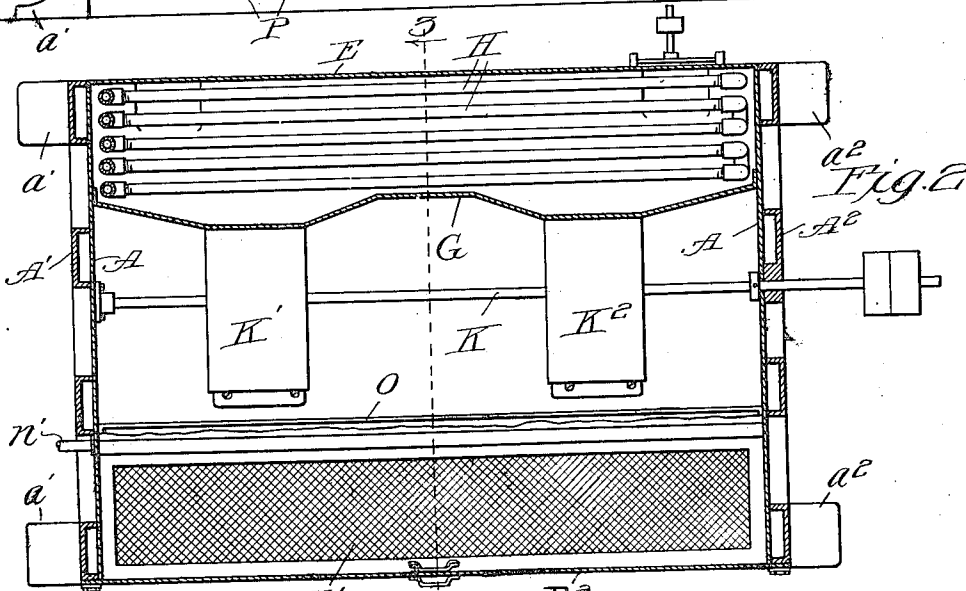
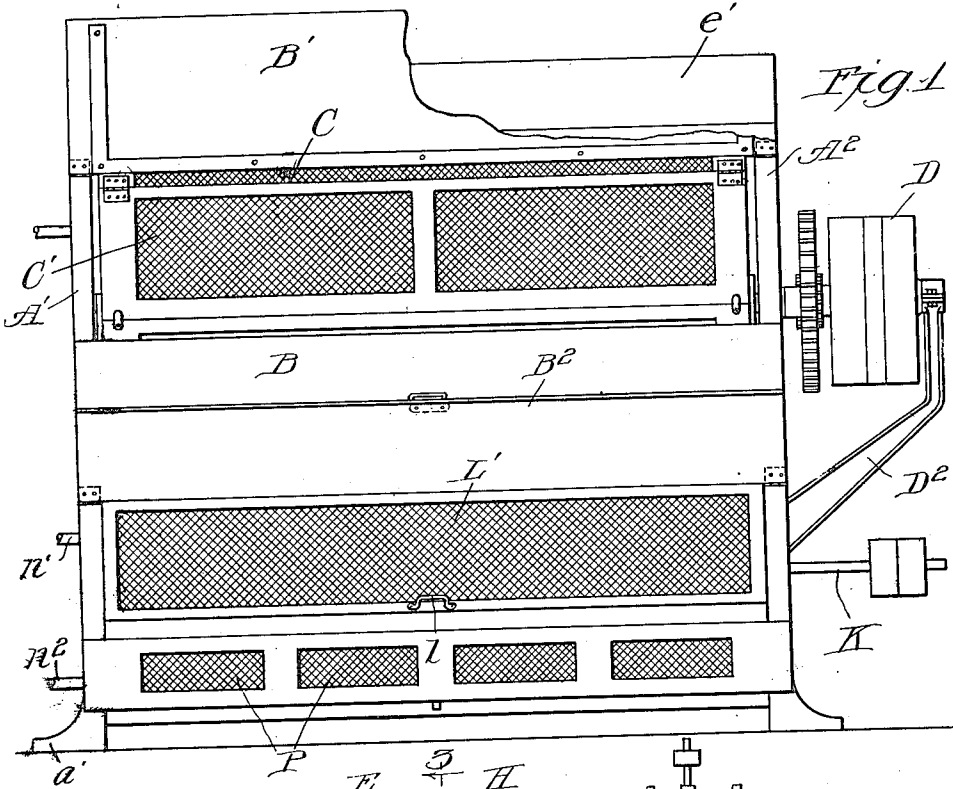


F. BALZER.
 DRYING APPARATUS.
 APPLICATION FILED APR. 27, 1914.

Patented Jan. 30, 1917.
 2 SHEETS—SHEET 1.

1,213,999.



Witnesses:
 Harry S. Gaither
 Edythe M. Anderson. 64

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 Attys

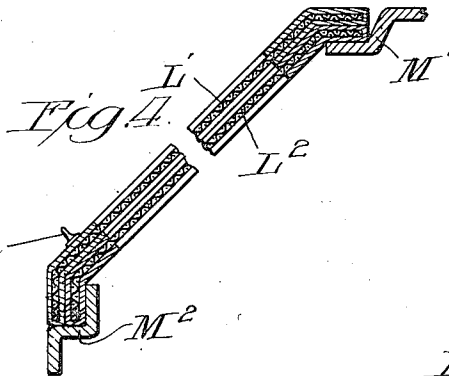
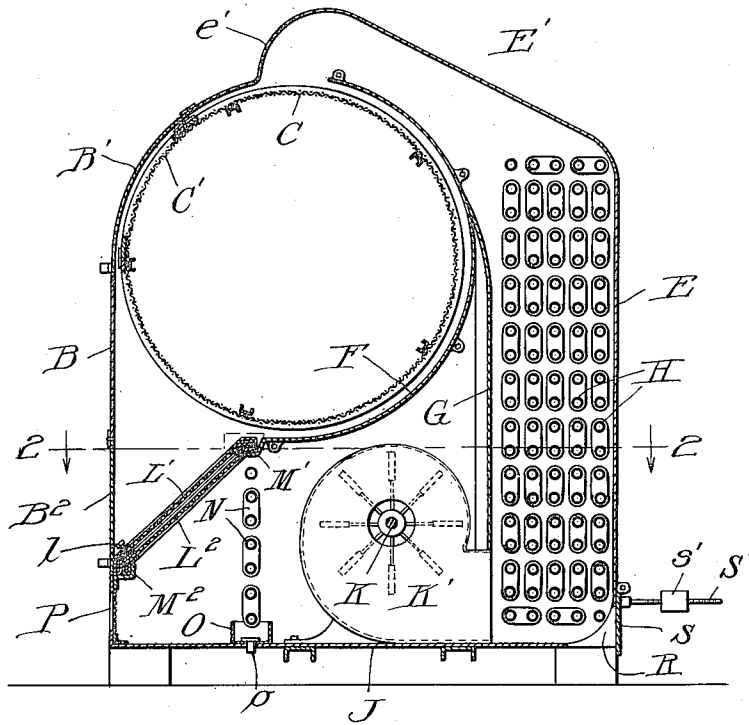
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2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

FRITZ BALZER, OF CHICAGO, ILLINOIS, ASSIGNOR TO TROY LAUNDRY MACHINERY COMPANY, LTD., A CORPORATION OF NEW YORK.

DRYING APPARATUS.

1,213,999.

Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed April 27, 1914. Serial No. 834,795.

To all whom it may concern:

Be it known that I, FRITZ BALZER, a subject of the Emperor of Germany, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Drying Apparatus, of which the following is a specification.

My invention relates in general to drying apparatus, and more particularly to drying tumblers for laundry use.

Drying tumblers of the character to which my invention relates comprise a rotary foraminous cylinder inclosed within casings containing steam-heated coils, and a blower for circulating air around the coils and thence through the foraminous cylinder to dry the articles therein. It has heretofore been customary in such dry room tumblers to discharge the heated air after being once circulated around the heating coils and through the rotary cylinder. This is wasteful of heat and unnecessarily prolongs the drying operation, as, obviously, only a limited degree of heat can be imparted to the air by merely passing once around the heating coils. However, to circulate the same air repeatedly by the blower around the heating coils and through the cylinder involves difficulties, as the air in passing through the articles in the cylinder becomes laden with the lint which accumulates in the blower and produces an unbalanced condition thereof resulting in excessive wear and injury. Furthermore, in passing through the wet articles the air becomes charged with moisture, which must be eliminated before it can again efficiently be passed through the articles.

The primary object of my invention is to provide an improved drying tumbler in which the articles will be quickly dried by repeatedly circulating through them the same heated air, which is reheated by passing around the heating coils after being drawn through the articles, and in which the lint will be eliminated from the air before again passing through the blower, thereby protecting the blower from injury.

A further object of my invention is to provide an improved drying tumbler in

which the moisture will be removed from the air after it has passed through the articles in the cylinder, and the air then reheated and again circulated through the articles, thereby economizing in the consumption of the heat and expediting the drying of the articles.

A still further object of my invention is to provide a drying tumbler in which the lint picked up by the air in passing through the articles will not only be eliminated from the air, but may be readily removed from the apparatus, so as not to impede the repeated free circulation of the hot air through the articles.

A further object of my invention is to provide a drying tumbler which will be simple in construction, efficient in operation, and convenient in use.

My invention will be more fully disclosed hereinafter with reference to the accompanying drawings, in which the same is illustrated as embodied in convenient and practical form, and in which—

Figure 1 is a front elevational view, parts being broken away. Fig. 2 is a sectional view, taken on the line 2—2 of Fig. 3. Fig. 3 is a vertical sectional view, taken on the line 3—3 of Fig. 2; and Fig. 4 is an enlarged detail sectional view.

The same reference characters are used to designate the same parts in the several figures of the drawings.

Reference characters A', A² designate the end supporting frames of a casing or housing, such frames being preferably made of cast metal and provided with pairs of feet *a'* and *a*² at the lower edges thereof, which serve to support the casing. Secured to the inner surfaces of the end frames A' and A² are sheet metal plates A, which form the end walls of the casing.

B designates the front wall of the casing, which is preferably formed of sheet metal and supported upon the front surfaces of the end frames. The upper portion of the front wall B is curved to conform to the curvature of a cylinder C supported in the casing by suitable trunnions journaled in the end frames. The cylinder is of any suit-

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able construction so as to permit the free passage of air therethrough, and may conveniently be formed of wire fabric supported upon a suitable frame. The upper curved portion of the front wall B is provided with a hinged door B', preferably of a width coextensive with the width of the cylinder C, while the latter is provided with a similar hinged door C', so that when the doors are brought in registry articles may be placed in, or removed from, the cylinder.

One of the trunnions of the cylinder C projects through one of the side frames, as shown in Fig. 1, and is provided with suitable means for imparting rotary motion thereto, such, for instance, as belt pulleys D. The outer end of the extended trunnion of the cylinder may be suitably supported by a bracket D² secured to the adjacent end frame A².

E designates the rear wall of the casing, which is provided with an inclined top portion E' extending above the cylinder C and connected with the top edge of the curved upper portion of the front wall B by means of a downwardly curved portion e'.

F designates a substantially semi-circular partition extending from one end wall to the other end wall and closely surrounding the rear and bottom surfaces of the cylinder, as clearly shown in Fig. 3. The top edge of the partition F terminates a short distance from the top edge of the upper curved portion of the front wall B to form a passageway immediately above the cylinder, and preferably coextensive therewith.

G designates a partition extending downwardly from the rear surface of the curved partition F to the bottom wall J of the casing. The partition G is spaced inwardly from the rear wall of the casing, so as to provide a chamber in which are located heating coils H through which passes a heating medium, such as steam.

K' and K² designate blowers supported upon the bottom wall J of the casing beneath the semicylindrical partition F, and having their discharge openings communicating with openings through the partition G adjacent the bottom thereof, as shown in Fig. 3.

K designates a shaft upon which the blades of the blowers are secured, and by means of which they are rotated. This shaft is journaled in bearings on the end walls of the casing, one end of the shaft projecting through one of the end walls, as, for instance, A², and being provided with suitable power connections for rotating the same.

One or more screens L', L² are supported within the casing intermediate of the end walls and in the path of the air passing from the cylinder to the intakes of the blow-

ers. These screens are preferably located in inclined positions, as shown in Fig. 3, with their upper edges resting upon a flange M' extending along the lower front edge of the semi-cylindrical partition F, and supported at the lower edges on a flange M² secured along the inner surface of the front wall B of the casing. In order to permit the insertion and removal of the screens, the casing is provided with a door B² substantially coextensive in width with that of the casing and slightly greater in width than that of the screens, so that the latter may freely pass through the door opening. In order to facilitate the insertion and removal of the screens, they are preferably provided with one or more handles l. The screens are preferably formed of surrounding sheet metal frames supporting wire fabric.

N designates a series of coils extending across the casing intermediate of the end walls thereof, and located between the screens L' and L² and the blowers K' and K². The coils N are connected so as to form a continuous conduit through which cold water is circulated. The ends of the continuous conduit so formed extend through one of the end walls of the casing, as indicated at n' and n² in Fig. 1, with which suitable conduits are connected to supply water for circulating through the coils N. Located below the coils N, which are preferably arranged vertically, is a trough O supported upon the bottom wall of the casing and having an outlet o extending there-through. The moisture condensed by the coils N drips therefrom into the trough and is discharged therefrom through the outlet opening o.

A plurality of screened openings P are provided in the front wall B of the casing, adjacent the lower edge thereof, through which air is drawn by the blowers to supply the requisite volume for circulation through the rotary cylinder. A plurality of outlet openings R are provided through the rear wall of the casing, preferably adjacent the lower edge thereof, through which surplus air is discharged. Each of the openings R is provided with a damper S for closing the same, such damper being hinged on the outside of the rear wall of the casing above the opening which it controls. Each damper is provided with a rod S' rigidly connected thereto, upon which is adjustably mounted a weight s'. The weight retains the damper in closed position, but permits it to open when the pressure of the air circulating within the casing reaches a predetermined degree. By adjusting the position of the weight s' upon the rods S' the pressure to be maintained in the machine may be varied.

The manner of using and operation of my improved drying tumbler are as follows: The door C' of the cylinder C is brought into registry with the door B' at the front of the casing, so that both of the doors may be opened and wet articles placed within the cylinder to be dried. The doors are then closed, and the cylinder rotated through the power connections so as to agitate the articles and expose all portions thereof to the circulating hot air. The fans are rotated, through suitable connections, so as to force air into the bottom of the heating chamber containing the steam heated coils H. The air passes around the steam-heated coils and is heated thereby, after which it passes through the opening above the cylinder, thence through the cylinder into contact with the articles contained therein. The rotation of the blowers draws the air from the cylinder through the portion thereof intermediate of the front wall of the casing and the lower edge of the semi-cylindrical partition F. The air thus drawn from the cylinder by the blowers passes through the screens L' and L², which serve to remove from the air the lint with which it is laden by reason of its passage through the articles in the cylinder. The air then passes around the condensing coils N, which serve to condense the moisture which the air has absorbed from the wet articles in the cylinder, after which the air passes through the intake openings of the blowers and is again delivered into the bottom of the heating chamber to be reheated by being forced upwardly around the steam-heated coils H. The same air is, therefore, continuously circulated through the cylinder, and after each passage therethrough passes through the screens so as to have the lint removed therefrom, and also around the condensing coils, and then again through the heating chamber. The consumption of heat is therefore economized and the drying of the articles promoted, inasmuch as the air is successively reheated, and thereby acquires higher temperature as its circulation continues.

When the articles have been treated a sufficient length of time to be thoroughly dried, the door C' of the cylinder is again brought into registry with the door B' of the casing and the dry articles replaced by another supply of articles to be dried. The door B² is opened and the screens removed, so that the lint intercepted by them may be removed, after which they are again placed in position. The convenient withdrawal of the screens and the frequent removal of the lint from them avoids any interference with the free circulation of the air from the cylinder to the intakes of the blowers.

In order that the requisite volume of air may be maintained in circulation, the

screened openings P are provided, through which atmospheric air is drawn by the blowers to replace any decrease in volume of air in circulation by reason of the condensation of moisture therein. Any surplus air is discharged through the restricted openings R. It will be observed that as the openings P are located adjacent the bottom of the casing and on the opposite side of the condensing coils from the blower, any atmospheric air drawn through the openings will come into contact with the hot air passing from the cylinder to the condensing coils, and therefore serve to permit the condensation of moisture by reason of the cool atmospheric air coming into contact with the hot air in circulation. The position of the outlet openings R adjacent the bottom of the casing, and on the opposite side of the blower from the inlet openings P permits the discharge of the moisture condensed by the contact of the cool atmospheric air with the hot air in circulation, and through the contact of the circulating air with the condensing coils.

From the foregoing description it will be observed that I have invented an improved drying tumbler in which the air is kept in circulation around the heating coils and through the cylinder, thereby economizing the heat and expediting the drying of the articles, inasmuch as the air is repeatedly heated during its circulation around the heating coils. It will be further evident that by my invention the repeated circulation of the same air through the cylinder is rendered practicable, inasmuch as the lint is removed from the air passing from the cylinder before it enters the blowers, thereby protecting the blowers from injury. It will further be seen that the screens are so located as to be readily withdrawn from the casing, in order that the lint which they have intercepted may be removed from them.

While I have described my invention with more or less minuteness, and as being embodied in certain precise forms, yet it will be understood that I do not desire to limit myself thereto unduly, or any more than is pointed out in the appended claims. On the contrary, I contemplate all proper changes in form, construction, and arrangement, the omission of immaterial parts, and the substitution of equivalents as circumstances may suggest or necessity render expedient.

I claim:—

1. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder in the casing, a heating chamber, a blower for circulating air through the heating chamber and cylinder, and removable means for eliminating the lint from the air after it passes through the cylinder and before it enters the blower.

2. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder in said casing, heating coils, a blower for circulating air around the heating coils and through the cylinder, a screen through which the air passes before being drawn through the blower, and means for permitting access to said screen to clean the same. 65
3. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder in said casing, heating coils, a blower for circulating air around the heating coils and through the cylinder, a removable screen located adjacent one wall of the casing through which the air passes before being drawn through the blower, and a door in said wall of the casing through which said screen may be withdrawn to remove the lint therefrom. 70
4. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder located within the upper portion of said casing, a heating chamber in the back portion of said casing and terminating in its upper end adjacent the top of said cylinder, a blower adjacent the bottom of said casing discharging into said heating chamber, a screen adjacent the front of the casing and intermediate of the cylinder and the intake of the blower, and a door in the front wall of said casing through which said screen is removable. 75
5. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder in the casing, a heating chamber, a blower for circulating air through the heating chamber and the cylinder, and means for eliminating the moisture from the air passing from the cylinder before it passes to the blower. 80
6. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder in said casing, a heating chamber, a blower for circulating air through the heating chamber and cylinder, and a condenser intermediate of the cylinder and blower for removing the moisture from the air passing from the cylinder to the blower. 85
7. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder in said casing, a heating chamber, a blower for circulating air through the heating chamber and cylinder, condensing coils located in the path of the air current intermediate of the cylinder and the blower, and a trough located beneath said condensing coils to receive drippings therefrom. 90
8. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder in said casing, heating coils, a blower for circulating air around the heating coils and through the cylinder, a screen through which the air passes before being drawn through the blower, and means for removing the moisture from the air located in the path of the air current passing from the cylinder to the blower. 95
9. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder in the casing, a heating chamber, a blower for circulating air through the heating chamber and cylinder, means for eliminating the lint from the air after it passes through the cylinder and before it enters the blower, and a condenser intermediate of the cylinder and blower for removing the moisture from the air passing from the cylinder to the blower. 100
10. In a drying tumbler, the combination with a casing, of a rotary cylinder located within the upper portion of said casing, a heating chamber in the back portion of said casing and terminating in its upper end adjacent the top of said cylinder, a blower adjacent the bottom of said casing discharging into said heating chamber, a screen adjacent the front of the casing and intermediate of the cylinder and the intake of the blower, a door in the front wall of said casing through which said screen is removable, condensing coils located in the path of the air current passing from the cylinder to the blower, and a trough located beneath said condensing coils to receive the drippings therefrom. 105
11. In a drying tumbler, the combination with a casing, of a rotary cylinder in the casing, a heating chamber, a blower for circulating air through the heating chamber and cylinder, means for eliminating the lint from the air after it passes through the cylinder and before it enters the blower, said casing having a restricted air inlet for maintaining the required volume of air in circulation in the casing, and a restricted outlet for permitting the escape of surplus air from the casing. 110
12. In a drying tumbler, the combination with a casing, of a rotary cylinder in the casing, a heater, means for circulating air through the heater and cylinder, said casing having a restricted air inlet for maintaining the required volume of air in circulation in the casing and a restricted outlet for permitting the escape of surplus air from the casing, and a damper controlling said outlets to maintain them closed until a predetermined pressure has been obtained in the casing. 115
13. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder in said casing, a heating chamber, a blower for circulating air through the heating chamber and cylinder, condensing coils located in the path of the air current intermediate of the cylinder and the blower, and a trough located beneath said condensing coils to receive drippings therefrom. 120
14. In a drying tumbler, the combination with a casing, of a rotary foraminous cylinder in said casing, a heating chamber, a blower for circulating air through the heating chamber and cylinder, means for eliminating the lint from the air after it passes through the cylinder and before it enters the blower, and means for removing the moisture from the air. 125

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5 with a casing, of a rotary cylinder in the casing, a heater, means for circulating air through the heater and cylinder, said casing having a restricted air inlet for maintaining the required volume of air in circulation in the casing and a restricted outlet for permitting the escape of surplus air from the casing, a damper for normally closing said out-

let, and means for varying the pressure required to open said damper.

In testimony whereof, I have subscribed my name.

FRITZ BALZER.

Witnesses:

GEO. L. WILKINSON,
HENRY A. PARKS.

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