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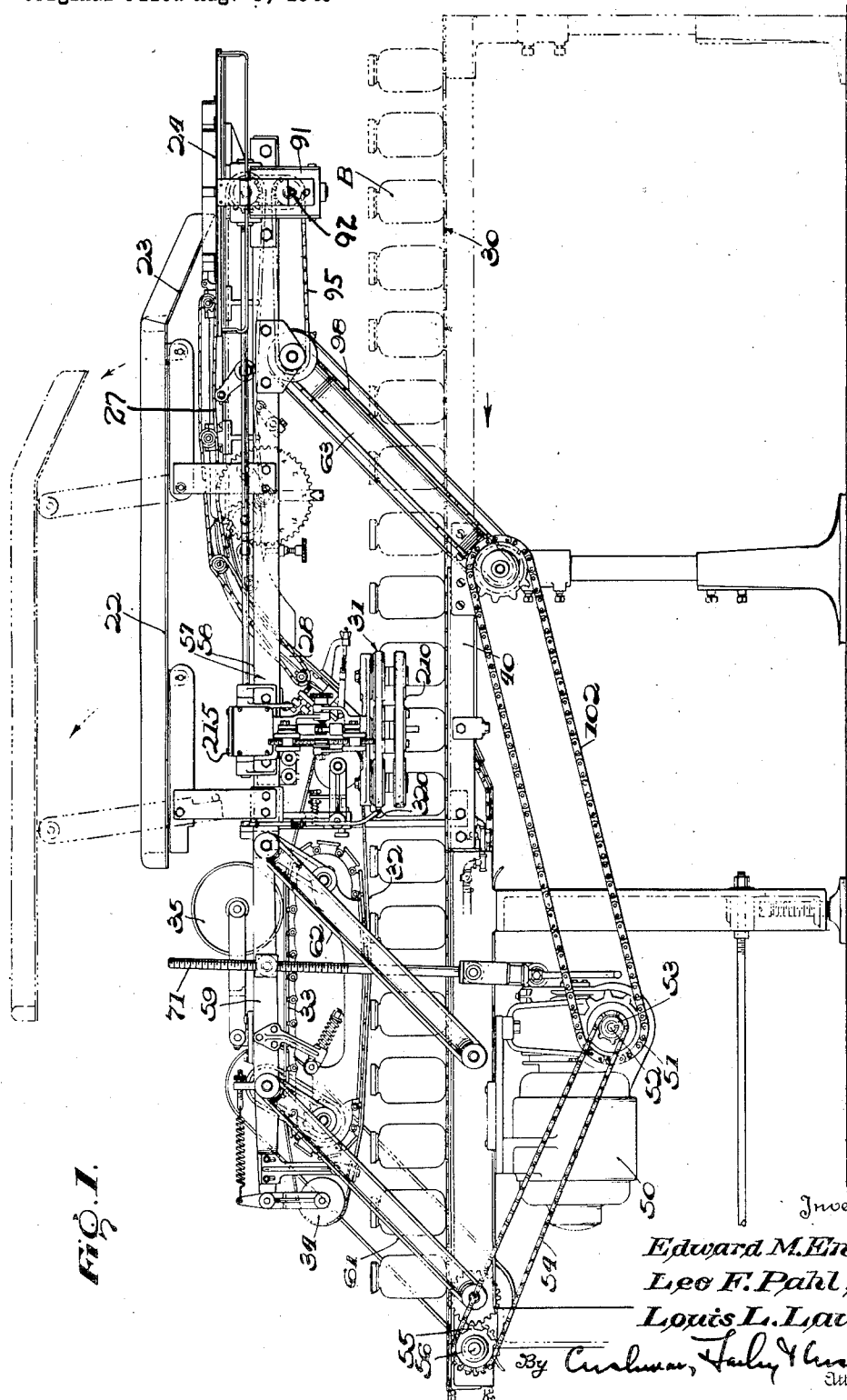
E. M. ENKUR ET AL

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CONVEYER MECHANISM FOR CONTAINER CAPPING APPARATUS

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3 Sheets-Sheet 1



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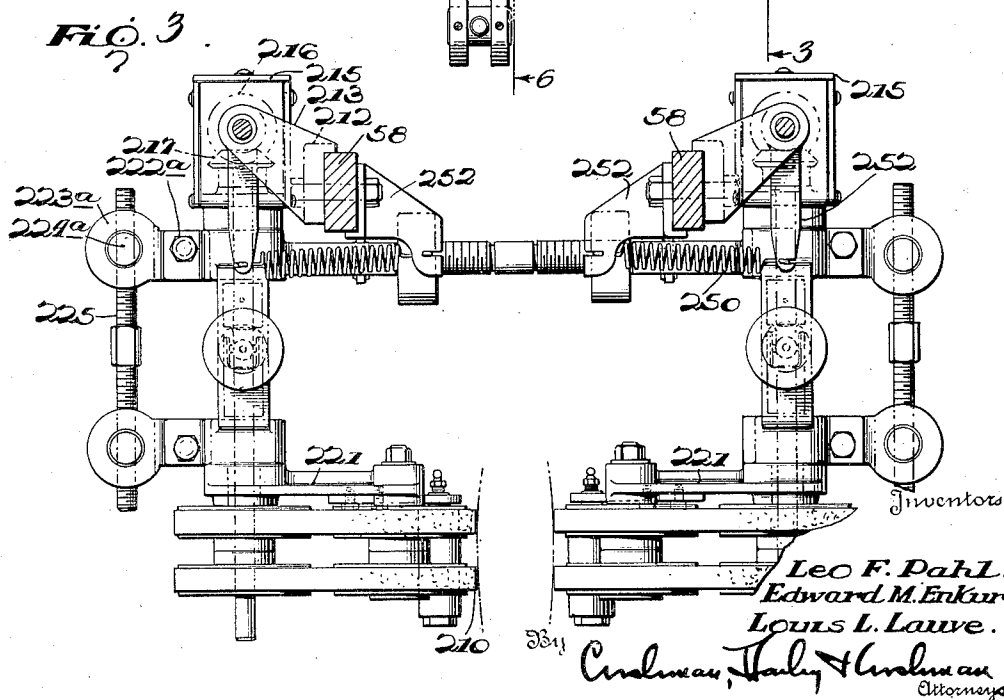
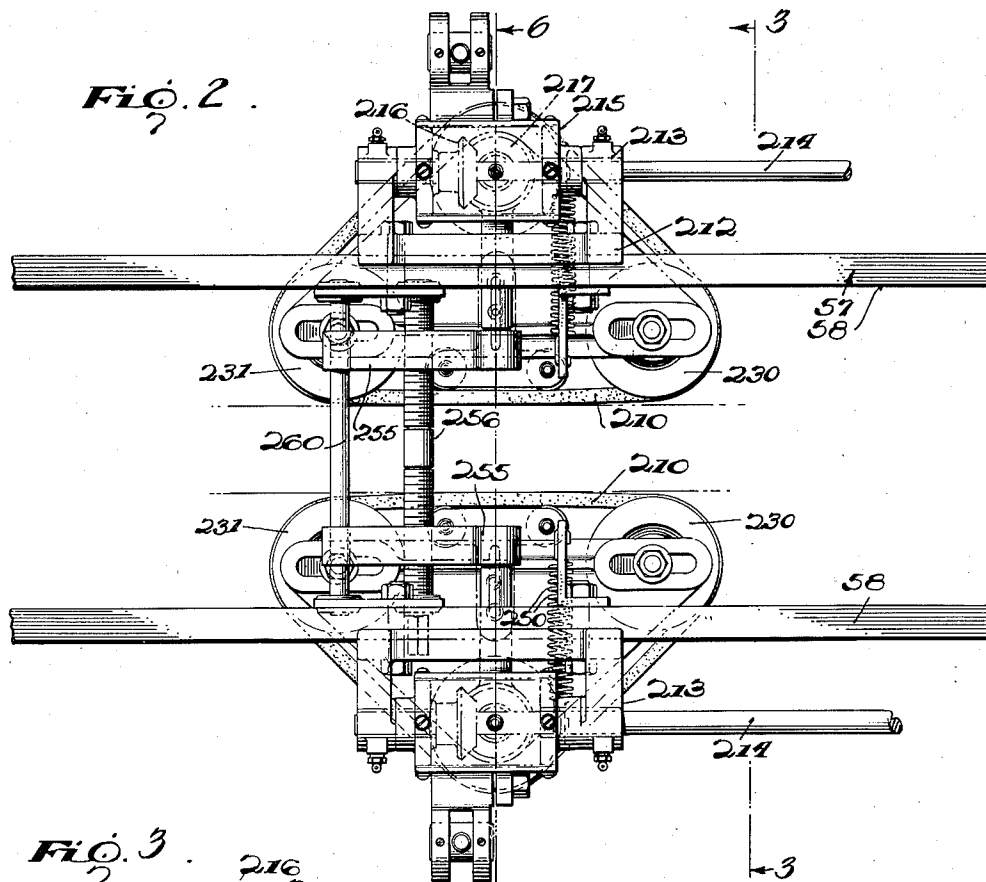
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CONVEYER MECHANISM FOR CONTAINER
CAPPING APPARATUS

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Original application August 3, 1940, Serial No. 351,004, now Patent No. 2,433,549, dated December 30, 1947. Divided and this application November 6, 1944, Serial No. 562,110

8 Claims. (Cl. 198—165)

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The present invention relates to container capping apparatus and is a division of our original application Serial No. 351,004 for Container sealing apparatus filed August 3, 1940, Patent No. 2,433,549, issued December 30, 1947.

An object of the invention is to provide an arrangement for centering containers and for holding them upright during the application of caps thereto.

Apparatus including an inclined cap chute beneath which containers move to remove a cap may be unsatisfactory with containers having a small base because contact of the container mouths with the caps in the chute is apt to cause such containers to be tilted backwardly.

Previous devices for centering and gripping containers during cap application include endless belts moving about fixed pulleys, with small movable elements to force the central portion of the inner run of the belt inwardly at a point adjacent the cap applying station. A disadvantage of such an arrangement is that the small movable elements may have container contents spilled upon them with the result that they will become gummy and fail to move properly.

The present mechanism is characterized by the fact that no small movable parts are provided in the structure adjacent the cap applying means but, on the other hand, the entire structure is bodily movable to freely center and grip the containers.

Other objects and advantages of the invention will be apparent from the following drawings wherein:

Figure 1 is a side elevation of the machine;

Figure 2 is a top plan view of the container centering structure shown in side elevation at the central portion of Figure 1;

Figure 3 is a detail transverse sectional view on the line 3—3 of Figure 2;

Figure 4 is a side elevation of the container centering element, the view being taken from the right of Figure 3 or from the bottom of Figure 2;

Figure 5 is a horizontal sectional view on the line 5—5 of Figure 4; and

Figure 6 is a transverse vertical section on the line 6—6 of Figure 2.

In the following description of the invention, the apparatus is described as operating to apply and seal skirted caps to containers having a horizontally projecting shoulder or ring on their mouths, the cap skirt being sufficiently resilient that inwardly projecting lugs at the lower end of the cap skirt will engage beneath the container

mouth shoulder when the cap is in sealed position. Such caps are provided with a sealing ring or disc on the under side of their top wall to bear upon the top edge of the container mouth to form an air-tight seal. It will be understood that the apparatus may be used with numerous other types of caps.

The construction and operation of the apparatus may be generally described as follows: Caps of the type described are placed in tray 22 with their skirts downward and are moved by hand to the inclined chute 23 of the tray so as to slide down upon the central portion of a continuously rotating disc 24. Rotation of the disc 24 will cause the caps to be moved outwardly on the disc adjacent its periphery and through an outlet portion to move upon a continuously moving endless chain as described in said Patent No. 2,433,549 which will conduct the cap to the left in Figure 1 between suitable lateral and top guiding members comprising the horizontal portion 27 of a cap passageway. This horizontal portion 27 terminates in an inclined chute 28 forming a continuation of the cap passageway. Chute 28 is also provided with lateral and top guide means and terminates in a cap applying or leveling mechanism described in said original application.

Containers B are delivered to the machine upon an endless conveyor 30 (Fig. 1) and move toward the left beneath the structure described immediately above to come in contact with the lowermost cap in the applying or leveling mechanism. At the time that the container contacts with the skirt of the lowermost cap, the side walls of the container will be firmly engaged by opposed endless belts included in the container centering mechanism 31. This mechanism will prevent the container from being tilted backwardly as it contacts with the lowermost cap in the chute 28.

Immediately before the cap moves out of contact with the applying mechanism, its upper surface will be engaged by an endless fabric belt 32 which further levels and holds the cap upon the container. Belt 32 moves along the outer surface of a capping element 33 of a construction generally similar to that disclosed in the Patent No. 2,256,413 issued September 16, 1941, on an application of Robert J. Stewart for Container sealing apparatus, element 33 being vertically adjustable to operate upon containers of various heights. In order that the fabric belt 32, which is of greater length than the inner capping belt 33, will move at substantially the same speed as

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the latter belt, a tensioned roller 34 is provided at the outer end of belt 32 and a weighted roller 35 is provided above capping element 33 to hold the upper run of fabric belt 32 in contact with the capping element 33.

Referring in detail to the construction of the apparatus, the machine preferably includes a table or base portion 40 which forms a continuous support for the endless container supporting conveyor 30.

Referring to Figure 1, a motor 50 and a speed reducer 51 including a driven shaft 52 are supported upon the under side of the table 40. The driven shaft 52 of the speed reducer is provided with a small sprocket 53 which drives a sprocket chain 54 also encircling a sprocket 55 fixed to a shaft 56 journaled in the outfeed end of the table 40. The links of the container supporting conveyor 30 move about a sprocket wheel secured to shaft 56.

In order to support the various mechanisms which apply caps and seal them upon the containers at a suitable height above the container supporting element 30, the machine includes a longitudinally extending superstructure 57 including spaced bars 58 extending from the infeed end of the apparatus to the capping mechanism, while a plate element 59 comprises the superstructure for the capping mechanism. The superstructure 57 is supported above the table 40 by means of pairs of heavy links 61, 62 and 63 spaced from the outfeed to the infeed end of the machine, each pair of links comprising a link on each side of the supporting table and superstructure.

The links 61 to 63 are pivoted at their respective ends to the superstructure and table and thereby support the superstructure in parallel relation with the upper surface of the table 40.

In order that the superstructure 57 may be supported at a fixed height and its height adjusted with respect to base 40, a pair of rotatable threaded shafts 71 extending between the base or table and the superstructure are provided. This construction is similar to that disclosed in said Stewart patent.

In order to prevent the containers from being tilted backwardly by their initial engagement with the lowermost cap in the chute, we provide the centering and holding structure 31 best illustrated in Figures 2 to 6. This structure is particularly desirable in the handling of full containers having a small base.

The container centering mechanism may be generally described as comprising two sets of driven belts 210 positioned on each side of the longitudinal center line of the container supporting conveyor 30. As best shown in Figures 1 and 3, each set of belts comprises an upper belt and a lower belt adapted to contact with a container at vertically spaced points on the side wall of the container.

The centering structure is supported on the superstructure bars 58. The drive and supporting arrangement for each belt 210 includes a bracket 212 of general U-shape secured to the outer surface of the corresponding superstructure bar 58, the outwardly projecting arms 213 of each bracket serving as a journal for a drive shaft 214 driven in a manner hereinafter described. A housing or gear case 215 is supported between the arms 213 of a bracket 212, the housing being in effect pivoted upon the shaft 214. Within the housing 215 shaft 214 has fixed thereto a bevelled gear 216 which meshes with a bevelled gear 217

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fixed as best shown in Figure 6 to a vertical shaft section 218 journaled in the bossed lower wall of the housing 215. Shaft section 218 is thus movable about the drive shaft 214 with the housing 215.

Vertical shaft section 218 is connected by a universal joint 219 to a lower vertical shaft section 220 journaled in a generally triangular plate element 221. Plate 221 has fixed thereto an outwardly projecting bracket 222 including integral ear members 223 at its outer end in which a trunnion element 224 is rotatably mounted. The trunnion element 224 is generally of the form of a pin having a threaded aperture extending there-through intermediate the ears 223 and this threaded aperture receives the lower and threaded end of a rod 225. The upper end of rod 225 is threaded in the opposite direction from its lower end and extends through a trunnion pin 224a which is rotatably mounted between ears 223a of a bracket 222a fixed to the lower bossed wall of gear casing 215.

It will be noted that the above mounting of the triangular plate element 221 permits this plate to be fixed in various planes at an angle to the surface of the container supporting conveyor 30 simply by rotation of the threaded rod 225, the universal joint between the vertical shaft sections 218 and 220 enabling such adjustment to be made without interfering with the drive of the lower shaft section.

Beneath plate 221 the lower shaft section 220 has fixed thereto a pair of pulleys 228 and 229 grooved to receive belts 210. As best indicated in Figure 5, the shaft section 220 is positioned adjacent the rear apex of the triangular plate 221 and idler pulleys 230 and 231 are positioned at the other corners or apices of plate 221. The idler pulleys are journaled upon studs 232 which are horizontally movable longitudinally of the center line of container supporting conveyor 30 in slots 233 formed in plate 221. In order to cause the inner runs of the belts 210 to have firm contact with a container moving between the belts at a point midway between the idler pulleys 230 and 231, a pair of longitudinally spaced idler rolls 235 are mounted on the inner edge of plate 221. As best shown in Figure 6, each idler roll 235 is of sufficient length to contact with both of the belts 210 carried by the corresponding plate 221. The idler rolls 235 are journaled upon pins 236 fixed in a plate 237 which includes a rearwardly extending arm 238 slotted so that its position with respect to triangular plate 221 may be adjusted inwardly and outwardly with respect to the center line of the container supporting conveyor 30. As indicated in Figure 6, a pair of bolts 239 enable the plate 237 to be locked in the desired adjusted position with respect to the triangular plate 221.

In order that the triangular plate 221 will be securely held and braced at the desired angle with respect to the upper housing 215 after the shafts 225 have been adjusted, the bracket 222 secured to plate 221 is provided with an off-set upwardly projecting arm 245 having an aperture therein which will be aligned with an off-set and downwardly projecting arm 246 secured to the lower wall of the housing 215. A large thumb screw 247 extends through the apertures in the arms 245 and 246 and the aperture in the latter arm is threaded. By this arrangement the two arms may be rigidly locked in the desired relationship to hold the triangular plate 221 at the desired angle with respect to the housing 215.

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The entire structure for supporting each pair of centering belts 210, including the corresponding housing 215, is urged to a position to maintain the belts 210 inwardly toward the container supporting conveyor center line and thereby into firm contact with containers by a spring 250 (Figure 3) which extends between a bracket 251 fixed to the inner surface of the corresponding superstructure bar 58 and an arm 252 extending downwardly from one side of the corresponding housing 215 and fixed with respect to the housing. As best shown in Figure 6, the inward swinging movement of the entire centering structure about the axes of the drive shafts 214 is limited by plates 255 carried by a rod 256, the plates 255 serving as abutments which will be contacted by studs 257 which project inwardly from the extreme lower portion of each housing 215. The rod 256 is mounted for rotation in plates 258 extending downwardly from the superstructure bars 58, being adapted to be rotated by a handle which may be attached to one end thereof. The portions of rod 256 which engage the abutments 255 are oppositely threaded so that rotation of the rod will cause the abutments to be simultaneously moved toward and away from each other. The abutments 255 are also apertured at one end to slide upon a rod 260 (Figure 2) which extends between the superstructure bars 58.

In operation, it is desirable to have the longitudinally central portion of the inner runs of the centering belts 210 so positioned that they will exert a slight pressure upon a container shown at position A in Figure 5. A container at position A in Figure 5 is at such position with respect to the cap chute 28 that a leading portion of the mouth of the container has just contacted with the depending skirt of the lowermost cap in the chute and some force is therefore acting upon the container to tilt it rearwardly. By having the container firmly gripped between the converging portions of the belts 230 at this time, the container will be securely held against tilting movement. During the subsequent portion of the process of removing the cap from the chute 28, the container will be even more firmly gripped by the portion of the belts 210 extending between the inwardly positioned idler rolls 235 and the converging portions of the belts 210 will also be in firm contact with the container at the moment that the latter moves under belt 32.

The belts 210 are preferably of sufficiently resilient material that they will have some inherent gripping action upon the container. However, the above described gripping action is primarily obtained by the action of the springs 250 which tend to swing the entire centering belt supporting structure inwardly about the axis of the drive shafts 214. The abutments 255 will actually serve to limit this swinging movement so that the belts will not be so close together as to upset a container moving into initial contact with the same.

It is usually desirable to have the centering belts 210 so positioned with respect to the surface of the container supporting conveyor 30 that a container will be gripped substantially midway of its height. However, if a container has its walls curved along vertical lines as indicated by the dotted lines in Figure 3, it is usually the best practice to have the belts 210 so positioned that the belts of each set will bear upon the side surface of the container at points spaced above and below the greatest diameter of the container. The provision of vertically spaced belts 210 in each set of belts of course permits the containers

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to be gripped at vertically spaced points, thereby further preventing tilting movement of the containers during the cap applying operation.

Numerous types of containers are tapered to have reduced portions either at their upper or lower ends and it will be observed that the centering belt construction disclosed therein is adjustable to cause the upper and lower bolts 210 of each set to have proper contact with such containers. That is, by loosening the thumb screws 247 and making the necessary adjustment of the threaded rods 225, the inner surfaces of the sets of bolts 210 can be positioned at any desired angle with respect to each other. Height of the belts 210 with respect to the container supporting conveyor will, of course, be adjusted by adjusting the height of the superstructure bars 58.

The drive shafts 214 for the centering belts 210 extend alongside the superstructure bars 58 as best shown in Figure 2 and, as indicated in Figure 1, extend into the housing 91 at the in-feed end of the machine where they are connected by sprocket chains and other suitable drive connecting means to the shaft 52 of speed reducer 51 so that the belts will move at the same speed as the container supporting conveyor 30. This drive connecting means includes shaft 92 and the chains 95, 98 and 102, as set forth in our said Patent No. 2,433,549.

Subject matter disclosed but not claimed herein may be claimed in our application Serial No. 635,552 for Container capping structure, filed December 17, 1945, which is also a division of the application for our said Patent No. 2,433,549.

The terminology used in the specification is for the purpose of description and not limitation, the scope of the invention being indicated in the claims.

We claim:

1. In a capping apparatus, a base, a container supporting conveyor, a pair of support elements pivotally mounted with respect to said base on horizontal axes spaced above said conveyor, endless container centering belts supported by and movable in an endless path defined by said support elements, and means to drive said belts at the same speed as said conveyor.

2. The combination in a capping apparatus, of a base, a container supporting conveyor movable on said base, a support spaced above said base, a pair of opposed carriers pivotally mounted on said support, endless container engaging belts movable about and bodily supported by said carriers, and means to adjust said carriers to vary the plane in which said belts move.

3. The combination in a capping apparatus, of a base, a container supporting conveyor movable on said base, a support spaced above said base, a pair of opposed carriers pivotally mounted on said support, endless container engaging belts movable about and bodily supported by said carriers, and resilient means to urge said carriers and belts toward each other.

4. In a container capping apparatus, a base, conveyor means to move containers along said base, a framework supported above said base, drive shafts journaled in said framework and extending parallel to said conveyor means, supporting elements respectively pivoted on said shafts, a series of pulleys carried by each of said supporting elements, a shaft journaled in each of said supporting elements and operatively connected to one of said pulleys, and endless container engaging belts movable about said pulleys.

5. In a container capping apparatus, a base,

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conveyor means to move containers along said base, a framework supported above said base, drive shafts journaled in said framework and extending parallel to said conveyor means, supporting elements respectively pivoted on said shafts, a series of pulleys carried by each of said supporting elements, a shaft journaled in each of said supporting elements and operatively connected to one of said pulleys, endless container engaging belts movable about said pulleys, said last-mentioned shafts including universal joints intermediate their length.

6. In a container capping apparatus, a container supporting conveyor, a base, planar elements supported by said base above said container supporting conveyor, each of said planar elements being provided with spaced slots in its forward end extending parallel with the container supporting conveyor and a rearwardly disposed journal, a driving pulley mounted in said rear journal, pulleys mounted in the forward slots, a belt extending about said pulleys, a member mounted intermediate said two last-named pulleys, and pulleys carried by said member to hold the central portion of the run of the belt between said forward pulleys beyond the plane of the forward pulleys.

7. In a container capping apparatus, a container supporting conveyor, a base, planar elements supported by said base above opposite sides of the center-line of said container supporting conveyor, each of said planar elements being provided with spaced slots in its forward end extending parallel with the container supporting conveyor and a rearwardly disposed jour-

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nal, a driving pulley mounted in said journal, pulleys secured in the forward slots, a belt extending about said pulleys, and pulleys mounted on said planar element between said forward pulleys to position the central portion of the belt run between said forward pulleys inwardly of said forward pulleys.

8. A container capping apparatus of the character defined in claim 4 including resilient means to urge the supporting elements about the respective drive shafts and toward the center line of the conveyor.

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