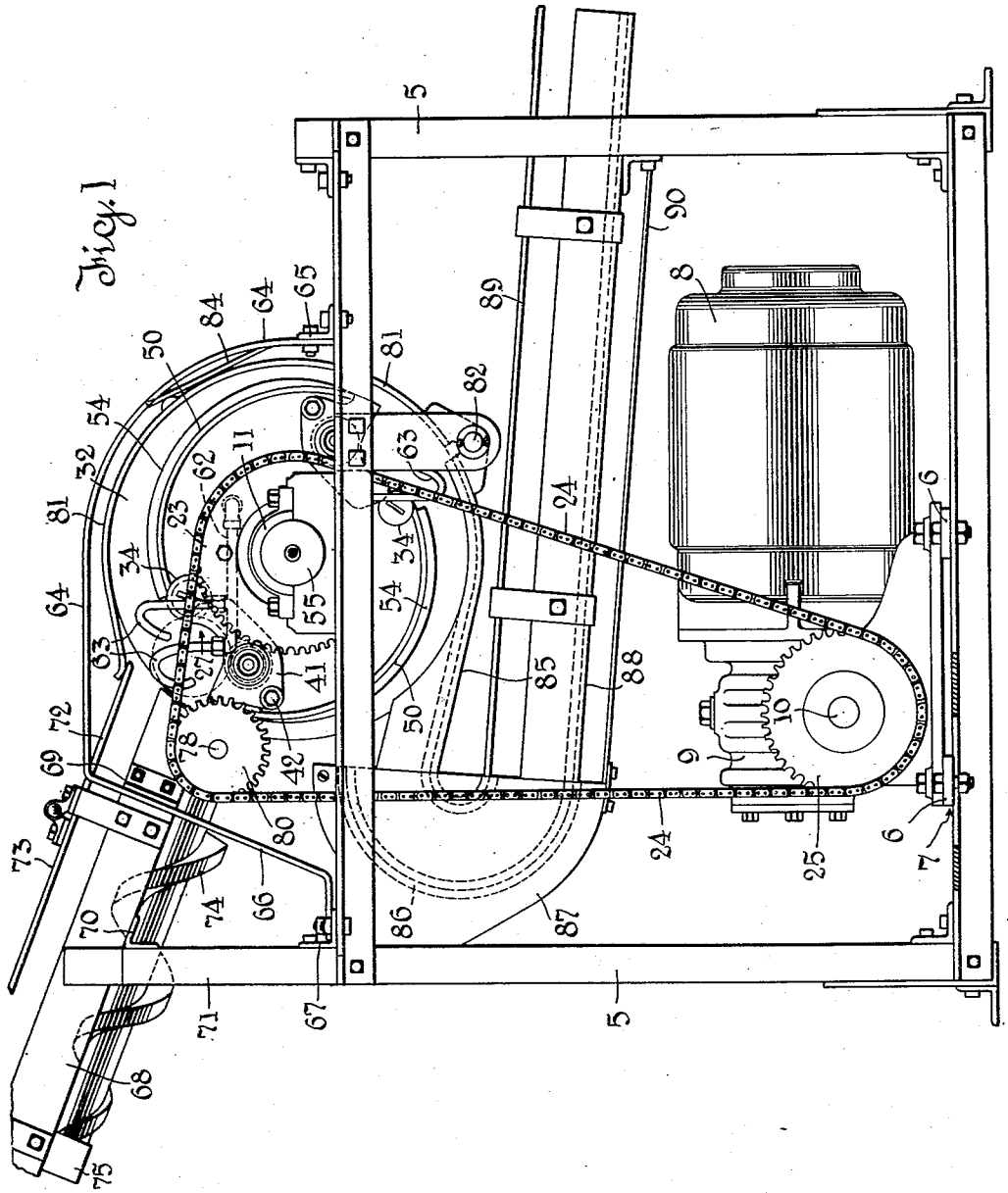
Dec. 27, 1938. H. L. MINAKER ET AL 2,142,001

APPARATUS FOR DRYING CANS

Filed Jan. 5, 1937 4 Sheets-Sheet 1

Fig. 1



Inventors
Herbert L. Minaker
and Lancelot Yarwood

By

Mason & Porter
Attorneys

Dec. 27, 1938. H. L. MINAKER ET AL 2,142,001

APPARATUS FOR DRYING CANS

Filed Jan. 5, 1937 4 Sheets-Sheet 2

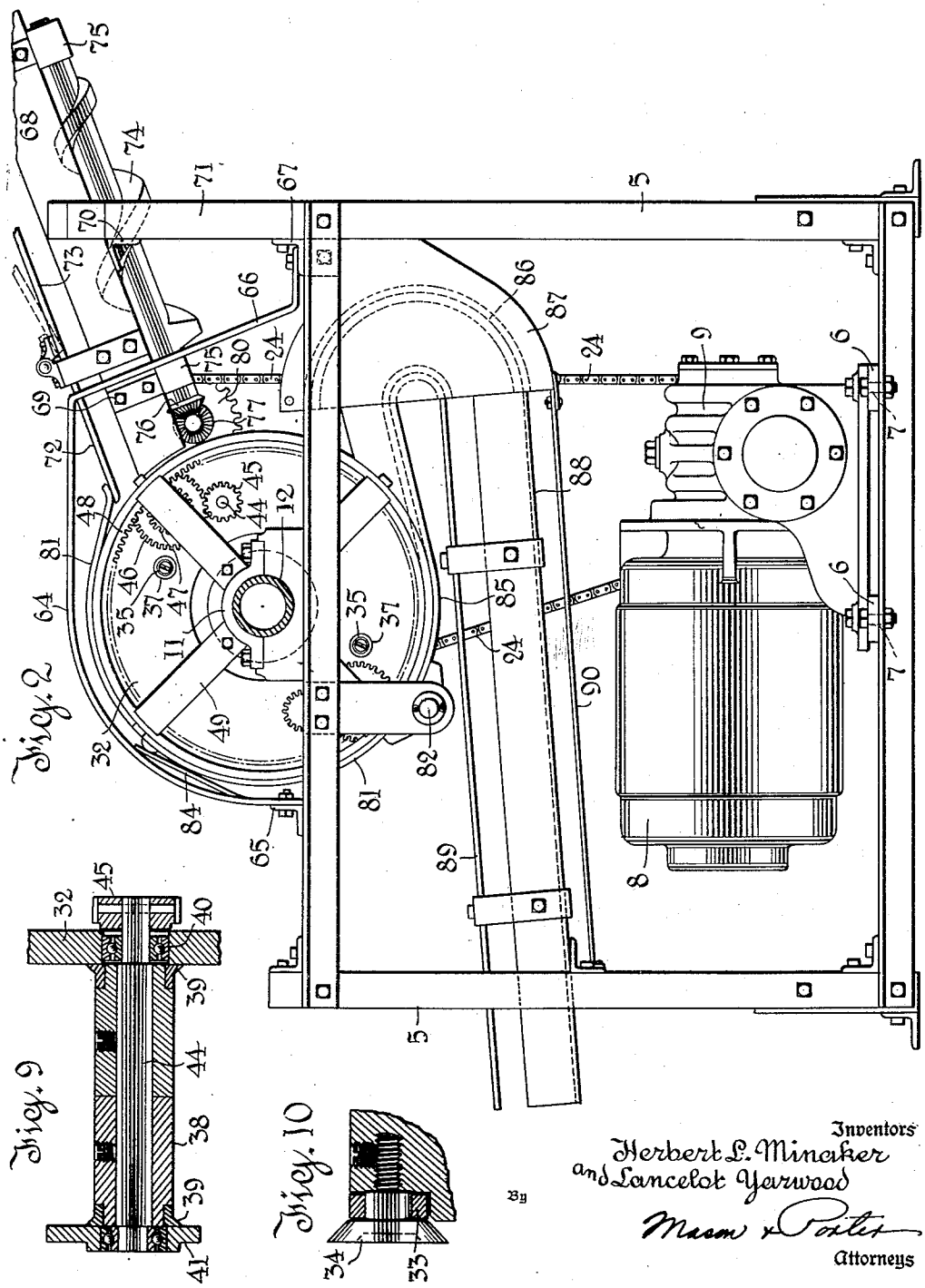


Fig. 2

Fig. 9

Fig. 10

Inventors
Herbert L. Minaker
and Lancelot Yarwood
By
Mason & Porter
Attorneys

Dec. 27, 1938. H. L. MINAKER ET AL 2,142,001

APPARATUS FOR DRYING CANS

Filed Jan. 5, 1937 4 Sheets-Sheet 3

Fig. 3

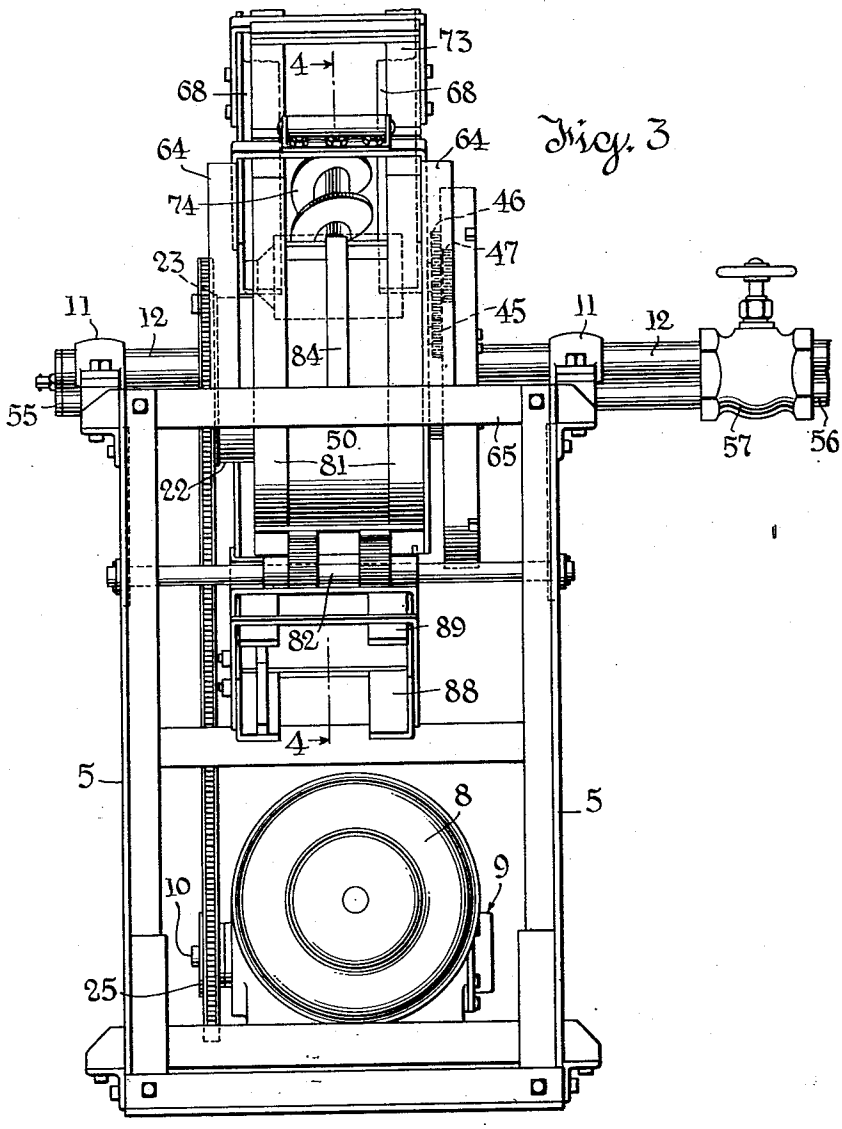
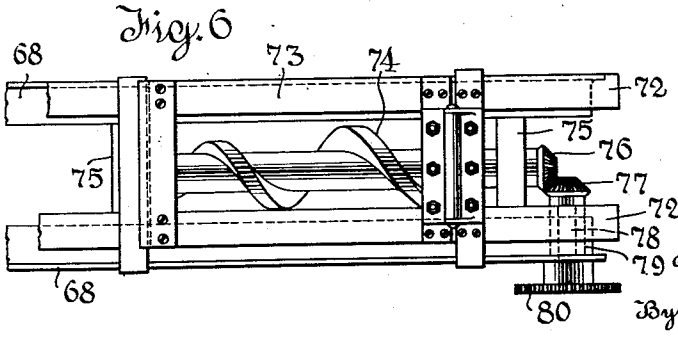


Fig. 6



Inventors
Herbert L. Minaker
and Lancelot Yarwood

By Mann & Porter
Attorneys

Dec. 27, 1938. H. L. MINAKER ET AL 2,142,001

APPARATUS FOR DRYING CANS

Filed Jan. 5, 1937 4 Sheets-Sheet 4

Fig. 4

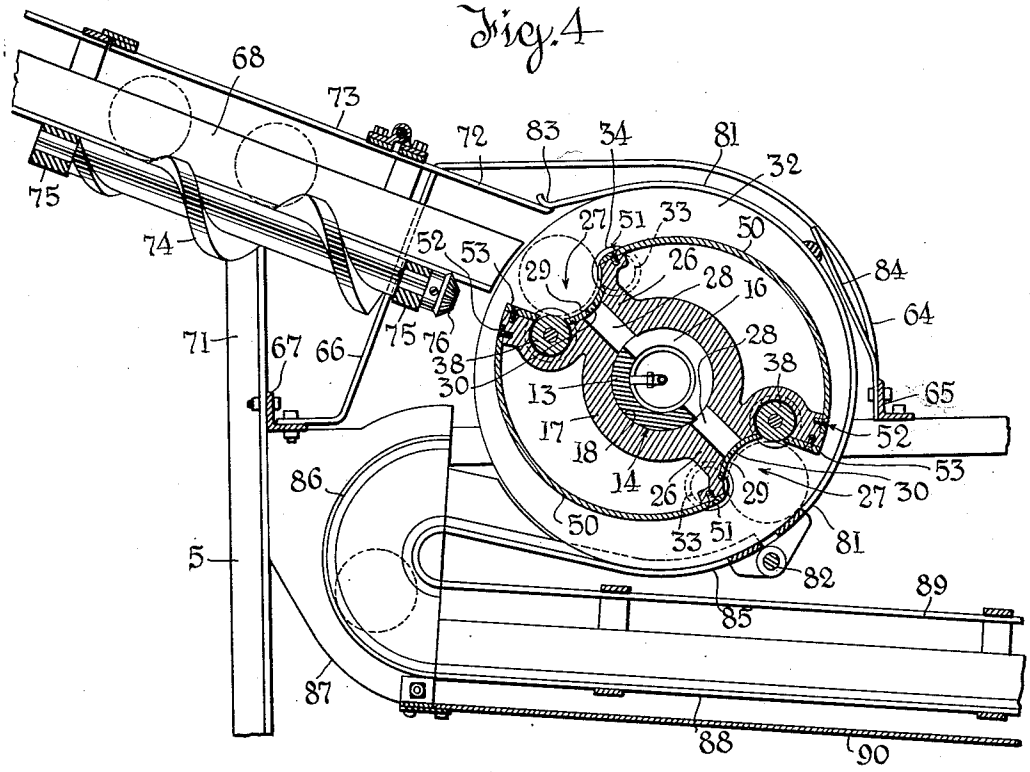


Fig. 5

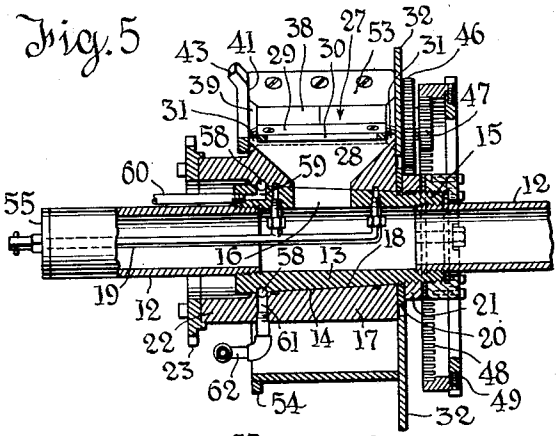


Fig. 7

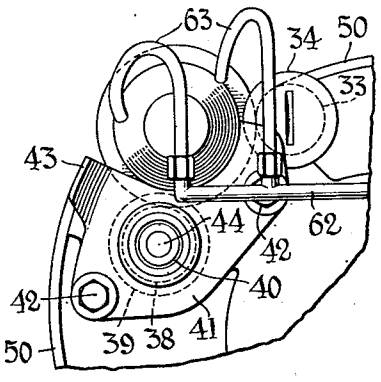
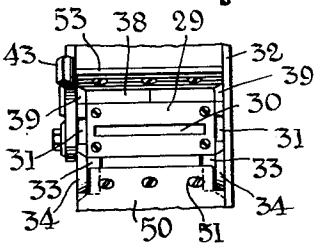


Fig. 8



Inventors
Herbert L. Minaker
and Lancelot Yarwood
By Mason & Porter
Attorneys

Patented Dec. 27, 1938 2,142,001

UNITED STATES PATENT OFFICE

2,142,001

APPARATUS FOR DRYING CANS

Herbert L. Minaker and Lancelot Yarwood, Syracuse, N. Y., assignors to Continental Can Company, Inc., New York, N. Y., a corporation of New York

Application January 5, 1937, Serial No. 119,164

19 Claims. (Cl. 34—4)

The invention relates generally to the art of canning and primarily seeks to provide a novel apparatus for drying cans the exteriors of which have been wetted during pasteurization.

While adapted to broader uses, the invention is designed principally for the drying of beer cans after they leave the pasteurizer, thus avoiding rusting of the cans and the wetting of the paper cartons in which they are packed.

In its more detailed nature, the invention resides in the provision of a delivery conveyor, a discharge conveyor, and an interposed rotor for transporting the cans individually from one conveyor to the other and for subjecting each can to a drying air treatment while being so transported.

Another object of the invention is to provide novel means for subjecting the cans to a combination vacuumized and compressed air treatment.

With the above and other objects in view that will hereinafter appear, the invention further resides in the novel details of construction and combination and arrangement of parts, first fully described in the following detailed description, then particularly pointed out in the appended claims, reference being had to the accompanying drawings.

In the drawings:

Figure 1 is a right side elevation.

Figure 2 is a left side elevation.

Figure 3 is a rear elevation.

Figure 4 is an enlarged detail vertical longitudinal section taken on the line 4—4 on Figure 3.

Figure 5 is a vertical cross section taken on the line 5—5 on Figure 4.

Figure 6 is a detail plan view of the delivery conveyor.

Figure 7 is an enlarged, somewhat diagrammatic right end elevation of a rotor pocket and a can therein in the process of being dried.

Figure 8 is a detail plan view illustrating one rotor pocket.

Figure 9 is a detail longitudinal section of one of the driver rollers.

Figure 10 is a detail longitudinal section of one of the idler rollers.

In the example of apparatus disclosed herein, we employ a frame generally designated 5 and which may be conveniently fabricated of angle iron members arranged to support the various parts of the apparatus.

Cross bars 6 are longitudinally-adjustably-secured at 7 upon the base and carry the motor 8 which comprises the power source of the apparatus. The drive shaft of the motor is connected, through any suitable speed reduction gear unit generally designated 9, with a driver shaft 10 from which power is applied to the driven parts of the apparatus in a manner to be described later.

Disposed transversely of the apparatus, in suitable clamp bearings 11, is a hollow shaft including sleeve-like end members 12 and a center shaft proper 13 of heavier construction and into the ends of which the members 12 are fitted. The hollow shaft portion 13 is provided with a tapered bearing surface 14, an externally threaded end extension 15, and a centrally disposed air port 16 which extends about approximately 180° of the circumference of said shaft portion.

A rotor body 17 having a tapered bearing bore 18 is rotatably supported upon the hollow shaft portion 13, and the tapered bearing surfaces 14 and 18 may be supplied with lubricant through the center of the shaft, as indicated at 19. The rotor body 17 may be secured upon the tapered shaft portion in any approved manner, as by use of the hardened bearing ring 20 and thrust collar and securing nut equipment 21 which cooperates with the threaded extension 15.

The rotor body 17 includes an annular flange or hub extension 22 which carries a sprocket 23, and rotation is imparted to the sprocket by the chain 24 which passes over it and the sprocket 25 fixed upon the drive shaft 10.

A plurality of arms 26 project radially from the rotor. Preferably there are two of these arms, disposed diametrically oppositely, and shaped at their ends to form individual can receiving and confining pockets 27. Each arm includes an air duct or passage 28 affording communication between the interior of the hollow shaft and the respective pocket. The bottom of each pocket is formed by a plate 29 which closes over the arm duct or passage and which has formed therein a narrow central slot 30 extending transversely of the rotor, or in a direction parallel to the axis of said rotor. The plate 29 terminates short of each end of the pocket with which it is associated to form at each said end a longitudinal slot 31 positioned to line up with an end of a can carried in said pocket.

At one side of the rotor the pockets are completed by a wall ring 32 which may be secured to the arms 26. A pair of idler rollers 33, flanked by can centering flanges 34, are removably secured at 35 to each arm in the ad-

vance wall of the pocket thereof, in arm recesses 36. The bearing unit at the wall ring side of the pocket is accessible through a suitable opening 37 formed in the wall ring 32.

In the trailing wall of each pocket is mounted a driver roller 38, and these rollers also include flared ends or can centering flanges 39. Each driver roller is mounted in a pair of ball bearing units 40, one thereof being mounted in the wall ring 32 and the other in a special bearing member 41 removably secured at 42 to the rotor at the side of the respective pocket opposite the wall ring. Each of the members 41 includes a lateral stop lug extension 43 which tends to prevent lateral displacement of cans which are being deposited into the respective pocket.

The shaft 44 of each driver roller 38 extends through the wall ring 32 and carries a pinion 45 which meshes with a relatively large intermediate gear 46 supported on a stud carried by the wall ring. A smaller pinion 47 is rotatable with the intermediate gear 46 and engages a rim gear 48 stationarily secured as at 49 to the stationary shaft.

The periphery of the rotor is completed by feed surface plates 50, one such plate being mounted to bridge each gap intervening two arms 26. Each plate is secured at a low point, as at 51, at the advance side of one pocket, and at a high point, as at 52, at the trailing side of the preceding pocket. The plates thus constitute eccentric trackway portions or rotating inclines down which cans being fed into the pockets are gradually lowered into said pockets. The trailing wall of each pocket is in the nature of an abutment shoulder and is equipped with a removable wear plate 53. At the edge thereof opposite the wall ring engaging edge, each plate carries a guard flange 54 for preventing lateral displacement of cans engaging said plates.

One end of the stationarily supported center shaft is closed by an end cap 55, and the other end is connected as at 56 to any suitable evacuated area or vacuum source (not shown), a suitable cut off valve 57 being interposed in said connection.

Registering annular grooveways 58 are formed in the opposed rotor and shaft portion surfaces, and compressed air is directed into the grooveways through the duct 59 formed in the shaft portion 13 and the supply pipe 60 leading to any suitable source of air under pressure (not shown). A delivery duct 61 is formed in the rotor hub 22 for cooperation with each pocket. Each duct 61 serves to deliver compressed air from the grooveways 58 into a delivery pipe 62 and two nozzles 63 disposed at the end of the respective pocket fitted with the special bearing member 41. The nozzles 63 are positioned to direct two converging streams or blasts of compressed air against the head end of a can positioned in the respective pocket and in the general direction of the openings 30 and 31 in the bottom of said pocket.

Laterally spaced support bars 64 partially encircle the rotor and have their rear ends secured to the transverse frame bar 65, and their front ends, bent to form support standards 66, are secured to the transverse frame bar 67.

The delivery ends of the downwardly inclined delivery track or conveyor 68, composed of laterally spaced angle irons, is bracket-secured as at 69 to the support standards 66, and this conveyor is also supported on the cross angle 70 carried at the upper ends of the vertical frame extensions 71. The conveyor 68 includes upper guard bars 72 which include a hinged gate section 73 through which access may be had to cans on said conveyor.

A can feed timing screw 74 is associated with the conveyor, being rotatable in bearings 75 supported on the conveyor rails. The screw shaft carries a bevel gear 76 meshing with a like gear 77 secured upon the transverse shaft 78 rotatable in bearings 79 supported by the conveyor and equipped with a sprocket 80 driven by the chain 24 hereinbefore referred to. The screw 74 serves to space and time the rolling of the cans down the conveyor 68 so that each can is lowered against a feed surface plate 50 substantially at the highest portion thereof, or just after a rotor pocket has passed the delivery end of the conveyor. The can thus deposited against the feed surface plate is gradually lowered into the approaching rotor pocket substantially without shock.

Cans received in the rotor pockets are held therein by suction created by a vacuum induced air stream at atmospheric pressure. Supplementary guard rails 81 are provided, however, and extend concentrically about approximately 180° of the circumference of the rotor, or from the point at which the cans enter the pockets to approximately the point at which the suction grip on the cans is released. At the guard rail terminus the rails are supported on a cross pin 82, and at the other end the rails are curved and rest against the conveyor guard bars 72 as indicated at 83. The guard rails 81 are yieldably held in the position stated by a spring 84.

The cross pin 82 also supports the receiving ends of an angle iron discharge conveyor section 85 which receives the cans when they are released from the rotor pockets and guides them into an elbow 86 preferably closed at the sides by shield plating 87, and which directs the cans forwardly onto the downwardly inclined discharge conveyor 88 likewise formed of laterally spaced angle irons. The conveyor 88 may also include upper guard bars 89, and the portion thereof overlying the motor 8 preferably is equipped with shield plating 90. Obviously other portions of the apparatus may be shielded with enclosing plates if desired.

As the cans roll one by one down the delivery conveyor, spaced and retarded or timed by the screw 74, each is delivered in contact with a high point surface on the rotor just beyond a receiving pocket thereof and is gradually lowered into the next rotor pocket by rolling contact with the respective feed surface plate 50 in the manner hereinbefore described.

The cans fit the pockets snugly with only sufficient surface clearance to assure free movement and surface moisture removal. The rotor 17 is rotated relatively slowly but this movement is sufficient to impart relatively rapid rotation to the driver rollers 38 in the manner previously described. The cans lie on their sides in the pockets 27, with their end flanges supported on the driving and idler rollers 38, 33 and, preferably, with their head or capped ends toward the right side of the machine, or toward the pocket ends opposite the wall ring 32.

While centrifugal force can be made effective to throw off excess moisture it is not our purpose to rely upon this means to dry the exteriors of cans in our improved apparatus. It will be obvious that if the excess moisture is centrifugally or otherwise thrown off the can surfaces into the surrounding atmosphere a misty environment will

thus be created which will be anything but conducive to rapid drying of the cans. In our improved apparatus the rotation of the cans preferably serves to concentrate moisture at the flanges and in position for the more effective and desirable removal by suction, or rather by the utilizing of vacuum-induced air current.

The references herein made to treatment in or by vacuum-induced air current are to be understood as referring to the subjecting of the cans to treatment or contact in or by a vacuum induced air stream at atmospheric pressure.

Just after the rotor moves away from the position at which a can is introduced into a receiving pocket thereof, the air ports or passages 16 and 28 register and a vacuum-induced air current rushes into the pocket about the exterior of the revolving can. Excess moisture from the body portion of the can is carried off through the elongated transverse slot 30, and moisture from the can ends is carried off through the longitudinal slots 31 with which they are aligned.

The air ports or passages 16 and 28 remain in communication for about 180° of rotation of the rotor, and during this time the cans are being dried by vacuum-induced air treatment, the excess moisture being conducted away through the hollow shaft so that fresh, relatively dry air constantly is being employed in the drying treatment of the cans. During the 180° of rotor movement comprising the drying period with respect to a given can, the rotating can is held in the pocket by suction, or more accurately, by the force of air inrushing at atmospheric pressure. Upon completion of this interval of movement the communication through the passages 16 and 28 is broken and the can is released from the carrying pocket and permitted to pass onto the discharge conveyor.

While travelling in the rotor pockets the head or capped ends of cans are subjected to steady blasts of compressed air from the nozzles 63. The two spaced nozzles associated with each pocket direct converging jets of air inwardly against the head ends of the cans, tending to concentrate the surface moisture thereon adjacent the longitudinal pocket groove 31 and thus facilitate its removal through said groove.

After the dried cans are released from the rotor pockets they are received on the discharge track section 85 and propelled by the rotor into the elbow section 86 from whence they move onto and along the downwardly inclined discharge tracks 88.

From the foregoing it will be clear that in our improved apparatus, the cans are deposited in confining pockets, conveyed through space and at the same time rotated about their axes, and while in said pockets subjected to a combined treatment of compressed and vacuum-induced air currents, the latter serving to carry off surface moisture, away from the drying zone, and also to hold the cans in the confining pockets.

In the foregoing description, we have described one form of apparatus adaptable to the accomplishment of the purposes of our invention. It is to be understood, however, that various modifications in construction and arrangement may be made without departing from the spirit and scope of the invention as pointed out in the appended claims.

What we claim is:

1. In can drying apparatus, a single conveyor having a pocket for receiving a can and shaped to conform substantially to and closely embrace a considerable portion of the external contour of the can, means for moving the conveyor through space, and means effective during travel of said conveyor for opening communication between said pocket and an evacuated chamber to subject the external surface of a can in said pocket to a vacuum-induced air current.

2. In can drying apparatus, a single conveyor having a pocket for receiving a can and shaped to conform substantially to and closely embrace a considerable portion of the external contour of the can, means for moving the conveyor through space, means effective during travel of said conveyor for opening communication between said pocket and an evacuated chamber to subject the external surface of a can in said pocket to a vacuum-induced air current, and means in said pocket for rotating the can.

3. In can drying apparatus, a travelling conveyor having a confining pocket for receiving a can, means effective during travel of said conveyor for opening communication between said confining pocket and an evacuated chamber to subject the external surface of a can in said pocket to a vacuum-induced air current, and means movable with the conveyor for subjecting the can to a blast of compressed air.

4. In can drying apparatus, a single conveyor having a pocket for receiving a can and shaped to conform substantially to and closely embrace a considerable portion of the external contour of the can, means for moving the conveyor through space, means effective during travel of said conveyor for opening communication between said pocket and an evacuated chamber to subject the external surface of a can in said pocket to a vacuum-induced air current, means in said pocket for rotating the can, and means for subjecting the travelling and rotating can to a localized blast of compressed air.

5. In can drying apparatus, a single conveyor having a pocket for receiving a can and shaped to conform substantially to and closely embrace a considerable portion of the external contour of the can, means for moving the conveyor through space, means effective during travel of said conveyor for opening communication between said pocket and an evacuated chamber to subject the external surface of a can in said pocket to a vacuum-induced air current, and means operable by movement of said conveyor for imparting rotation to the can in said pocket.

6. A can drying apparatus comprising, a frame, a hollow constantly evacuated shaft supported on said frame, a rotor supported on and rotatable about said shaft and having a pocket for receiving a can and shaped to conform substantially to and closely embrace a considerable portion of the external contour of the can and an air duct communicating between the pocket exteriorly of a can therein and with the interior of the shaft, means for delivering cans to said rotor, and means for discharging cans from said rotor.

7. A can drying apparatus comprising, a frame, a hollow evacuated shaft supported on said frame, a rotor rotatable about said shaft and having a confining pocket for receiving a can and an air duct communicating between the pocket and the interior of the shaft and including a cross slot in the bottom of said pocket and a longitudinal slot in each end of the pocket for registering with an end of a can in said pocket, means for delivering cans to said rotor, and means for discharging cans from said rotor.

8. A can drying apparatus comprising, a frame, a hollow evacuated shaft supported on said frame, a rotor rotatable about said shaft and having a confining pocket for receiving a can and an air duct communicating between the pocket and the interior of the shaft and including a cross slot in the bottom of said pocket and a longitudinal slot in each end of the pocket for registering with an end of a can in said pocket, means for imparting rotation to a can when disposed in said pocket, means for delivering cans to said rotor, and means for discharging cans from said rotor.

9. A can drying apparatus comprising, a frame, a hollow evacuated shaft supported on said frame, a rotor rotatable about said shaft and having a confining pocket for receiving a can and an air duct communicating between the pocket and the interior of the shaft and including a cross slot in the bottom of said pocket and a longitudinal slot in each end of the pocket for registering with an end of a can in said pocket, means for imparting rotation to a can when disposed in said pocket, means movable with the rotor for subjecting a can in said pocket to a blast of compressed air, means for delivering cans to said rotor, and means for discharging cans from said rotor.

10. A can drying apparatus comprising, a frame, a rotor supported on the frame, and having can receiving and confining pockets therein, means for rotating the rotor, means in each pocket for rotating a can therein, means for subjecting the exterior surfaces of the cans to localized negative and positive pressure air treatment in said pockets, means for delivering cans to said rotor, and means for delivering cans from said rotor.

11. A can drying apparatus comprising, a frame, a rotor supported on the frame, and having can receiving pockets therein, means for rotating the rotor, means for subjecting the exterior surfaces of the cans to air treatment in said pockets, means for delivering cans to said rotor, and means for delivering cans from said rotor, said rotor including eccentrically disposed peripheral surfaces leading to said pockets contacted by delivered cans and effective to gradually lower each can into its receiving pocket.

12. A can drying apparatus comprising, a frame, a rotor supported on the frame, and having can receiving pockets therein, means for rotating the rotor, means for subjecting the exterior surfaces of the cans to air treatment in said pockets, means for delivering cans to said rotor, and means for delivering cans from said rotor, said rotor including eccentrically disposed peripheral surfaces leading to said pockets contacted by delivered cans and effective to gradually lower each can into its receiving pocket, and said delivery means including a delivery controlling screw operable in timed relation with said rotor to deliver each can for initial engagement at a high point on one of said peripheral surfaces.

13. A can drying apparatus comprising, a frame, a rotor supported on the frame, and having can receiving pockets therein, means operable by movement of the rotor for imparting rotation to cans in said pockets, means for subjecting the exterior surfaces of the cans to vacuum-induced air and compressed air treatment in said pockets, means for delivering cans to said rotor, and means for delivering cans from said rotor, said rotor including eccentrically disposed peripheral surfaces leading to said pockets contacted by delivered cans and effective to gradually lower each can into its receiving pocket, and said delivery means including a delivery controlling screw operable in timed relation with said rotor to deliver each can for initial engagement at a high point on one of said peripheral surfaces.

14. A can drying apparatus comprising, a frame, a hollow evacuated shaft supported on said frame, a rotor rotatable about said shaft and having a plurality of peripheral pockets each having duct equipment for at times communicating with the interior of said shaft, roller equipment for supporting a can in each pocket, means operable by rotation of said rotor for imparting rotation to said roller equipments to rotate cans supported thereon, said rotor including eccentrically disposed peripheral surfaces leading to said pockets, means for delivering cans to said rotor including a delivery controlling screw operable in timed relation with said rotor to deliver each can for initial engagement at a high point on one of said peripheral surfaces and thereby effect a gradual lowering of the can into its receiving pocket, and means for discharging cans from said rotor.

15. In can drying apparatus, a shaft, a rotor rotatable about said shaft and having a can receiving pocket therein, a compressed air duct formed between the engaging surfaces of said rotor and said shaft, a nozzle positioned for delivering a blast of compressed air against an exterior portion of a can in said pocket, and means for delivering compressed air to said duct and from said duct to said nozzle.

16. In can drying apparatus, an evacuated shaft having a wall opening extending a distance about the circumference of the shaft, means through which the evacuated condition of the shaft is maintained and a rotor rotatable on said shaft and having a peripheral can confining pocket and a duct for communicating between the pocket and the interior of the shaft through said wall opening to subject a can in the pocket to a treatment of vacuum-induced air effective to hold the can in the pocket and dry the exterior thereof during such communication and to release the can from the pocket when the communication is broken by each termination of the wall opening.

17. In can drying apparatus, an evacuated shaft having a wall opening extending a distance about the circumference of the shaft, means through which the evacuated condition of the shaft is maintained and a rotor rotatable on said shaft and having a peripheral can confining pocket and a duct for communicating between the pocket and the interior of the shaft through said wall opening to subject a can in the pocket to a treatment of vacuum-induced air effective to hold the can in the pocket and dry the exterior thereof during such communication and to release the can from the pocket when the communication is broken by each termination of the wall opening, said duct opening into said pocket through a transverse slot in the bottom of the pocket and a longitudinal slot at each end of said pocket in position for registering with an end of a can in said pocket.

18. In can drying apparatus, an evacuated shaft having a wall opening extending a distance about the circumference of the shaft, means through which the evacuated condition of the shaft is maintained, a rotor rotatable on said

shaft and having a peripheral can confining pocket and a duct for communicating between the pocket and the interior of the shaft through said wall opening to subject a can in the pocket to a treatment of vacuum-induced air effective to hold the can in the pocket and dry the exterior thereof during such communication and to release the can from the pocket when the communication is broken by each termination of the wall opening, and means movable with the rotor for directing a blast of compressed air into said pocket.

19. In can drying apparatus, an evacuated shaft having a wall opening extending a distance about the circumference of the shaft, means through which the evacuated condition of the shaft is maintained, a rotor rotatable on said shaft and having a peripheral can confining pocket and a duct for communicating between the pocket and the interior of the shaft through said wall opening to subject a can in the pocket to a treatment of vacuum-induced air effective to hold the can in the pocket and dry the exterior thereof during such communication and to release the can from the pocket when the communication is broken by each termination of the wall opening, means movable with the rotor for directing a blast of compressed air into said pocket, and means in said pocket for imparting rotation to a can in said pocket.

HERBERT L. MINAKER.
LANCELOT YARWOOD.