June 28, 1960 K. BOFINGER ET AL 2,942,719

APPARATUS FOR TREATING ARTICLES

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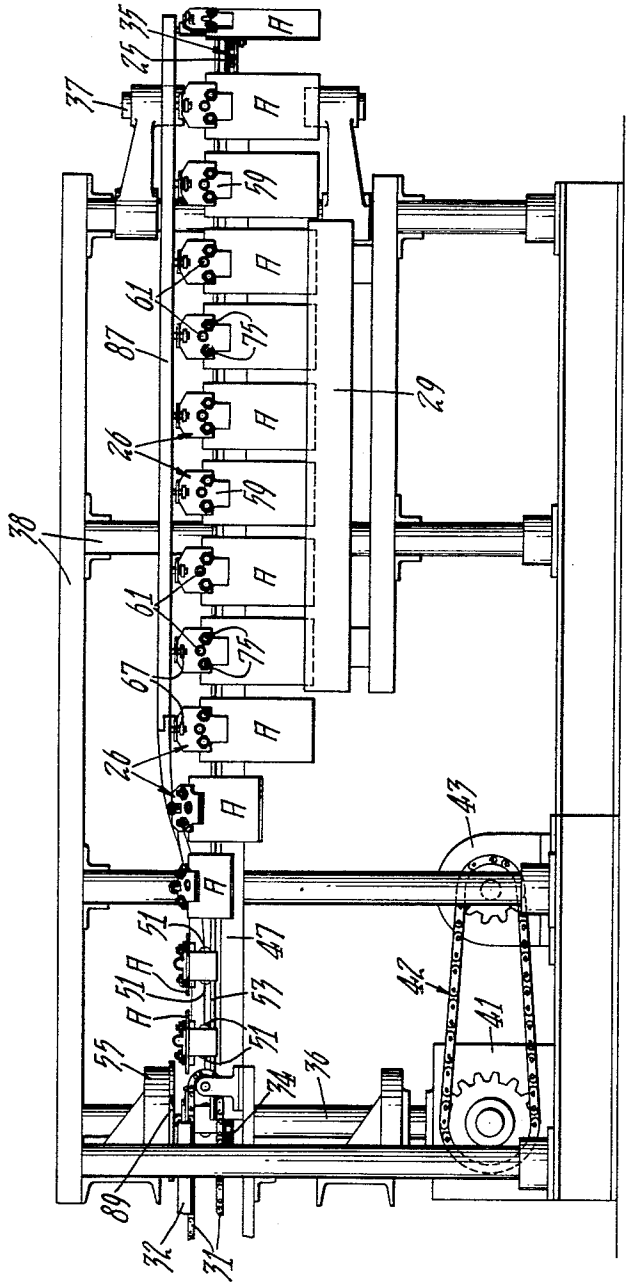


FIG. 1

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APPARATUS FOR TREATING ARTICLES

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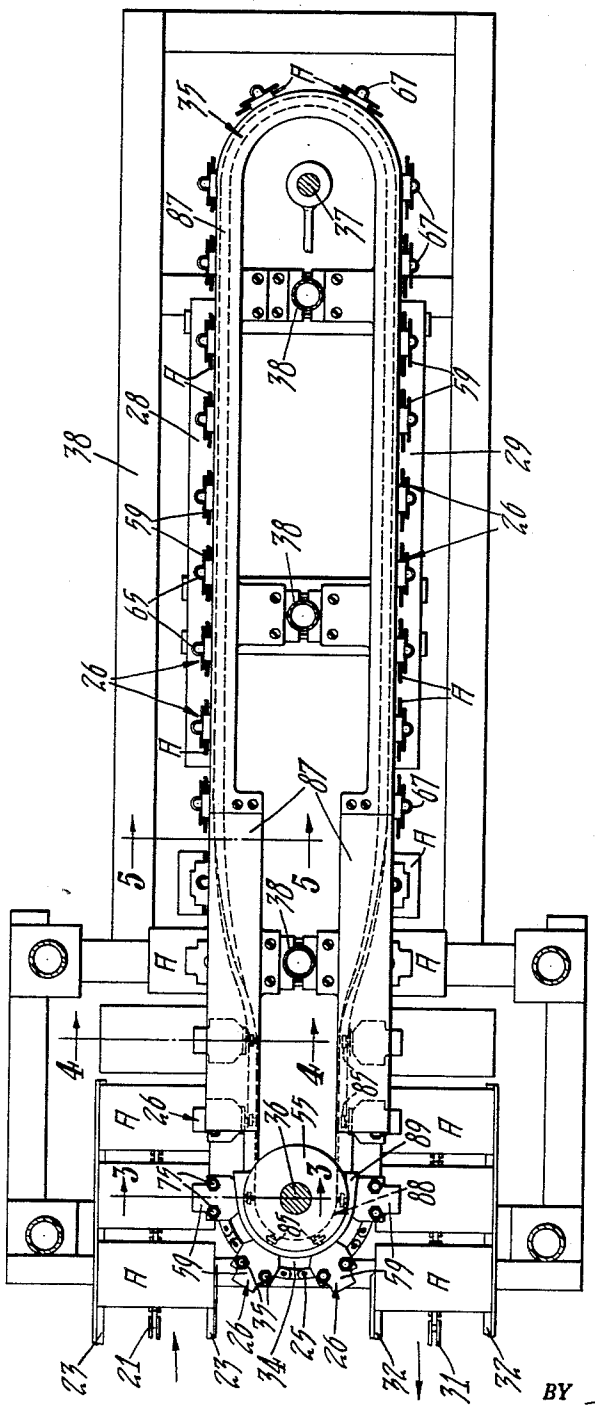


FIG. 2

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FIG. 3

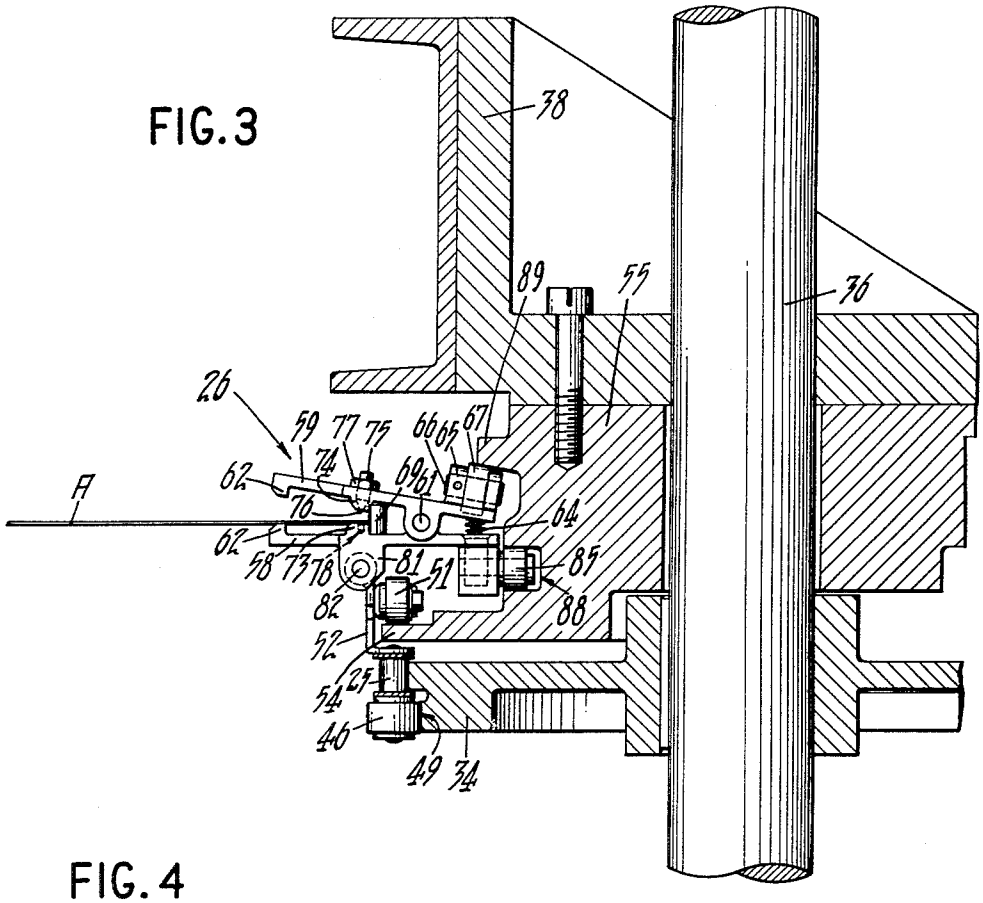
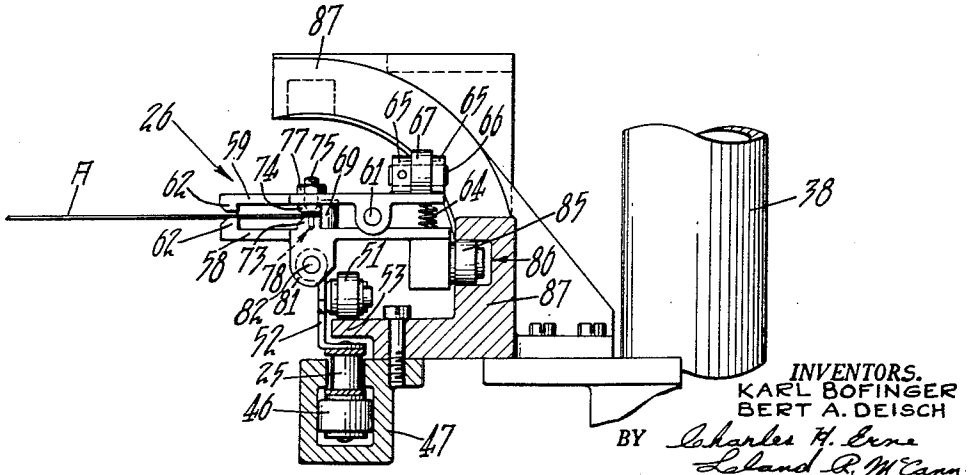


FIG. 4



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APPARATUS FOR TREATING ARTICLES

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FIG. 5

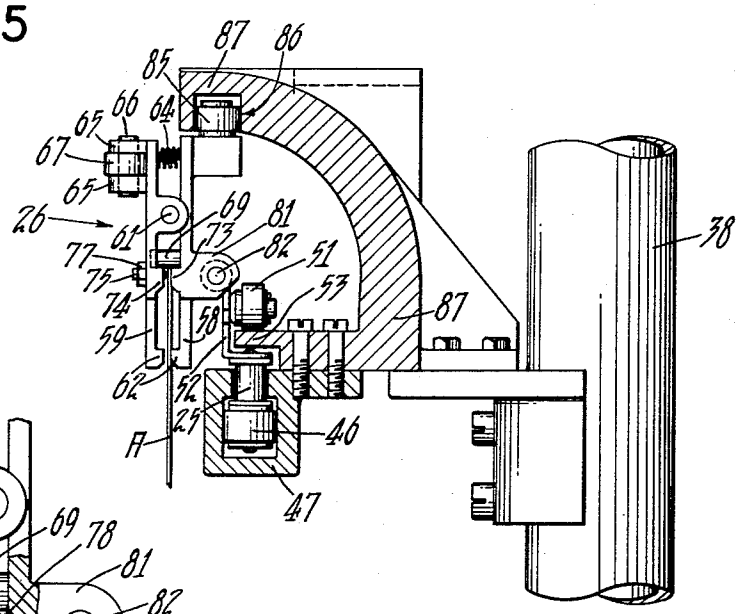


FIG. 6

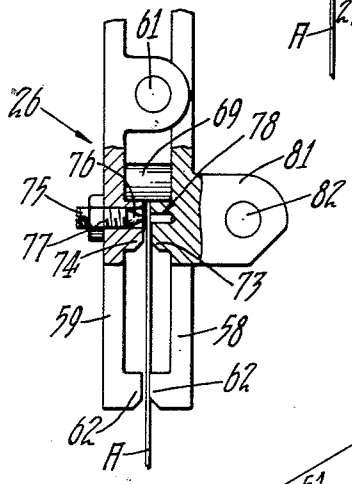
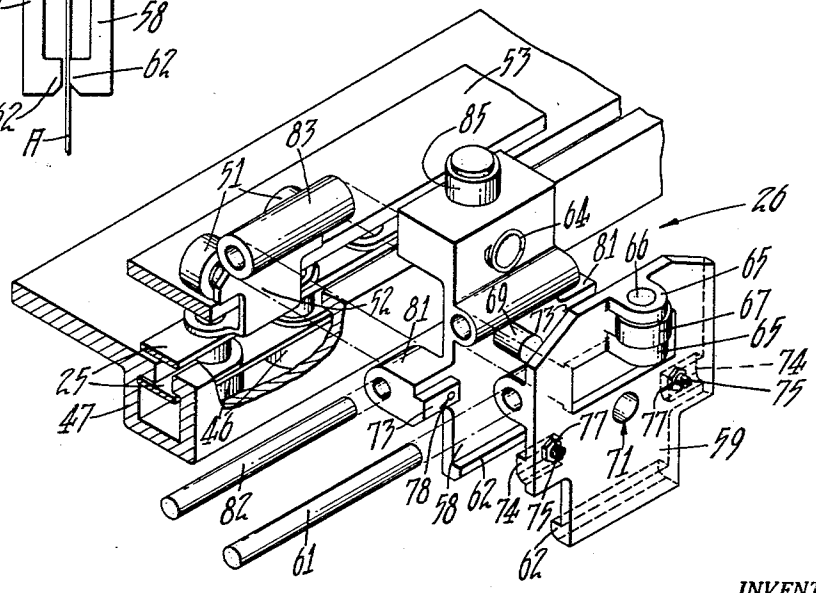


FIG. 7



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2,942,719

APPARATUS FOR TREATING ARTICLES

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Filed Feb. 6, 1956, Ser. No. 563,626

4 Claims. (Cl. 198—33)

The present invention relates to an apparatus for treating articles such as sheet material can body blanks and has particular reference to conveyor and gripper devices for carrying, holding and swinging the blanks into predetermined positions for treatment of the marginal edge portions of the blanks.

This application is a companion to the following applications filed in the United States Patent Office: Serial Number 563,578, filed February 6, 1956, in the name of Harold R. Vitense on Apparatus for Treating Articles; application, Serial Number 563,621, filed February 6, 1956, in the names of Karl Bofinger and Ronald E. J. Nordquist, on Apparatus for Treating Articles; application, Serial Number 563,576, filed February 6, 1956, in the names of Harold R. Vitense and Walter F. Pillnik, on Apparatus for Treating Edge Portions of Can Body Blanks; and Serial Number 563,577, filed February 6, 1956, in the name of Harold R. Vitense, on Method of Treating Edge Portions of Blanks.

An object of the invention is the provision in a sheet blank treating apparatus, of a conveyor having gripper devices which are pivotable into predetermined positions while advancing along a path of travel so as to receive and discharge a blank in a horizontal position to facilitate feeding the blanks into and out of the apparatus and to swing a blank into a vertically suspended position for treatment.

Another object is the provision of such gripper devices which are designed to grip and hold a blank in an edgewise relation for movement through the apparatus in such a relation.

Another object is the provision in such gripper devices of means for properly locating the blank and for firmly gripping the blank so as to facilitate treatment of marginal edge portions of accurately defined areas.

Another object is the provision of such gripper devices which are particularly adapted to advancement along a constant level path of travel.

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 of a sheet blank treating apparatus embodying the instant invention;

Fig. 2 is a top plan view of the apparatus shown in Fig. 1, with parts broken away;

Figs. 3, 4 and 5 are enlarged fragmentary sectional views taken substantially along the lines 3—3, 4—4, 5—5 in Fig. 2;

Fig. 6 is an enlarged end elevation of one of the gripper devices used in the apparatus, parts being broken back and shown in section; and

Fig. 7 is an exploded perspective view of one of the gripper devices and adjacent portions of the apparatus.

As a preferred or exemplary embodiment of the instant invention the drawings illustrate an apparatus for

conveying sheet metal can body blanks A, held in suspended relation with one marginal edge portion free and exposed and arranged in edgewise spaced relation, along a predetermined constant level path of travel for treatment of the free and exposed edge portion of the blanks.

The blanks A preferably are fed into the apparatus from any suitable source of supply, in spaced processional order and in a horizontal position, with their short or end marginal edge portions to be treated in the direction of travel of the blanks. This feeding of the blanks A into the apparatus is effected preferably by a short endless chain conveyor 21 (Fig. 2) having spaced feed dogs for propelling engagement behind the blanks. The blanks are supported and retained in straight line relation by a pair of spaced and parallel horizontal guide rails 23.

As the blanks A enter the apparatus, they advance into position alongside of one run of a horizontally disposed endless conveyor chain 25 having grippers 26 pivotally mounted thereon at spaced intervals therealong for gripping one end edge portion of a blank A as it enters the apparatus and for carrying the blank along the path of travel of the conveyor. After gripping the blank, the gripper pivots it from its horizontal position to a vertically suspended position and in this position carries it through a plurality of treating stations 28, 29 (Figs. 1 and 2) for treatment of the free and exposed end marginal edge portion of the suspended blank.

After treatment, the blank A is pivoted upwardly from its suspended position into a horizontal position, by a swinging movement of the gripper 26, to facilitate discharge of the blank from the apparatus. This discharge of the blank preferably is effected by a discharge conveyor 31 which is disposed adjacent the conveyor chain 25 and which is provided with spaced feed dogs for propelling engagement behind the blanks being discharged. Spaced and parallel guide rails 32 support and guide the blanks during discharge. The conveyor carries the blanks to any suitable place of deposit.

The treating conveyor chain 25 operates over a pair of spaced horizontally disposed sprockets 34, 35 (Figs. 1, 2 and 3) mounted on vertically disposed shafts 36, 37 journaled in suitable bearings mounted in a structural frame 38 which constitutes the main frame of the apparatus. The shaft 36 carrying the sprocket 34, is a driving shaft and at its lower end is connected to an angle drive device 41 actuated through a chain and sprocket connection 42 with an electric motor 43.

The conveyor chain 25 is accurately guided and supported along its path of travel in order to maintain it at a constant level. For this purpose, the chain 25 carries spaced depending rollers 46 (Figs. 3, 4, 5 and 7) which while traveling between the sprockets 34, 35 operate in stationary guide tracks 47 which are secured to stationary parts attached to the main frame 38. The guide tracks 47 confine the conveyor chain 25 against lateral travel and thus keep the chain accurately in a straight line between the sprockets. Around the sprockets 34, 35 the rollers 46 engage against a peripheral face 49 (Fig. 3) of the sprockets to keep the chain in proper alignment.

Vertical support of the conveyor chain 25 is effected by spaced pairs of rollers 51 (Figs. 3, 4, 5 and 7) which project inwardly from vertical brackets 52 secured to the chain 25 at intervals along its length. Between the sprockets 34, 35 and around the sprocket 35, the rollers 51 ride on a horizontally disposed stationary support plate 53 which is secured to members of the main frame 38. This plate 53 extends up to the sprocket 34 and aligns with an auxiliary support shelf 54 (Fig. 3) of a stationary cam 55 carried on the main frame 38 and surrounding the sprocket shaft 36 above the sprocket 34. In traveling around the sprockets 34 the rollers 51 ride on the support shelf 54.

The grippers 26 attached to the conveyor chain 25 for carrying and pivoting the blanks A into proper position, comprise a pair of cooperating spaced apart inner and outer jaws 58, 59 (Figs. 3, 4, 5, 6 and 7) hinged together on a pintle 61 intermediate their lengths for the reception of one end marginal edge portion of a blank A. At one end of the jaws, at the left as viewed in Figs. 3 and 4, their inner faces are provided with inwardly projecting guide lugs 62 which are utilized to guide and partially support a blank during its reception and discharge from the gripper. Adjacent the opposite ends of the jaws 58, 59 and located between them is a compression spring 64 which operates to keep the guide lug ends of the jaws closed. The spring end of the outer jaw 59 is formed with a pair of spaced outwardly projecting bearings 65 which carry a pin 66 on which is mounted a roller 67 utilized for opening the jaws 58, 59 as will be hereinafter explained.

Intermediate the guide lugs 62 and the jaw pintle 61, the inner jaw 58 carries a locating pin 69 which projects into the space between the jaws and into a clearance opening 71 in the outer jaw 59. This locating pin 69 locates the edge of the blank which enters between the jaws upon reception so as to accurately locate the outer free and exposed edge portion to be treated.

Gripping of a blank A between the jaws is effected by a pair of spaced elements located adjacent the locating pin 69 and between this pin and the guide lugs 62. For this purpose the inner jaw 58 is provided with a pair of bosses 73 and the outer jaw 59 is provided with a like oppositely disposed pair of bosses 74, which extend toward each other for cooperation and which are spaced near the side edges of the jaws to spread the clamping effect. The bosses 74 in the outer jaw 59 threadedly hold adjustable set screws 75 (Fig. 6) having sharp gripping points 76 which extend inwardly beyond the bosses 74 for engagement with a blank interposed between the jaws. A locknut 77 on each screw 75 holds it in an adjusted position. The gripping points 76 on the screws 75 align with small clearance openings 78 (see also Fig. 7) in the oppositely disposed bosses 73 in the jaw 58 to facilitate firm gripping of the blank by the two widely spread gripping points 76.

This entire gripper element 26 as explained above is pivotally mounted sidewise on the conveyor chain 25 for carrying the gripped blank edgewise and for laterally swinging the blank away from the conveyor chain. For this purpose the inner jaw 58 is provided with a pair of spaced, horizontally aligned hinge lugs 81 which are mounted on a pivot pin 82 disposed parallel with the conveyor chain 25 and carried in a hinge lug 83 formed on the conveyor chain roller support brackets 52.

Hinging of the gripper 26 bodily on its pivot pin 82 preferably is effected by an actuating roller 85 which is carried on the inner jaw 58 and which rides in a cam groove 86 of a stationary cam or track 87 which is part of the conveyor chain support plates 53. This track or cam 87 extends from the driving sprocket 34 of the conveyor chain 25, for the entire path of travel of the gripper 26 between the sprockets 34, 35 and around the sprocket 35, and return to the sprocket 34 as best shown in Figs. 1 and 2. The cam groove 86 is shaped to hinge the gripper bodily as desired. Around the driving sprocket 34, the gripper is guided by the passage of the actuating roller 85 through a cam groove 88 (Fig. 3) in the stationary cam 55 surrounding the sprocket driving shaft 36.

In operation, the jaws 58, 59 of a gripper 26 are held open and in a substantially horizontal position as the gripper travels around the sprocket driving shaft 36 of the conveyor chain 25, so as to receive between them an incoming horizontally disposed blank A on the entrance or feed-in conveyor 21 as explained above. The jaws are held open through control of the gripper rollers 67, 85 as shown in Fig. 3. The roller 85 in riding the cam groove 88 holds the inner jaw 58 in a substantially horizontal position for advancement under the incoming blank. The roller 67 on the outer jaw 59 rides under a projecting cam track 89 on the stationary cam 55 and thereby holds the jaw 59 open relative to the jaw 58 for passage over the top of the incoming blank. The cam track 89 extends for a major portion around the cam 55, over the path of travel of the conveyor chain 25.

When the open jaws 58, 59 of a gripper 26 and the adjacent marginal edge portion of an incoming blank move into register, with the end edge of the blank in engagement with the locating pin 69 in the gripper and with the guide lug 62 on the inner jaw supporting the blank, the roller 67 rides from under the cam track 89 and thereby permits the compression spring 64 to close the outer jaw 59 against the blank, as shown in Fig. 4. In thus releasing and closing the outer jaw 59, the sharp points 76 of the gripping screws 75 in the outer jaw, close against and bite into the located marginal edge portion of the blank and thus tightly or firmly grip and hold the blank between the gripper jaws. The two screws 75 being spaced apart substantially the width of the blank increases the holding power of the screws and prevents shifting of the blank during subsequent treatment.

With the jaws 58, 59 firmly holding the blank in place, the advancing gripper carries the blank edgewise and horizontally off the feed-in conveyor 21 and along the path of travel of the conveyor chain 25, traveling around the idler sprocket 35 and returning to the driving sprocket 34. During this travel of the gripper 26, the roller 85, traversing the stationary cam track 86 pivots the gripper bodily on its pivot pin 82 and thus swings the blank from its horizontal position to its vertically suspended position for treatment.

Following treatment of the blank and as it advances along the return run of the conveyor chain 25 toward the driving sprocket 34, the gripper 26 is again swung bodily to pivot the blank back into its horizontal position for discharge. The blank is returned to its horizontal position just as it approaches the discharge conveyor 31 and in this position rides onto the discharge conveyor. At this time in the cycle of operation, the gripper roller 67 again engages under the cam track 89 as shown in Fig. 3 and thereby opens the outer jaw 59 to release the blank for discharge, while the guide lug 62 on the inner jaw 58 supports the blank until the feed dogs on the discharge conveyor 31 engage behind the blank and advance it out of register with the gripper 26. The gripper thereupon advances around the driving sprocket 34 to return to the feed-in conveyor 21 to pick up another blank to carry it through another cycle of operation.

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

We claim:

1. In a machine for treating relatively thin, flexible and flat can body blanks, the combination of a conveyor moving along a predetermined path of travel, a gripper comprising an inner jaw and an outer jaw, said inner jaw having a pivotal mounting on said conveyor extending longitudinally thereof and said outer jaw having a pivotal mounting on said inner jaw also extending longitudinally of the conveyor, opposing gripper means on said inner and outer jaws cooperable for gripping a marginal portion of a said blank, jaw closing means for swinging said outer jaw on its mounting to grip said marginal portion of the blank between said gripper means and to hold the blank in an edgewise position relative to its direction of travel with the conveyor, locating means disposed between said

jaws and adjacent said pivotal mounting of the outer jaw for engaging and locating the innermost edge of a blank in a predetermined position relative to said gripper means, gripper oscillating means for engaging and swinging said inner arm on its mounting to move said gripped blank into a plurality of positions ranging from a substantially horizontal to a vertically suspended position for treatment of a lower portion of the blank, and jaw opening means for releasing said blank from said jaws.

2. The combination defined in claim 1 wherein said gripping means comprises a pointed gripper element on one of said jaws and an opposing gripper element having an opening formed therein to provide clearance opposite said pointed gripper element.

3. The combination defined in claim 2 wherein said locating means provides a single gauging point and said gripping means comprises an inner and an outer jaw provided with two pairs of said opposing pointed clearance-providing gripping elements, each of said pairs of gripping elements being disposed on a line substantially parallel to the path of the conveyor and spaced from said gauging point on opposite sides thereof.

4. In a machine for treating relatively thin, flexible and flat can body blanks, the combination of a conveyor moving along a predetermined path of travel, a gripper comprising an inner jaw and an outer jaw, said inner jaw having a pivotal mounting on said conveyor extending longitudinally thereof and said outer jaw having a pivotal mounting on said inner jaw also extending longitudinally of the conveyor, opposing gripper means on said inner and outer jaws cooperable for gripping a marginal portion

of a said blank, jaw closing means for swinging said outer jaw on its mounting to grip said marginal portion of the blank between said gripper means and to hold the blank in an edgewise position relative to its direction of travel with the conveyor, gripper oscillating means for engaging and swinging said inner arm on its mounting to move said gripped blank into a plurality of positions ranging from a substantially horizontal to a vertically suspended position for treatment of a lower portion of the blank, jaw opening means for releasing said blank from said jaws, feed-in means and discharge means disposed adjacent said conveyor for feeding a said blank to said gripper and for discharging said blank from said gripper, and guide lugs adjacent the outer free ends of said jaws and projecting inwardly between said jaws for guiding said blank as it is inserted therebetween by said feed-in means and for supporting said blank on opposite sides thereof during its subsequent movements while gripped by said jaws.

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