeth 56 on a block 57. The arm is received in a recess 58 in the enlargement and the block held in place by suitable screws 59. By use of the adjustment the effective length of the legs can be varied and the door can be made to rest firmly in place in both closed and open positions.

When in the closed position illustrated in Figure 3, the door is latched shut. Latching is accomplished by an appropriate mechanism which performs a double function, namely, that of latching the door when it is either in closed position or opened position and also that of lifting the door outwardly from engagement with the cylindrical wall 18 without any sliding motion taking place.

A part of the mechanism herein made reference to consists of a cam 50 at each end which consists of a camway or cam track 51 having a free leading end 52 and a free trailing end 53, again considering the direction of movement of the drum for opening the door. The cam is secured by suitable ribs 54 to the end walls 16, 17 in each case.

A plate assembly at each end of the door structure comprising a pair of parallel individual plates 60 is pivotally secured to the enlargement 45 of the leading arm 40 for rotation about the pin 46. On the plate in each instance is a pair of traction rollers consisting of a leading traction roller 61 and a trailing traction roller 62, assuming motion in a counterclockwise or door opening direction. Also on each plate is a pair of secondary rollers comprising a leading secondary roller 63 and a trailing secondary roller 64. These rollers are clearly identified in Figures 3 and 4.

Associated with the bracket in its operation is a forward stop consisting of a lug 65 having a locking roller 66 thereon shown in Figure 4. There is also provided a rearward stop comprising a lug 67 and locking roller 68 thereon clearly shown in Figure 3. On the inside face of the plate 60 in each instance is an arcuate segment or retainer 69 which is adapted to engage around the respective locking roller when the door is in closed position, as shown in Figures 3 and 4, and also when it is in open position, as shown in Figure 6. The relative position of the door can be readily identified by reason of the fact that the cam 50 is positioned at the end of the door opening; hence, when the door lies adjacent the cam, it is in closed position, as shown in Figure 3, and when it is removed from the cam, it is in open position, as shown in Figure 6.

As shown in Figure 4, the plate or latch is shown in latched position. This position can be identified by engagement of the traction lead roller 61 with the underside of the free leading end 52 of the cam where the roller is received in an appropriate recess 70. In that position the pin 46 abuts the roller 66 and by reason of the engagement shown the door 34 is held in seated position by tension in the arms 40 and 41. Centrifugal force created by rotation of the drum and the door tends to force the roller against the inside arcuate portion of the retainer 66 and thereby further tighten the locking relationship.

Let it be assumed that the drying operation is complete and that the door is to be opened. To accomplish the opening of the door, the trip brackets 37 previously made reference to must be in the downward positions illustrated in Figures 1, 3, 5, 6 and also particularly in the solid line position of Figure 11. The trip bracket 37 in each instance is pivotally secured by means of a pin 71 to a web 72 of the superstructure 15. A lever 73 pivoted at point 74 to the web 72 is connected at its opposite ends by means of rods 75 to the trip brackets 37. A hydraulic cylinder 76 mounted upon the superstructure acting through its piston rod 77 attached to the lever 73 serves

to lower the tilt brackets 37 to the solid line position of Figure 11 and to elevate them to the broken line positions shown in the same Figure 11.

In order to unlatch the plates 60, the tilt brackets are lowered. Each tilt bracket is provided with outer legs 78 and 79 separated by an inner leg 80 providing a space 81 between the inner leg and the outer leg 78 and a space 82 between the inner leg and the outer leg 79. A recess 83 forms the lower end of the inner leg 80.

To understand the unlatching operation, attention is invited to Figure 3 wherein the plate 60 which is in fact a pair of plates forming a plate assembly is shown in a different position by broken lines. This is the position which the plate or plate assembly will occupy as the drum is slowly advanced by a familiar jogging operation, in a clockwise direction as there shown and indicated by the direction of the arrow. When the plate 60 encounters the trip bracket 37, the trailing traction roller 62 will strike the leg 79. As the drum continues to rotate, this last mentioned engagement will cause the plate 60 to rotate in a counter-clockwise direction about the pin 46. Rotation as described causes the leading traction roller 61 to be rotated out of engagement with the recess 70 and the free end 52 of the cam 50. During this portion of movement, the retainer 69 will rotate about the roller 66 until it clears the roller.

As the advance continues, the roller 64 will fall into the recess 82 and ultimately the roller 63 will fall into the recess 81. This relationship is clearly shown in Figure 5. The relationship however will be assumed before the traction rollers 61 and 62 start to climb the cam way 51. As the drum continues to advance in a clockwise direction, as shown in Figures 3 and 5, the cam way will advance with the drum and slide under the traction rollers 61 and 62. These rollers will consequently climb the arcuate cam way and immediately begin lifting the door 34 radially outwardly without any sliding motion of the edges thereof with the edges of the opening 32. The door is lifted outwardly by an amount illustrated in Figure 5 which depends upon the rise of the center of the cam way 51.

As the drum continues to advance, the traction rollers will ride down the trailing portion of the cam way until the plate approaches the position illustrated in Figure 6. As the plate rides down the trailing portion of the cam way, the arms 40 and 41 also act to draw the beam 47 and attached door 34 against the outer surface of the cylindrical wall 18 of the drum.

As the plate 60 reaches the trailing end of the cam way 51, the arms 40 and 41 will draw the door downwardly upon the cylindrical wall 18 and the plate 60 will be unable to travel further. At about this time the trailing traction roller 62 will roll over the free trailing end 53 of the cam 50. As the drum continues to advance clockwise and the trip bracket 37 remains stationary, the rollers 63 and 64 will be drawn out of their respective recesses to the positions illustrated in Figure 6. At the same time the retainer 69 will rotate around the roller 68 of the lug 67 which forms the stop at that end of the operation.

From the foregoing description it will become clear that the door is now in full open position and entirely removed from any close association with the opening 32. The door, moreover, will be pressed snugly against the drum and with the trip bracket 37 removed, the drum can be further rotated so as to present the opening 32 at a most desirable location for unloading the contents of the drum and for reloading the drum with a new charge of materials to be processed.

Resumption of the drying operation first necessitates closing of the door 34. To perform the door closing operation the trip brackets 37 are placed in the downward position as clearly shown in the sundry figures and especially as viewed in Figure 6. The drum is then rotated by jogging in a reverse or counter-clockwise direction, as viewed in Figure 6. As this occurs, the plate 60 and

the cam 50 are moved toward the bracket and the traction lead roller 61 will strike against the leg 78. This will tilt the plate 60 in a clockwise direction about the pin 46, as viewed in Figure 6. Tilting continues until the traction trailing roller 62 is drawn outwardly from under the free trailing end 53 and clears that end of the cam 50. At the same time the retainer 69 will be rotated out of a position of engagement with the roller 68. Consequently, as the drum continues to be jogged in a counter-clockwise direction, the traction rollers 61 and 62 will again climb the cam way 51 in a reverse direction causing the beams 47 and door 34 to be lifted from contact with the cylindrical outer wall 18. The door is thereafter passed over the drum until the door finally reaches the initially described position over the opening 32, as shown and made reference to in connection with Figure 3. After this has been accomplished the trip brackets 37 are elevated to the broken line position illustration in Figure 11 and the drum can thereafter be rotated repeatedly through the time required for a drying cycle.

To further facilitate and accentuate the selected positions of the latching mechanism exemplified by the plate 60 and its appurtenances, a temporary detent mechanism shown in Figures 12 and 13 is provided.

The detent mechanism comprises a pair of leaf springs 90 and 91 retained in a block 92 which is fastened to the leading arm 40, as shown in Figures 8 and 10 in addition to Figures 12 and 13. A cam 93 has a knob 94 located thereon in a position such that when the plate 60 is latched to hold the door in closed position, as shown in Figure 12, the knob will press against the leaf spring 91 and be held by the leaf spring releasably in that position. After the plate 60 has been rotated counter-clockwise, as viewed in Figures 4 and 12, for example, to the intermediate position illustrated in Figures 5 and 7, the knob 94 of the cam will lie within the V-shaped opening formed between the leaf springs 90 and 91. Thereafter as the plate 60 continues to be rotated in a counter-clockwise direction, as viewed in Figures 6 and 13, the knob 94 of the cam will turn to engagement with the leaf spring 90 where action of the leaf spring will tend to hold the latching mechanism exemplified by the plate 60 and its attendant mechanism in a position latching the door in open position against the wall of the drum. By reason of the employment of a temporary detent like that described in connection with Figures 12 and 13 at each end of the door, associated as described with the latching mechanism, it will be appreciated that whatever position of the three alternative positions the latching mechanism temporarily occupies, it will be suitably maintained in that position without prospect of being disturbed inadvertently. Where the springs 90 and 91 are light in character, they serve chiefly to prevent the plate or plate assembly 60 from tilting out of position until other portions of the apparatus fix the position of the plate assembly.

From the foregoing description of the structure and operation of the door operating mechanism, it will be appreciated that a door has been provided which can be lifted out of contact with the door opening and entirely removed from the opening to an effectively removed position entirely out of the way of loading and unloading operations. The lifting of the door and the setting of the door in position entirely eliminates any frictional movement of one part upon another such as would present an unavoidable wearing problem. By making use of a jogging rotation of the drum for both opening the door, removing the door from an open position, and for subsequently closing the door, operating mechanisms have been maintained at an effective minimum and the operating of the device has been materially simplified. The simplification is also reflected in the reduction of necessary parts to a very substantial degree while at the same time providing a positive acting latch opening and closing mechanism.

While I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A rotary drum type machine comprising a frame, a drum member rotatably mounted on the frame for rotation about a horizontal axis to a loading and delivery station on one horizontal side of the drum, said drum having end walls and a cylindrical wall secured between said end walls, said cylindrical wall having an opening therein extending throughout a portion of the length and breadth of the cylindrical wall, a door member having a closed position overlying the opening and an open position entirely removed from said opening and overlying an adjacent portion of said cylindrical wall, door member actuating means comprising a set of arms attached respectively to the door member and to the end walls, latch means having cooperating elements respectively on the door member and on the drum member whereby to releasably hold the door in closed position, latch tripping means on the frame engageable with said latch means and adapted to shift said latch means alternatively to holding and releasing adjustments, and means enabling lifting said door member from the drum member comprising an element on one of said members having points thereon progressively variable with respect to the distance from said horizontal axis and a fixed element on the other of said members cooperable with the element on said one of said members whereby the door member is lifted from the drum member during movement away from and toward a position overlying said opening.

2. A rotary tumbler drum comprising a frame, a drum member rotatably mounted on the frame for rotation about a horizontal axis to a loading and delivery station on one horizontal side of the drum, said drum having end walls and a cylindrical wall secured between said end walls, said cylindrical wall having an opening therein extending throughout a portion of the length and breadth of the cylindrical wall and a door member having a closed position with overlying edges of the opening and an open position entirely removed from said opening and overlying an adjacent portion of said cylindrical wall, door member actuating means comprising a set of arms attached respectively to the door member adjacent the ends thereof and to the end walls, latch means having cooperating elements respectively on the door member and on the drum member whereby to releasably hold the door in closed position, latch tripping means on the frame engageable with the latch means and adapted to shift said latch means alternatively to holding and releasing adjustment upon partial rotation of the drum, and means enabling lifting said door member from the drum member comprising a camway on one of said members, successive points on said camway being at progressively varying distances from the horizontal axis, and a cam on the other of said members cooperable with said camway whereby the door member is lifted from the drum member during movement away from and toward a position overlying said opening.

3. A rotary tumbler drier comprising a frame, a drum member rotatably mounted on the frame for rotation about a horizontal axis to a loading and delivery station on one horizontal side of the drum, a superstructure on the frame above said drum, said drum having end walls and a cylindrical wall secured between said end walls forming a tumbler chamber, said cylindrical wall having a substantially rectangular opening therein extending throughout the horizontal length of the wall and a door member slightly longer and wider than the opening having a closed position with edges of the door mem-

ber overlying edges of the opening and an open position entirely removed from said opening and overlying an adjacent portion of said cylindrical wall, door member actuating means comprising a set of arms attached respectively to the door member at the ends thereof and to the end walls, latch means having cooperating elements respectively on the door member and on the drum member whereby to releasably hold the door in closed position, latch tripping means on the superstructure engageable with said latch means and adapted to shift said latch means alternatively to holding and releasing adjustments, and means enabling lifting said door member from the drum member comprising a camway on the drum member, successive points on the camway being at progressively variable distances from the horizontal axis, and a cam on the door member cooperable with said camway whereby the door member is lifted from the drum member during movement away from and toward a position overlying said opening.

4. A rotating drum device comprising end walls, a cylindrical side wall between said end walls forming a chamber, a frame rotatably mounting the drum device on a horizontal axis, means forming an opening in said side wall extending to a location adjacent said end walls, an arcuate door member having a closed position over said opening, and a door control for lifting said door from the drum and moving said door to and from a location adjacent and entirely aside from said opening by rotating action of said drum member, said control comprising a set of camming elements at each end of the opening, each set having one element on the door member and one element on the drum member, one of said camming elements having a portion at a different distance from the center of rotation of the drum than remaining portions, means for holding the ends of the door member respectively in closed position and open position, said means comprising a pair of arms at each end of the door member pivotally secured respectively to opposite sides of the door member and pivotally secured to the respective end walls at locations removed from the axis of rotation, said arms having lengths greater than the radial distance from said locations to the edges of the end walls, traverse means including one of said camming elements cooperable with the other camming element for carrying said door member between closed and open positions, latch means on the door member engageable with the drum member for holding the door member respectively in closed and open positions, latch tripping means adjustably mounted on the frame for alternatively releasing and securing said latch means to the drum member, said tripping means being positionable in operable position in alignment with the respective latch means whereby as the drum member is rotated in forward and reverse directions engagement of the latch means with the tripping means rotates the latch means out of latching adjustment respectively at open and closed position of the door member, said tripping means being adjustable to clear position whereby to permit unrestrained rotation of the drum member with the door member in closed position.

5. A rotating drum device comprising end walls, a cylindrical side wall between said end walls forming a chamber, a frame rotatably mounting the drum member on a horizontal axis, means forming an opening in said side wall extending to a location adjacent said end walls, an arcuate door member having a closed position over said opening, and a door control for lifting said door from the drum and moving said door to and from a location adjacent and entirely aside from said opening by rotating action of said drum member, said control comprising a set of camming elements at each end of the opening, each set having one element on the door member and one element on the drum member, one of said camming elements having a portion at a different distance from the center of rotation than remaining portions, means for holding the ends of the door member

respectively in closed position and open position, one of said camming elements comprising plate assemblies having rollers thereon, said plate assemblies being respectively at opposite ends of the door member in positions adapted to roll on the other camming element, said plate assemblies being pivotally mounted on the respective member whereby to provide latch means on the said respective member engageable with the other member for holding the door respectively in closed and open positions, latch tripping means adjustably mounted on the frame for alternatively releasing and securing said latch means to the drum member, said tripping means being positionable in operable position in alignment with the respective latch means whereby as the drum member is rotated in forward and reverse directions engagement of the plate assembly with the bracket rotates the plate assembly out of latching adjustment respectively at open and closed positions of the door member, said tripping means being adjustable to clear position whereby to permit unrestrained rotation of the drum member with the door member in closed position, and temporary detent means for holding the latch means in both latching and unlatched positions, said detent means comprising a spring detent connected to one of said members adjacent the plates and a detent element on the plate engageable with the spring detent in different attitudes in said latched and unlatched positions.

6. A rotating drum device comprising end walls, a cylindrical side wall between said end walls forming a chamber, a frame rotatably mounting the drum member on a horizontal axis, means forming an opening in said side wall extending to a location adjacent said end walls, an arcuate door member having a closed position over said opening, and a door control for lifting said door from the drum and moving said door to and from a location adjacent and entirely aside from said opening by rotating action of said drum, said control comprising a set of camming elements at each end of the opening, each set having one element on the door member and one element on the drum member, one of said camming elements having a portion at a different distance from the center of rotation of the drum member than remaining portions thereof, adjustable means connected between the door member and drum member for holding the ends of the door member respectively in closed position and open position, one of said camming elements comprising traverse means for carrying said door member between closed and open positions, said traverse means comprising rollers respectively on opposite ends of the door in positions adapted to roll on the other camming element, oppositely projecting devices on one of said members, latch means on the door engageable with said projecting devices for holding the door member respectively in closed and open positions, said latch means comprising a plate pivotally mounted on the other of said members at each end of the door member and adjacent one side thereof, said rollers being mounted in pairs and each pair comprising advance and trailing rollers on said plates, latch tripping means adjustably mounted on the frame for alternatively releasing and securing said latch means to said projecting devices, said tripping means being positionable in operable position in alignment with the respective plate whereby as the drum member is rotated in forward and reverse direction engagement of the plate with the bracket rotates the plate out of latching adjustment respectively at open and closed position of the door, said bracket being adjustable to clear position whereby to permit unrestrained rotation of the drum with the door in closed position.

7. A rotating drum device comprising end walls, a cylindrical side wall between said end walls forming a chamber, a frame rotatably mounting the drum device on a horizontal axis, means forming an opening in said side wall extending to a location adjacent said end walls,

an arcuate door member having a closed position over said opening, and a door control for lifting said door from the drum member and moving said door member to and from a location adjacent and entirely aside from said opening by rotating action of said drum member, said control comprising a set of camming elements at each end of the opening, each set having one element on the door member and one element on the drum member, one of said camming elements having a portion at a different distance from the center of rotation than remaining portions, adjustable means connected between the door member and the drum member for holding the ends of the door respectively in closed position and open position, said means comprising a pair of arms at each end of the door pivotally secured respectively to opposite sides of the door and pivotally secured to the respective end walls at locations removed from the axis of rotation, said arms having lengths greater than the radial distance from said locations to the edges of the end walls, one of said camming elements comprising traverse means for carrying said door member between closed and open positions, said traverse means comprising rollers respectively on opposite ends of the door in positions adapted to roll on the respective other camming element, oppositely projecting devices on one of said members, latch means on the door member engageable with said projecting devices for holding the door respectively in closed and open position, said latch means comprising a plate pivotally mounted on the other of said members at each end of the door member and adjacent one side thereof, said rollers being mounted in pairs of advance and trailing rollers on said plates, latch tripping means adjustably mounted on the frame for alternatively releasing and securing said latch means to said projecting devices, said tripping means comprising a bracket pivotally secured at each end of the frame and positionable in operable position in alignment with the respective plate whereby as the drum member is rotated in forward and reverse direction engagement of the plate with the bracket rotates the plate out of latching adjustment respectively at open and closed position of the door member, said bracket being adjustable to clear position whereby to permit unrestrained rotation of the drum with the door member in closed position.

8. A rotating drum device comprising end walls, a cylindrical side wall between said end walls forming a drum, a frame rotatably mounting the drum on a horizontal axis, means forming a substantially rectangular opening in said side wall extending to a location adjacent said end walls, an arcuate substantially rectangular door having a closed position over said opening with edges of the door overlying edges of the opening, and a door control for lifting said door from the drum and moving said door to and from a location adjacent and entirely aside from said opening by rotating action of said drum, said control comprising a pair of arcuate camways on the drum located one at each end of the opening, said camways having free ends and having mid-portions extending to a distance from the center of rotation greater than said free ends, means for holding the ends of the door in respectively closed and open positions, said means comprising a pair of arms at each end of the door pivotally secured respectively to opposite sides of the door and pivotally secured to the respective end walls at locations removed from the axis of rotation, said arms having lengths greater than the radial distance from said locations to the surface of the cylindrical wall, traverse means for carrying said door between closed and open positions, said traverse means comprising rollers respectively on opposite ends of the door in positions adapted to roll on the respective camways, latch means on the door engageable with said free ends for holding the door respectively in closed and open positions, said latch means comprising a plate pivotally mounted on the door at each end and adjacent one side, adjustable latch tripping means

for shifting said latch means to alternatively releasing and holding relations with said free ends of the camway, said tripping means comprising a bracket pivotally secured at each end of the frame, said brackets being positionable in operable position in alignment with the respective plate whereby during rotation of the drum in forward and reverse direction engagement of the plate with the bracket rotates the plate into and out of latching adjustment respectively at open and closed positions of the door, said bracket being adjustable to clear position whereby to permit unrestrained rotation of the drum with the door when in closed position.

9. A rotating drum device comprising end walls, a cylindrical side wall between said end walls forming a chamber, a frame rotatably mounting the drum member on a horizontal axis, means forming an opening in said side wall extending to a location adjacent said end walls, an arcuate door member having a closed position over said opening, and a door control for lifting said door from the drum and moving said door to and from a location adjacent and entirely aside from said opening by rotating action of said drum, said control comprising a set of camming elements at each end of the opening, each set having one element on the door member and one element on the drum member, one of said camming elements having a portion at a different distance from the center of rotation than remaining portions, adjustable means connected between the door member and drum member for holding the ends of the door member respectively in closed position and open position, said means comprising a pair of arms at each end of the door pivotally secured respectively to opposite sides of the door and pivotally secured to the respective end walls at locations removed from the axis of rotation, said arms having lengths greater than the radial distance from said locations to the edges of the end walls, one of said camming elements comprising traverse means for carrying said door between closed and open positions, said traverse means comprising rollers respectively on opposite ends of the door in positions adapted to roll on the other camming means, opposite projecting devices on one of said members, latch means on the door member engageable with said projecting devices for holding the door member respectively in closed and open positions, said latch means comprising a plate pivotally mounted on the door member at each end and adjacent one side, said rollers being mounted in pairs and each pair comprising advance and trailing rollers on said plates, latch tripping means for alternatively releasing and securing said latch means to said projecting devices, said tripping means comprising a bracket pivotally secured at each end of the frame and positionable in operable position in alignment with the respective plate whereby as the drum is rotated in forward and reverse direction engagement of the plate with the bracket rotates the plate out of latching adjustment respectively at open and closed position of the door member, said bracket being adjustable to clear position whereby to permit unrestrained rotation of the drum member with the door member in closed position, and temporary detent means for holding the latch in both latching and unlatched positions, said detent means comprising a spring member on the end of the arms adjacent the plates and a detent element on the plate engageable with the spring member in different attitudes in said latched and unlatched positions.

10. A rotating drum device comprising end walls, a cylindrical side wall between said end walls forming a chamber, a frame rotatably mounting the drum on a horizontal axis, means forming a substantially rectangular opening in said side wall extending to a location adjacent said end walls, an arcuate substantially rectangular door having a closed position over said opening with edges of the door overlying edges of the opening, and a door control for lifting said door from the drum and moving said door to and from a location adjacent and entirely aside from said opening by rotating action of said drum, said

control comprising a pair of arcuate camways on the drum located one at each end of the opening, said camways having free ends, said camways having mid-portions elevated an amount greater than said free ends and extending above the side wall, means for holding the ends of the door in respective closed and open positions, said means comprising a pair of arms at each end of the door pivotally secured respectively to opposite sides of the door and pivotally secured to the respective end walls at locations removed from the axis of rotation, said arms having lengths greater than the radial distance from said locations to the surface of the cylindrical wall, traverse means for carrying said door between closed and open positions, said traverse means comprising traction rollers respectively on opposite ends of the door in positions adapted to roll on the respective camways, latch means on each end of the door engageable with said free ends of the camways for holding the door respectively in closed and open positions, said latch means comprising a plate member pivotally mounted on the door at each end and adjacent one side, said rollers being mounted in pairs on said plate members and comprising advance and trailing rollers, a pair of secondary rollers on each plate member located generally radially outwardly of said traction rollers, latch trip means in positions of potential engagement with the latch means and adapted to alternatively shift said latch means to releasing and holding relations with said free ends of the camway, said trip means comprising a bracket pivotally secured at each end of the frame, said brackets being positionable in operable position in alignment with the respective plate whereby during rotation of the drum in forward and reverse direction engagement of the plate with the bracket rotates the plate into and out of latching adjustment respectively at open and closed positions of the door, said bracket being adjustable to clear position whereby to permit unrestrained rotation of the drum with the door when in closed position, and temporary detent means for holding the latch in both latching and unlatched positions, said detent means comprising a spring member on the end of the arms adjacent the plates and a detent element on the plate engageable with the spring member in different attitudes in said latched and unlatched positions.

11. A rotary drum type machine comprising a frame, a drum member rotatably mounted on the frame for rotation about a horizontal axis, said drum having end walls and a cylindrical wall secured between said end walls, said cylindrical wall having an opening therein extending throughout a portion of the length and breadth of the cylindrical wall, a door member having a closed position overlying the opening and an open position removed from said opening, door member actuating means comprising a set of arms attached respectively to the door member and to the end walls, latch means having co-operating elements respectively on the door member and on the drum member whereby to releasably hold the door in closed position, latch tripping means on the frame engageable with said latch means and adapted to shift said latch means alternatively to holding and releasing adjustments, and means enabling lifting said door member from the drum member comprising an element on one of said members having successive locations thereof at variable distances from said horizontal axis and a fixed element on the other of said members cooperable with the element on said one of said members whereby the door member is lifted from the drum member during movement away from and toward a position overlying said opening.

12. A rotary drum type machine comprising a frame, a drum member rotatably mounted on the frame for rotation about a horizontal axis, said drum having end walls and a cylindrical wall secured between said end walls, said cylindrical wall having an opening therein extending throughout a portion of the length and breadth of the cylindrical wall, a door member having a closed position overlying the opening and an open position re-

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moved from said opening, door member actuating means comprising a set of arms attached respectively to the door member and to the end walls, latch means having cooperating elements respectively on the door member and on the drum member whereby to releasably hold the door in closed position, latch tripping means on the frame engageable with said latch means and adapted to shift said latch means alternatively to holding and releasing adjustments, and means enabling lifting said door member from the drum member comprising an element on one of said members having successive locations thereon at progressively variable distances from said horizontal axis and a fixed element on the other of said members cooperating with the element on said one of said members whereby the door member is lifted from the drum member during movement away from and toward a position overlying said opening, at least one arm in said set of arms having an endwise extendible adjustment whereby to vary the setting of the door with respect to the cylindrical wall.

13. A rotary drum type machine comprising a frame, a drum member rotatably mounted on the frame for rotation about a horizontal axis, said drum having end walls and a cylindrical wall secured between said end walls, said cylindrical wall having an opening therein extending throughout a portion of the length and breadth of the cylindrical wall, a door member having a closed position overlying the opening and an open position removed

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from said opening, door member actuating means comprising a set of arms attached respectively to the door member and to the end walls, latch means having cooperating elements respectively on the door member and on the drum member whereby to releasably hold the door in closed position, latch tripping means on the frame engageable with said latch means and adapted to shift said latch means alternatively to holding and releasing adjustments, and means enabling lifting said door member from the drum member comprising an element on one of said members having successive locations thereon at progressively variable distances from said horizontal axis and a fixed element on the other of said members cooperating with the element on said one of said members whereby the door member is lifted from the drum member during movement away from and toward a position overlying said opening, and an endwise adjustable connection between opposite ends of at least one arm at each end of the drum adapted to vary the length of said last identified arms whereby to vary the setting of the door with respect to the cylindrical wall.

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