Oct. 23, 1928.

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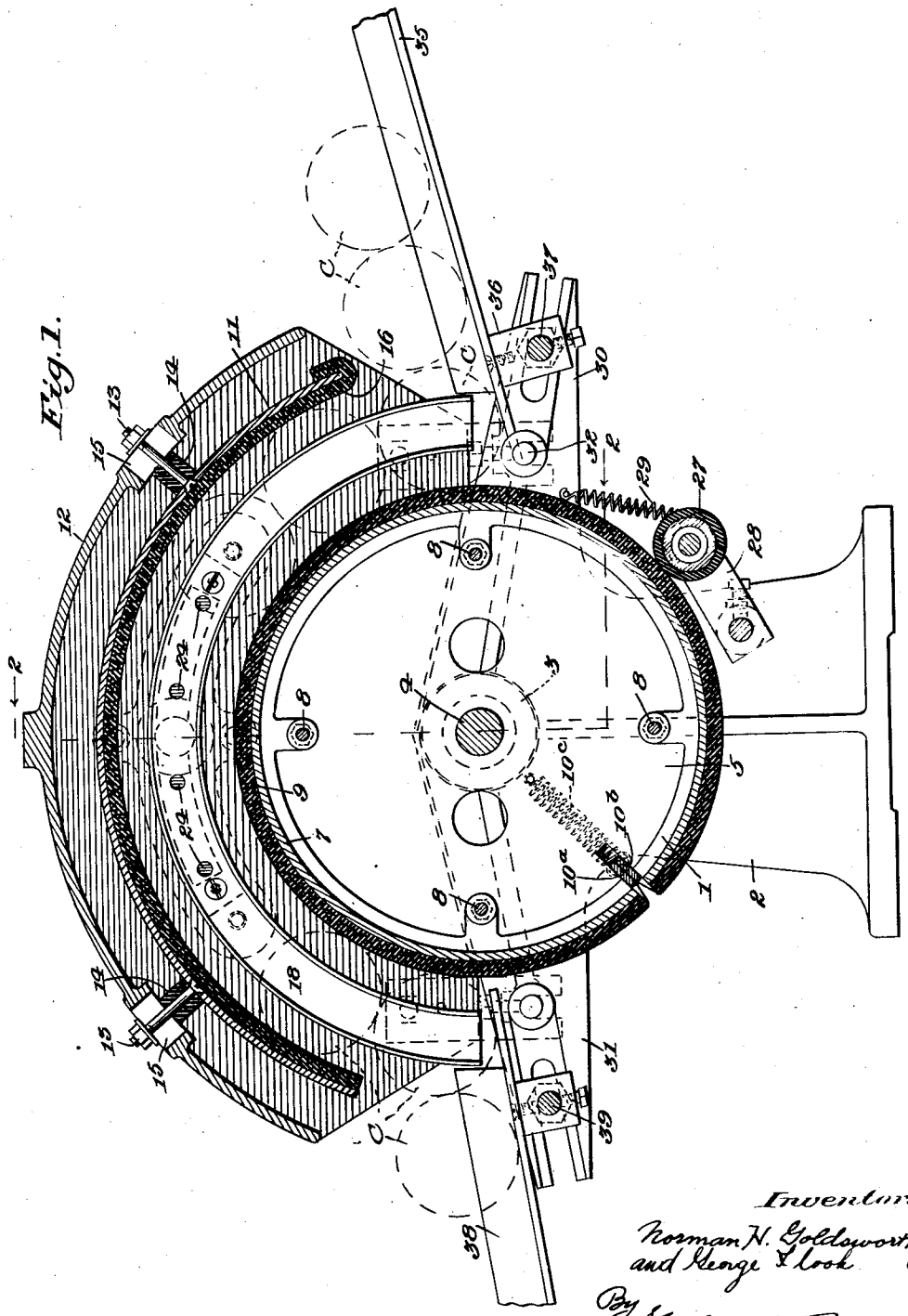
N. H. GOLDSWORTHY ET AL

APPARATUS FOR DRYING METAL CANS

Filed Aug. 17, 1927

3 Sheets-Sheet 1

Fig. 1.



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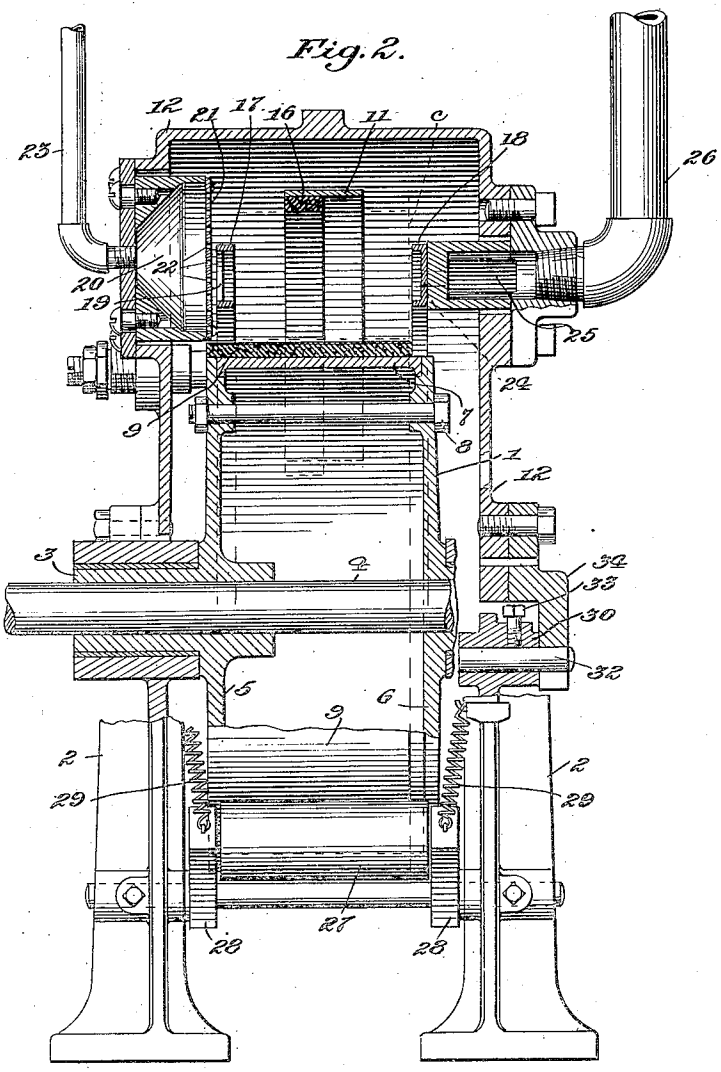
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Fig. 2.



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APPARATUS FOR DRYING METAL CANS

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Fig. 3.

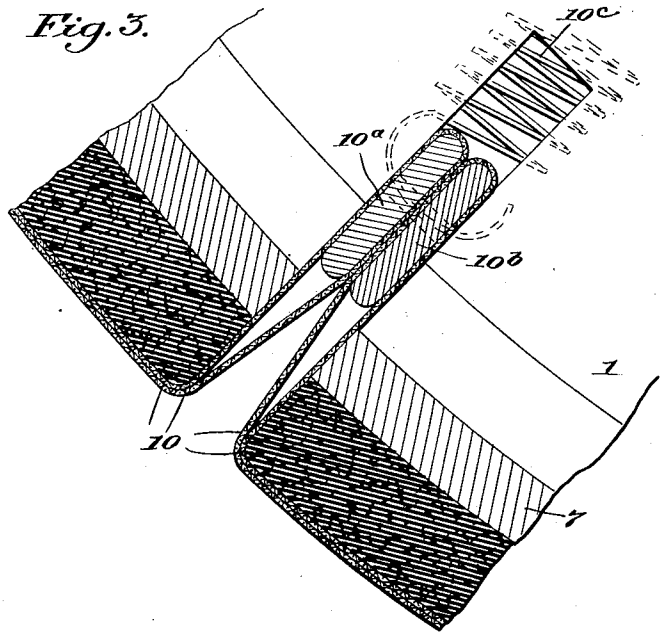
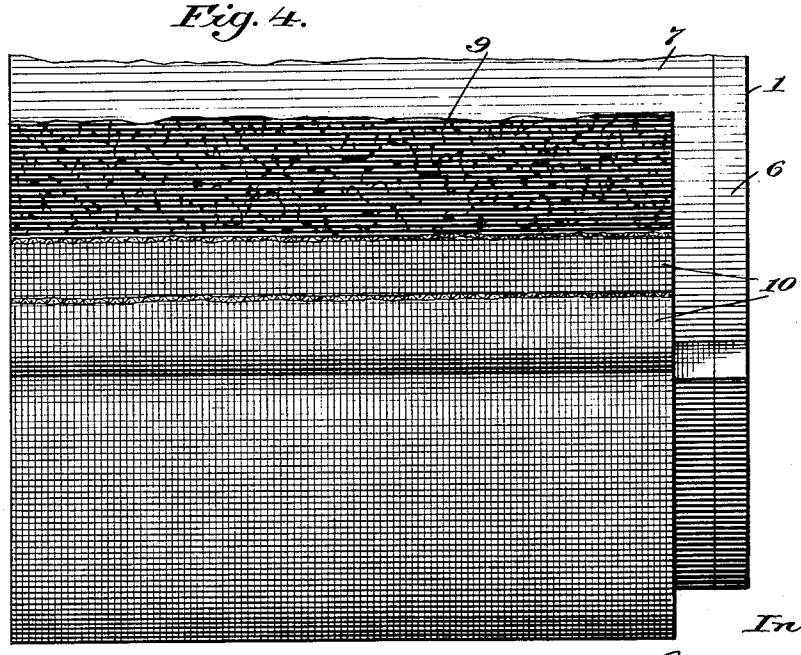


Fig. 4.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR DRYING METAL CANS.

Application filed August 17, 1927. Serial No 213,678.

The invention relates to new and useful improvements in an apparatus for drying metal cans, and more particularly to an apparatus wherein the can surface is dried during the bodily travel of the can.

An object of the invention is to provide a drying apparatus wherein the absorbent pad for distributing and absorbing the moisture adhering to the outer wall of the can is caused to travel, and thus impart a bodily travel and a rolling movement to the can being dried.

A further object of the invention is to provide an apparatus of the above type wherein said absorbent pad is subjected to a squeezing or wringing action during its travel when out of contact with the cans for removing the water which has been absorbed from the cans.

A further object of the invention is to provide an apparatus of the above type wherein heated air is forced into the can during its bodily travel in contact with the pad for heating the can and aiding in the drying of the outer surface thereof.

A still further object of the invention is to provide an apparatus of the above type wherein air is projected against the bottom end of the can throughout the entire extent thereof during the bodily travel of the can for distributing the moisture adhering to the end of the can and aiding in the drying thereof.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings which show by way of illustration one embodiment of the invention—

Figure 1 is a vertical sectional view through a drying apparatus embodying the improvements, said section being taken at right angles to the axis of rotation of the drum;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1, the section being offset at one point to show the support for the upper frame structure,

Fig. 3 is an enlarged detail in section showing the manner of attaching the fabric covering for the pad.

Fig. 4 is a detail, showing in face view a portion of the drum, the pad and covering therefor.

The invention is directed broadly to a drying apparatus for drying cans. It is a well known practice at the present time to test cans after they are completed by means of a water bath. The can is submerged in the water, and is subjected to air under pressure, and the escaping air either gives evidence of a leak, or is utilized to bring about the ejection of the leaky can. After the cans are removed from the water bath, it is essential that they should be dried, and the present apparatus has to do with the drying of the outer surface of the cans. The drying apparatus includes a rotating drum which is provided on its outer face with an absorbent pad. This absorbent pad is preferably constructed of cellular rubber, that is, a rubber which is often referred to as a sponge rubber. The outer surface or skin of the rubber is removed so that the cells are open at the surface of the pad. This pad entirely encircles the drum and over the pad is preferably placed layers of fabric. Spaced from the drum substantially the diameter of the can to be dried is an arc-shaped guide rail, the inner surface of which is also preferably lined with a yielding material which may be of the same character as the pad on the drum. This arc-shaped guide rail is likewise yieldingly mounted. The cans to be dried are delivered from the runway against the face of the drum and as the drum rotates, it will carry the can against the arc-shaped guide rail, and as the cans pass between this arc-shaped guide rail and the drum, they will be rotated. After the can has passed to a point diametrically opposite the point where they are received, they are delivered from the drum on to a runway and continue their travel along the runway. Guide rails are provided at the ends of the can for maintaining the can properly positioned on the absorbent pad, preferably with the flange of the can lying along the side edge of the pad. Adjacent the path of travel of the bottom ends of the can, there is an arc-shaped chamber provided with a perforated cover plate, and this chamber is supplied with air under pressure, which passes through the perforated plate and is directed against the end of the can. At the open end of the can, the guide rail which is channel-shaped in cross section, has a series of openings leading to a chamber which is sup-

plied with heated air. Thus it is that hot air is directed into the cans as they pass along the drum. The hot air passing into the chambers will heat the wall of the can and this will aid in the drying of the can.

Referring more in detail to the drawings, the improved drying apparatus includes a hollow drum 1, which is mounted for rotation on a suitable supporting frame 2. The drum is provided with hubs 3, 3 which are mounted in suitable bearings in the supporting frame 1. Extending through the hubs 3, 3 is a shaft 4 which is used for rotating the drum. The drum in structure includes two spaced disk members 5 and 6 with an intermediate circumferential member 7. The disk members are provided with supporting ledges for the circumferential member, and said disk members are joined by suitable bolts 8. This makes up the drum of the drier.

Secured to the outer face of the drum is an absorbent pad 9. This absorbent pad extends all the way around the drum. The pad extends from a point substantially in line with the outer face of the disk member 5 to a point spaced inwardly from the outer face of the disk member 6. This pad is preferably made of sponge rubber, as the sponge rubber is formed with a multitude of cells which absorb the moisture from the surface of an article coming in contact with the pad. The pad is also yielding, so that the surface of the article is not in any way marred. The pad is of considerable thickness, and the outer skin of the sponge rubber is preferably removed so as to expose the cells whereby the cellular portion of the spong rubber comes in contact with the can which is to be dried. On the outer face of the sponge rubber pad is preferably placed a series of layers of fabric indicated at 10 in the drawings. The fabric is used for the purpose of more evenly distributing the moisture which adheres to the can, often in globular form. The moisture passes through the fabric and is taken up by the sponge rubber. As clearly shown in Figures 1 and 3, the ends of the pad extending around the drum are slightly spaced, and the fabric extends down into this space, and is attached to bars 10^a and 10^b. One end of the fabric is attached to the bar 10^a and the other end to the bar 10^b. These bars are forced radially toward the center of the drum by springs 10^c attached to the ends of the bars and located on opposite sides of the drum. Thus it is that the fabric is put under slight tension and any slack tending to accumulate in the fabric is taken up.

Associated with the drum is an arc-shaped guide plate 11. The frame 1 is provided with the upper structure 12 which substantially houses the upper half of the drum and extends a considerable distance above the same. This arc-shaped guide plate 11 is mounted on the upper structure of the frame by means of bolts 13, 13. These bolts pass through the arc-shaped guide plate 11 and through rubber bushings 14, 14, and thence through slots 15, 15 in the frame structure. This provides a means whereby the plate can be adjusted, if desired, in a direction lengthwise of the plate. On the inner face of this guide plate 11 is a pad 16 which is preferably of a yielding nature. A sponge rubber may be used in the forming of this pad. As clearly shown in Fig. 2, the pad extends only for a portion of the width of the plate 11, and the plate 11 extends only for a portion of the width of the drum. This pad on the inner face of the plate 11 is not for the purpose of absorbing moisture. It is purely for the purpose of providing a yielding contacting surface to cause a rolling and sliding of the cans on the drum.

The cans to be dried are indicated at C. When the cans are brought by the rotation of the drum against the guide plate 11, they will be caused to roll on the drum, as the guide plate 11 is stationary, and retards the movement of the outer point of the can. While the curvature of the plate 11 is about the same center as the drum, it is on a longer radius, and therefore, the cans as they roll along this stationary rail, will have a slight sliding and rolling contact with the pad on the drum. This also aids in the distribution of the moisture, the breaking up of the globular forms and the taking up of the moisture by the pad.

As a means for guiding the cans in their travel between the drum and the plate 11, guide rails 17 and 18 are provided. The cans are directed into the drier so that the closed bottom ends of the cans run along the guide rail 17 while the open ends run along the guide rail 18. The guide rail 18 is positioned so that the flange *c* of the can is positioned at the side edge of the pad (see Fig. 2) and the flange will extend down along the side edge of the pad, or possibly the pad at the corner edge thereof will yield so as to give space for the flange. By guiding the can so that the flange is at the edge of the pad, the can body will come down into contact with the pad all along the side face thereof, clear up to and close underneath the flange. These guide rails 17 and 18 are carried by an upper frame structure. The guide rail 17 is provided with openings 19 which extend all the way through the guide rail. Adjacent this guide rail is a chamber 20. This chamber 20 includes a front plate 21 adjacent the end of the can, which is provided with a series of openings 22. The chamber 20 may be attached to the upper frame structure in any suitable way. A pipe 23 leads to this chamber 20. Compressed air is supplied through the pipe 23, and thus air under pressure is continuously passing out through the openings 22, and is projected against the closed end of the cans as they pass along

this chamber 20. The air projected against the end of the can breaks up any moisture gathering in globular form thereon, and dislodges the moisture from the end of the can and thus aids in the drying of the can bottoms.

The guide rail 18 is provided with a series of openings 24 which are spaced along the path of travel of the cans, and these openings are in line with the path of travel of the centers of the cans. These openings 24 communicate with a chamber 25 mounted in the upper frame structure. A pipe 26 is connected to the chamber 25, and hot air is supplied through this pipe 26 to the chamber and out through the openings 24 so that as a can passes by these openings, the steam or hot air will be projected into the can, filling the interior of the can and heating the walls of the can. This greatly aids in the drying of the cans. It is, of course, understood that while a greater portion of the moisture is taken up by the absorbent pad, there will still be left a very slight portion of the moisture which is very finely distributed about the surface of the can, and the heating of the wall of the can aids in bringing about a perfect drying of the can after it has left the drying apparatus.

Associated with the drum is a wringer 27. This wringer so far as the operating of the roll of the same is concerned, is of the usual type of wringers. The wringer roll is mounted on bracket arms 28. A spring 29 presses the wringer roll 27 against the surface of the pad. This occurs at a point removed from the region where the cans make contact with the pad. The wringer roll pressing against the pad will squeeze or wring the water out of the pad which has been absorbed by the pad as it contacts with the cans.

The main frame 2 of the apparatus is provided with projecting arms 30 at the right of the drum as viewed in Fig. 1. This is the receiving side of the drum. There are also projecting arms 31 at the delivery side of the drum. The arms are provided with supporting pins 32 secured thereto by set screws 33. The upper frame structure is provided with forked bracket arms 34 which rest on these pins. This provides a very readily detachable support for the upper frame structure, as it may be quickly lifted from the pins which support the same.

The cans are delivered to the drying apparatus by a can chute 35. The can chute 35 is supported on a bracket 36 attached to a rod 37 carried by the bracket arms 30. This can chute 35 is inclined downwardly, and as the cans roll down the chute, they will come in contact with the drum. They make contact with the drum substantially at a horizontal line passing through the center of the drum. As the drum rotates, the cans will be lifted against the end of the inner pad on the arc-shaped plate 11, and will be caused to roll along the plate. The plate can be adjusted endwise so as to insure that the plate will be placed sufficiently close to the path of travel of the cans in the can chute as to be raised by the drum into contact with the pad on the plate. The cans are then caused to roll along the plate and also roll along the drum, and when they reach the other side of the drum from where they are received, they are discharged on to a can chute 38 which is mounted on a rod 39 attached to the bracket arms 31. This can chute 38 is slightly inclined downwardly so that gravity will direct the cans along the chute until they are again taken up by the usual conveying means associated with the can chutes.

From the above, it will be apparent that the cans are delivered continuously to the drying apparatus, and are automatically taken into the drying apparatus with little or no delay in the continuous travel. As the cans pass from the drying apparatus, they are rolled and slid in contact with the absorbing pad which takes up the moisture and distributes any moisture still clinging to the surface of the cans. The pad after passing through the region of contact with the cans, is squeezed by the wringer, and the moisture taken up thus removed to a large extent from the pad. As the cans pass through the drying apparatus, they are subjected to the air under pressure at the bottom ends, and the heated air also under pressure at the open ends, and this greatly increases the efficiency of the drying action of the cans.

It is obvious that minor changes in the details of construction and the arrangement of the parts may be made without departing from the spirit of the invention as set forth in the appended claims.

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

1. A drying apparatus for cans comprising a pad of absorbent material, means for moving said pad and means for imparting a combined rolling and sliding movement to the cans in contact with said pad.

2. A drying apparatus for cans comprising a pad of absorbent material, means for moving said pad and means for imparting a combined rolling and sliding movement to the cans in contact with said pad, said pad including a layer of absorbent material and a fabric covering therefor.

3. A drying apparatus for cans comprising a pad of absorbent material, means for moving said pad, means for imparting a combined rolling and sliding movement to the cans in contact with said pad, and means for directing hot air into the cans as they pass through the drying apparatus.

4. A drying apparatus for cans comprising

a pad of absorbent material, means for moving said pad, means for imparting a combined rolling and sliding movement to the cans in contact with said pad, means for directing hot air into the cans as they pass through the drying apparatus, and means for projecting air under pressure against the entire bottom of the can during the travel of the can through the drying apparatus.

5. A drying apparatus for cans comprising a pad of absorbent material, means for moving said pad, means for imparting a combined rolling and sliding movement to the cans in contact with said pad, means disposed along the path of travel of the series of cans for directing hot air under pressure into the open end of the can, and means extending along the path of travel of the can end for projecting air under pressure against the entire end of the can.

6. A drying apparatus for cans comprising a rotated drum, a pad of absorbent material surrounding said drum and rotating therewith, and means for holding the cans in contact with said drum and for causing the cans to rotate as the drum turns.

7. A drying apparatus for cans comprising a rotated drum, a pad of absorbent material surrounding said drum and rotating therewith, means for holding the cans in contact with said drum and for causing the cans to rotate as the drum turns, and means extending along the path of travel of the centers of the cans for projecting hot air into the cans.

8. A drying apparatus for cans comprising a rotated drum, a pad of absorbent material surrounding said drum and rotating therewith, means for holding the cans in contact with said drum and for causing the cans to rotate as the drum turns, means extending along the path of travel of the centers of the cans for projecting hot air into the cans, and means extending along the path of travel of the centers of the cans for projecting air under pressure against the bottom ends of the cans.

9. A drying apparatus for cans comprising a rotated drum, a pad of absorbent material surrounding said drum and rotating therewith, and means for holding the cans in contact with said drum and for causing the cans to rotate as the drum rotates, said pad including a layer of absorbent material and a covering of fabric.

10. A drying apparatus for cans comprising a rotated drum, a pad of absorbent material surrounding said drum and rotating therewith, means for holding the cans in contact with said drum and for causing the cans to rotate as the drum turns, and guides at the ends of the cans for guiding the cans so that the flange at the open end of the can overlies the edge of the pad whereby the pad makes contact with the inner surface of the can.

11. A drying apparatus for cans comprising a rotating drum, an absorbent pad extending circumferentially about said drum, with the ends of the pad slightly spaced, a fabric covering for said pad, the ends thereof extending around the ends of the pad and radially toward the center of the drum, yielding means connected to the ends of the fabric for holding said fabric tightly against said pad, and means for maintaining the cans in contact with the pad throughout a portion of the rotation of the drum.

12. A drying apparatus for cans comprising a rotating drum, an absorbent pad extending circumferentially about said drum, with the ends of the pad slightly spaced, a fabric covering for said pad, the ends thereof extending around the ends of the pad and radially toward the center of the drum, yielding means connected to the ends of the fabric for holding said fabric tightly against said pad, and means for maintaining the cans in contact with the pad throughout a portion of the rotation of the drum, said last-named means including a plate curved about the axis of the drum and having a yielding material on its inner face adapted to contact with the cans and cause the cans to roll on the drum.

13. A drying apparatus for cans comprising a rotating drum, an absorbent pad attached to the drum and extending about the same, a plate curved about the axis of said drum and spaced from the drum, a yielding pad on the inner face of said plate, and guides located between the plate and the drum for guiding cans between the plate and the drum with the cans in contact with both said plate and drum, whereby the rotation of the drum will cause the can to roll along the plate and said plate will cause the can to have rolling and sliding contact with the pad on the drum.

14. A drying apparatus for cans comprising a rotating drum, an absorbent pad attached to the drum and extending about the same, a plate curved about the axis of said drum and spaced from the drum, a yielding pad on the inner face of said plate, guides located between the plate and the drum for guiding cans between the plate and the drum with the cans in contact with both said plate and drum, whereby the rotation of the drum will cause the can to roll along the plate and said plate will cause the can to have rolling and sliding contact with the pad on the drum, and means for projecting hot air into the cans as they travel along the plate, and for projecting air under pressure against the bottom ends of the cans as they pass along said plate.

15. A drying apparatus for cans comprising a supporting frame, a drum mounted for rotation on said frame, a plate curved about the center of the drum, means carried by the frame for supporting said plate, said drum having an absorbent pad attached thereto

and extending about the drum, said plate having a yielding pad on its inner face, said plate being spaced from the drum so as to permit the cans to pass between the plate and the drum with the cans in contact both with the pad on the plate and the pad on the drum.

16. A drying apparatus for cans comprising a supporting frame, a drum mounted for rotation on said frame, a plate curved about the center of the drum, means carried by the frame for supporting said plate, said drum having an absorbent pad attached thereto and extending about the drum, said plate having a yielding pad on its inner face, said plate being spaced from the drum so as to permit the cans to pass between the plate and the drum with the cans in contact both with the pad on the plate and the pad on the drum, a can chute for directing cans against the drum at one end of said plate, and a can chute for receiving the cans located adjacent the other end of said plate.

17. A drying apparatus for cans comprising a supporting frame, a drum mounted for rotation on said frame, a plate curved about the center of the drum, means carried by the frame for supporting said plate, said drum having an absorbent pad attached thereto and extending about the drum, said plate having a yielding pad on its inner face, said plate being spaced from the drum so as to permit the cans to pass between the plate and the drum with the cans in contact both with the pad on the plate and the pad on the drum, a can chute for directing cans against the drum at one end of said plate, and a can chute for receiving the cans located adjacent the other end of said plate, the means for supporting said plate being free to move vertically on the frame.

18. A drying apparatus for cans comprising a supporting frame, a drum mounted for rotation on said frame, a plate curved about the center of the drum, means carried by the frame for supporting said plate, said drum having an absorbent pad attached thereto and extending about the drum, said plate having a yielding pad on its inner face, said plate being spaced from the drum so as to permit the cans to pass between the plate and the drum with the cans in contact both with the pad on the plate and the pad on the drum, a can chute for directing cans against the drum at one end of said plate, a can chute for receiving the cans located adjacent the other end of said plate, guiding rails located between the drum and the plate at each end of the path of travel of said cans for guiding the cans in their path of travel, a guide rail at the open end of the can having openings therethrough, and means for projecting hot air through said openings into the can bodies traveling along said rail.

19. A drying apparatus for cans comprising a rotated drum, an absorbent pad attached to and extending about said drum, a plate curved about the center of the drum and spaced therefrom, a yielding pad carried by said plate, a can chute for directing cans against the drum whereby said cans are carried against the plate and are caused to contact with the plate and drum and roll along the plate from one end thereof to the other, a can chute for receiving the cans when they leave the plate, said plate extending about one side of said drum, and a wringer roll located at the opposite side of the drum from said plate and yieldingly pressed against said pad for squeezing the water out of said pad.

In testimony whereof, we affix our signatures.

NORMAN H. GOLDSWORTHY.
GEORGE FLOOK.