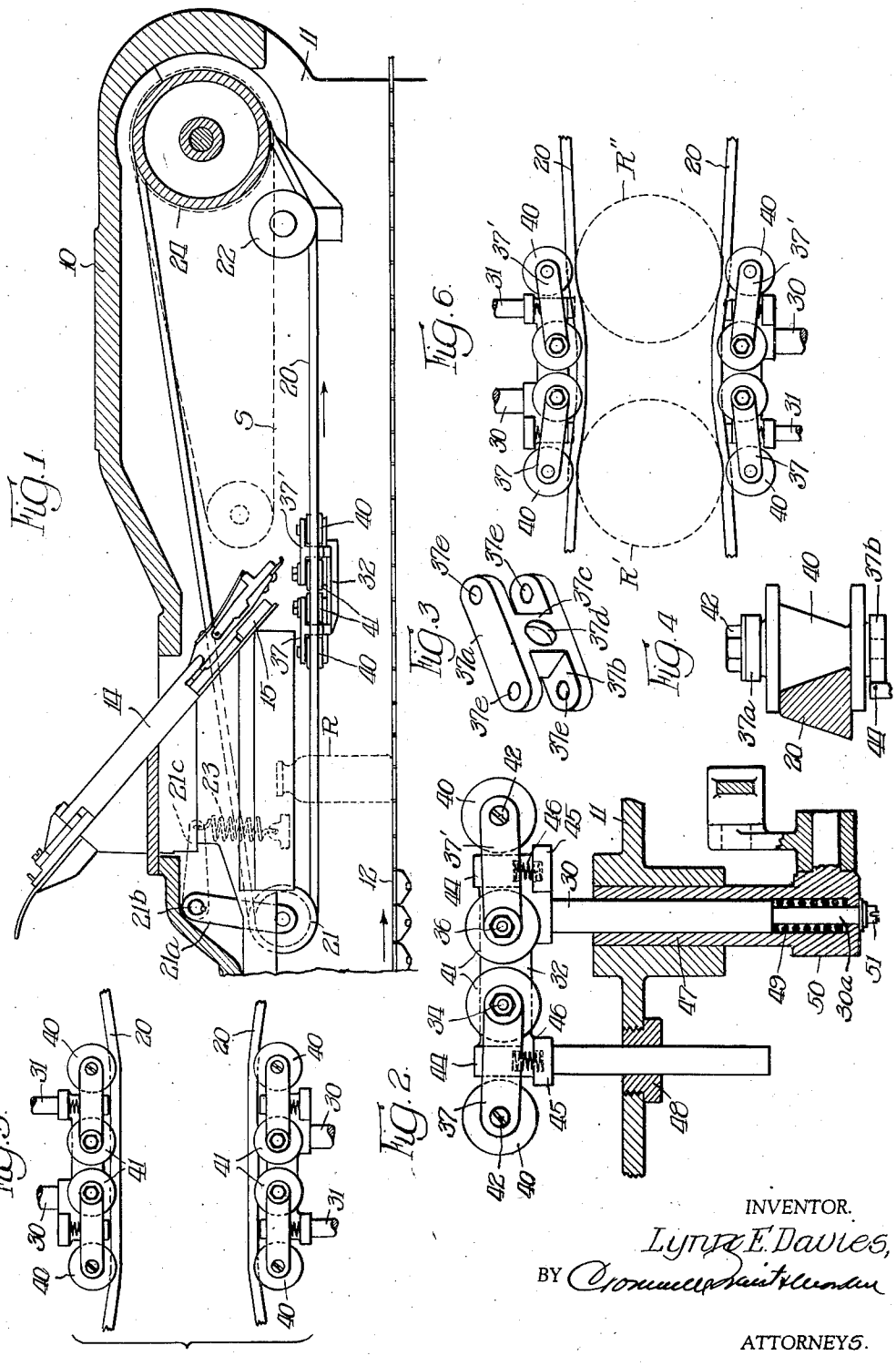
May 16, 1939. L. E. DAVIES 2,158,675

PACKAGING APPARATUS

Filed July 20, 1938 2 Sheets-Sheet 1



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Fig. 7

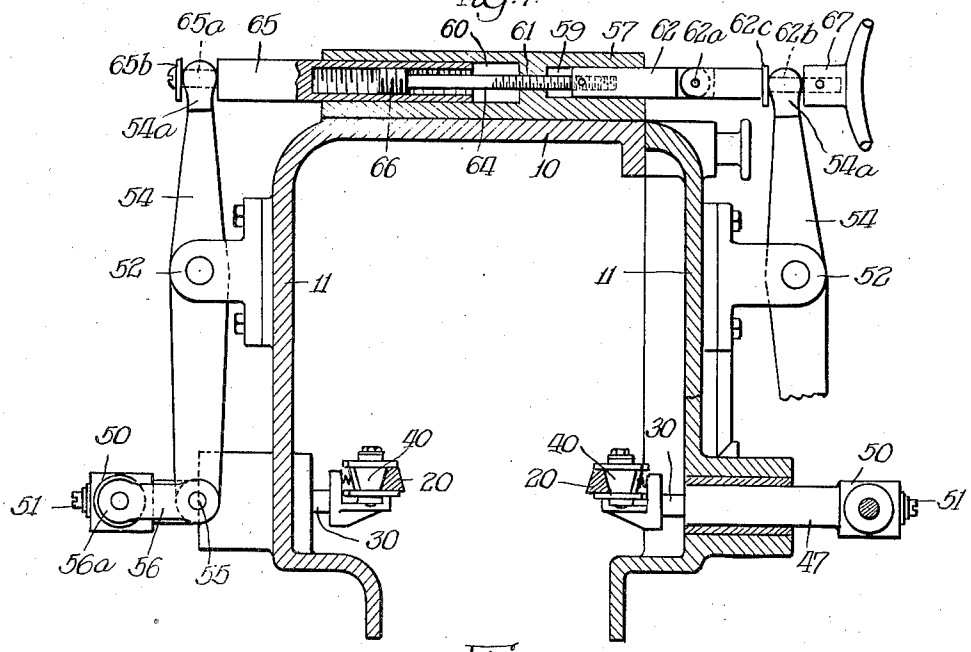


Fig. 8

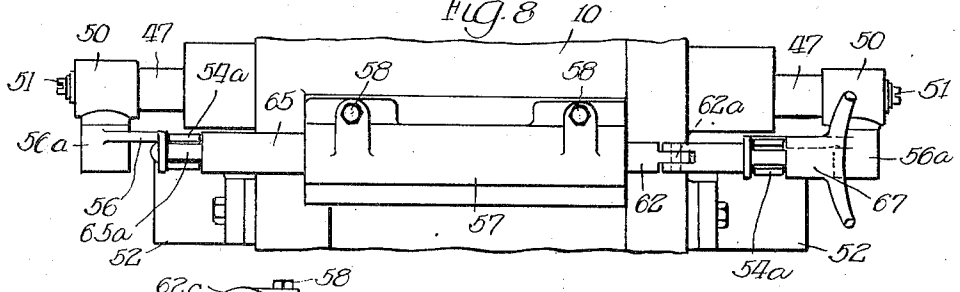
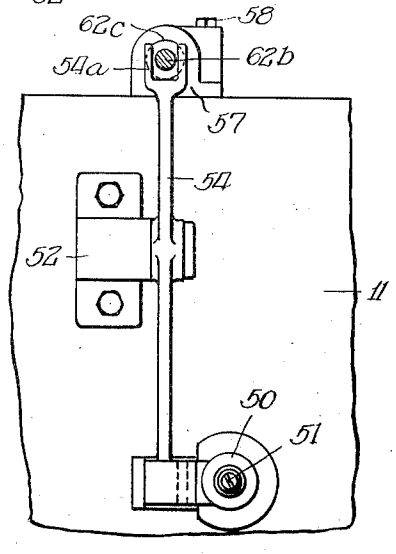


Fig. 9



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UNITED STATES PATENT OFFICE

2,158,675

PACKAGING APPARATUS

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Application July 20, 1938, Serial No. 220,238

16 Claims. (Cl. 226—129)

This invention relates to apparatus for progressively feeding or advancing receptacles, such as jars, bottles or the like, in a series, as for the purpose of applying and sealing closure caps upon them in the packaging of food products or the like.

The present invention comprises primarily improvements on the mechanism forming the subject matter of U. S. Letters Patent No. 2,041,891, granted to White Cap Company on May 26, 1936, and its primary object is to provide means whereby receptacles may be fed progressively in a series at a uniform rate of travel, but at non-uniform or irregular spacing relative to one another, and be maintained securely against tilting or upsetting at various localities in their course whereat their upper portions may be subjected to drag or a certain amount of impedance, as incident to the application of closure caps to them.

A particular object of the present invention is to provide an arrangement whereby the retentive engagement of the individual receptacles is rendered more positive, certain and secure at the critical locations in the course of their travel and at the same time to render their progress absolutely smooth and uniform and eliminate any opportunity for their being subjected to shocks or jolts at the times that the retentive pressures are applied to or removed from them.

Yet another object is the provision of an apparatus whereby the accurate centering or aligning of the receptacles in reference to an associated device, such as a cap-applying means, is effected smoothly and without jolting, while at the same time the accustomed variations from uniform size in the width or diameters of the receptacles may be suitably accommodated.

A further object of the invention is the provision of a means for accomplishing very accurate adjustment of the receptacle engaging elements so as to accommodate the apparatus to receptacles of various sizes.

Other and further objects of the invention will be pointed out or indicated hereinafter, or will be apparent upon an understanding of the invention or its employment in use.

In the accompanying drawings forming a part of this specification, I show, and hereinafter describe, one form of apparatus representing an embodiment of the invention. It is to be understood, however, that this is presented merely for purpose of illustration and hence is not to be construed in any fashion for the purpose of limiting the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawings,

Fig. 1 is a somewhat diagrammatic illustration of apparatus embodying the invention, showing it as used in a cap-applying and sealing machine such as is shown in the above mentioned Patent No. 2,041,891 and U. S. Patent No. 1,920,539, granted to White Cap Company on August 1, 1933, the illustration being in the nature of a vertical section through such a machine and showing portions of the apparatus constituting the present invention in side elevation;

Fig. 2 is a top or plan view of one of the belt control devices forming a part of said apparatus;

Fig. 3 is a detail in the nature of a perspective of a sheave yoke employed in the apparatus shown in Fig. 2;

Fig. 4 is an end elevational view of a portion of the belt control apparatus showing the associated belt in cross section;

Fig. 5 is a plan view illustrating the relationship of the associated receptacle-engaging belts and their control devices in the positions which they normally occupy in the absence of receptacles;

Fig. 6 is a similar plan view illustrating the altered positions or relationships assumed by the various elements of the belt control devices and the belts incident to the presence of receptacles between the belts;

Fig. 7 is a transverse vertical section illustrating means for adjusting the belt control devices;

Fig. 8 is a top view of same; and

Fig. 9 is a side elevational view of same.

The nature of the present invention may be most quickly ascertained from the following description of the illustrative embodiment shown in the drawings.

It is to be understood that in the drawings the invention is shown as utilized in a machine for applying and sealing closure caps on jars, bottles, or the like. It is to be understood, however, that the invention is susceptible of other uses. The machine here shown comprises a casing 10 having a top portion from which depend side wall portions 11 in such relationship as to provide a tunnel-like passage. Through this passage runs the upper flight of a conveyor belt 12, which is actuated by suitable mechanism to move it in the direction indicated by the arrow. Through the top of the casing 10 extends a chute 14 down which closure caps may be fed to a cap-applying device 15 which is positioned above the conveyor

belt 12 and which is adapted to present caps successively for application to successive receptacles which may be moved progressively past the device 15.

Associated with the conveyor 12, and disposed one at each side thereof, are the endless holding belts 20, which are entrained on pulleys 21, 22 and 24 which are journaled on the sides 11 of the casing. These belts are flexible, and compressible transversely to a certain extent, but preferably are as nearly non-stretchable as possible. The pulleys 21 are journaled on swinging yokes 21a which are keyed to stub shafts 21b which, at their outer ends carry arms 21c which are drawn downwardly by springs 23 to tension the belts longitudinally. As seen in Fig. 4, the cross-sectional form of the belts is such that at their inward sides they present relatively thin or narrow margins toward the path of the receptacles. The location of the pulleys 21 and 22 is such that they guide the lower flights of the belts 20 in approximately horizontal direction at an appropriate distance above the conveyor 12 so that they are opposite the upper portions of the receptacles which are transmitted on the belt 12, the relationship of such receptacles in this particular being illustrated in a general way by the dotted line profile designated by the reference character R in Figure 1. Means is provided for actuating the pulley 24 so as to transmit the lower flights of the belts 20 in the same direction and at the same speed as the upper flight of the conveyor belt 12 is advanced.

In opposite locations adjacent the cap-applying device 15, belt control devices are mounted on the casing walls 11. Details of these belt control devices may be seen in Figs. 2, 3 and 4. Each of them comprises a pair of rigid parallel rods 30 and 31 which are rigidly connected at one end by a head member 32. In this head member are rigidly set two strong pintle posts 34 and 36, which extend upwardly in parallel relationship. Journaled on each of these posts is a sheave yoke 37, 37' of the form shown more clearly in Fig. 3, wherein it will be seen that it comprises an upper link 37a and a similar lower link 37b rigidly connected in parallel relationship by a spacer block 37c which is formed with a depression 37d constituting a spring seat. Toward their ends the links are provided with aligned apertures 37e adapted to fit rotatably on the pintle posts 34 or 36. Between the end portions of the links 37a and 37b are mounted the guide sheaves 40 and 41, the guide sheaves 41 being the intermediate sheaves and being journaled on the pintle posts 34 and 36 respectively, and the end sheaves 40 being journaled on the pintle screws 42 which are set in the proper apertures 37e of the yokes.

At their inner sides the head members 32 carry upstanding stop members 44, which extend upwardly to the inner sides of the lower links 37b of the yokes, but terminate short of the peripheral grooves of the sheaves. These stops 44 form abutments for the yokes to limit their movement inwardly, and they are so located that when the yokes are against them, the peripheries of the end sheaves 40 extend inwardly slightly beyond those of the intermediate sheaves. This inward offset position of the end sheaves is shown in somewhat exaggerated proportion in Fig. 2, and is for a purpose hereinafter explained. To the outer sides of the yokes, the head member is provided with upstanding spring seats 45 having cavities which are opposite the cavities 37d of the yokes, and in these cavities, between the respective yokes and associated spring seats 45, are socketed the coil springs 46, which are put in under compression so that they are compressed when the yokes are against the inner stops 44, and thereby are effective normally to hold the yokes against those stops.

The rods 30 are slidably mounted in sleeves 47, which are set in the casing side walls 11, so that they may slide outwardly and inwardly, and against the outer end of the rod 30 is imposed a coil spring 49, maintained under compression against a cap socket 50 through which extends a reduced extension 30a of the rod 30. A screw 51 is threaded into the outer end portion of the extension 30a and contacts the cap 50 to hold the spring 49 under compression, while permitting the rod 30 and extension 30a to slide outwardly. The spring 49 presses the device to an inner limit position, but may yield to permit the device to move outwardly if sufficient pressure is applied to it.

The belt control devices are disposed in the casing wall 11 at a level such that the peripheral grooves of the sheaves 40 and 41 receive the respective belts 20, and guide said belts in their course as they approach the cap-applying device 15, as they pass it, and as they leave its vicinity. The spacing of the two oppositely disposed pulleys 22 transversely of the machine, and likewise the spacing of the two oppositely disposed pulleys 21, is somewhat greater than the diameter of the largest receptacles admissible to the machine. One of the functions of the belt control devices is to direct or guide the lower traverses of these belts into such relationship that they will engage opposite side portions of the receptacles, so as to grasp the receptacles between them and thus support them firmly against tilting or rocking on the conveyor belt 12 incident to their progressive movement. Accordingly, in order to exercise this function, the oppositely disposed belt control devices are set closer to each other than are the oppositely disposed pulleys 22 and 21, with the result that the belts 20 move on convergent paths from the pulleys 21 to the rearward end sheaves 40 and on divergent paths from the forward end sheaves 40 to the pulleys 22.

The means for adjusting the belt control devices for cooperation with receptacles of different diameter is illustrated in Figs. 7, 8 and 9. On the outer sides of the housing walls 11 and in positions opposite each other are secured bearing members 52, same being in association with the cap sockets 50, and journaled in these bearing members 52 are the arbors of adjusting levers 54. The upper ends of these adjusting levers are bifurcated as seen at 54a (Fig. 9) and their lower ends are journaled at 55 to short links 56. These links are journaled at their outer ends 56a to the cap sockets 50.

The levers 54 swing in planes parallel to the sleeves 47, so that when the upper ends of said levers are swung outwardly, away from the housing, their lower ends will be swung inwardly and will propel the sleeves 47 and rods 30 inwardly, hence moving the belt control devices toward each other; and when the upper ends of the levers 54 are swung inwardly, the belt control devices will be moved outwardly or away from each other.

For effecting such adjustments of the belt control devices, and keeping them uniform so that both will be moved exactly the same distance, I provide on the top of the housing 10 a transversely extending sleeve 57 fixedly secured in

place by bolts 58. This sleeve has coaxial longitudinal bores 59 and 60, separated by a restriction 61 which is tapped with a screw thread. In the bore 59 rotates and slides a rod 62 which has fixed coaxially thereto a rod 65 which is screw threaded and meshed with the tapped restriction 61. In the bore 60 slides a quill 65 which is bored and tapped with an internal screw thread. The rod 64 carries at its end an enlarged head 66 which is threaded and meshed with the internal thread of the quill 65. This internal thread of the quill 65 is of opposite pitch from that of the rod 64 and restriction 61, and it is of twice the pitch thereof.

The outer end portion of the quill 65 carries a reduced extension 65*a* which extends through the bifurcation 54*a* of the lever, said bifurcation being retained between the shoulder at the inner end of said reduced extension and a flange 65*b* at the outer end thereof. The outer end of the rod 62 is provided wth a hinged joint 62*a* and a reduced extension 62*b* at its outer end, which occupies the bifurcation 54*a* of the other lever, said bifurcation being retained between a flange 62*c* and the shoulder of a hand wheel 67 which is fixed to the outer end of the reduced extension 62*b*.

By virtue of the construction, rotation of the hand wheel 67 in one direction will rotate the rods 62, 64 and member 66 and will propel them in one direction, according to the pitch of the threading of the restriction 61. At the same time, however, by virtue of the screw-threaded engagement of the head 66 in the threaded bore of rod 65, because of the fact that its pitch is opposite and twice the degree of that of the restriction 61 and rod 64, said rod 65 will be propelled in the direction opposite that in which the rod 64 is moved. Accordingly, the upper ends of both levers 54 will be swung inwardly when the hand wheel is rotated in one direction, and outwardly when it is rotated in the other direction, and the extent to which said levers will be swung will be exactly the same. Consequently, the two belt control devices will be moved inwardly or outwardly to exactly the same extent, so that they will be maintained in symmetrical relationship to the median line of the conveyor 12.

It will be observed that this adjustment of the belt control devices is effected against the influence of the belt tensioning springs 23. Accordingly, the belts 20 are always maintained taut, even though the actual length of their lower flights, between pulleys 21 and pulleys 22, may vary according to the positions of the control devices.

Accordingly, as a receptacle approaches the cap-applying device 15, even though it may not be standing on the exact median line of the belt 12, it will be very gradually and very gently slid inwardly to the median position by one or the other of the belts 20 as it approaches the control devices.

Inasmuch as the disengagement of the cap from the cap-applying device 15 may impose considerable drag or resistance to the progressively moving receptacle, it is quite important that the grasping action exerted by the belt upon the upper part of the receptacle be quite firm and strong. This necessitates the cooperating control devices being set close enough to each other to compress the belt strongly against the interposed receptacle. Consequently, there may be a rather abrupt, though necessarily obtuse, change in the direction of the belt at the point where it first touches the periphery of the rearward end sheave 40. In order to overcome any undesirable effect of such an abrupt corner-like change in the direction of the belt, which might jar the receptacle or momentarily retard its progress, the said rearward sheave 40, by virtue of the pivotal mounting of the yoke 37 on the pintle post 34, is adapted to swing outwardly, against the influence of the compression spring 46, and thus taper off to a gentler angle the change in the direction of the belt. The importance of this will be recognized when it is appreciated that even before reaching the rearward sheaves 40, the belts may be somewhat compressed upon the receptacle, so that it will have indented itself into them to some extent. By virtue of this independent yieldability of the rearward sheaves 40, therefore, the receptacle is eased into the closer bite and higher grasping pressure of the belts between the intermediate sheaves 41. This is illustrated in a general way at the left hand part of Fig. 6.

Accordingly, by the time the mouth of the receptacle engages the cap in the cap-applying device 15, the receptacle is very securely grasped between the belts which are firmly supported at their outer sides by the intermediate sheaves 41, this pressure, of course, being subject to relief through the medium of springs 49, in event it reaches a dangerous degree, as might occur in the case of an excessively oversize receptacle. With this advancing movement, the receptacle withdraws the cap from the cap-applying device and moves on to a position between the forward end sheaves 40. These end sheaves on the departing end of the control devices, like those at the entering end, are susceptible of outward independent movement against the pressure of their springs 46, in like fashion. However, there is a somewhat different purpose for allowing them this independent outward movement. This purpose is in contemplation of instances in which the departing receptacle is materially oversize and is followed closely by another receptacle which may be somewhat undersize. If the departing sheaves had no outward movement excepting that partaken of by the entire device, against the spring 49, the departing oversize receptacle might hold the belts sufficiently far apart to prevent their maintaining an effective grasp upon the immediately following undersize receptacle, with the result that said undersize receptacle might be tilted or even upset by the drag or retarding action exerted upon its mouth portion by the cap which is in the cap-applying device. The provision of the independent outward movement for the departing end sheaves avoids such a contingency and permits the intermediate sheaves to maintain the belts at proper minimum spacing even though the departing receptacle may be excessively oversize. The outward movement of the departing end sheaves is illustrated at the right hand side of Fig. 6. It has a further useful function in easing off the angle of the belts from the intermediate sheaves and hence overcoming any tendency of the departing receptacle to jump immediately after it passes the bite point between the opposite intermediate sheaves. The provision of the independently movable departing end sheaves also extends the control of the holding belts 20, so that they may be maintained definitely in holding engagement with the receptacle until it passes under the sealing belt, which

may be located at approximately the position indicated by the dotted lines S.

The inward offset of the end sheaves 40, when their yokes are against the stops 44, as described above, is for the purpose of insuring an effective grip of the holding belts upon an entering or departing receptacle in an instance when an oversize receptacle may be opposite the intermediate sheaves. Of course, there are limitations as to the extent to which a receptacle may be permissibly oversize or out-of-round in order to come within accepted standards or specifications. By having the inward offset of the end sheaves approximately $\frac{1}{32}$ of an inch, an overall diametric variation of $\frac{1}{16}$ of an inch will be accommodated, in the particulars explained above, and a variation of that extent amply exceeds the permissible or overall variation in the caliber of glass receptacles according to the present standards.

What I claim is:

1. In an appliance for handling packing receptacles which has means for conveying receptacles progressively in a series, holding belts arranged to run along opposite sides of the path of the receptacles and means for driving said belts, apparatus for controlling the direction of the belts' travel comprising a plurality of sheaves arranged in series in oppositely disposed groups and engaging the belts at their outer sides and guiding them, the respective groups of sheaves being adjustable as a unit inwardly and outwardly relative to the paths of the receptacles, and certain of the sheaves being individually adjustable inwardly and outwardly relative to the others in their groups by pressure applied to the belts, and yielding pressure means urging the respective groups and the respective individually adjustable sheaves inwardly toward their inner limit positions.

2. Apparatus as specified in claim 1 and wherein the said yielding pressure means which is effective on the groups of sheaves is of greater resistance than that which is effective on individual sheaves.

3. Apparatus as specified in claim 1 and wherein the sheaves in respective groups are normally approximately in alignment parallel to the path of travel of the receptacles.

4. Apparatus as specified in claim 1 and wherein each group of sheaves comprises terminal sheaves and at least one intermediate sheave, and the individually adjustable sheave is the terminal sheave which is rearmost in the direction of the belts' travel.

5. Apparatus as specified in claim 1 and wherein each group of sheaves comprises terminal sheaves and at least one intermediate sheave, and the individually adjustable sheave is the terminal sheave which is foremost in the direction of the belt's travel.

6. Apparatus as specified in claim 1 and wherein each group of sheaves comprises terminal sheaves and at least one intermediate sheave, and the terminal sheaves are the ones which are individually adjustable.

7. Apparatus as specified in claim 1 and wherein the belts are guided in converging relationship to the groups of sheaves and in diverging relationship from the groups of sheaves.

8. Apparatus as specified in claim 1 and wherein the sheaves are rotatably mounted on head members which are movable inwardly and outwardly rectilinearly relative to the path of the receptacles.

9. Apparatus as specified in claim 1 and including head members which are movable inwardly and outwardly rectilinearly relative to the path of the receptacles and whereon the sheaves are rotatably mounted, the individually adjustable sheaves being adjustable arcuately relative to the head members.

10. In apparatus of the class described, a belt guide comprising an adjustable head member, means limiting it to right-line movement in its adjustments, pintle posts fixed in parallel relationship on the head member, sheaves journaled on said pintle posts, yokes hinged on said pintle posts, other sheaves journaled in said yokes, stop members for cooperation with said yokes to limit their inward movement, and springs urging said yokes toward said stop members.

11. In apparatus of the kind described, the combination of a conveyor for moving receptacles progressively, endless holding belts extending along opposite sides thereof, yielding means for tensioning said holding belts longitudinally, means for driving said conveyor and belts at like linear speed, and belt control devices disposed opposite each other and each having a plurality of belt-engaging members engaging outer sides of the respective belts to guide them, said belt control devices being adjustable toward and from each other to vary the course of the belts, and certain of the belt-engaging members of respective control devices being individually adjustable inwardly and outwardly independently of the others.

12. Apparatus as specified in claim 11 and wherein the belt control devices are spring pressed toward each other against the tension of the belt tensioning means.

13. Apparatus as specified in claim 11 and wherein the independently adjustable belt-engaging members are spring pressed against the belts.

14. Apparatus as specified in claim 11 and wherein the belt control devices are primarily spring pressed against the tension of the belts and the independently adjustable belt-engaging members are spring pressed against the belts but with a force inferior to that effective on the belt control devices primarily.

15. Apparatus as specified in claim 11 and wherein the belt control devices are primarily spring pressed inwardly against the belts and certain of their belt-engaging members are secondarily spring pressed individually and independently against the belts with an inferior force, and stop members are provided to limit the inward movement of the belt control devices and belt-engaging members.

16. Apparatus as specified in claim 11 and including stops for limiting inward movement of the individually adjustable belt-engaging members in positions where they extend inwardly slightly beyond their associated belt-engaging members, and yielding pressure means urging said individually adjustable belt-engaging members toward said stops.

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