Feb. 7, 1967 L. J. TALARICO 3,302,367

CASE SEALER

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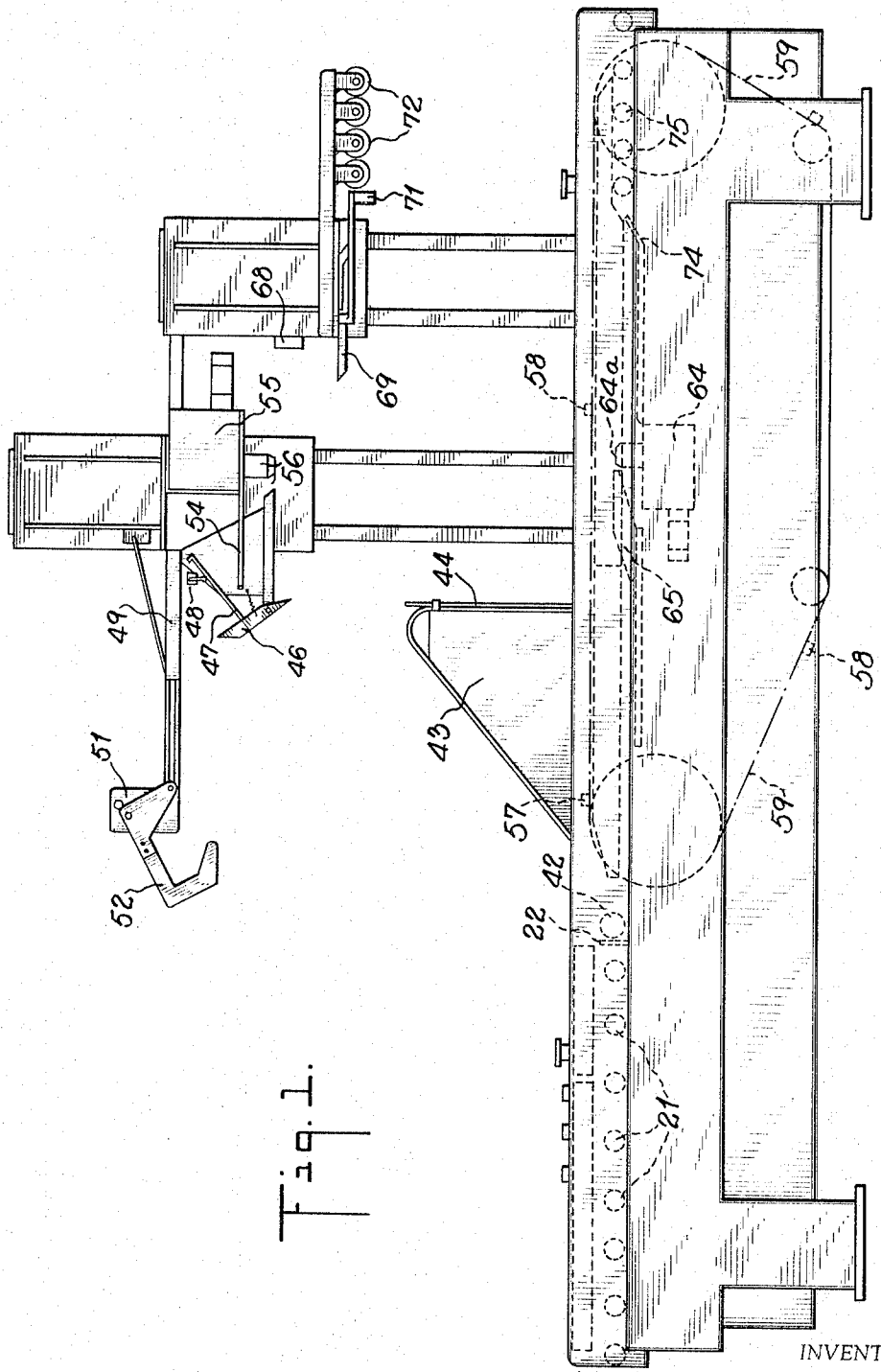


Fig. 1.

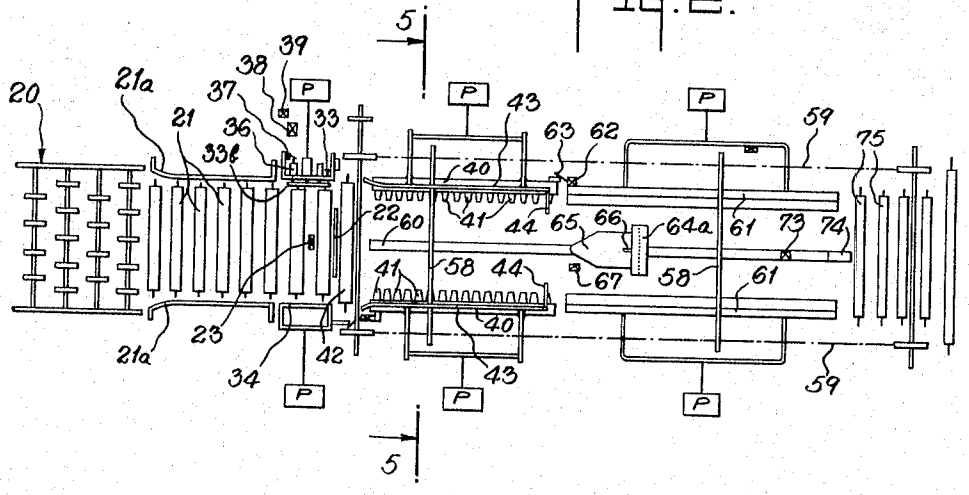
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CASE SEALER

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Fig. 2.



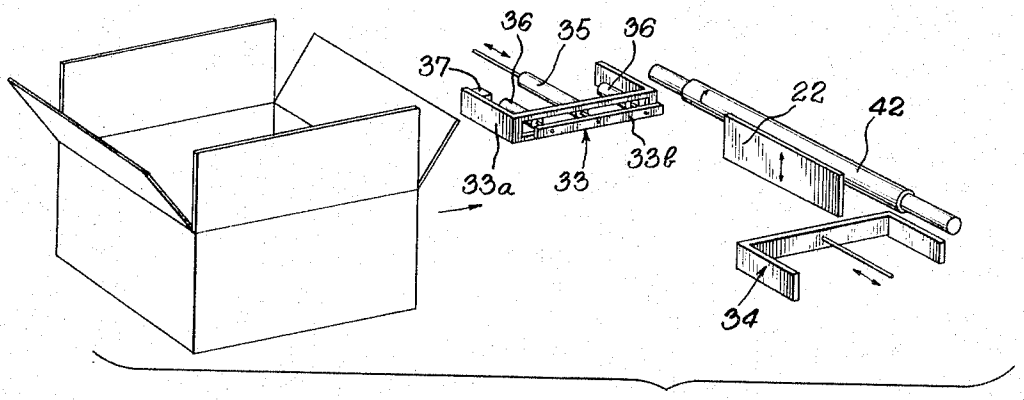


Fig. 3.

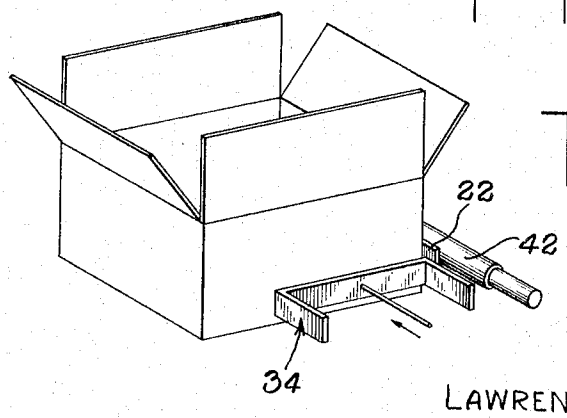


Fig. 4.

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CASE SEALER

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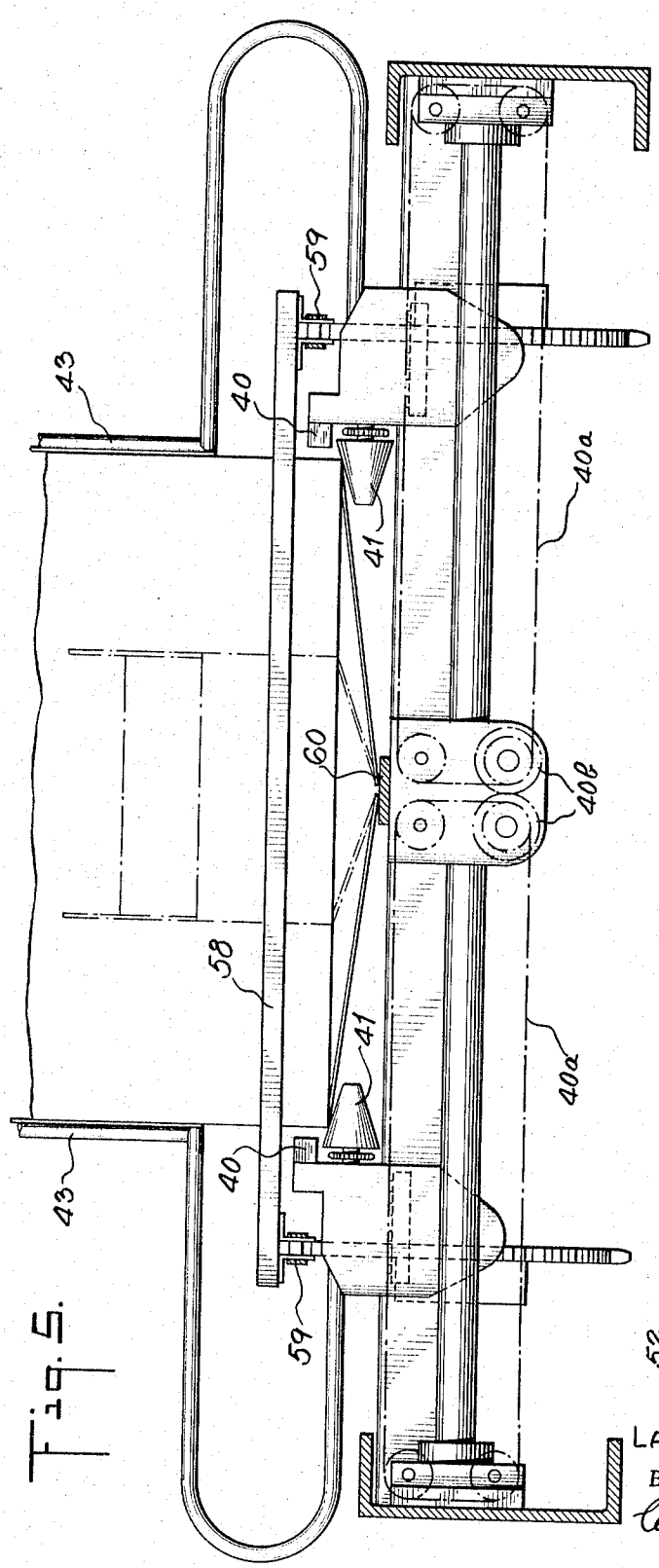


Fig. 5.

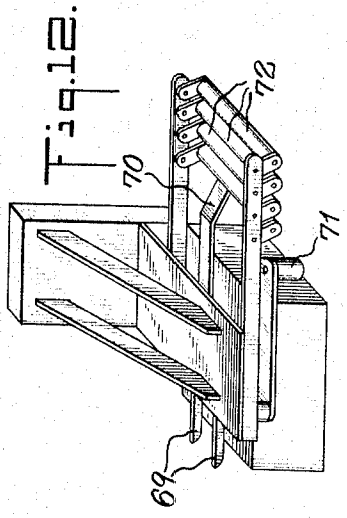


Fig. 12.

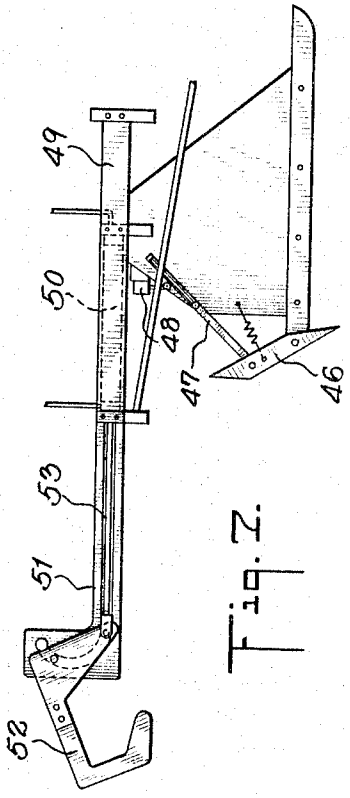


Fig. 7.

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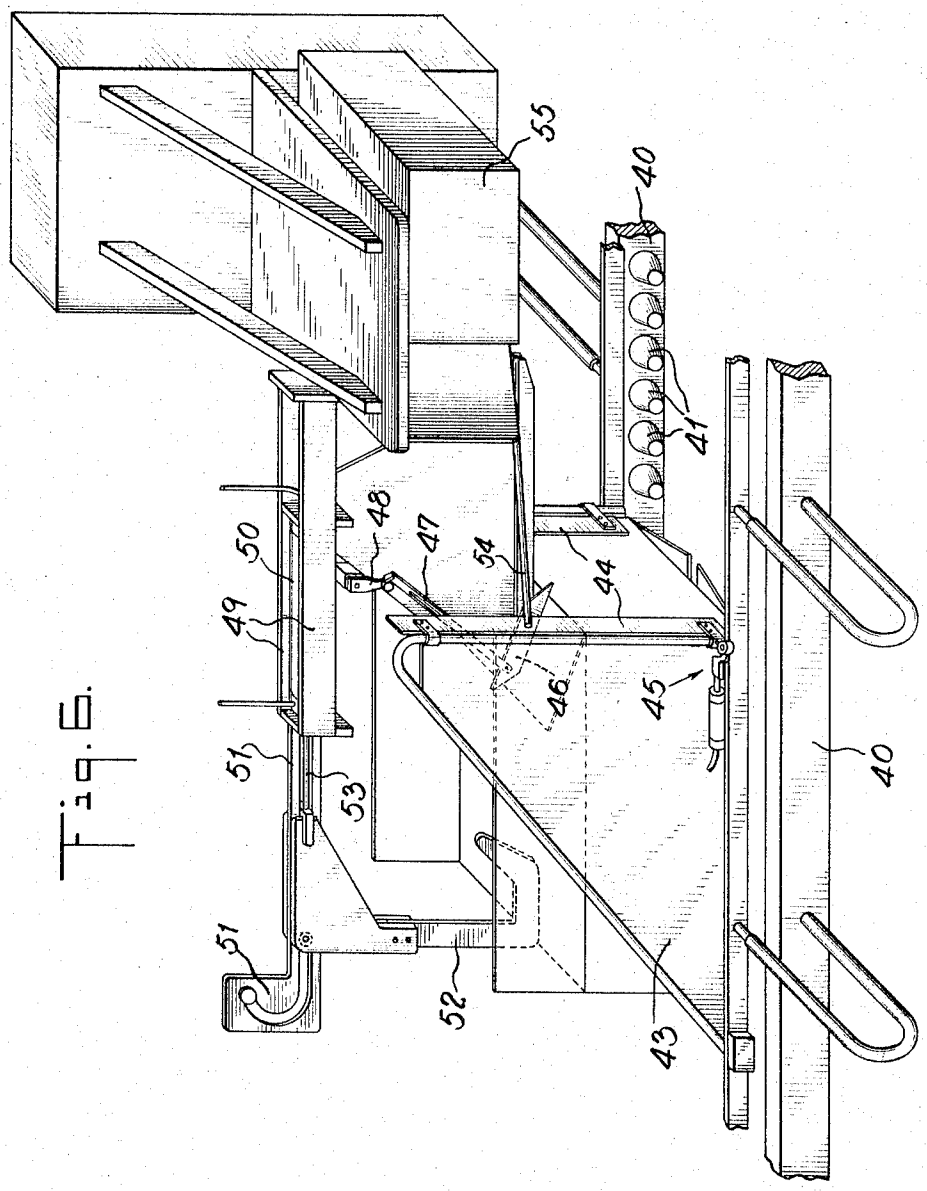


Fig. 6.

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Fig. 8.

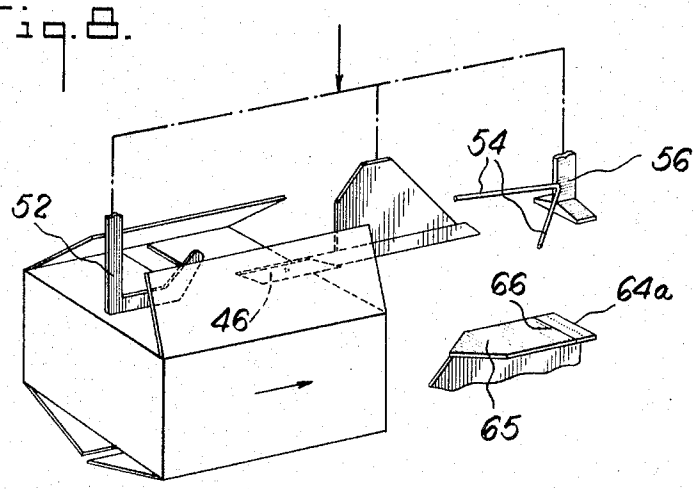
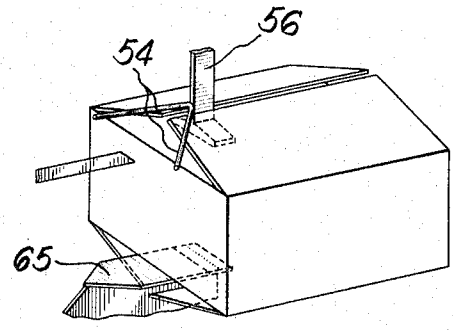


Fig. 9.



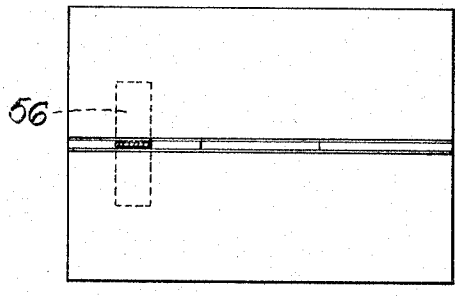


Fig. 10.

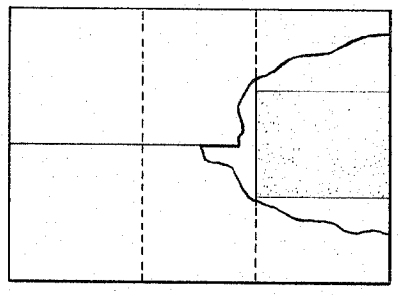


Fig. 11.

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CASE SEALER

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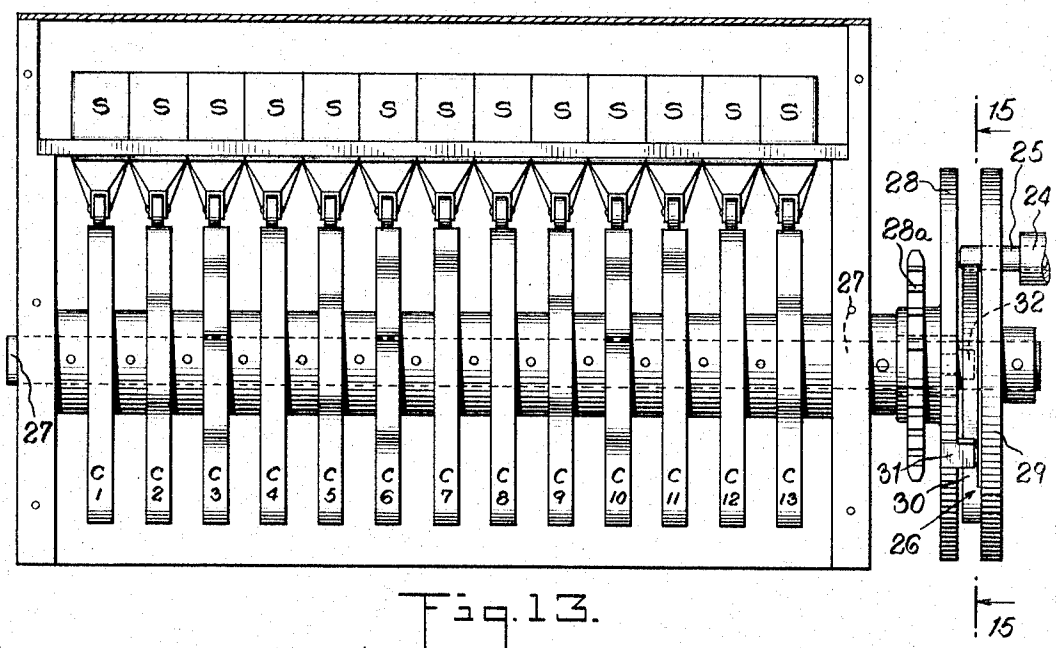


Fig. 13.

Fig. 14.

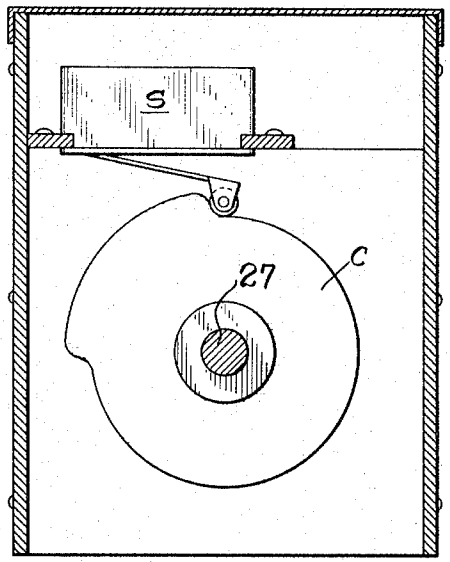
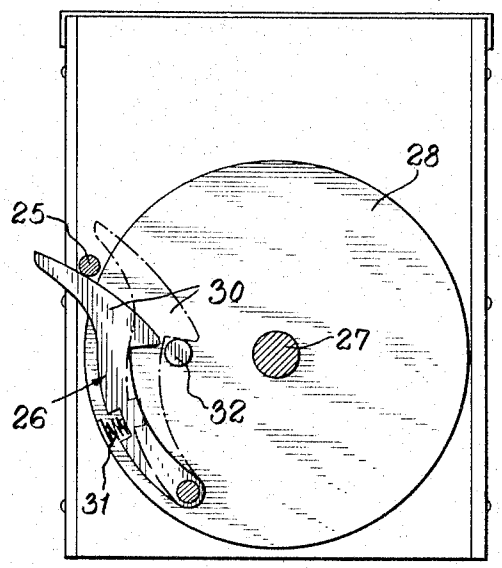


Fig. 15.

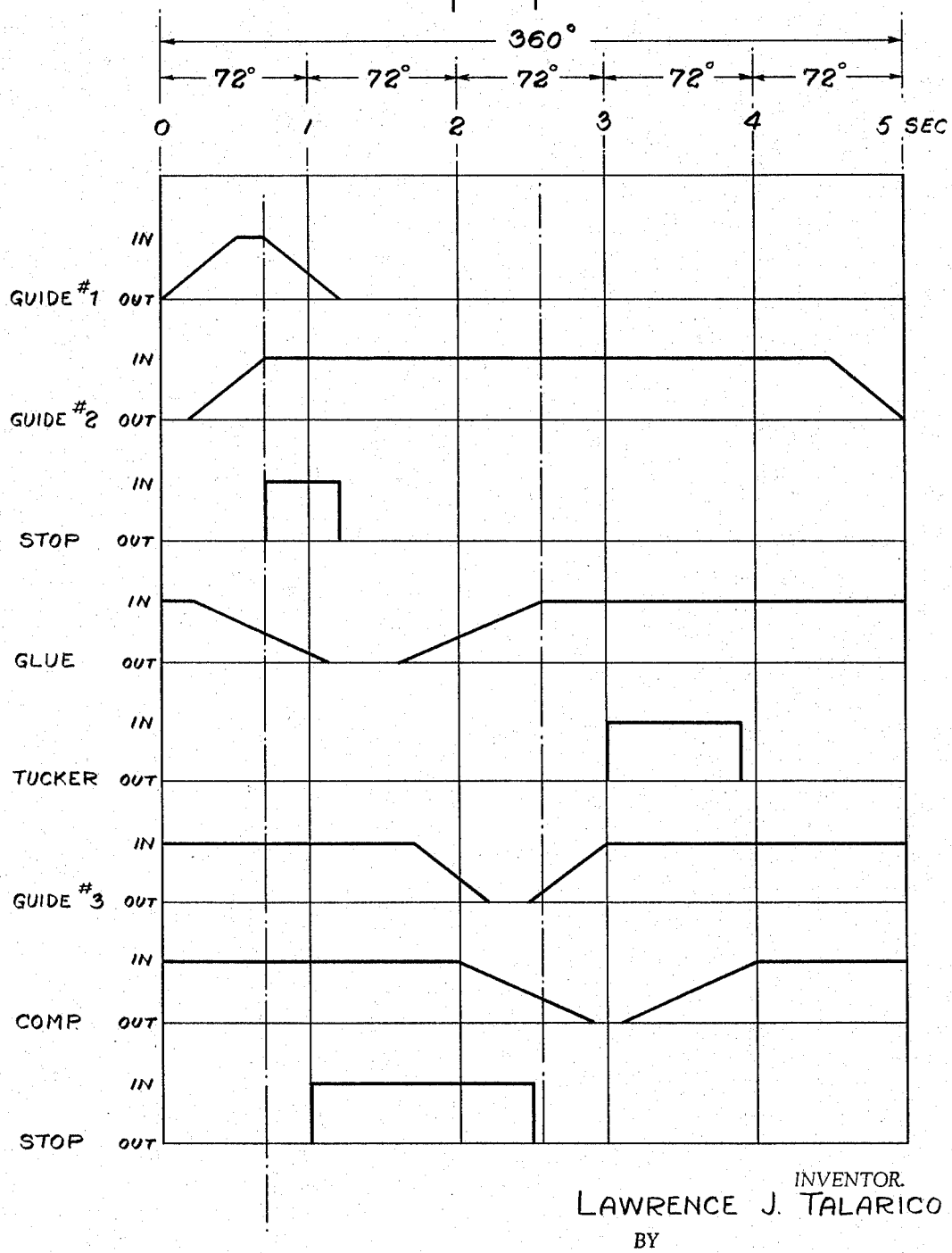


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Fig. 16.



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United States Patent Office

3,302,367

Patented Feb. 7, 1967

3,302,367

CASE SEALER

Lawrence J. Talarico, South Plainfield, N.J., assignor to Union Camp Corporation, a corporation of Virginia

Filed Dec. 3, 1963, Ser. No. 327,596
13 Claims. (Cl. 53—47)

The present invention relates to improvements in carton sealing machine. More particularly it pertains to a random case sealer which accepts containers of various size dimensions and seals the flaps of each container, and the method of closing these containers.

Although some random case sealers have been available, they have required a large amount of floor space, have been expensive to build, and have definite limitations of speed and operation. The case sealer of the present invention receives containers of various size dimensions in random order in continuous or intermittent single line flow, adjusts itself automatically to the dimensions of each incoming container, prepares the flaps for closure, applies sealant to both the bottom and top inner flaps, closes the outer flaps squarely with minimum seam between flaps, applies compression to top flaps to assure proper contact of adhesives, and ejects the sealed container in line for further handling. The machine is further designed to give positive protection to the box contents during sealing and to eliminate the problems of contents falling through the unsealed bottom. It is thus an object of the present invention to provide a machine which is more efficient in operation than prior machines.

A further object is to provide a machine which is relatively compact in size to save on expensive plant floor space and release such space for more productive use.

A further object is to provide a machine in which the various functions are timed relative to a cycle rather than to the container, thereby permitting greater speeds over prior machines.

A further object is to provide a method of closing and sealing the flaps of containers automatically in any random sequence of sizes.

A further object is to provide a machine and method which are efficient and economical in operation, are fully automatic, and reduce handling, closing and sealing costs.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the several steps and the relation of one or more of such steps with respect to each of the others, and the apparatus embodying features of construction, combinations of elements and arrangement of parts which are adapted to effect such steps, all as exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a view in side elevation of the machine of the present invention;

FIGURE 2 is a top plan view of the machine;

FIGURE 3 is a perspective view showing the centering guides, stop bar and accelerator roll as the container moves toward them;

FIGURE 4 is a perspective view similar to FIGURE 3 with the container centered between the guides;

FIGURE 5 is an enlarged sectional view taken along the line 5—5 of FIGURE 2;

FIGURE 6 is a perspective side view showing the mechanism for positioning the flaps of the container prior to the application of glue;

FIGURE 7 is a side view of the mechanism for laying down the front and rear inner flaps of the container;

FIGURE 8 is a perspective view of parts of the mechanism for positioning the flaps of the container prior to the application of glue;

FIGURE 9 is a perspective view of a carton showing the upper and lower glue applicators;

FIGURE 10 is a top view of the carton showing the top glue applicator under the side flaps;

FIGURE 11 is a top view of the carton with a portion of the flap cut away to show the glue pattern;

FIGURE 12 is a perspective view showing the top compression portion of the machine;

FIGURE 13 is a plan view showing the timing cam shaft and the switches and cams which make up the timing box, and the single revolution clutch;

FIGURE 14 is a sectional view showing one of the cams and switches of the timing box illustrated in FIGURE 13;

FIGURE 15 is a side view of the single revolution clutch illustrated in FIGURE 13; and

FIGURE 16 shows the timing chart for the timed motions of the machine.

Referring to FIGURES 1 and 2, cartons are fed by a conventional conveyor **20** to a live roller section made up of a series of rollers **21** mounted between guide rails **21***a*, which rollers are power driven and urge the carton to a stop bar **22** adapted to move up and down in the path of the moving carton. In its motion to the stop bar the carton passes over a switch mechanism **23** which energizes a four way air valve that controls air to an air cylinder **24** whose piston rod **25** acts as a stop dog on a single revolution clutch **26** which is attached to a timing cam shaft **27** (see FIGURES 14 and 15). Since the interconnection between the switch mechanism and the stop dog on the single revolution clutch can be performed in other ways and is not part of the invention, it has not been shown.

The timing cam shaft and single revolution clutch are shown in FIGURES 14 and 15. The single revolution clutch comprises a driving member **28** and a driven member **29**. The driving member **28** is driven continuously by the chain gear **28***a* in time with a flight bar section hereinafter described and is idling when the machine is empty of cartons. The driven member **29** is a plate attached to a timing cam shaft **27**. On the plate **29** is a pivotally connected dog **30** normally held in a disengaged position by the cylinder piston rod **25**. When the cycle begins and the piston rod **25** is retracted a spring **31** urges the dog to engage a pin **32** on the face of the driving member. This causes the driving and driven members to become one, thus rotating the cam shaft for a single cycle. If there is only one carton, as the carton is fed into the machine the air cylinder piston rod returns to such a position as to detach the dog **30** from the pin **32** to stop further cycling. If there is more than one box the piston rod will remain retracted and cycling will continue, the number of cycles being equal to the number of cartons. The timing shaft houses a series of cams which actuate switches which sequence virtually all the operations performed by the machine. Inasmuch as the functions are timed relative to the cycle and not the carton, it permits greater speeds and is a distinct improvement over other machines.

Immediately on starting a cycle a pair of guides **33** and **34** move inward simultaneously toward the center line of the machine. The carton on the rollers accordingly is moved toward the center line of the machine and is thus centered. The motion of these guides is stopped when both guides are exerting equal pressure on the sides of the carton. This pressure is a variable and may be

adjusted to suit various weights of cartons and their contents. This is accomplished by the arrangement shown in FIGURES 3 and 4 which show an enlarged view of the guides. Guide 33 is made up of a U-shaped member 33*a* and a collapsing member 33*b* which telescopes into member 33*a*. Member 33*b* is supported by an air cylinder 35 and two guide rods 36. The air cylinder 35 acts as a spring to keep the member 33*b* extended from member 33*a*. With the air pressure in the cylinder set the guides squeeze against the sides of the carton. The member 33*b* initially in its extended position collapses into alignment with member 33*a* which action de-energizes a switch 37 which controls the inward driving power of the guides. This switch also reverses air flow to the air cylinder so that it ceases to act as a spring. When centering is complete guides 33 and 34 retract to the maximum outward positions at which point guide 33 energizes a switch 38 which again applies air pressure to the cylinder 35 causing member 33*a* to return to its extended positon ready for the next carton. Switch 39 is a switch which stops the guides at their outward positions.

While the guides 33 and 34 are centering the carton a second pair of guides 40 embodying a series of conical rollers 41 are being being moved inward simultaneously toward the center of the machine. One form of mechanism for moving these guides is shown in FIGURE 5. It consists of two closed loops of roller chain 40*a* connected together by chain gears 40*b*. Each guide 40 is connected to a loop of a chain equally spaced from the center line of the machine. When one chain is moved the opposite chain moves an equal distance in the opposite direction. Such inward motion is stopped when these guides align themselves with the centering guides 33 and 34. This is done by a series of switches not shown.

While the centering guides 33 and 34 are being retracted the stop bar 22 is lowered, allowing the carton to advance to the accelerator roll 42. This roll, preferably rubber covered, contacts the bottom of the carton and urges it forward into the roller section at a high rate of speed to provide a gap between it and succeeding cartons and insure positioning of cartons between flight bars. This acceleration is maintained by driving the conical rollers 41. The gap permits the stop bar to return to its upward position thereby stopping the next carton. The acceleration of the carton into the roller section at an extremely high rate of speed could cause a bouncing problem with the carton. Therefore, a decelerating flight bar is used to control the speed with which the carton hits the gate section.

Attached to the guides 40 are side flap-lifter plates 43 which plates serve to raise the side flaps of a carton from an outward position to an essentially vertical position (FIGURE 6). Hinged to these plates are gates 44 which serve to stop the carton and to carry the forward inner flap when bent outward to a vertical position. These gates are held to a closed position by an air cylinder and associated air valves and linkages 45.

As the leading end of the carton rests against the gates the glue elevator section (FIGURES 1 and 6) starts to descend. This section is made up of front flap tucking mechanism, rear flap tucker, side flap plows, and an upper glue pot. This section is mounted above the main portion of the machine and is adapted to be raised and lowered above a carton moving through the machine.

As the elevator descends pivotally connected finger 46 engages the front inner flap now in the vertical position against the gate. The angle of this finger is such that its downward motion as part of the elevator causes the front inner flap to bend at the score line of the carton toward the rear of the carton. The continued downward motion of the elevator now pivots this finger to further flatten the front inner flap. This pivoting action activates a linkage 47 which actuates a switch 48 which stops the downward motion of the elevator at the level of the top of the carton.

The carton now remains in a stopped position with its leading edge against the gates 44 (FIGURE 6). The air pressure used to close the gates is now exhausted from air cylinder 45 so that the gates are now closed but not under pressure. A carrier flight bar now contacts the rear of the carton and pushes it through the gates. When the rear of the carton is pushed to a predetermined position, the rear flap tucker is actuated to a flap tucked position. The tucker consists of a pair of side plates 49, an air cylinder 50 mounted between the plates, a slotted track member 51 mounted at the end of the side plates, a movable tucker arm 52 which rides in the slot or track of the member 51, and a cylinder piston rod 53 connected to the arm 52. The tucker arm is normally in the out-position shown in FIGURE 7. The action of cylinder piston rod 53 retracting causes the tucker arm 52 to rotate first and then move horizontally to the maximum in-position of the cylinder piston rod. This motion allows the tucker arm to get behind a trailing rear inner flap and carry it forward to a horizontal tucked position (FIGURE 8). This action takes place and is completed before the outer flaps contact the side flap plows 54.

The side flap plows 54 consist of a pair of round bars mounted at a 90° included angle with its vertex at the center line of the machine. The vertical position of these bars when the elevator is at the height of the carton being closed is above the score line of the side flaps. As the carton is being pushed by the carrier flight bar, the essentially vertical side flaps of the carton contact the plow bars which, with the continued motion of the cartons, bend the side flaps at the score line of the carton to a tented or partially closed position, with a definite gap between the edges of the side flaps such as is shown in FIGURE 9.

The carton is now pushed past the upper glue pot section. This section consists of a glue reservoir 55 and a nozzle or T-sectioned applicator 56 (FIGURES 8 and 9) and means for moving the glue from the reservoir to the applicator, which is not shown. The glue pot sections of this machine are fully described and claimed in my copending patent application Serial No. 327,757, filed December 3, 1963. This section may utilize either cold or hot glues. The unit herein described uses hot glues for reasons of high speed gluing and the elimination of long glue drying time and compression.

The flight bars heretofore mentioned as decelerating flight bar and carrier flight bar are numbered herein as 57 and 58 respectively (FIGURE 1). These bars are attached at their ends to continuously moving roller chains 59 which are driven at a rate timed with the various motions performed by the machine. This timing is such that it allows for the maximum variation in carton size. As the carton size range is decreased the speed of the flights may be increased and conversely as the range increases the speed may be decreased. As the carton is positioned in the roller guides 40 the bottom outer side flaps of the carton are allowed to open to a tented position with a definite gap between the outer side flaps as shown in FIGURES 5 and 9. The degree of tent is limited by a support bar 60 running along the center line of the machine. FIGURE 5 illustrates this tenting for a large and small carton. It will be noted that in each case the outside edges of the carton will ride on the roller guides 40.

As the carrier flight bar 58 pushes the carton through the gates 44 a third set of guides 61, known as compression guides, are moved inward simultaneously toward the center line of the machine, thus aligning themselves with the roller guides 40 (FIGURE 1). This is accomplished through a switch 62 and switch actuator 63.

Furthermore, as the carton is pushed through the gate 44 and the top outer flaps are plowed to a tented position the carton passes over a lower glue pot section (FIG-

URES 1, 2 and 8). This section is similar to the upper glue pot section and consists of a glue reservoir 64, a nozzle or T-sectioned applicator 64a, and a guide or plow plate 65, and a switch actuating finger or feeler 66. The feeler 66 signals the switch 67 for glue application for both the upper and lower glue pot sections and only permits the application of glue to the flaps when such flaps are passing over the feeler.

At this stage (FIGURE 9) the carton has its side flaps both top and bottom in tented positions with the T-sectioned applicators resting against the inner flaps and applying glue thereto. The plow plate 65 serves to support the contents of the carton in the flap gap area as the glue is being applied.

As glue is being applied to the top and bottom leading inner flaps of the carton, the compression elevator section (FIGURES 1 and 12) descends and aligns itself at the level of the top of the carton. This is done when switch 68 contacts a switch actuator, not shown, located on the glue section elevator. The compression elevator consists of a pair of fixed guides 69, a top closing plow 70, squaring rollers 71, and spring loaded compression rollers 72. The fixed guides maintain the outer top side flaps in a tented position until glue application is completed and guides the outer flaps to the top closing plow 70 which brings the outer flaps from the tented position to a closed position. The squaring rollers 71 are now energized when the leading edge of the carton strikes switch 73 (FIGURE 1). These rollers apply pressure to the sides of the carton at its upper edges to insure that the edges of the flaps are close together. The carton is then pushed under the rollers 72 which applies the actual sealing pressure.

Directly below the compression elevator section a similar plow 74 and rollers 75 are used to close the bottom and apply compression (FIGURES 1 and 2). No squaring rollers are necessary because the carton is held at the bottom between the compression guides 61.

All the functions performed on this machine, that are relative to time and not a carton, are signalled to start by means of cams C and switches S located in what is known as a timing box shown on FIGS. 13, 14 and 15. The rotation of the cam shaft 27 is such that a single rotation is equal to a single cycle of the machine. In this design there are 13 timed functions each having a separate cam and are so positioned to produce a timing chart as shown in FIGURE 16. The cams themselves are designed basically to start motion. The action of the particular part of the machine which has been signaled to start only stops when a carton is reached. The stopping has heretofore been described. Referring to FIGURE 13 the cams shown perform the following functions:

C–1—Centering guides—inward motion
C–2—Centering guides—outward motion
C–3—Roller guides—inward motion
C–4—Roller guides—outward motion
C–5—Stop bar—down motion (spring loaded return)
C–6—Glue elevator—down motion
C–7—Glue elevator—up motion
C–8—Tucker—tucking rear flap (automatic return)
C–9—Compression guides—inward motion
C–10—Compression guides—outward motion
C–11—Compression elevator—down motion
C–12—Compression elevator—up motion
C–13—Gate closing—automatic release

All associated switches S electrically signal either air valves or magnetic starters.

Referring to FIGURE 16, there is shown a timing chart which shows the relative positions of all timed motions on the machine during one cycle, operating at a speed of 12 cycles per minute. The "out" reference means all movable sections are at an extreme outward position away from the carton and the "in" reference means all such sections are at an extreme inward position adjacent the smallest carton. The slopes of the curves indicate the time allotted for each motion to be performed.

In FIGURE 2 there are a number of units along the side of the machine which are marked with the letter P. These are power units which serve to drive the various parts of the machine in its operation.

The sealing of cartons by a large producer of incandescent light bulbs in 10 to 500 watt sizes will illustrate the merits and advantages of the machine of the present invention. To accommodate this size range and the varied unit packs of from 24 to 120 bulbs per case, this company uses more than 30 different sizes of corrugated shipping containers. One standard size container measuring 17 x 10 x 5 inches packaged 25% of this company's daily output and was sealed on a machine which closed the boxes at a rate of a minimum of 10 per minute. Because this unit was unable to adjust automatically to handle varied container sizes, this company had also been using two stapling machines to seal the other shippers which comprise 75% of the company's packaging. The stapling machines operated throughout two shifts requiring a total of four operators. Maximum output per machine was 6 boxes per minute. The machine of the present invention seals a variety of containers ranging, for example, in size from 10 x 8 x 4 inches to 30 x 20 x 18 inches at a rate of up to 12 a minute. Fed in random order they enter the machine with bottom flaps folded but unsealed. This company estimates that since installing this machine it is saving 50% in labor costs while maintaining its same output per day. It also reports a substantial savings in material costs because the hot melt adhesive which seals the containers is less expensive than were the staples. An additional advantage is the machine's extreme compactness. It requires a working area of only 4 feet 2 inches in width by 9 feet 8 inches in length. The height clearance is 6½ feet.

Although the foregoing dimensions and speeds are relative and can be varied for different needs and conditions, it will be apparent that the case sealer of the present invention has distinct advantages over case sealers now in use and that it affords definite savings in labor and costs over other available operations.

Since certain changes in carrying out the above process and in the construction set forth, which embody the invention, may be made without departing from its scope, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of closing and sealing random size filled containers with their closure flaps unsealed comprising the steps of conveying the first container to a first stop position, centering such container while in the stop position, providing a path for the container substantially the width of the container, releasing the container from the first stop position and accelerating it into the provided path, stopping the next container at the first stop position, raising the top outer side flaps and the top forward inner flap of the first container to a substantially vertical position, bringing the moving first container to a second stop position, pushing the top forward inner flap to a substantially horizontal position at the level of the top of the first container, releasing the container from the second stop position, striking the top rear inner flap to a forward tucked position, bending the top outer side flaps to a tented position with respect to the top inner flaps, opening the bottom outer side flaps to a tented position with respect to the bottom inner flaps, applying adhesive to

the inner flaps while the outer flaps are in tented position, closing the outer flaps and sealing them against the inner flaps.

2. In a machine for closing and sealing random size filled containers with their closure flaps unsealed comprising a conveyor for moving the containers, means for stopping the leading container, first movable guides which center the leading container while in a stopped position, second movable guides which adjust to the width of the leading container and provide a path through the machine, means for releasing the stopping means and moving the leading container into the path, means for tucking the top front and rear inner flaps under the top outer flaps into a substantially horizontal position at the top of the container, means for bending the top and bottom outer flaps into a tented position with respect to the inner flaps, an adhesive elevator adapted to descend and stop at substantially the top of the container, a top nozzle on the adhesive elevator and a bottom nozzle, both of said nozzles directed against the inner flaps and adapted to apply adhesive thereto while the outer flaps are in tented position, means for pressing and sealing the outer flaps against the inner flaps, a timing mechanism which determines the time for motion of the various functions of the machine during one cycle of operation, and sensing means to stop the motions determining the width and height of the container.

3. The machine of claim 2 in which the means for tucking the rear inner flap comprises a movable tucker arm, a track supporting said arm, which track has a portion extending substantially parallel to the top of the container, said track being of a length and positioned to keep the arm before actuation clear of the approaching container and to allow the arm after actuation to strike the trailing rear inner flap and carry it forward to a horizontal tucked position, and means for actuating said arm into movement when the container is in a predetermined position.

4. The machine of claim 3 in which the track supporting said arm comprises an arcuate portion and a horizontal portion with the arm resting in the arcuate portion before actuation and riding into the horizontal portion after actuation.

5. The machine of claim 3 in which the timing mechanism comprises a series of rotating cams and switches with a cam and switch for each motion.

6. In a machine for closing and sealing random size containers with their top closure flaps unsealed comprising a conveyor for moving the containers, means for stopping the moving containers, first movable guides which center the leading container while in a stopped position, second movable guides which adjust to the width of the leading container and provide a path through the machine, means for releasing the stopping means and moving the leading container into the path, means for tucking the inner flaps under the outer flaps into a substantially horizontal position at the top of the leading container, means for bending the outer flaps into a tented position with respect to the inner flaps, an adhesive elevator adapted to descend upon approach of the leading container and stop at substantially the top of the container, a T-shaped nozzle on the adhesive elevator directed against the inner flaps and adapted to apply adhesive thereto while the outer flaps are in tented position, and means for pressing and sealing the outer flaps against the inner flaps.

7. The machine of claim 6 in which there is a timing mechanism which determines the time for motion during one cycle of operation of the first and second movable guides, the release of the stopping means, the adhesive elevator, and the tucking of the top rear inner flap, and sensing means to stop the motions of the guides and elevator at the width and height of the container.

8. The machine of claim 7 in which the timing mechanism comprises a series of rotating cams and switches with a cam and switch for each motion.

9. In a machine for closing and sealing random size filled containers with its bottom closure flaps folded into position and its top and bottom closure flaps unsealed comprising a conveyor for moving the containers, means for stopping the moving containers, first movable guides which center the leading container while in a stopped position, second movable guides which adjust to the width of the leading container and provide a path through the machine, means for releasing the stopping means and moving the leading container into the path, means for tucking the top inner flaps under the top outer flaps into a substantially horizontal position at the top of the container, means for bending the top and bottom outer flaps into a tented position with respect to the inner flaps, an adhesive elevator adapted to descend upon approach of the leading container and stop at substantially the top of the container, a top nozzle on the adhesive elevator and a bottom nozzle, both of said nozzles directed against the inner flaps and adapted to apply adhesive thereto while the outer flaps are in tented position, and means for pressing and sealing the outer flaps against the inner flaps.

10. The machine of claim 9 in which each nozzle comprises a horizontal cross member which cross member is supported by a vertical member which fits between the gap of the tented outer flaps.

11. The method of closing and sealing random size filled containers with their closure flaps unsealed, comprising the steps of conveying the first container to a first stop position, centering such container while in the stop position, providing a path for the container substantially the width of the container, releasing the container from the first stop position and moving it along the provided path, stopping the next container at the first stop position, raising the top outer side flaps and the top forward inner flap of the first container to a substantially vertical position, bringing the moving first container to a second stop position, moving the top forward inner flap to a substantially horizontal position at the level of the top of the first container, releasing the container from the second stop position, tucking and bending the top rear inner flap to a forward position and the top outer side flaps to a tented position, opening the bottom outer side flaps to a tented position with respect to the bottom inner flaps, applying adhesive to the inner flaps with the outer flaps in tented position and folding the outer flaps in contact with the adhesive of the inner flaps.

12. In a machine for closing and sealing a filled container with its inner and outer closure flaps unsealed, comprising guides adjusted to the width of the container to provide a path through the machine, means for moving the container through such path, means for tucking the rear and front inner flaps under the outer flaps to a substantially horizontal position, means for bending the outer flaps to a tented position with respect to the inner flaps, an applicator for applying adhesive to the inner flaps while the outer flaps are in tented position, means for pressing and sealing the outer flaps against the inner flaps, said means for tucking the rear inner flap comprising a movable tucker arm, a track supporting said arm and means for actuating said arm into movement when the container is in a predetermined position, said track having a portion extending substantially parallel to the top of the container, said track being of a length and positioned to keep the arm before actuation clear of the approaching container and to allow the arm after actuation to strike the trailing rear inner flap and carry it forward to a horizontal tucked position and said track comprising an arcuate portion and a horizontal portion with the arm resting in the arcuate portion before actu-

ation and riding into the horizontal portion after actuation.

13. In a machine for closing and sealing a filled container with its inner and outer closure flaps unsealed, comprising guides adjusted to the width of the container to provide a path through the machine, means for moving the container through such path, means for tucking the rear and front inner flaps under the outer flaps to a substantially horizontal position, means for bending the outer flaps to a tented position with respect to the inner flaps, an applicator for applying adhesive to the inner flaps while the outer flaps are in tented position, said adhesive applicator being T-shaped with the cross bar

applying adhesive to the inner flaps and a vertical bar supporting the cross bar and riding between the gap of the tented outer flaps, and means for pressing and sealing the outer flaps against the inner flaps.

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