This invention relates to improvements in can end drying machines and it has reference more particularly to driers of that type wherein can ends, with a sealing compound freshly applied to their flanges, are arranged, slightly spaced, in stacks and the stacks are supported vertically by a rotating carrier and, while being rotated with the carrier, are caused to be progressively advanced upwardly through a drying chamber and the dried ends to be displaced from the upper ends of the stacks as they emerge from the chamber, and delivered into a chute through which they pass to a place for packaging or use.

Explanatory to the present invention it will here be stated that heretofore it has been the practice in use of machines of the above type, to cause the can ends to be displaced from the upper ends of the upwardly moving and rotating stacks by coming into direct contact with a member fixed to a stationary or relatively stationary part of the machine and thus to be laterally displaced from the stack and directed into the delivery chute. Such a method and means of displacement is illustrated and described in U. S. Patent #1,682,371 issued on March 13, 1929 to Nelson Troyer et al. It has been found necessary however, when the ends are deep drawn, to effect a positive separation of each end from the one that is next lower on the stack, thus to avoid jams or other difficulties that are possible by reason of lateral ejection without first unm Prestating the above it has been the principal object of the present invention to provide means associated with the respective stack elevating means and operable in synchronism with the delivery of can ends thereto, whereby the dried ends will be positively and individually lifted from the upper ends of the stacks as they reach the delivery point clear and free from the stack to a position at which it will, incident to rotation of the assembly, be brought into contact with a stripper member which detaches it from the cup and ejects it into the delivery chute.

Another object of the invention is to provide simple and effective means for actuating the several suction pads in synchronism with rotation of the assembly.

Still further objects reside in the details of construction and combination of parts embodied in the invention and in their mode of operation, as will hereinafter be fully described.

In accomplishing these and other objects, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a front elevation of a mechanism embodying the present invention as applied to the upper end portion of a can end drier.

Fig. 2 is a sectional view of the same, taken in a vertical plane through the axial line of the drier.

Fig. 3 is a horizontal section taken on the line 3—3 in Fig. 2.

Fig. 4 is a horizontal section taken on the line 4—4 in Fig. 2.

Fig. 5 is a sectional detail taken on line 5—5 in Fig. 3.

Referring more in detail to the drawings—

In its general form the type of drier with which the present mechanism is associated is that of the Troyer patent before mentioned and comprises an upright, cylindrical chamber, or drum, into which the circular can ends 2 are delivered 30 for drying. To expedite the drying operation, the chamber may be interiorly heated by heating means therein or by heated air discharged thereinto. The can ends 2 are successively delivered, with a sealing compound freshly applied to their peripheral flanges, into the drying chamber at its lower end and are there taken up between the lower ends of parallel, vertical elevating screws 3 rotated about their own axes in synchronism with the rate of delivery of can ends 40 thereto so that the threads of adjacent screws will supportingly engage the can ends and cause them to be progressively elevated through the drying chamber. Preferably the several screws would be parallel and arranged in equal spacing 45 and at equal radial distances from a central vertical axis about which the several screws bodily rotate. Thus, provision is made for supporting stacks of can ends about the central axis and between each two adjacent screws as is seen in Fig. 3.

In the present illustration, I have not shown the drying chamber in detail nor have I illustrated the means for supporting the several screws and for causing them to rotate on their
5 axes while the assembly is rotated on its axis. I have, however, illustrated the upper end portion of the chamber and the means whereby the axes are rotatably mounted and held in proper spacing relative to each other and to the chamber wall; it being understood that outside of what is herein shown the machine may be like that of the patent above-mentioned.

As seen best in Fig. 2, the upper end of the cylindrical drying chamber 1 is equipped with a ring like collar 5 to give it strength and rigidity. Erected on this collar in regular spacing are vertical posts 6 for the support of mechanism presently described, and these posts have rollers 7 mounted thereon within which a circular frame 8, keyed coaxially on the central or axial driving shaft 9 of the machine, is located.

The upper ends of the several screws 3 have portions 3a of reduced diameter revolvably contained in sockets 20 in the frame 8, as shown in Fig. 5, thus to retain the screws in proper spacing. Also, the frame 8, as shown in Figs. 2 and 3, has circular openings 10 therethrough for the upward travel of the stacks of can ends advanced upwardly between the rotating screws.

It is to be explained also that the several screws are revolvably supported at their lower ends in a base plate that is fixed to and revolved by the shaft 9. Also, that means is provided whereby for each rotation of the mechanism bodily about the shaft 9, the screws are caused to rotate once on their own axes. Thus, when a can end is delivered to the lower end of a stack between the lower ends of adjacent screws, it will be picked up by the threads of these two screws and while the shafts are carried about the central axis of the unit, they will rotate about their own axes and thus elevate the can end a distance equal to the pitch of the threads and thus clear the space for entrance of the next can end fed to the screws.

The axial or driving shaft 9 of the assembly has an extension 9a of reduced diameter at its upper end on which a casting or head 11 is mounted to be rotated by the shaft. This head 11 comprises sets of vertically aligned bearings 11a—11b in which tubular shafts 12 are revolvably contained. These shafts 12 are equal in number to the number of stacks of can ends and are coaxially in alignment with the stacks, and each shaft is equipped at its lower end with a suction pad 13 adapted to be brought flatly against the top of the stack of can ends with which it is aligned.

The upper end of each of the tubular shafts 12 is connected through the medacy of a flexible tube 15 with an opening 16 in a manifold 17 which, in turn is connected by a pipe 18 with a source of vacuum. The manifold 17 is formed in the upper end of a post 20 threaded onto the upper end of shaft 9a and the pipe 18 has a packed rotatable connection as at 21 with the manifold and is coaxial of the shaft 9a and post so that the latter parts may freely rotate relative thereto.

As will be observed in Figs. 1 and 2, the posts 6 mount a horizontal, ring like frame 24 that encircles the lower end portions of the several shafts 12 and this ring is formed on its upper side concentrically about the shaft 9a with a circular cam flange 29 which has a gradually rising surface 86a from one point to a point diametrically opposite, as seen in Fig. 2, and then for a part of the circle has a horizontal surface 26b, as seen in Fig. 1, and then a downwardly inclined surface as at 26c leading to the lower point of the cam.

Fixed on each of the tubular shafts 12 between the bearings 11a—11b is a block 26 having a spindle portion 27 mounting a cam roller 28. The several cam rollers are arranged to follow upon the cam ring 26 as the mechanism is rotated by the screw 29. This roller is rotated by each shaft 12 and will be reciprocally actuated in a manner to cause its suction pad to be lowered against the stack of can ends beneath it, then to be raised by reason of suction in the pad, to lift the top end 2 from the stack as seen at the left side in Fig. 2. This suction is maintained at all times in connection with the source of vacuum through tubes 15 and pipe 18.

At the upper end of each shaft 12 a block 30 is fixed and these blocks rigidly mount standards 31 with inwardly and downwardly turned upper ends 31a to which coiled springs 32 are attached and placed under tension to pull downwardly thus to hold the cam rollers 26 firmly against the cam 26 as the mechanism rotates about its axis. The lower ends of the springs 32 are attached to the upper ends of rods 23 mounted vertically in the head casting 18 and which serve as guides for the blocks 26 in their vertical movement.

Vertical rods 33 are mounted above the cam ring 24 as extensions of the posts 6, and these rods support a horizontal frame 35 at their upper ends overlying the mechanism and serving as a support in which the suction pipe 18 is fixed and secured against rotation. Incident to rotation of the assembly within the machine, the can ends that are lifted from the upper ends of their respective stacks are brought successively into contact with a stripper arm 38 that is fixed to a block 39 attached to the under side of frame disk 24. This arm 38 extends horizontally into the line of travel of the lifted can ends in position that the ends on contact therewith will be displaced thereby from their suction pads, but the pads pass over the arm. Centripetal force then carries the ends, when thus displaced, into a delivery chute 40 having its upper end located adjacent the point of displacement and down which the ends slide to a point of use or to a 45 container for packaging.

In order that the can ends may not be delivered flatly upon the bottom of the chute and their inertia thus checked to an extent which might cause them to stop on the chute and cause a piling up of ends, a wire 41 is stretched horizontally across the top of the rotating assembly at a position below the can end at its time of release from the suction pad and also so located that the ends on falling on the wire will be tilted downwardly and forwardly and fall into the chute on their forward edge and thus not be retarded in their delivery to any material extent.

The wire as seen in Fig. 3 is attached at its ends to a bracket 42 on a post 6 and to the inner 40 end of arm 38.

With the parts so constructed and assembled, it is quite readily apparent that, incident to rotation of the assembly about the central axis and the feeding of can ends to the stack elevating screws, the can ends will be delivered in stacks into the vertical openings 11 of the end frame 8, and that, as the stacks are elevated to approximately the level of the upper ends of these openings, the uppermost end in each stack 70 will, as it is equipped with the cam roller 28 off by its corresponding suction pad; the pad being actuated synchronously with rotation of the machine by the reciprocal action imparted to the tubular shafts 12 by the cam rollers 28 traveling...
along the cam 25. Contact of the can ends, while held in elevated position, with the stripper arm 38 causes them to be detached from their pads and discharged, falling first on the wire 41 and thereby lifted so that they fall in the chute on their forward edge, thus not to materially retard their force of delivery.

The present device lifts the ends from nested relation prior to lateral ejection and affords a positive means of removing the ends from their stacks, one at a time, and thus prevents jams in the machine and all possibility of damage to the ends incident to removal.

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

1. The combination with a machine including means whereby a stack of can ends may be continuously and progressively advanced to a point of delivery, of a suction pad, a pad support reciprocally operable to actuate the pad against and away from the stack thereby on each successive movement away from the stack to displace the uppermost end therefrom, a delivery chute and means arranged to engage the can ends when lifted by the pad, to effect their displacement from the pad into the delivery chute.

2. The combination with a machine including a means whereby a stack of can ends is continuously and progressively elevated while the stack is rotating about an axis parallel thereto, of a suction pad, a support for the pad aligned with the stack above its upper end, means for reciprocally actuating the support to cause said pad to move against, then upwardly from the stack, thereby on each upward movement to elevate the uppermost can end from the stack, and a relatively stationary member against which the ends, when lifted, are caused to engage thereby to be displaced for delivery from the machine.

3. The combination with a machine including a rotating carrier whereby a stack of can ends is progressively elevated to a point of discharge while rotating with the stack about the said axis, means for reciprocally actuating the support to cause the pad to be moved against and then upwardly from the stack and thereby to lift the uppermost end from the stack with each upward movement, a delivery chute, and a stripper member against which the can ends while lifted will engage for displacement from the pad into the chute.

4. The combination with a rotating carrier whereby a stack of can ends is rotated about an axis parallel thereto and progressively elevated to a discharge level while being rotated, of a suction pad, a reciprocally movable support for the pad, a cam ring coaxial of the axis of rotation of the carrier, a cam follower on the reciprocally movable support engaging the cam for actuating the support to move the pad against and away from the stack and thereby with each upward movement to lift off the uppermost end of the stack, a delivery chute and a stripper located in position to engage with the lifted ends thereby to displace them from the pad into the delivery chute.

5. The combination with a machine including a carrier rotatable about a vertical axis and including means for supporting a plurality of stacks of can ends for rotation about said axis and whereby said stacks are progressively elevated as they are rotated to a discharge level, of a frame supported above and rotating with said carrier, suction pad supports aligned with each of the stacks and vertically reciprocable in the said frame, a suction pad in each support and movable thereby against and upwardly from the stack and thereby with each upward movement to lift a can end from the stack, a cam ring concentric of the axis of rotation, a cam follower for each pad support operable along the cam as the frame rotates, to reciprocally actuate the support, a delivery chute and a stripper wire drawn across the path of travel of the lifted can ends to displace them from the pads into the delivery chute.

6. A device as in claim 5, wherein each of said pads has continuous connection with a source of vacuum.

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