

F. M. RAYMOND.  
SLIDING DOOR FOR OUTER CASES OF STERILIZING WASHING MACHINES.  
APPLICATION FILED MAY 22, 1908.

947,701.

Patented Jan. 25, 1910.

2 SHEETS—SHEET 1.

Fig. 1

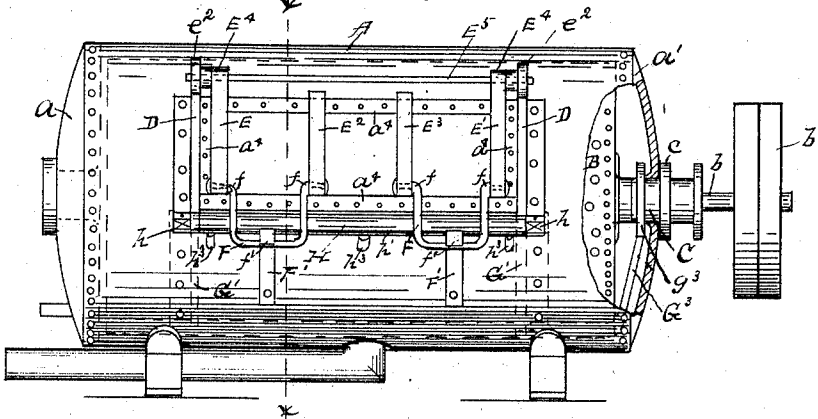
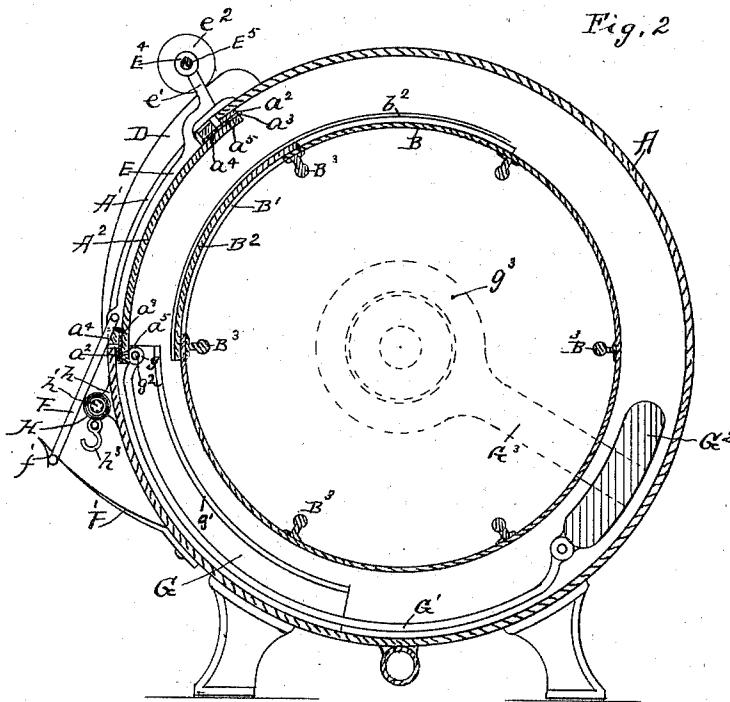


Fig. 2



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Fig. 3

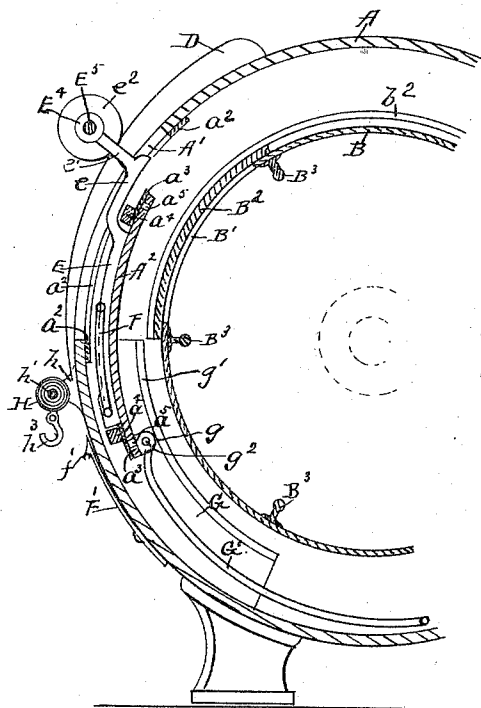


Fig. 4

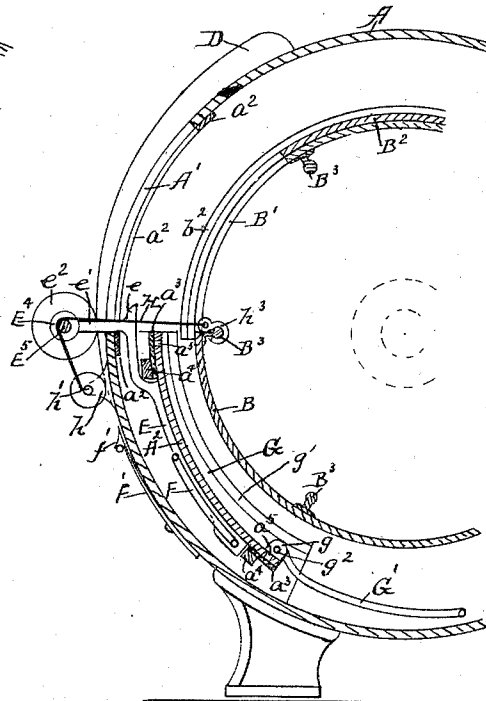


Fig. 5

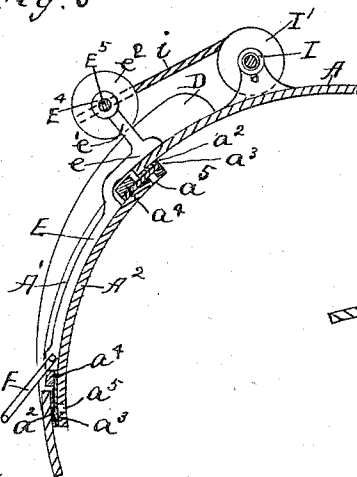
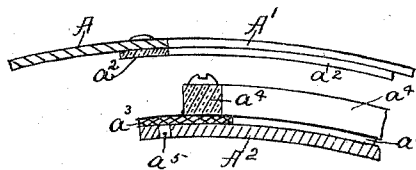


Fig. 6



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# UNITED STATES PATENT OFFICE.

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SLIDING DOOR FOR OUTER CASES OF STERILIZING WASHING-MACHINES.

947,701.

Specification of Letters Patent.

Patented Jan. 25, 1910.

Application filed May 22, 1908. Serial No. 434,233.

*To all whom it may concern:*

Be it known that I, FRANKLIN M. RAYMOND, citizen of the United States, and resident of Westport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Sliding Doors for Outer Cases of Sterilizing Washing-Machines, of which the following is a specification.

The present invention has reference to cylinders or drums equipped with doors which are adapted to be slid to an open or closed position and the more prominent features of novelty in the new construction are embodied in connection or coactive with said door, the general purposes being to insure a positive steam and air-tight closure by the door when shut, the ready and convenient movement of the door in opening and closing, the compact and unobstructive disposition of the door when in an open position and the absolute prevention of materials or articles from working down at the inner side of the door opening in the cylinder drum when the door is open.

In the present case, I have disclosed my invention in connection with a cylinder washing machine, in which application, the novelty of the new features is especially emphasized and promoted with highly advantageous results. The character of the improvements is also such that they largely contribute to the washing operation, the latter being so conducted that the thorough sterilization and disinfection of the clothes will both be insured. While as stated, the invention is set forth in connection with a washing machine, it will be obvious that it will be highly serviceable in a wide range of other uses.

In the accompanying drawing forming part of this specification—Figure 1, is a side view of a washing machine equipped with my invention; the door being closed and a portion of the outer cylinder or drum being broken away at the right hand end, to show more clearly how the door-counterbalancing weight is supported. Fig. 2, is a vertical cross sectional view on line  $x-x$  of the machine shown in Fig. 1, the door and coacting parts being in the same position. Figs. 3 and 4 are like cross sectional views of the machine, the door being shown in partly opened and completely opened posi-

tions, respectively. Fig. 5, is a detail sectional view of a modification illustrating a novel means for insuring the easy opening and closing movements of the door, and which means can be employed in lieu of the counterbalancing arrangement previously adverted to. Fig. 6 is a detail sectional view showing the packing strips on the cylinder and on the door.

The same reference characters are used to designate corresponding parts in the different figures of the drawing, wherein they occur.

A longitudinally extended cylinder or drum A, which is of stationary character, is firmly mounted on end supports and has its heads  $a, a^1$ , both enlarged at their central portions, the enlargement of the head  $a$  containing a bearing recess, while the enlargement of the head  $a^1$ , has a bearing opening extending therethrough.

Concentrically within the cylinder A, is the inner cylinder B, of relatively shorter diameter and length to contribute in the formation of an extended annular space and end spaces intermediately of said cylinders. A journal carried at one end of the cylinder B, bears in the recess of the head  $a$ , and revolubly supports said cylinder at this point, while at the other end of the cylinder B, the revoluble supporting means is presented by a shaft  $b$ , extending through the opening in the head  $a^1$ , and carrying externally at the end of the machine, pulleys  $b^1$ , through which the revolving motion can be transmitted to the inner cylinder. The shaft  $b$  is not revolubly supported by direct contact with the surface bearing presented by the opening in the head  $a^1$ , but by a sleeve C, in the longitudinal opening of which the shaft properly bears and which sleeve in turn bears in the opening of the head  $a^1$ , and is revoluble independently of said shaft. A collar  $c$  on the sleeve C and other coacting means serve to hold the cylinder B, against end movement. In this latter cylinder, the clothes to be washed are to be introduced, said cylinder containing at one side for such purpose, a rectangular longitudinally extended opening  $B^1$ , adapted to be closed or opened by a curved sliding door  $B^2$ , of similar configuration but of slightly larger dimensions than the opening  $B^1$ , the ends of said door slidably bear-

ing in curved guides  $b^2$ , circumferentially secured on the cylinder B, at the ends of the door opening, said guides extending upward on the cylinder to an extent that will permit the door  $B^2$ , to be slid upward and retained in a position that will leave the door opening completely uncovered. Secured on the interior surface of the cylinder B, are relatively equi-distantly located longitudinal bars  $B^3$ , which have rounded heads and the familiar function of which is to effect an overturning movement of the clothes during the washing operation.

The stationary outer cylinder A, contains a longitudinally extended rectangular opening  $A^1$ , which is adapted to be closed and positively maintained closed by a highly novel sliding door arrangement; the door being located at the inner side of the cylinder and the conditions being such that with the door closed, the joints around the door opening are rendered absolutely steam and water-tight.

Secured on the inner side of the cylinder A, and extending from the end and side edges of the door opening, is a thin strip  $a^2$ , of packing material preferably of metallic character, such for instance as brass. The door  $A^2$ , has externally secured thereon and extending around all four of the edge portions of the door, a wider strip  $a^3$ , which will be somewhat more yielding, packing rubber being a material that will give satisfactory results. The strips  $a^3$ , are secured only at their inner parts, by narrow bars  $a^4$ , secured to the door, for this purpose. The outer free portions of the strips  $a^3$ , overlies perforations  $a^5$ , in the door.

Externally on the cylinder A, at the ends of the door opening, are circumferentially disposed eccentric ribs D, D, the most pronounced portions of which are in a plane just above the top of the door opening, downwardly from which portions, said ribs gradually diminish and they finally vanish at a plane just below the lower edge of the door opening. Braces E to  $E^3$ , inclusive, are rigidly secured on the door so there will be a brace near each end and two intermediately located, and all regularly spaced with respect to each other. The end braces E,  $E^1$ , are in juxtaposition to the eccentric ribs D, D, and said braces integrally present at their upper ends, brackets  $E^4$ , which are of the configuration generally illustrated in Figs. 1 to 4, inclusive. It will be noted that the brackets  $E^4$  project through and beyond the door opening and that the base  $e$ , of each bracket is so upwardly disposed that it is adapted to overlap the cylinder at the top edge of the door opening when the door is closed. Each bracket  $E^4$  is provided with an arm  $e^1$  which support a rod  $E^5$  extending the entire length of the door, and on the outer ends thereof are supported rollers  $e^2$ ,

in traveling contact with the edge surfaces of the eccentric ribs D, D. It will be appreciated that the rod  $E^5$ , is also adapted to serve as a highly convenient form of handle in effecting the opening and closing of the door. Pivotaly mounted in the lower ends of each end brace and the brace immediately contiguous, are the journals  $f, f$ , of a bail or yoke F, there being one of these at each end of the door. As indicated in Figs. 3 and 4, each of these bails can be upwardly turned to cause it to be completely received within the space presented between the two braces to which the bail is pivoted. When the door is to be firmly locked in the closed position, these bails F, F, are swung downward to the positions illustrated in Fig. 1, for the purpose of being sprung over and engaged with the shouldered ends  $f^1$ , of strong spring catches  $F^1$  secured on the cylinder A, below the door opening.

On the inner side of the door  $A^2$ , at the bottom edge and at the ends thereof, are small integral lugs  $g, g$ , each of which occupies a position immediately adjacent to the lateral flange  $g^1$ , of a curved guide G, secured on the inner side of the cylinder A, there being one of said guides just beyond each end of the door opening  $A^1$ . These guides G, G, as shown, extend from a point level with the lower edge of the opening, downwardly within the lower part of the cylinder A, to an extent at least equal to the width of the door  $A^2$  and prevent the door moving toward the inner cylinder. Bearing in each lug  $g$ , is a lateral pin  $g^2$ . Hung on each pin  $g^2$ , between its lug and adjacent flange, is the upper end of an extended curved rod  $G^1$ , the other ends of the curved rods thus provided at the door ends, being firmly connected with a narrow weight  $G^2$ , within the space between the cylinders A, B, and extending from one end of the latter cylinder to the other end thereof. This weight is designed to counterbalance that of the door and thus render the movements of the latter the more easily effected. The said weight  $G^2$ , is swingingly supported to partake of an arc movement between the cylinders referred to, and such swinging support is provided by arms  $G^3$ , connected to the weight at its ends and diverted to a limited extent so that heads  $g^3$ , on the other ends of said arms, can be mounted on the sleeve C of shaft  $b$  of the inner cylinder, to have an independent movement and yet be properly maintained in position. The connections between the weight and door are such that the normal tendency of the former will be to urge the door to its closed position.

Ears  $h$ , on the cylinder A, are just beyond each end of the door opening, in a plane below the lower edge thereof, and in said ears is journaled a torsional spring roller  $H^1$ , and on this roller is normally spring wound,

a flexible apron H, preferably of a material that is impervious to moisture and insensible to deleterious effects of steam. Many of the commercial rubber fabrics will answer. At its free edge the apron has a hook or hooks  $h^3$ .

From the description thus far, it is believed that the functions and advantages connected with the invention will be readily comprehended. When the door is in the open position as shown in Fig. 4, it sets considerably nearer the inner cylinder and farther from the cylinder A, than when said door is closed. This is due to the coaction of the door-carried rollers  $e^2$ , with the eccentric ribs D, as will be explained. In the said open position, Fig. 4, the rollers have traveled downward on the ribs D, to a point where said ribs have diminished to an extreme degree. Assuming that the clothes have been introduced within the inner cylinder and its door firmly closed, the door  $A^2$ , is slid upward by manual power exerted on the rod  $E^5$ , supplemented by the counterbalancing effect of the weight  $G^2$ . As the rollers, during this elevating movement of the door, travel upward on the ribs D, of increasing eccentricity, the door is gradually drawn in the direction of its cylinder A and at the completion of the closing movement, the edge portions of the door will be firmly held against the portions of the cylinder A, surrounding the door opening. Obviously, this will bring all four portions of the cylinder A, surrounding the edges of the door opening, and the corresponding edge portions of the door in such close relation that the packing strips  $a^2$ ,  $a^3$ , will be held in such intimate bearing contact with each other as to insure absolute steam and water-tight joints between the door and cylinder. The final closing position of the door  $A^2$ , also brings the bar  $a^4$  on the door, immediately adjacent to and parallel with the surface forming the top of the door opening, so that said bar can, if the occasion requires, act as a stop to limit the upward closing movement of the door. Likewise, the corresponding lower bar  $a^4$  will have attained a position opposite the surface forming the bottom of the door opening. The steam-tight character of the bearing contact between the packing strips  $a^2$ ,  $a^3$ , will be largely augmented when it is most desired, *i. e.* when steam is used, by the pressure of the steam being outwardly exerted through the openings  $a^5$ , in the edge portions of the door, and acting on the free parts of the packing  $a^3$ , to more firmly hold the latter against the packing  $a^2$ . The final act in closing the door is the swinging down of the yokes F, F, so that they will engage the lower edge or bottom of the door opening  $A^1$ , forming a fulcrum thereof and raising the door to its full extent and simultaneously drawing the door

to its seat on the inside of the cylinder, and the yokes are held in place by the catches  $F^1$   $F^1$ :

With both cylinders closed as described, the washing operation can be proceeded with, which operation involves generally imparting to the inner cylinder a predetermined number of relatively reversed revolutions, this usually being kept up during the entire operation. During the described movement of the inner cylinder, steam at a temperature of 240 degrees or more is introduced and kept at an elevated temperature, said steam entering the inner cylinder through numerous perforations therein and caused to act on the clothes until they become absolutely sterilized and the dirt appreciably loosened. The steam can then be discharged, and hot water, soap or any other washing and cleansing liquids admitted to practically complete the washing operation. When the washing liquid is discharged and the clothes are rinsed and they are to be removed, the yokes F, F, are disengaged from the catches  $F^1$ ,  $F^1$ , the rod  $E^5$ , grasped and the door downwardly slid to the open position heretofore fully described with the yokes F, F, occupying their spaces. The cylinder B, if necessary, is then brought to a position opposite the door opening  $A^1$ , whereby access can be readily had to the door  $B^1$ , so that the latter can be oppositely slid to an open position, after which the apron H is drawn from its spring roller and adjusted to the position indicated in Fig. 4, by having its hook means  $h^3$ , engaged with the rounded head of the nearest bar  $B^3$ , which is within the cylinder B, flush with the lower edge of the opening  $B^1$ , in said cylinder. With the apron thus arranged, it will be seen that it affords a perfect guard against the liability of clothes, particularly small articles from working into the interspace between the cylinders. The purpose in having the door  $B^2$ , open with an ascending movement, will be readily recognized, as the space below the openings  $A^1$ ,  $B^1$ , would be rendered somewhat restricted by the presence of the guides G, and the lowered door  $A^2$ .

The rising movement of the door in the opening operation can be rendered very easy by some power means supplementing a comparatively slight effort on the part of the attendant. One form of such means is that generally indicated by the detail view Fig. 5, wherein a powerful torsionally actuated spring roller I, is mounted in bearings on the top of the cylinder A, and extends the length of the door  $A^2$ . Each end of the rod  $E^5$ , will in this instance project a short distance beyond the adjacent roller  $e^2$ , so that a cable  $i$  can be attached thereto and arranged to wind on one of a pair of reels  $I^1$ , on the spring roller I above mentioned. Manifestly no undue manual effort will be

required in the opening operation as the power of the spring provision of the roller will be such as to practically counterbalance the weight of the door. Conversely, the closing movement can be effected with similar convenience.

One of the advantages of employing a metallic packing material for the strips  $a^2$ , on the cylinder A, is that the anti-sticking qualities of such material will prevent the flexible rubber packing  $a^3$ , from adhering to the same as it might otherwise do under the action of the heat of the steam and hot liquids used in the washing operation.

The various features of novelty connected with the invention, and their attendant advantages having heretofore been fully set forth, their importance and practicability will be readily understood and further description is therefore not deemed necessary.

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

1. In a machine of the character described, the combination of a cylinder having a door opening, a sliding door on the inner side of the cylinder, means on the cylinder, and devices on the door extending through the opening and engaging said means on the cylinder, whereby the door is drawn to the inner side of the cylinder coincidently with the sliding movement and brought in firm bearing contact against the cylinder when the door is completely closed, and means for securing the door in its closed position.

2. In a machine of the character described, the combination of a cylinder containing a door opening, a sliding door on the inner side of the cylinder, eccentric ribs on the outside of the cylinder at opposite ends of the door opening, and devices on the door, extending through the opening and in traveling engagement with said ribs, whereby the door is drawn to the cylinder coincidently with the sliding movement and brought in firm bearing contact against the inner side of the cylinder when the door is completely closed, and means for securing the door in closed position.

3. In a machine of the character described, the combination of a cylinder containing a

door-opening, a sliding door on the inner side of said cylinder, eccentric ribs on the outside of the cylinder at opposite ends of the door opening, brackets on the door and extending through the opening, a shaft supported on the brackets, rollers on said shaft and in traveling contact with the eccentric ribs, and means for securing the door in closed position.

4. In a machine of the character described, the combination of a cylinder containing a door opening, a sliding door on the inner side of the cylinder, eccentric ribs on the outside of the cylinder at opposite ends of the door opening, brackets on the door at the ends thereof and extending through the opening, a rod passing through and projecting beyond both brackets, rollers mounted on said rods, and means for seating and securing the door.

5. In a machine of the character described, the combination of a cylinder containing an opening, a door for said opening within the cylinder, and having marginally located perforations, metallic packings on the inner side of the cylinder at the opening, flexible packing on the corresponding part of the door and having free portions overlying the perforations in said door, and means for bringing the packing of the door and cylinder into engagement when the door is closed.

6. In a machine of the character described, the combination with an outer stationary and an inner revoluble cylinder, both containing openings and sliding doors therefor, of a spring roller mounted on the outer cylinder contiguous to the bottom of the opening thereof, and an apron on said roller, said apron being adapted to be unwound from its roller, adjusted horizontally within the outer cylinder and engaged with a projection at the bottom of the opening of the inner cylinder, whereby the apron spans the space between the outer and inner cylinders.

Signed at New York in the county of New York and State of New York this 7th day of May A. D. 1908.

FRANKLIN M. RAYMOND.

Witnesses:

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