Jan. 16, 1945. L. E. DAVIES 2,367,387

TOPPING MACHINE FOR CANNING

Filed May 11, 1942 3 Sheets-Sheet 1

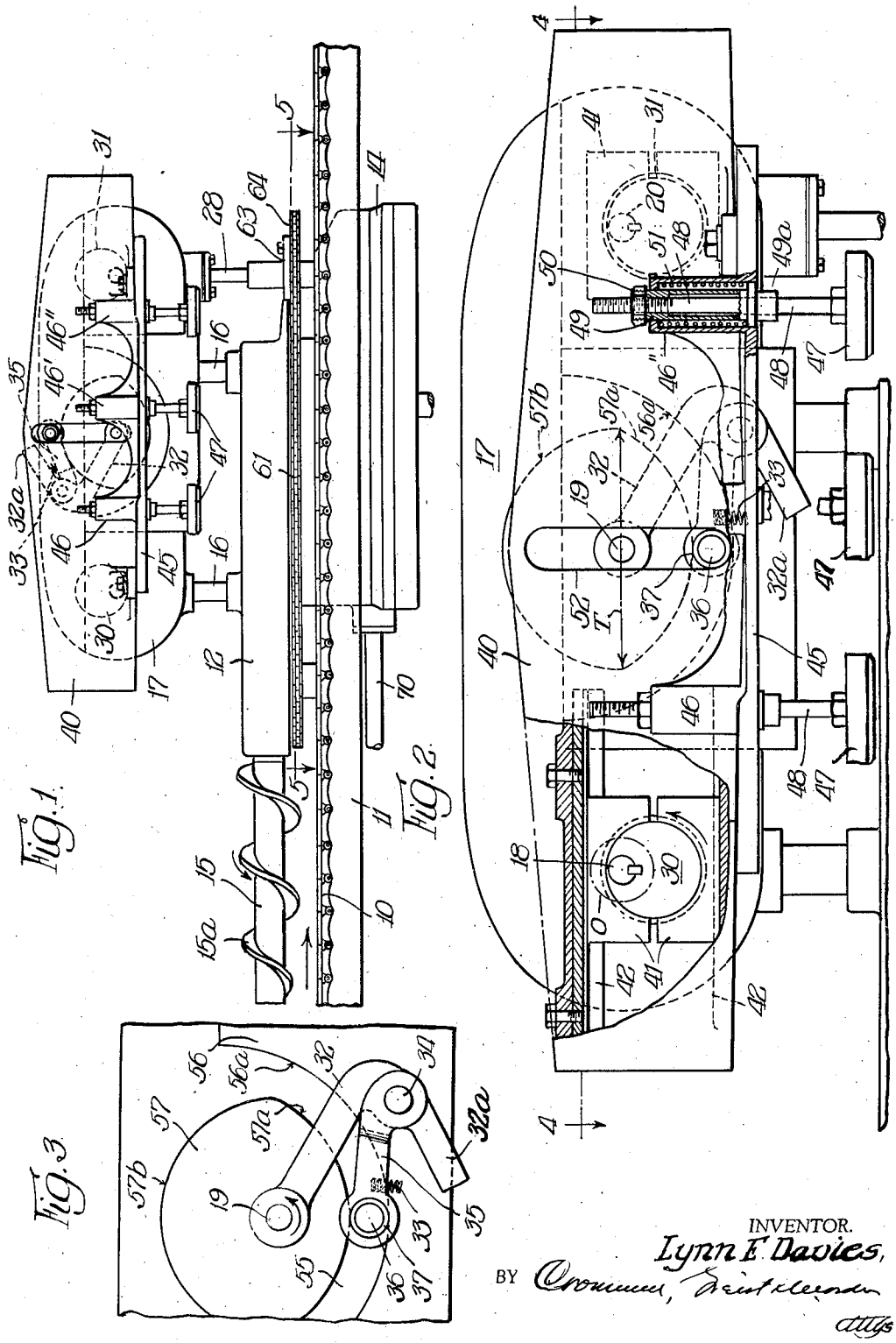


Fig. 1.

Fig. 2.

Fig. 3.

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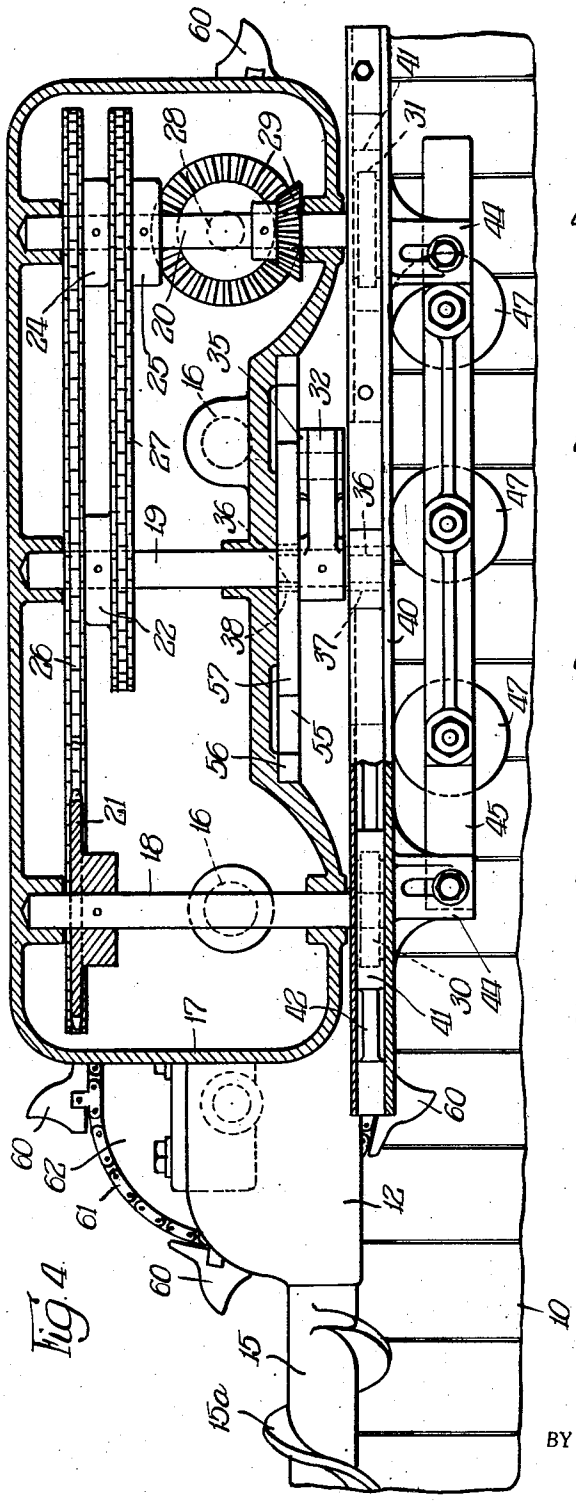


Fig. 4.

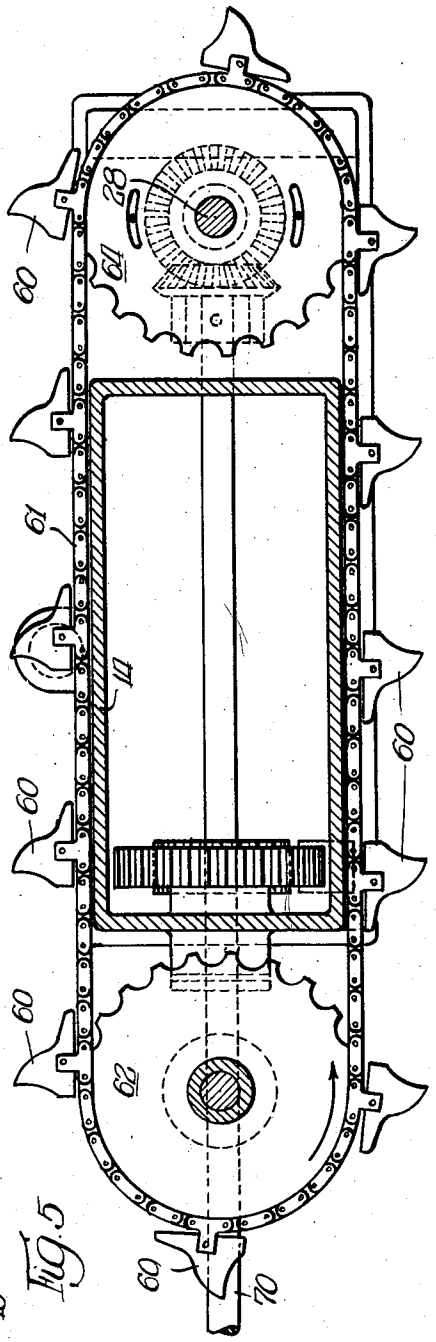


Fig. 5.

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TOPPING MACHINE FOR CANNING

Filed May 11, 1942 3 Sheets-Sheet 3

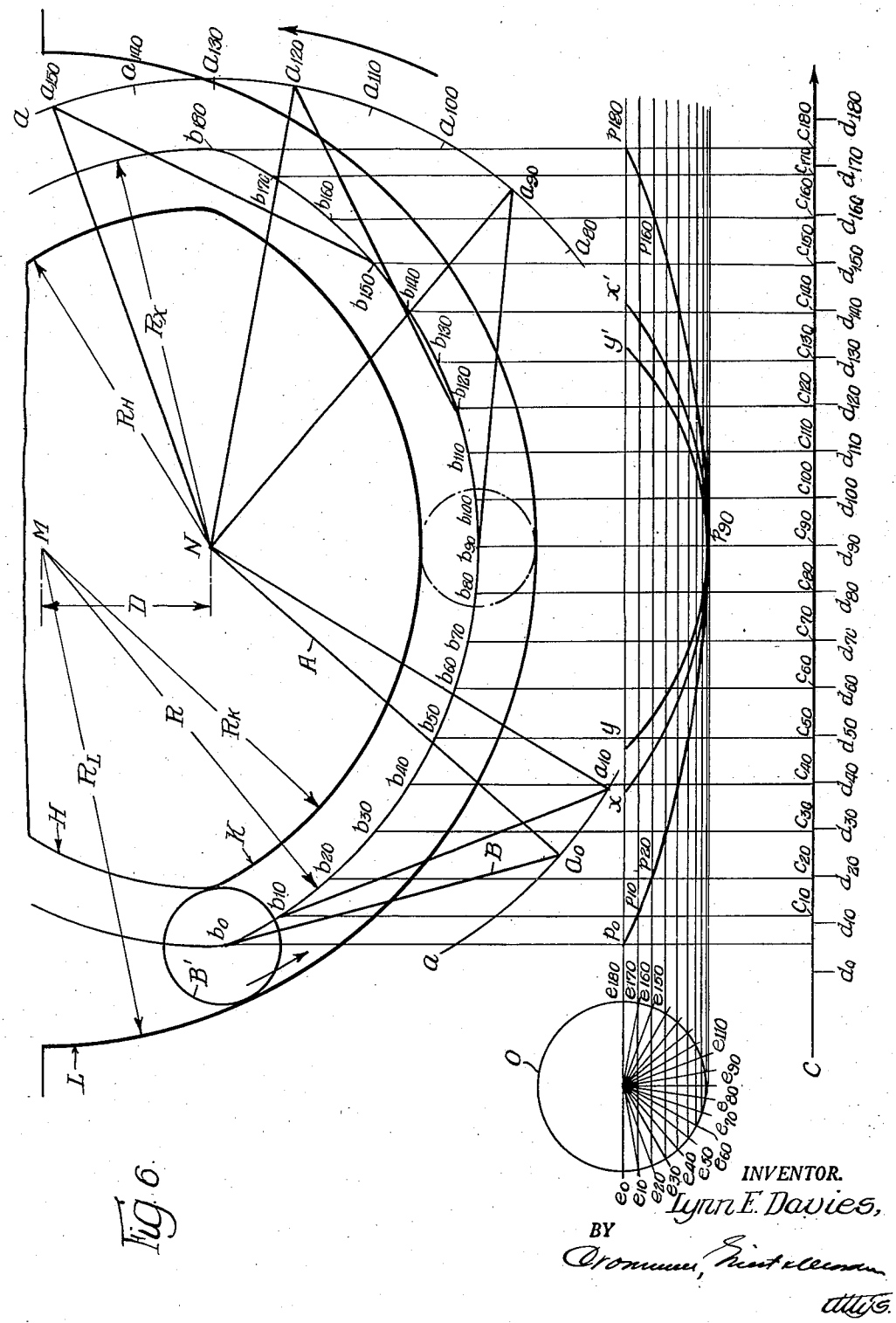


Fig. 6.

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UNITED STATES PATENT OFFICE

2,367,387

TOPPING MACHINE FOR CANNING

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Application May 11, 1942, Serial No. 442,445

18 Claims. (Cl. 226—71)

This invention relates to a topping machine for use in the commercial packaging or canning of food materials and the like, its purpose being to depress or push the material down within the packing receptacle or can to a location below the upper rim thereof, and provide a suitable head space if desired, preliminary to the placing of the closure or cover upon the can. Accordingly, it is adapted to be employed in the canning line between the filler, which places the material in the cans, and the closure applying device which places the closures upon them.

In order to fit properly into the canning procedure without interrupting or retarding the progress thereof, it is essential that the topping operation be accomplished quite expeditiously and while the cans are moving progressively at the normal rate at which the line is operated.

Many commodities, peeled fruits for example, are of tender or delicate structure and may be crushed, bruised or mutilated by pressure if their movement downwardly in the can under the pressure is resisted. Such is likely to occur when the pressure is applied more rapidly than the pieces of fruit are able to move freely or accommodate their positions to it.

It is the general purpose of the present invention to provide a topping mechanism which may be embodied in the form of a comparatively small unit which can be installed in the canning line and which will perform its intended function at suitable speed, yet will apply the pressure to the product sufficiently slowly to permit the product to accommodate itself to the pressure and adjust its position within the can in such fashion as to avoid mutilation or bruising.

Another object is to provide such a mechanism which is of simple construction and which will be consistent and reliable in operation and which will operate smoothly at high speeds.

Other and further objects of the invention will be pointed out or indicated hereinafter or will be apparent to one skilled in the art upon an understanding of the present disclosure of it or upon use of it in practice.

For the purpose of explaining the invention I show in the accompanying drawings forming a part of this specification, and hereinafter describe, one form in which it may be embodied and used. It is to be understood, however, that this is presented merely for purpose of illustration and is not to be construed in any fashion to limit the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawings,

Fig. 1 is a side elevational view of apparatus embodying my invention, showing same installed in association with a conveyor which forms part of a canning line;

Fig. 2 is a similar side elevational view, on a larger scale, of the portion of the mechanism shown in the upper part of Fig. 1, certain parts being broken away and shown in section;

Fig. 3 is a detail showing in elevation certain of the parts included in Fig. 2;

Fig. 4 is a top or plan view of a portion of the mechanism shown in Fig. 1, certain of the parts being broken away and shown in horizontal section;

Fig. 5 is a horizontal section of a portion of the mechanism taken on approximately line 5—5 of Fig. 1, the illustrations in Figs. 4 and 5 being on a larger scale than that of Fig. 1; and

Fig. 6 is a diagram serving to illustrate certain of the features of the operation of the machine.

The nature of the invention will be most readily ascertained from a description of the illustrative embodiment shown, which is as follows.

It is to be understood that the reference numeral 10 designates a traveling belt portion of a conveyor adapted to support packing receptacles standing thereon in upright position and carry them with progressive movement in the direction indicated by the associated arrow. Supported stationarily in association with the belt 10 is a frame member 11 upon which are mounted gear housings 12 and 14, the former being located to one side of the belt and somewhat above it. A helical conveyor 15 is journaled in the housing 12 and extends longitudinally of the belt along and above one side thereof. On posts 16, which are supported on the housing 12, is carried a casing 17 in which are journaled three shafts 18, 19 and 20 disposed horizontally and having their ends extending through the wall of the casing which is toward the conveyor 10. These shafts carry sprockets 21, 22, 24 and 25, sprockets 21 and 24 having a chain 26 entrained on them and sprockets 22 and 25 having entrained on them a chain 27. A stub shaft 28 extends upwardly from within housing 14 and is connected by beveled gears 29 with shaft 20. Consequently, shaft 20 is rotated by rotation of shaft 28 and, through the sprocket and chain connections, rotates shafts 18 and 19 in the same direction. The sprocket and chain connections are such that the three shafts 18, 19 and 20 are rotated at the same speed.

Shaft 18 has affixed to its projecting end a circular crank disk 30 and shaft 20 carries affixed to

its projecting end a circular crank disk 31 of the same diameter as crank disk 30, said disks being hereinafter referred to as plunger revolving cranks. Shaft 19 has affixed to its projecting end a radially extending crank arm 32, to which is pivoted at 34 a link 35 (see Fig. 3). Link 35 carries at its outer end a hub 36 which projects from opposite sides of said link and is fitted with antifriction bushings 37 and 38. The compound crank comprising arm 32 and link 35 will be referred to as a plunger guiding crank.

Extending alongside the casing 17 is a carrier frame 40 which is mounted on the crank disks 30 and 31 by means of bearings 41. The crank disks have peripheral tongues which run in grooves in said bearings, and the bearings are mounted for sliding movement longitudinally of the carrier frame, in which movement they are guided by trackways 42. Consequently, when the crank disks 30 and 31 are revolved by rotation of shafts 18 and 20, carrier frame 40 will be given a translatory movement, wherein it travels in an orbit alongside casing 17 but without any alteration of its position angularly relative to the horizontal.

Upon brackets 44 which project laterally from the carrier frame is mounted a horizontal presser bar 45 and fixed on this presser bar are three upwardly extending plunger mountings 46, 46' and 46'' arranged at equidistant intervals in alignment longitudinally of the presser bar. In each of these plunger mountings is mounted a pressing plunger comprising a disk-like head 47 and stem 48. The stem is screw threaded in and passes through a sleeve 49 which is guided coaxially within the hollow mounting member by means of a collar-like enlargement 49*a* at the lower end of the sleeve and a sliding fit of the upper portion of the sleeve in a central aperture in the top of the mounting. A nut 50 is threaded onto the projecting upper end of the sleeve 49 and, by contact with the upper end of the mounting, limits downward movement of the sleeve. The sleeve is yieldably pressed downwardly by means of a coiled spring 51 which bears at its upper end against the overhanging top flange of the mounting and at its lower end against the projecting collar portion 49*a* of the sleeve. By virtue of this arrangement each of the plunger heads may be moved upwardly against the pressure of its spring 51, and also, by screwing the stem upwardly or downwardly in the sleeve 49, each of the plungers may be adjusted vertically relative to the presser bar 45.

At its middle the carrier 40 is provided with a vertically extended slot 52 in which fits the bushing 37 of the hub 36 in such fashion that said bushing and hub may travel upwardly and downwardly in the slot. The bushing 38 which is carried on the opposite end of the hub 36 (see Fig. 4) fits in an arcuate slot 55 which is defined by the margins 56*a* and 57*a* of guide members 56 and 57, which guide members are fixedly mounted on the casing 17. Consequently, as the crank arm 32 is revolved by rotation of shaft 19, which shaft rotates at the same speed as shafts 18 and 20, the path of hub 36 is defined and controlled by the contours of the margins of guide members 56 and 57 upon which bushing 38 of said hub rides.

In the arrangement shown, the upper half of the orbit of hub 36 is concentric with shaft 19 because bushing 38 is then riding on the concentric marginal portions 57*b* of guide member 57, but in the lower half of its orbit, hub 36 travels in a flatter arc, eccentric of shaft 19, due to the fact that the guide margins 56*a* and 57*a* are formed on arcs of greater radius than the margin 57*b*. The hub 36 is permitted to follow the eccentric path due to the fact that the link 35 which carries it is pivotally connected at 34 to crank arm 32 and also due to the fact that the hub and its bushing 37 are free to move longitudinally of slot 52.

The total extent of horizontal movement of the carrier 40 is a distance *T* corresponding to the diameter of profile 57*b* or chord of profile 57*a*, and the total extent of vertical movement of the carrier 40 is equal to the diameter of the circular orbit *O* described by the centers of the crank disks in their rotation. Inasmuch as *T* is considerably greater than *O*, the acceleration of the movement of carrier 40 in the horizontal sense is varied from that of the simple harmonic motion which it would have if controlled entirely by the crank disks. This variation is permitted by the shiftable mounting of the bearings 41 and the shiftable engagement of the bushing 37 of hub 36 in slot 52 of the carrier. The propelling and guiding action of hub 36 on carrier 40 is that of a crank of varying length, due to the fact that the distance of the hub from the center of shaft 19 is varied by the guide profiles. Because of the fact that the guide profiles 56*a* and 57*a* are formed on a greater radius than that of the profile 57*b*, the acceleration of the horizontal movement of the carrier while traveling through the greater portion of the lower half of its orbit is reduced, and thus its rate of movement in the horizontal sense is rendered more nearly uniform in that portion of its cycle. It will be seen also that during its travel in the lower half of its orbit the rate of vertical displacement of the carrier 40 is materially less, in ratio to the rate of horizontal movement of the plunger and container, than what it would be if the horizontal movement followed uniformly the simple harmonic motion of the crank disks. The shafts 18, 19 and 20, as viewed in Fig. 2, are rotated in counterclockwise direction. Hence, the period during which the carrier 40 has this modified movement is while it is traveling in the rightward direction of that figure, namely, forward in the direction of movement of the conveyor 10, and it is during a portion of this modified or equalized movement that the plungers 47 are rendered effective on the material in the containers which are located below them on the conveyor. As the hub 36 approaches the rightward end of guide margin 57*a*, said hub is being moved away from shaft 19 so that link 35 is swung toward the tail 32*a* of crank 32, finally reaching a point where tail 32*a* compresses a spring 33 which is carried on link 35. As a result, bushing 37 is held against the profile 57*b* of guide member 57 by the pressure of spring 33 during the return or leftward movement, and when hub 36 passes the leftward end of profile 57*b*, the hub is urged away from the tail portion 32*a* and into the slot 55.

The filled containers are set upon the conveyor belt 10 ahead of the screw conveyor 15 (viz., to the left of Fig. 1) and are advanced by the conveyor belt until engaged by the helical flange 15*a*, which flange, accordingly, spaces the successive containers at proper intervals. As each container leaves the rightward end of flange 15*a*, it is in a position immediately ahead of one of a series of flights 60 which are carried

by a chain 61 that is entrained about a pair of sprockets 62 and 64. Sprocket 62 is an idler but sprocket 64 is adjustably secured to the flange of a mounting hub 63 which is splined to shaft 28 so that sprocket 64 is rotated to actuate the chain. The spacing of the flights 60 corresponds with the spacing of the plunger heads 47, and the diameter of the sprockets 62 and 64 is such that the rate of progressive movement of the flights corresponds approximately with the rate of horizontal advancement of the carrier 40 while it is traveling through the lower portion of its orbit. By proper design of the contour of profiles 56*a* and 57*a*, the rate of horizontal advancement of the carrier 40 in the lower portion of its orbit may be made to correspond very closely to the rate of progressive movement of the flights 60. Moreover, the timing of parts is such that in the course of each cyclical revolution of the carrier 40, three of the containers will be moved and positioned by the flights 60 and belt 10 to proper locations for entry of the three plunger heads 47 into them simultaneously. The downward movement of the plunger heads operates to press the solid pieces of material in the containers downward in them to an extent predetermined by the position of adjustment of the plungers in their mountings and the elevational adjustment of casing 17 relative to conveyor belt 10. The plunger heads 47 are interchangeable to permit installation of heads of diameter suitable for the particular containers being handled, and sprocket 64 is rotatably adjustable on its mounting flange 63 to permit corresponding adjustment of chain 61 and flights 60, and presser bar 45 is adjustable laterally on brackets 44 in order to position the plungers properly for containers of different diameters.

Certain of the results accomplished by the machine as to the timing of the forward movement of the plungers with the progressive movement of the containers and as to their pressing action on the material therein, particularly as compared with machines in which the plungers have uniform circular motion, are illustrated in the diagram of Fig. 6. The line *C* represents the path traveled by the mouth of the container as it is moved progressively at a constant rate of speed by the conveying mechanism, and each of the space intervals d_0—d_{10}, d_{10}—$_{20}$, d_{20}—d_{30}, etc., represents the distance traveled by any given point of the container's mouth, its center for example, during a given unit of time. The circle *O* represented the orbit of the centers of crank disks 30 and 31, and hence the vertical diameter of that orbit represents the extent of vertical movement of the carrier 40. Each of the space intervals e_0—e_{10}, e_{10}—e_{20}, e_{20}—e_{30}, etc., represents the distance which the centers of the crank disks travel per unit of time on orbit *O*, and the distances between the horizontal lines which are projected from the points e_0, e_{10}, e_{20}, etc., represent the distances which the carrier 40 is moved vertically during the corresponding time intervals. The center *N* represents the center of the shaft 19 (Fig. 2) and the vector arm *A* represents the distance from the center of shaft 19 to the center of pivot 34, while arm *B* represents the distance from the center of pivot 34 to the center of hub 36 and circle *B'* represents the periphery of hub bushing 38. It is to be noted that arm *B* is free to swing angularly relative to arm *A*. Arc *L* which is described on a radius R_L from a center *M* at a distance *D* above center *N* represents the guide profile 56*a*, arc *H* having radius R_H represents the guide profile 57*b*, and arc *K* on a radius R_K represents guide profile 57*a*. Since the course of *B'* throughout the lower portion of its orbit is determined by profiles *K* and *L*, the course of the center of *B'* is defined by the arc b_0—b_{180} which is on radius *R*. Theoretically, the horizontal distance from b_0 to b_{180} should be equal to half the distance traveled by a container during one complete cycle of arm *A* and the distance from *N* to b_{90} should be equal to or very slightly less than the radius of a circle having a circumference equal to the distance traveled by the container in one complete cycle of arm *A*. In practice, however, in order to avoid excessive shock effect at the ends of profile *K*, the horizontal distance b_0—b_{180} should be made somewhat less than the theoretical figure. For example, if the theoretical distance were seven and one-half inches, a feasible practical distance would be seven inches. With the points b_0 and b_{90} thus located, the position of *M* is readily determined. The points b_0, b_{10}, b_{20} et seq. to b_{180} represent the center positions of *B'* at consecutive unit time intervals, at which times the end of arm *A* is at corresponding points a_0, a_{10} et seq. which are equally spaced from one another on arc *a*—*a*. In the diagram the positions of *A* and *B* at points a_0, a_{10}, a_{90}, a_{120} and a_{150} are shown in order to demonstrate how the locations of points b_0, b_{10}, b_{20} et seq. are determined. Inasmuch as horizontal movement of carrier plate 40 is governed by movement of *B'*, the horizontal distances between the lines projected vertically from point b_0, b_{10}, b_{20} et seq. to b_{180} represent the distances traveled horizontally by carrier plate 40 during the corresponding unit time intervals. It will be seen, by comparison of projected points c_{10}, c_{20}, c_{30}, c_{40} et seq. with points d_{10}, d_{20}, d_{30}, d_{40} et seq., that the horizontal travel of carrier plate 40 corresponds very closely with the progressive travel of the container throughout almost the entire extent of the travel of B' on profile K. Accordingly, inasmuch as the movement of the plungers 47 is exactly the same as that of carrier plate 40, it is apparent that the displacement of the container relative to the plunger in the horizontal direction is very slight in the course of the travel of the container from d_{10} to d_{170}. Consequently, the diameter of the plungers need be but very little less than that of the mouths of the containers. The centers of plungers 47 follow paths which are resultants of the vertical movement e_0—e_{90}, e_{90}—e_{180} and horizontal movement b_0—b_{180}, and hence the path of any point on a plunger, its center for example, is defined by the arc p_0—p_{90}—p_{180}, which arc, it will be observed, has a considerably lesser rate or degree of curvature than does the profile b_0—b_{180}. It may be assumed that the plunger first contacts the material projecting above the mouth of the receptacle when the plunger center is at point p_{10}, and that the plunger first enters the mouth of the receptacle when its center is at p_{20} which, on the scale illustrated, would allow a total entry or plunge depth of one-half inch while the container is traveling from d_{20} to d_{90}. From the latter point movement of the plunger is upward, and it is completely withdrawn from the mouth of the container slightly beyond p_{160}. Thus the total period that the plunger is within the mouth

of the container is while the container is traveling from p_{20} to p_{160}, and it is to be observed that the plunging movement while the plunger is depressing the material within the container is relatively slow, giving the material opportunity to adjust itself within the container and thus greatly decreasing the possibility of bruising or mashing portions of the material as compared with the likelihood presented if the travel of the plunger were a simple harmonic motion. For purpose of comparison I show at x—x' the path of a plunger traveling with a simple harmonic motion on a radius of the same length as R_x. Here it will be seen that the depressing of the material from the level of p_{10} to p_{90} would have to be done very much more quickly by such plunger than is the case where the vertical movement of the plunger is modified in accordance with the present invention. A harmonic motion on the radius R_x is chosen for this comparison because that is the maximum radius of the center of B' in its orbit. If we take for comparison the movement of a plunger which travels with a simple harmonic motion in an orbit which is of the same extent as the distance traveled by the container in the course of one cycle of the plunger, it will be found that the depressing of the material in the container would have to be done still more rapidly. The path of such a plunger is illustrated by the arc y—y'. Moreover, in both examples where the plunger has a simple harmonic motion there would be a very substantial discrepancy as between the forward movement of the plunger and the advancing movement of the container, and in order to permit the plunger to enter the container at the level of p_{20} and remain in it until it reached the same level at the point of withdrawal, the plunger would have to be of so much smaller diameter than the container mouth that it would be practically ineffective to depress the material in the container. Accordingly, in order that the plunger might be of sufficient diameter to operate effectively, the point at which it could enter the container would have to be much closer to p_{90} in both the horizontal and vertical relationships, and that, in turn, would still further shorten both the duration and depth of the plunging action. The result would be that the plunger would have a short, jabbing action on the material instead of the slow depressing action and prolonged holding-down effect on the material which characterizes the plunger action of my above described invention. In the machine illustrated in the drawings, the timing of the rotation of shafts 18, 19 and 20 with the conveyor mechanism 10, 15 and 61 is such that upon each revolution of said shafts a container will be advanced by the conveyor a distance three times as great as the center-to-center spacing of plungers 47. Consequently, inasmuch as the spacing of the containers on the conveyor by the flights corresponds to the spacing of the plungers, three containers will be operated upon simultaneously at each plunging stroke of the plungers and will then be moved onward beyond the reach of the plungers while the three following containers are advanced to positions to receive the plungers at the next plunging stroke. As pointed out above, the plunging movement is slow in relation to the advancing movement of the containers, and the period during which the plungers remain in contact with the material in the containers is prolonged. As a result, the pieces of material have opportunity to adjust themselves to one another in the containers, the likelihood of bruising or macerating them is reduced, and they are more likely to remain in their depressed position in the containers after they are relieved of pressure from the plungers. It will be observed that in the course of a cycle, the extent of vertical movement of the carrier and plungers is relatively short as compared with the extent of their horizontal movement, and also that the radii of gyration of the revolving parts are comparatively short. These features permit desirable limitations in the height of the machine and enable it to operate rapidly with smoothness.

What I claim is:

1. In a topping machine having a conveyor operable to feed containers progressively in a straight path, a pressing mechanism comprising a carrier, a plunger mounted on said carrier and located above the path of the containers, a plunger revolving crank and a plunger guiding crank operably connected with said carrier and having horizontal axes of revolution parallel with each other, the connection of said plunger revolving crank with said carrier permitting them relative sliding movement in the horizontal directions and retaining them against relative movement in the vertical directions, the connection of said plunger guiding crank with the carrier permitting them relative sliding movement in the vertical directions and retaining them against relative movement in the horizontal directions, means for revolving both said cranks in synchronism with the feeding movement of the conveyor, and means for conducting said plunger guiding crank through an orbit larger than that of the plunger revolving crank.

2. In a topping machine having a conveyor operable to feed containers progressively in a straight path, a pressing mechanism comprising a carrier, a plunger mounted on said carrier and located above the path of the containers, a plunger revolving crank and a plunger guiding crank operably connected with said carrier and having horizontal axes of revolution parallel with each other, the connection of said plunger revolving crank with said carrier permitting them relative sliding movement in the horizontal directions and retaining them against relative movement in the vertical directions, the throw of said plunger guiding crank being variable and its connection with the carrier permitting them relative sliding movement in the vertical directions and retaining them against relative movement in the horizontal directions, means for revolving both said cranks in synchronism with the feeding movement of the conveyor, and means restricting revolution of said plunger guiding crank to a vertical orbit having a horizontal axis greater than its vertical axis.

3. In a topping machine having a conveyor operable to feed containers progressively in a straight path, a pressing mechanism comprising a carrier, a plunger mounted on said carrier and located above the path of the containers, a plunger revolving crank and a plunger guiding crank operably connected with said carrier and having horizontal axes of revolution parallel with each other, the connection of said plunger revolving crank with said carrier permitting them relative sliding movement in the horizontal directions and retaining them against relative movement in the vertical directions, the plunger guiding crank having a variable throw and its connection with the carrier permitting them relative sliding move-

ment in the vertical directions and retaining them against relative movement in the horizontal directions, means for revolving both said cranks in synchronism with the feeding movement of the conveyor, and means for guiding the throw of said plunger guiding crank through a vertical orbit which has most of its portion that is below its horizontal axis on a radius larger than that of the portion which is above that axis.

4. In a topping machine having a conveyor operable to feed containers progressively in a predetermined path, a pressing mechanism comprising a plunger disposed above the path of the containers, a carrier on which said plunger is mounted, a pair of plunger revolving cranks on which the carrier is supported, said cranks being mounted for revolution about parallel horizontal axes and having operating connection with the carrier which allows it sliding movement relative to them in the horizontal directions but not in the vertical directions, a plunger guiding crank mounted for revolution about an axis parallel with those of the first mentioned cranks, said plunger guiding crank having operating connection with the carrier which allows the carrier sliding movement relative to it in the vertical directions but not in the horizontal directions, means for revolving all of said cranks in synchronism with the feeding movement of the conveyor, and means cooperating with sa'd plunger guiding crank to induce sliding movement of the carrier relative to the plunger revolving cranks in the horizontal direction.

5. In a topping machine having a conveyor operable to move containers progressively in a predetermined path, a pressing mechanism comprising a plunger disposed over the path of the containers, a carrier on which said plunger is mounted, said carrier being movable in horizontal directions longitudinally of the path of the containers and in vertical directions toward and from said path, a plunger revolving crank and a plunger guiding crank arranged for revolution about horizontal axes which are parallel with each other, means for revolving said cranks and operating said conveyor in synchronism, the periods of revolution of said cranks being the same, and driving connections between said cranks and the carrier whereby the plunger revolving crank is effective to revolve the carrier in a vertical plane and the plunger guiding crank is effective to move the carrier back and forth in the horizontal directions in said plane through a distance greater than the throw of the plunger revolving crank.

6. In a topping machine having a conveyor operable to feed containers progressively in a predetermined path, a plunger disposed over the path of the containers, a carrier supporting the plunger, a pair of cranks revoluble about parallel horizontal axes and having horizontally shiftable driving connection with the carrier, a third crank revoluble about an axis parallel with those of the first mentioned cranks, a hub forming a driving connection between the carrier and said third crank, said hub being shiftable toward and from the axis of revolutions of said third crank, means for revolving all of said cranks in synchronism with the feeding movement of the conveyor, and means for shifting said hub toward and from the axis of said third crank incident to revolution of the latter.

7. In a topping machine, a combination as specified in claim 6 and wherein the extent of the orbit of said hub in the horizontal direction is greater than that of either of said first mentioned cranks.

8. In packaging apparatus having a conveyor operable to move containers progressively in a series at a constant rate along a horizontal path, a topping device comprising a movable carrier, a plunger carried thereby and arranged for travel in a vertical orbit above the path of the containers in positions to press material downwardly in them while they are traveling progressively at constant speed, a revoluble crank connected to the carrier, means for revolving said crank at constant speed to actuate the carrier to revolve the plunger in its orbit cyclically in synchronism with the conveyor, and means for guiding the carrier to hold the plunger to a flatter course during its travel in the direction of the conveyor's movement than in the reverse direction.

9. In packaging apparatus having a conveyor operable to move containers progressively in a series at a constant rate along a horizontal path, a topping device comprising a movable carrier, a plunger carried thereby and arranged for travel in a vertical orbit above the path of the containers in positions to press material downwardly in them while they are traveling progressively at constant speed, a revoluble crank connected to the carrier, means for revolving said crank at constant speed to actuate the carrier and thereby revolve the plunger in its orbit cyclically in synchronism with the conveyor, and means for guiding the carrier to decelerate the vertical movement of the plunger in the lower portion of its orbit relative to its rate at corresponding positions in the upper portion of its orbit.

10. In packaging apparatus having a conveyor operable to move containers progressively in a series at a constant rate along a horizontal path, a topping device comprising a movable carrier, a plunger carried thereby and arranged for revolution in a vertical orbit above the path of the containers to and from positions to press material downwardly in them while they are traveling progressively at constant speed, the travel of the plunger in the lower half of its orbit being in the general direction of the conveyor's movement, means operating at constant speed in synchronism with the conveyor for actuating the carrier to revolve the plunger in its orbit cyclically, and means cooperating with the carrier to decrease the rate of vertical movement of the plunger in the lower half of its orbit as compared with its vertical rate in the upper half thereof.

11. In packaging apparatus, in combination, a conveyor operable continuously to move containers progressively in a series at a constant rate along a horizontal path, a plunger arranged for revolution in a vertical orbit above said path to positions to press material downwardly in containers traveling at constant speed along said path, a movable carrier on which said plunger is mounted, a crank having rotary connection with said carrier, means for revolving said crank in synchronism with the conveyor to move the carrier in a vertical orbit, and guide means cooperating with the carrier to shift the plunger periodically back and forth relative to the crank in directions parallel with said path and in the course of the orbital movement of the plunger.

12. Packaging apparatus as specified in claim 11 and wherein operation of the guide means is timed with the feeding movement of the conveyor.

13. Packaging apparatus as specified in claim

11 and including means maintaining the plunger constantly in the same angular relationship to the horizontal.

14. In packaging apparatus, in combination, a conveyor operable continuously to move containers progressively in a series at a constant rate along a horizontal path, a plunger arranged for travel in a vertical orbit above said path to positions to press material downwardly in containers traveling at constant speed along said path, a movable carrier on which said plunger is mounted, a crank having rotary connection with said carrier, means for revolving said crank in synchronism with the conveyor to travel the carrier in a vertical orbit, and means effective on the carrier in the course of its orbital movement to shift it periodically back and forth relative to the crank in directions parallel with the path of the containers.

15. Packaging apparatus as specified in claim 14 and wherein there is a plurality of plungers mounted on the carrier and equidistantly spaced in a series longitudinally of the path of the containers for pressing cooperation with a plurality of containers simultaneously.

16. Packaging apparatus as specified in claim 14 and including means for positioning containers with their centers equidistantly spaced in said path, and including also a plurality of plungers mounted on the carrier in a series parallel with said path and with their centers equidistantly spaced to agree with the spacing of the containers.

17. In packaging apparatus, in combination, a conveyor operable continuously to move containers progressively in a series at a constant rate along a horizontal path, a plunger arranged for travel in a vertical orbit above said path to positions to press material downwardly in containers traveling at constant speed along said path, a movable carrier on which said plunger is mounted, a crank having rotary connection with said carrier, means for revolving said crank in synchronism with the conveyor to move the carrier upwardly and downwardly in a vertical orbit, and means cooperating with the carrier during its orbital movement to increase the amplitude of the plunger's horizontal movement in its orbit relative to that of its vertical movement therein.

18. In packaging apparatus, in combination, a conveyor operable continuously to move containers progressively in a series at a constant rate along a horizontal path, a plunger arranged for travel in a vertical orbit above said path to positions to press material downwardly in containers traveling at constant speed along said path, a movable carrier on which said plunger is mounted, a crank having rotary connection with said carrier, means for revolving said crank in synchronism with the conveyor to move the carrier upwardly and downwardly in a vertical orbit, and means cooperating with the carrier to increase the amplitude of its horizontal movement in its orbit relative to that of the crank.

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