METHOD AND APPARATUS FOR CURLING CAN COVERS

Filed Nov. 30, 1927

4 Sheets—Sheet 4
This invention relates in general to the preparation of can covers for double seaming with can bodies, and has more particular reference to the curling of the flanges of can ends or covers to permit easier automatic feeding in subsequent machines to insure easier and more efficient double seaming and in some types of ends to confine and retain the gasket or lining compound.

While the invention is perhaps more particularly adapted to the curling of non-circular (such as rectangular) ends, it will be readily apparent that from certain aspects the invention has variable application to the curling of can ends of circular form.

A principal object of the invention is the provision of a new and improved method and apparatus for the curling of rectangular can ends with rounded corners by continuous operation and without interruption of the movement of the ends through the apparatus.

Other important objects are the provision of an effective and efficient apparatus for curling can ends, which will be adapted with slight and simple changes or adjustments for operation on can ends of various sizes, which will be of positive and certain action, which will consist of sturdy parts and simple construction not likely to require frequent repair, replacement or adjustment, and which will provide for certainty of feeding and delivery actions.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings,

Figure 1 is a side elevation partly broken away, of an apparatus embodying my present invention;

Fig. 2 is a top plan view thereof, portions being removed for clarity;

Fig. 3 is a detail of a part of the delivery mechanism;

Fig. 4 is an enlarged sectional longitudinal view of the active or operative portion of the apparatus taken substantially on the line 4—4 of Fig. 2;

Fig. 5 is a section taken substantially on the line 5—5 of Fig. 4;

Fig. 6 is an end elevation showing the can ends as controlled by the feeding fingers; and

Fig. 7 is a detail illustrating in part the can end delivery mechanism.

The entire apparatus is preferably mounted on a frame 11 and comprises an inclined or tilted body or bed 12. Two conveyor chains indicated generally by reference characters 13 and 14 are arranged to travel over this bed, being arranged so that portions of their travel are parallel and adjacent. Figure 4 discloses the arrangement of these conveyors and it will be understood that this figure is a section taken parallel to the plane of the paper in Fig. 1 and turned to the horizontal position shown in Fig. 4 to permit of the drawing on the enlarged scale. The conveyor 14 is trained over sprockets 15 and 16 mounted respectively on shafts 18 and 17 in the frame 11. The shaft 17 is power driven and continuously drives the chain 14. This chain in its active travel moves across the bed 12 in a way 19 (Fig. 5). In the illustration the chains are supposed to move to the right in Fig. 1.

The chain 13 is trained over sprockets 22 and 23 arranged respectively on shafts 24 and 25 in bearings 26 and 27 extending upward from the bed so that the chain 13 is arranged above the chain 14 and the two chains are caused to move together by gears 28 and 29 mounted on shafts 17 and 25 in meshing relation, power being supplied to the organization through a pulley 31 or other suitable motor.

A spring chain tensioner 32 is provided for the chain 14 and an adjustable tensioner 33 is provided for the chain 13.

These two chains carry chucks or clamp members 34 and 35 respectively, so spaced and secured to the links of the chains as to come into registration throughout the active parallel adjacent travel of the chains across the bed. Referring to Fig. 5 it will be noted that the chucks 35 are provided with shoul-
ders 36 adapted to enter into the panels 37 of the can ends 38 in fitted relation and to engage the shoulders 39 of the can ends to center them on the chuck.

Each chuck 35 is provided with a shoulder 41 on which the flange of the can end rests. The chucks 34 are recessed at 43 to fit over the panel portion of the can end. Each chuck 34 also is provided with a flange 42 adapted to fit down over a shoulder of the can end and to engage upon its flange to clamp the flange down against the part 41 of the companion chuck 35. Thus constructed and arranged the can end is tightly clamped into position after being received between the chucks as will be later described and is carried past two curling stations at which the exposed flange edges are curled as may be observed upon comparing Figures 5 and 7.

These two curling stations are indicated at A and B in Fig. 1. The apparatus shown on the drawing is adapted for the curling of rectangular can ends having round corners and as each end is carried past the curling stations curling rolls engage the exposed corners and side at the station A and curl the same. Between these two stations A and B the can ends and the chucks are rotated through 90 degrees and the two remaining sides are curled by rollers arranged at the station B, these rollers also moving around the corners as an incident to their curling operation.

Four curling rolls are provided at each station A and B, two being arranged on each side of the chain travel as is best seen in Figure 2. Each roller is mounted upon the end of a curved arm 44, being indicated at 45 and pivotal upon a pivot 46. A plan of rod 47 is connected to each arm 44 and is embraced by a spring 48 arranged between a washer 49 held in place by nuts 51 on the rod and a backing bearing plate 52 through which the rod is disposed. These springs 48 force the rolls 45 against the flange edge and the curling is accomplished.

Referring now to Fig. 5, it will be noted that each roll 45 is adapted to float vertically in a recess 53 formed in the end of its arm 44 and these rollers are provided with the curling grooves 54. The rollers normally engage upon shoulders 35 on the chucks. From Fig. 2 it will be observed that the rolls first engage the presented end of the can end flange and roll around the corner and along the sides as the ends are moved past them.

In the travel through the apparatus the can ends are given two ninety degree rotations. The ends are fed into the apparatus with their longer sides parallel to the direction of travel. After passing the station A they are turned to present the shorter sides to the curling rollers at the station B, after which they are turned again so as to pass out of the apparatus traveling lengthwise. The first turning is accomplished at a station C and a second at a station D. The turning devices comprise fixed pins 61, which are adapted to enter into suitably arranged slots 62 in the chuck body to hold back a corner thereof and produce the desired rotation.

The chucks travel between guides 63, which restrain the chucks against turning except at these turning stations where the guides are interrupted. The turning is accomplished in the present instance through the active agency of the lower chuck alone, the two chuck members and the can end turning together because of the cramped relation between them. The lower chucks are guided throughout their travel by the guides 65 and guides 64 are provided for the chucks on the conveyor 13, the guide 61 however extending nearly throughout the return chain travel and about the sprockets. Pressure bars 65 pivoted at 66 to a cross frame member 67, are arranged to engage rolls 68 (Fig. 5) carried by the chain links 13 and preferably mounted on the pivots thereof. Springs 71 mounted in sockets 72 bear upon the pressure bars 65 and hold the chucks in cramped relation.

The can ends are fed in between the chucks in suitable fashion through slotted guideways 73 and the one to be next engaged by the chucks encounters a finger 74 pivoted at 75 above the path of movement of the lower chucks 35, being held down on the can end by a spring 76 under finger tail piece 77. As the chuck 35 is operated the can end thus held down, its part or flange 36 enters into the can panel and carries the end forward, lifting the finger in the passing. As the chuck 35 is thus moving with the can end, a companion chuck 34 is converging down into co-operating relation. The forward ends of the two chucks come into clamping relation first and at that time a second finger 78 like the finger 74 bears upon the rear of the can end holding it flat upon the lower chuck. This finger 78 performs the further function of holding the can end accurately upon the lower chuck from the time it has left the influence of the finger 74 until it is cramped in position.

The can ends are delivered out of the apparatus and into a guideway formed of rails 81, being first received by vertically and horizontally movable grooved spring pressed fingers 82. These fingers are pivoted at 83 upon the rails 81 for slight horizontal in and out movement being pressed inwardly by springs 84 arranged between their tail pieces 85 and fixed abutments 86. Viewing Fig. 3 it will be noted that the
pivots 83 are carried in arms 87 pivoted at 88 in the guides 81, so that a slight vertical movement is permitted the fingers 82. The slots in the fingers 82 are enlarged at 89 for the entrance of the can end curls, these openings being sufficient to permit the curled flange edges to enter freely and adapt the fingers to the end as it passes into the smaller portion of the grooves, as indicated at the left in Fig. 7.

The apparatus just described is readily arrangeable for can ends of various dimensions and to this end the guides 73 and 81 may be moved toward and from each other being held in place by bolts 91 taking through slots 92 in the guide members 73 and into the bed plate 12. Like slots 93 are provided for the bolts 94. Change of the apparatus for can ends of different dimension, of course, requires substitution of chucks to fit the can ends and it has been found practical to space the guides for the chucking rolls 69 and 66 a sufficient distance apart to accommodate the largest intended end and employ chucks of various smaller sizes, the rolls readily adapting themselves because of the springs.

It is believed that the method as well as the apparatus will be understood from the foregoing description, the ends being carried continuously through the machine and the curling rollers acting first around the presented corners, then along the sides, and then on back around the following corners of the can ends. The can end, after the first curling operation, is turned ninety degrees and subjected to the rolls at station B, these rolls also following around the corners as well as along the flat sides.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing without further description and it will be obvious that various changes may be made in the form, construction and arrangement of the parts of the apparatus without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinabove described being merely a preferred embodiment thereof.

I claim:
1. A method for curling can ends, which consists in moving the can ends continuously and in curling different portions of the can ends at separate stations while the can ends are in motion, and holding the can ends from rotation intermittently.

2. The method of curling can ends, which comprises the continuous movement of can ends during the curling operations, curling predetermined portions of the can ends in separate spaced positions, and in turning the can ends between the curling positions to bring different portions of the ends into curling operation without interrupting the movement of the can ends, and holding the can ends from rotation intermittently.

3. The method of curling can ends, which consists in continuously advancing the can ends, curling opposite edges of the can ends in different stages, rotating the can ends thereafter to bring other portions of the ends parallel with the direction of motion of the can ends, and thereafter curling the opposite sides of the can ends in separate stages which overlap on the edges already curled, and holding the can ends from rotation intermittently.

4. The method of curling can ends, which consists in conveying the can ends to opposite section curlers at spaced apart stations, completely curling a predetermined portion of the opposite edges of each can at each station, angularly rotating the can ends between stations, and holding the can ends against rotation as they pass through the stations, the curling operations overlapping to produce a completely curled edge for each can end.

5. The method of curling can ends in spaced stations, which consists in, conveying the can ends continuously through the stations between curling rollers arranged in preliminary and final stages, guiding the can ends against rotation through said stations, and rotating the can ends through an angle between the stations to bring different sections of the can ends for operation by the opposite rollers in succession, the curling operations overlapping in the successive stations so that the edges of the can ends are completely curled thereby.

6. The method of curling non-circular can ends, which consists in, conveying the can ends, parallel with one of the main dimensions thereof between opposite curling rollers, angularly rotating the can ends without interrupting their motion after the first curling operation is performed, again engaging the opposite edges of the can ends with curling rollers, and between the curling operations angularly rotating the can ends so that they will continue to present about the same dimensions as when they were originally started.

7. The method of curling can ends, which consists in, feeding can end blanks with straight flanges, positively gripping the opposite sides of the can ends for conveying them continuously in the same direction, curling predetermined opposite portions of the can ends in different spaced stations, rotating the can ends and the gripping means after the curling operation is complete.

8. The method of curling non-circular can ends, which consists in feeding them one at a time to a spring-pressed holder, engaging the opposite sides of the can ends and stripping them from the holder, conti-
ously advancing the can ends through separate, opposite curling stations spaced apart and at which different portions of the can ends are adapted to be engaged, curling edges of the can ends at said stations, maintaining the can ends against rotation when they are passing through the curling operations, angularly rotating the can ends and the engaging means after each curling station, separating the engaging means when the curling operation is complete, and stripping the curled can ends from the engaging means and delivering the can ends to the discharge.

9. In an apparatus for curling can ends, a pair of conveyor chains having a portion of their travel opposite and parallel, can end engaging chucks spaced apart on the chains and adapted to move together to engage can ends therebetween for moving them continuously through the parallel portions of the chains, the chucks being rotatable independent of their movement by the chains.

10. An apparatus for curling can ends, comprising a pair of conveyors arranged oppositely during a portion of their travel, rotatable can end engaging chucks carried by the conveyors, the corresponding opposite chucks being movable together to engage can ends therebetween, means for curling the opposite edges of the can ends in spaced stations as they are moved along by the conveyor, and means in connection with the chucks of one conveyor for preventing the rotation of the chucks as they pass through the curling stations.

11. An apparatus for curling can ends, comprising a pair of conveyors having opposite parallel portions through a portion of their travel, a plurality of rotatable can end engaging chucks carried at spaced distances by each of the conveyors, means for feeding can ends between opposite corresponding chucks of the conveyors at one end of the said parallel portion and for removing them at the other end thereof, opposite curling devices arranged in spaced stations along the said parallel portions of the conveyors, means for maintaining the can end engaging chucks against rotation as they pass through the curling stations, and means beyond a curling station for angularly rotating the chucks to present another portion of the can ends for overlapping engagement of the curling means at the next curling station, so that the entire edge of each can end will be completely curled.

12. In an apparatus for curling can ends, a pair of conveyor chains movable together through a portion of their travel having spaced rotatable chucks movable together to engage can ends therebetween, means for curling separate portions of the can ends in spaced stations as the chuck engaged can ends pass continuously therethrough, means for rotating the chucks after they pass a curling station, and stripping means for removing the can end and discharging it as the chucks release it.

13. In an apparatus for curling can ends, a pair of conveyor chains having portions of their travel adjacent and parallel, can end engaging chucks carried by said chains and adapted to move together to engage can ends therebetween for moving them continuously through the parallel portions of the chains, curling devices arranged along said parallel chain travel, and spring pressed members holding said chucks to said can ends throughout said travel.

14. In an apparatus for curling can ends, a pair of conveyor chains having portions of their travel adjacent and parallel, can end engaging chucks carried by said chains and adapted to conjointly come into position to clamp a can end therebetween, flexible traveling devices arranged adjacent said parallel travel of said chains, means feeding can ends into position for automatic engagement by said chuck, and a spring finger for holding a can end in engaging position and until removed therefrom by said chuck.

15. In an apparatus for curling can ends, a pair of conveyor chains having portions of their travel adjacent and parallel, can end engaging chucks carried by the chains and adapted to converge to clamp a can end therebetween at the commencement of said parallel travel, and a spring pressed finger controlling the position of the can end during the converging clamping action.

16. In an apparatus for curling the flanges of can ends, a pair of conveyor chains having portions of their travel adjacent and parallel, can end engaging chucks carried by the chains and adapted to clamp a can end between them throughout said parallel travel, curling devices arranged adjacent to said parallel travel and in position to operate upon said can ends at a plurality of stations, and a device for imparting partial rotation of the chucks and engaged can end between said stations, said device comprising a pin arranged in the path of travel of the chuck and a slotted formation in the chuck body for engaging said pin to accomplish said turning.

17. In an apparatus for curling the flanges of can ends, conveyor chains moving the can end past a curling station and provided with can end holding chucks, said chucks having parts entering into the panel of the can end and into the flange thereof, and curling devices arranged adjacent the travel of said chains, and means for holding the chucks from rotation.

18. In an apparatus for curling the flanges of can ends, conveyor chains moving the can end past a curling station and provided with can end holding chucks, said chucks having
parts engaging opposite sides of the flange of the end, and curling devices arranged along the path of travel of the can end and adapted to curl the portion of the flange extending beyond the chuck holding part.

19. In an apparatus for curling the flanges of can ends, a pair of conveyor chains having portions of their travel parallel and adjacent, can end holding chucks carried by the chains and adapted to converge to engage a can end and thereafter to move together to clamp the can end therebetween, and to diverge and release the can end at the end of the parallel travel, and spring held guide members receiving the can ends from the chucks.

20. In an apparatus for curling the flanges of can ends, a pair of conveyor chains having portions of their travel parallel and adjacent, can end holding chucks carried by the chains and adapted to converge to engage a can end and thereafter to move together to clamp the can end therebetween and to diverge and release the can end at the end of the parallel travel, and slotted guide members for receiving the can ends after they have been released by said chucks, said guide members being movable both horizontally and vertically as an incident to the delivery of the can ends.

21. In an apparatus for curling can ends, a pair of conveyor chains having portions of their travel parallel and adjacent, guide ways through which the conveyor chains travel, can ends holding chucks movable through said guide ways and past a plurality of curling stations, curling devices arranged at said stations, and fixed members arranged between the stations for imparting partial rotation to the chucks and independent of the relative size of the chuck and guide space.

22. The method of curling rectangular can ends, which consists in conveying can ends between rollers which curl the edges of the can ends around the corners, in turning the can ends through an angle of ninety degrees, holding the can ends intermittently from rotation, and in again curling the edges around the corners.

23. In an apparatus for curling rectangular can ends, the combination of curling rollers, means for conveying can ends to pass the rectangular ends between the rollers for curling around the corners thereof, a device for turning the can ends at an angle of ninety degrees, and means for thereupon curling the can ends around the corners thereof.

24. In an apparatus for curling rectangular can ends, the combination with sets of curling rolls, of means for conveying can ends to pass the rectangular ends between the rollers for curling around the corners thereof, a device for turning the can ends at an angle of ninety degrees between said sets, the curling operations overlapping to completely curl each can end.

HARVEY L. BRYANT.