

July 6, 1965

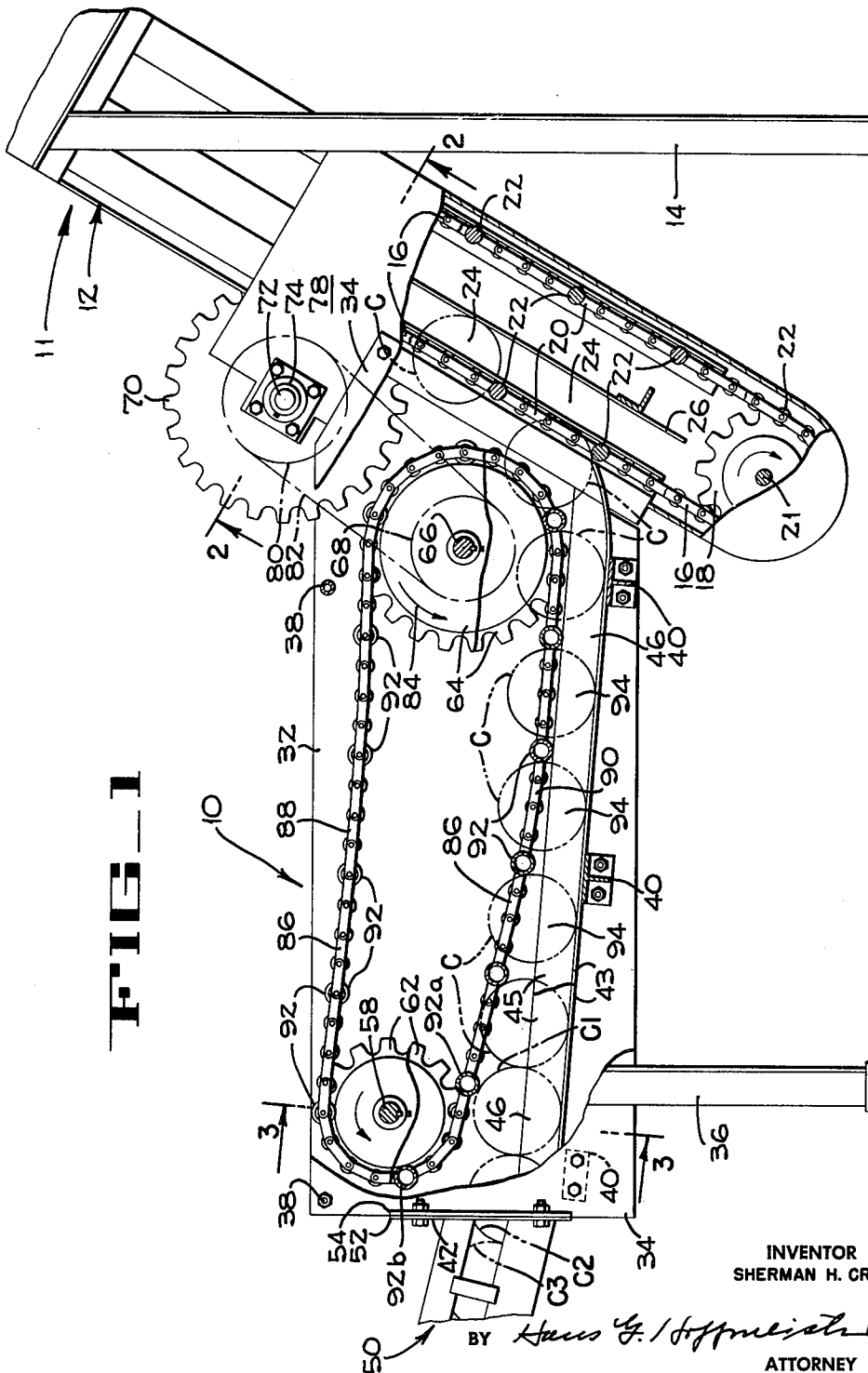
S. H. CREED

3,193,076

CONTAINER FEEDING MECHANISM

Filed June 19, 1963

3 Sheets-Sheet 1



July 6, 1965

S. H. CREED

3,193,076

CONTAINER FEEDING MECHANISM

Filed June 19, 1963

3 Sheets-Sheet 2

FIG. 2

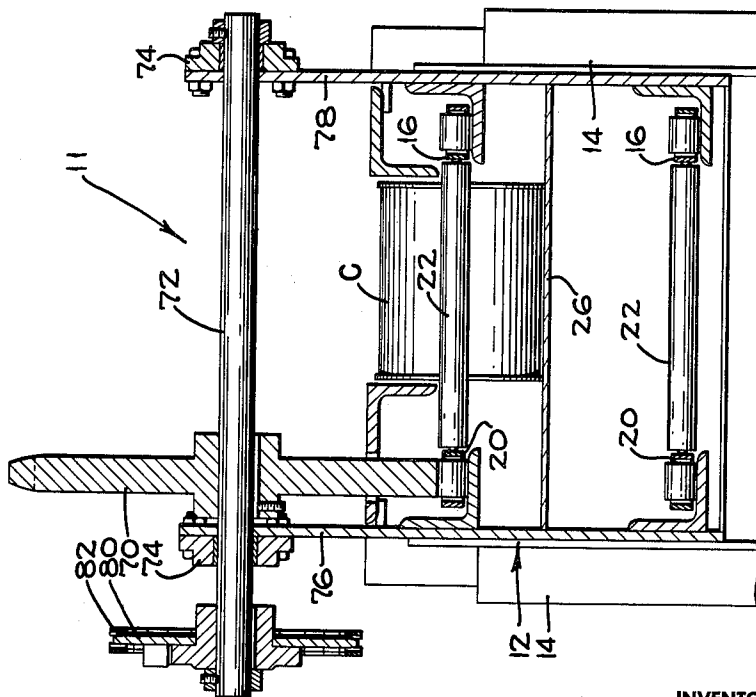


FIG. 3

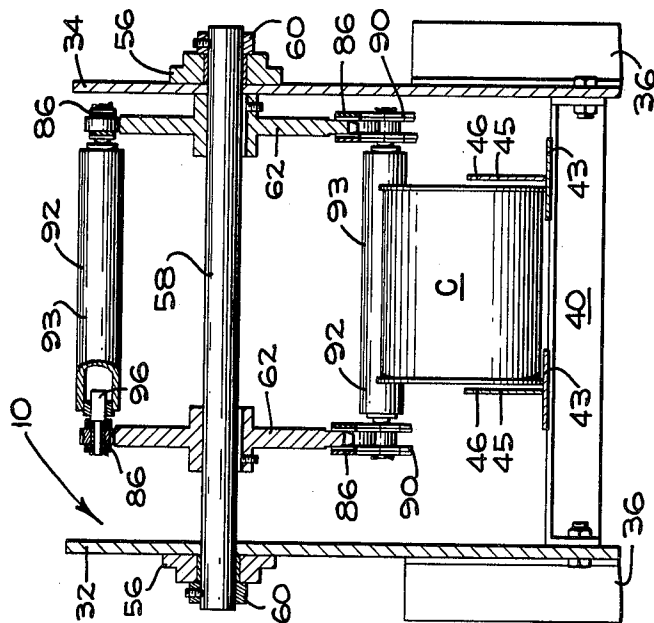
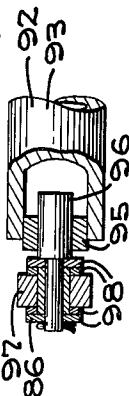


FIG. 3A



INVENTOR
SHERMAN H. CREED

BY *Hans G. Hoffmeister*
ATTORNEY

July 6, 1965

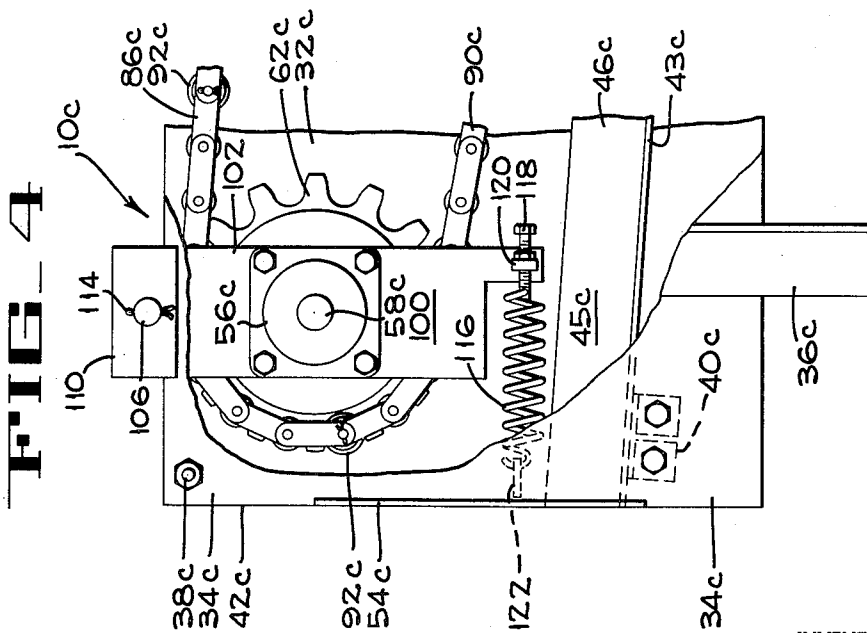
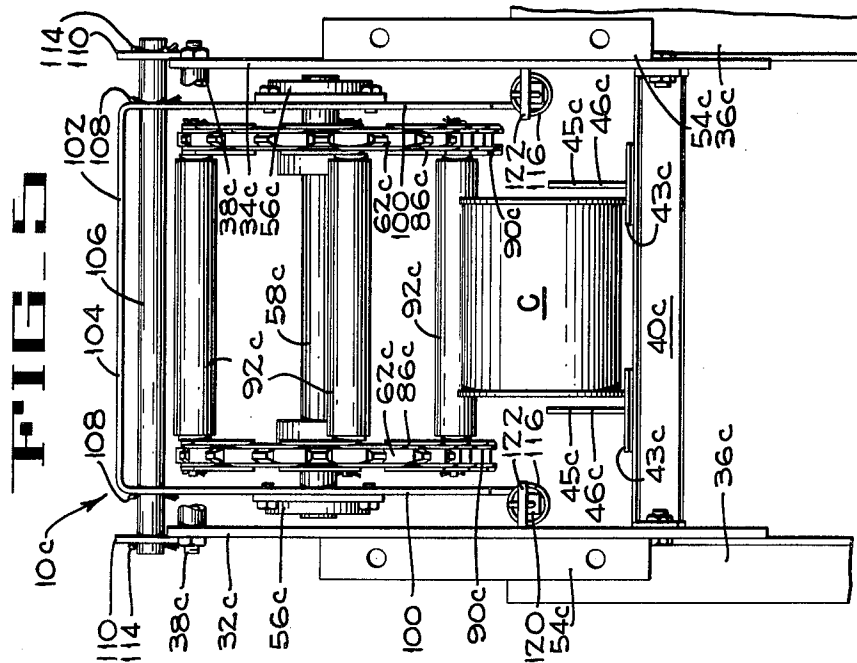
S. H. CREED

3,193,076

CONTAINER FEEDING MECHANISM

Filed June 19, 1963

3 Sheets-Sheet 3



INVENTOR
SHERMAN H. CREED

BY Hans G. Hoffmeister
ATTORNEY

1

3,193,076

CONTAINER FEEDING MECHANISM

Sherman H. Creed, San Jose, Calif., assignor to FMC Corporation, San Jose, Calif., a corporation of Delaware
Filed June 19, 1963, Ser. No. 289,133
9 Claims. (Cl. 198-22)

The present invention pertains to container handling machines, and more particularly relates to can feeding apparatus for spacing cans and discharging the cans in timed sequence.

One disadvantage of present can feeding devices is that gaps often occur in the row of discharged cans. This prevents use of the full capacity of the mechanism that is receiving cans from the feeding device and is, consequently, an inefficient procedure resulting in increased cost of the canned product.

An object of the present invention is to provide an improved can spacing and conveying mechanism for spacing randomly fed incoming cans and for transferring the cans in uniformly timed sequence from the discharge end thereof.

Another object of the invention is to provide a container feeding mechanism that will not damage any containers which may enter the mechanism in out of time relation to the mechanism.

Another object is to provide a container feeding mechanism which is adapted to handle containers at a relatively high rate of speed.

A further object of the invention is to provide a container feeding mechanism in which the possibility of containers becoming jammed is minimized.

Other objects and advantages of the present invention will become apparent from the following description and from the accompanying drawings, wherein:

FIGURE 1 is a diagrammatic side elevation, partly broken away, of the container feeding mechanism of the present invention operatively connected to a can elevator.

FIGURE 2 is a diagrammatic, enlarged section through the can elevator and is taken along lines 2-2 on FIGURE 1.

FIGURE 3 is an enlarged diagrammatic vertical section through the container feeding mechanism and is taken along lines 3-3 on FIGURE 1.

FIGURE 3A is an enlarged fragmentary elevation, partly broken away, of a can spacing roller.

FIGURE 4 is a fragmentary diagrammatic elevation, partly broken away, of a modified form of idler sprocket mounting, the view illustrating a portion of the mechanism which corresponds to the left end portion of the apparatus shown in FIGURE 1.

FIGURE 5 is an end elevation of the apparatus illustrated in FIGURE 4.

The embodiment of the invention chosen for illustration in FIG. 1 is indicated generally by reference numeral 10 and is shown as being arranged to feed cans to an elevator 11. The elevator is of the type disclosed in the United States Patent 2,756,862 to Creed and reference may be had to said patent for details of construction and operation not specifically mentioned herein. In general, the elevator includes an upwardly inclined frame 12 which is supported by legs 14 (FIGS. 1 and 2). An elevator chain 16 is trained around an idler sprocket 18 located at the near portion of the lower end of the elevator in FIGURE 1, and a similar chain 20 adjacent the other side of the elevator is trained around a second idler sprocket, not shown, that is aligned with the sprocket 18 on a common shaft 21. The elevator chains 16 and 20, which are also trained around a pair of aligned sprockets (not shown) at the upper end of the elevator, carry a plurality of equally spaced round bars 22 that define the lead-

2

ing and trailing ends of can receiving pockets 24. The bottoms of the pockets 24 are formed by a can support plate 26 which is fixed in the frame 12 beneath the upper flights of the chains 16 and 20.

In operation, the shaft at the upper end of the can elevator 11 is driven by a suitable drive to elevate the bars 22 of the upper chain flights at a uniform rate of speed, and cans C which are fed into the pockets 24 by the container feeding mechanism 10 of the present invention are subsequently discharged from the can elevator 11 to other can handling or processing machinery.

The container feeding mechanism 10 (FIGS. 1 and 3) includes laterally spaced side plates 32 and 34, each of which has a rear end portion that is bolted to, and is supported by the can elevator frame 12. The other ends of the side plates are supported by legs 36. Lateral tie rods 38 and cross members 40 interconnect the upper and lower edge portions of the side plates 32 and 34 in order to rigidify the structure.

The three cross members 40 (FIG. 1) are at different heights, decreasing in elevation from the input end 42 of the container feeding mechanism 10 to its discharge end, and support two laterally spaced, inverted T-shaped can guide tracks 46 (FIG. 3). Each can guide track is provided with a base flange 43 to support the cylindrical can surfaces and with an upright flange 45 that limits lateral movement of the cans. Cans C (FIG. 1) roll onto and down the declining tracks 46 from any conventional can supply means, such as a gravity chute 50. The chute 50 may be provided with an attachment flange 52 at each side that is bolted to a corresponding flange 54 on the side plates 32 and 34, only one pair of cooperating flanges 52 and 54 being shown. Incoming cans C may be fed singly, or in random number groups, and they may be either spaced apart or abutting, or can be arranged in a combination of both of the latter conditions.

Adjacent the input end 42 (FIG. 1) of the container feeding mechanism 10, two aligned bearings 56 (FIG. 3) are bolted to the side plates 32 and 34 and rotatably support an idler shaft 58 which is axially retained by a collar 60 on each end portion of the shaft. Intermediate the two side plates, two spaced idler sprockets 62 are keyed to the idler shaft, the sprockets being spaced apart a distance greater than the length of cans C that are being conveyed. Near the discharge end of the container feeding mechanism 10 (FIG. 1), a corresponding pair of drive sprockets 64 are secured to a driveshaft 66. The driveshaft 66 is journaled in bearings similar to the idler shaft bearings 56, and has one end portion projecting beyond the outer surface of the side plate 32. The projecting end portion of the shaft is keyed to a driven sprocket indicated by a pitch line 68.

Driving power for the sprocket 68 is obtained from the elevator chain 20 (FIGS. 1 and 2) by means of a large sprocket 70 which is in meshed driven engagement with the elevator chain. The sprocket 70 is mounted upon a freely rotatable shaft 72 that is supported by bearings 74, the bearings being bolted to upstanding plates 76 and 78 at each side of the elevator frame 12. A sprocket 80 (FIG. 2) is secured to the shaft 72 and has a driving connection to the sprocket 68 (FIG. 1) by means of a roller chain 82. Accordingly, when the can elevator 11 is operating, the sprockets 64 of the container feeding mechanism 10 are driven by the elevator, and rotate in the direction of the arrow 84.

An endless chain 86 (FIGURES 1 and 3) is trained around each aligned pair of idler and drive sprockets 62 and 64, the length, weight, and drive forces of each chain being such that the top flights 88 and the bottom flights 90 are slack even when the container feeding mechanism 10 is operating.

A plurality of equally spaced, transverse rollers 92 are carried by the chains 86, and in conjunction with the can tracks 46, adjacent rollers 92 define can transporting pockets 94 along the lower flights of the chains. Each roller 92 (FIG. 3A) comprises a tube 93 which is provided with an annular bearing 95 brazed in each outer end portion, the bearings being freely rotatably upon the inner end portion of an associated shouldered pivot pin 96. The reduced diameter portion of each pivot pin projects through the chain roller 97 and chain links 98 of the chain 86 and is axially retained by a cotter pin which bears against the outermost chain plate.

The distance between adjacent rollers 92 of the timing chain is the same as the distance between adjacent elevator bars 22, and the ratio of the pitch diameter of the sprocket 70 to the pitch diameter of sprocket 80 is equal to the ratio of the pitch diameter of the sprocket 64 to the pitch diameter of the sprocket 68. Accordingly, the elevator bars 22 and the timing mechanism rollers 92 are driven at the same linear speed. Adjacent the intersection of the timing mechanism 10 and the elevator 11, the rollers 92 and elevator bars 22 are so related to each other that the can transport pockets 94 and the can receiving pockets 24 successively become aligned with one another.

In the absence of cans C (FIG. 1) within the container timing mechanism 10, and before the elevator 11 is operating, both the top and bottom flights 88 and 90 of the chains 86 hang approximately as illustrated in FIG. 1 after an appropriate adjustment of the idler shaft bearings 56 by means of slotted mounting holes, not shown, in the side plates 32 and 34. If any cans C should then enter the container timing mechanism 10 from the gravity chute 50, the leading can at C1 will strike one of the upstream rollers 92, such as the roller at 92a, and the lane of cans will be held back by that particular roller until the can elevator 11 is started.

As soon as the can elevator starts and begins to rotate the drive sprockets 64, the bottom flight of the timing chain is pulled toward the sprockets 64, and the can C1 which is abutting the roller 92a, as well as the following cans C2 and C3 roll down the guide tracks 46. The next following roller 92, as for example roller 92b, will thus descend into contact with the upper arcuate surface of can C2 at a point ahead of its top dead center.

As the cans roll down the guide tracks 46, the rollers 92 drop down between adjacent cans because of the weight of the lower flight of rollers. Further downstream, the rollers 92 are prevented from dropping below the centers of the cans by reason of their contacting the upper edges of the upstanding flanges 45 of the can guide tracks 46. The cans thus subsequently receive only a forward driving force without any lifting force from the rollers 92.

Because the lower chain flights 90 descend relative to the guide tracks 46 in the direction of travel of the cans, it will be seen that a substantially wedge shaped chamber is formed between the guide tracks and chains, the chamber converging in the direction of can travel. The rollers 92 thus positively converge upon the row of cans C, and the positioning of the rollers C between adjacent cans to effect the desired timing and spacing of the cans is the result both of gravity and positive mechanical means tending to intermesh the rollers and the cans.

While other constructions can be used for the rollers 92, the disclosed hollow roller construction is preferred because can damage is less likely, and rotation of the hollow rollers is easily initiated due to their light weight. It will be evident, however, that the concept of utilizing the instability of one cylinder upon another cylinder (the roller on a can), makes it virtually impossible for any type of roller to maintain a position of exact balance upon the can while traversing the full length of the container feeding mechanism 10.

Near the discharge end of the can guide tracks 46 (FIG. 1) the base flanges 43 of the tracks curve upward

and their end edges lie close to the elevator bars 22. Cans which are pushed beyond these end edges by the rollers 92 are thus moved not only forward, but upward at the time they are discharged into the elevator pockets 24 so as to reduce jarring that might damage the cans and disturb their contents.

To further minimize can damage, the rollers 92 can be provided with resilient covers of rubber or similar material. The resilient covers on the rollers will not only protect the cans but will provide greater frictional contact of the rollers with the cans to rapidly induce rotation of the rollers. Various well-known constructions may be used to install the covers, and because such constructions are old, none are illustrated herein.

A further embodiment of the invention is illustrated in FIGURES 4 and 5, wherein the parts common to the mechanism first described will retain the same reference numerals with the suffix "c." The bearings 56c for the idler shaft 58c are mounted on the outer surfaces of the depending legs 100 of an inverted U-shaped bracket 102. Near the base portion 104 of the bracket, the legs 100 are pivotally mounted upon a pivot shaft 106. Pivot shaft 106 is axially retained in the bracket by cotter pins 108 and has projecting end portions which are mounted in apertured, upstanding plates 110 that are welded onto the side plates 32c and 34c. Cotter pins 114 extend through the pivot shaft and lie adjacent the outer surfaces of the plates 110 in order to fix the lateral position of the bracket 102.

The idler sprockets 62c are secured to the idler shaft 58c and lie inwardly of the legs 100. As in the previous embodiment of the invention, chains 86c which carry transverse rollers 92c, are trained around each idler sprocket, and around corresponding sprockets at the other end, not shown, of a container feeding mechanism that may be identical to the structure shown in FIGURE 1. Each leg 100 of the bracket 102 is provided with a tension spring 116 that is connected to a bolt 118 which is threaded through a block 120. The block is welded on the lower part of the leg 100, and the other end of each spring 116 is connected to a tab 122 which is welded to the inner surface of the associated side plate. The chains 86c, accordingly, are tensioned by the force exerted by the spring 116 in urging the bracket 102 to swing toward the feed end 42c of the container timing mechanism 10c. By adjusting the bolts 118 toward or away from the springs 116, the tension upon the chains 86c can be altered so as to obtain the desired degree of slackness in the lower chain flights 90c. The flights 90c can thus be adjusted to be as slack as the chain 86, but will accommodate more upward deflection, a feature especially desirable if the containers are fragile. If a can does happen to lift a roller, the springs 116 become further tensioned and will thus assist gravity in restoring the roller to its normal operating position by urging the tensioned chains downward.

It will be seen that both embodiments of the can feeding mechanisms 10 and 10c function by employing the inherent instability of one cylindrical object resting on another cylindrical object to the useful purpose of spacing and timing randomly fed cans in a can feeding mechanism. Moreover, both embodiments function by a combination of gravity and mechanical forces to attain such results, and are efficient and dependable without being unnecessarily complex. At the same time, it is virtually impossible to jam the mechanism or to damage the cans regardless of their timing into the mechanism.

Having thus described the invention, that which is believed to be new and for which protection by Letters Patent is desired, is:

1. A container feeding and timing mechanism comprising a container guide arranged to receive cylindrical containers in rolling position and guide the containers along a predetermined path, and endless conveying means mounted over said container guide and carrying a plurality of freely rotatable rollers extending across said con-

5

veyor path for contact with said containers, the spacing between adjacent roller surfaces being greater than the diameter of the containers, the lower flight of said rollers being mounted for movement in a path declining from a point above the upper surfaces of the incoming containers to a point intersecting the path of the containers at a subsequent downstream location.

2. A mechanism for feeding and timing containers comprising a container guide arranged to receive cylindrical containers and guide the containers along a predetermined path, a plurality of spaced apart and freely rotatable rollers movable in a substantially linear path spaced from the adjacent surfaces of the incoming containers and intersecting said container path at a subsequent downstream location, the axis of each roller being normal to said predetermined path and the spacing between adjacent rollers being at least equal to the diameter of said containers, and means for conveying said rollers toward said point of intersection whereby the inherent instability of the cylindrical surfaces of the freely rotatable rollers upon the cylindrical surfaces of the containers causes the rollers and containers to mesh with one another.

3. A mechanism for feeding and timing containers comprising a container guide arranged to support cylindrical containers in rolling position and guide them along a predetermined path, a plurality of spaced freely rotatable rollers, each roller being transverse to said container path and movable in a declining path from a point above the upper surfaces of the incoming containers to a point intersecting the path of the containers at a subsequent downstream location, along the container path, the spacing between adjacent roller surfaces being at least equal to the diameter of the containers, and means for conveying said rollers toward said point of intersection whereby the instability of the freely rotatable rollers upon the cylindrical surfaces of the containers prevents the rollers from attaining positions of rest atop the containers, thus causing the containers and rollers to intermesh.

4. A mechanism for feeding and timing containers comprising a container guide adapted to support cylindrical containers in rolling position and guide the containers along a predetermined path, an endless conveyor mounted over said container guide and including a plurality of freely rotatable rollers mounted transversely of said container path, the spacing between adjacent roller surfaces being at least equal to the diameter of the containers, the lower flight of said rollers being movable in a path descending from a point above the upper surfaces of the incoming containers to a point intersecting the path of the containers at a subsequent downstream location along said container path, and power means for driving said endless conveyor to transport said lower flight of rollers toward said point of intersection with said container path.

5. A mechanism for feeding and timing containers comprising a container guide adapted to support cylindrical containers in rolling position and guide the containers along a predetermined path, an endless chain conveyor mounted over said container guide and including an endless flight comprising a plurality of freely rotatable rollers extending transversely of said container path, the spacing between adjacent roller surfaces being at least equal to the diameter of the containers, the lower flight of said rollers being movable in a path converging toward said container guide from a point above the upper surfaces of the incoming containers to a point intersecting the path of the containers at a subsequent downstream location, and power means for driving said chain conveyor to transport said lower flight of said rollers toward said point of intersection with said container path.

6

6. A mechanism for feeding a succession of containers to a moving conveyor having a plurality of container receiving spaces therein, comprising a container guide adapted to support cylindrical containers in rolling position and guide the containers along a descending path, a chain conveyor mounted over said container guide and including an endless flight comprising a plurality of freely rotatable rollers mounted transversely of said container path, the spacing between adjacent roller surfaces being at least equal to the diameter of the containers, the lower flight of said rollers being movable in a substantially linear path descending from a joint above the upper surfaces of the incoming containers to a point intersecting the path of the containers at a subsequent downstream location, an idler sprocket meshed with said chain conveyor adjacent said incoming containers, a drive sprocket meshed with said chain conveyor adjacent said point of intersection, and power means connected to said drive sprocket for driving said chain conveyor to transport said lower flight of said rollers toward said point of intersection with said container path.

7. A container feeding and timing mechanism comprising a container guide arranged to receive cylindrical containers in rolling position and guide the containers along a predetermined path, and an endless timing chain mounted above said container guide and having a lower chain flight intercepting the container path, said chain flight including a plurality of freely rotatable spacer members disposed parallel to the rolling axes of the cans and having lower convex surfaces confronting the cans.

8. A timing and feeding mechanism for handling cylindrical containers comprising a container guide arranged to receive containers in rolling position and guide the containers along a predetermined path, an endless conveyor chain mounted above said container guide and having a slack lower flight, a plurality of freely rotatable cylindrical spacer members carried by said chain and extending transversely of said container path, the space between the confronting surfaces of said spacer members being at least equal to the diameter of the containers, a driven sprocket meshed with said conveyor chain at one end of said mechanism, an idler sprocket meshed with said conveyor chain at the other end of said mechanism, and means resilient urging one of said sprockets away from the other sprocket.

9. A container feeding and timing mechanism comprising a container guide having parallel sides connected to an inclined bottom surface and being arranged to receive cylindrical containers in rolling position and guide the containers along a predetermined path, said inclined bottom surface having an upturned curved portion adjacent the discharge end of the container guide, and endless, conveying means mounted over said container guide and carrying a plurality of freely rotatable rollers extending across said conveyor path for contacting said containers, the spacing between adjacent rollers being greater than the diameter of the containers, the lower flight of said rollers being mounted for movement in a path declining from a point above the upper surfaces of the incoming containers to a point intersecting the path of the containers at a subsequent downstream location.

References Cited by the Examiner

UNITED STATES PATENTS

2,805,755	9/57	Jones	198—34
3,056,483	10/62	Galloway	198—34

SAMUEL F. COLEMAN, *Primary Examiner.*

70 WILLIAM B. LA BORDE, *Examiner.*