March 11, 1969 W. N. MILLER 3,431,703

MACHINE FOR FILLING CARTONS

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Fig. 2

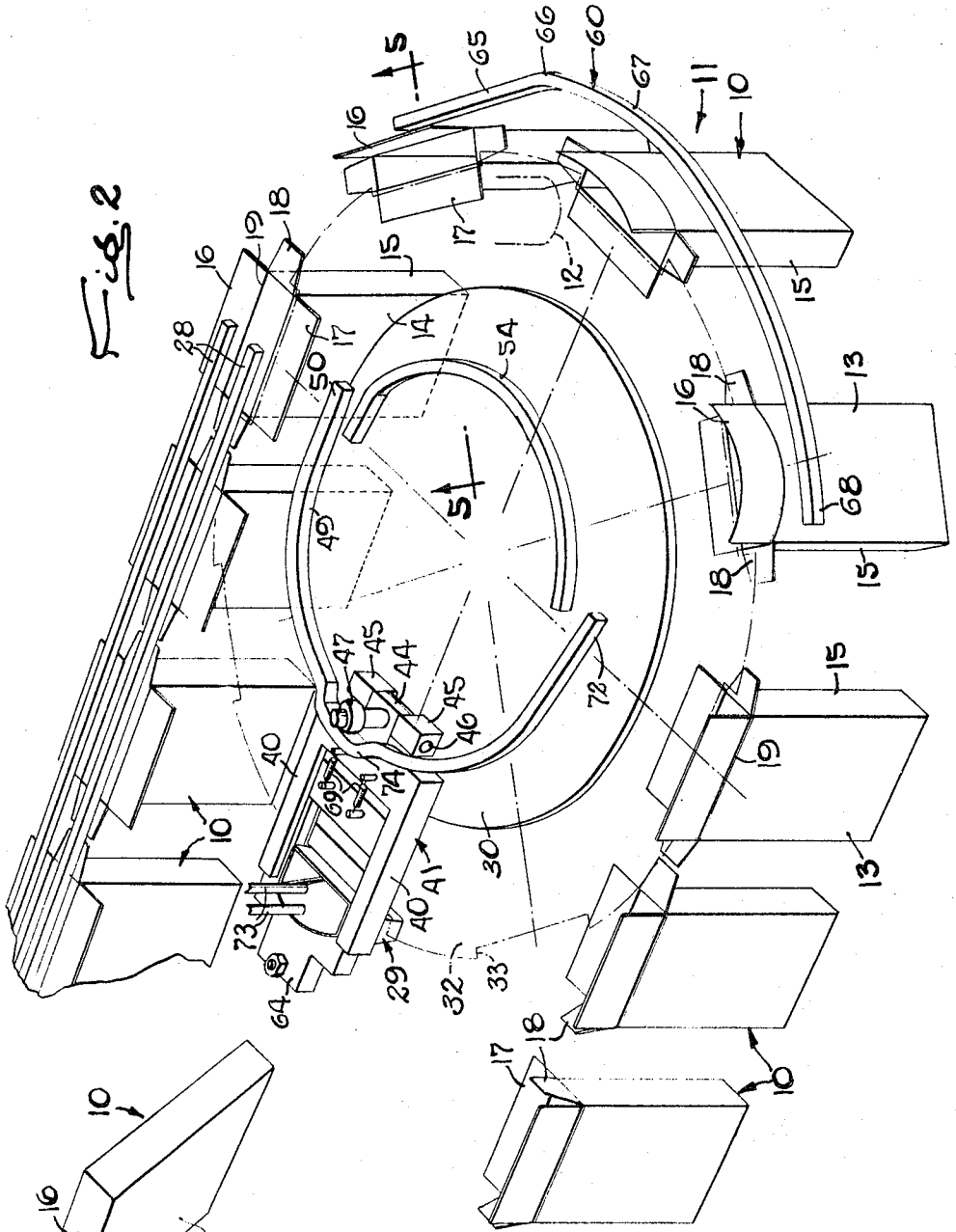


Fig. 1

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Fig. 3

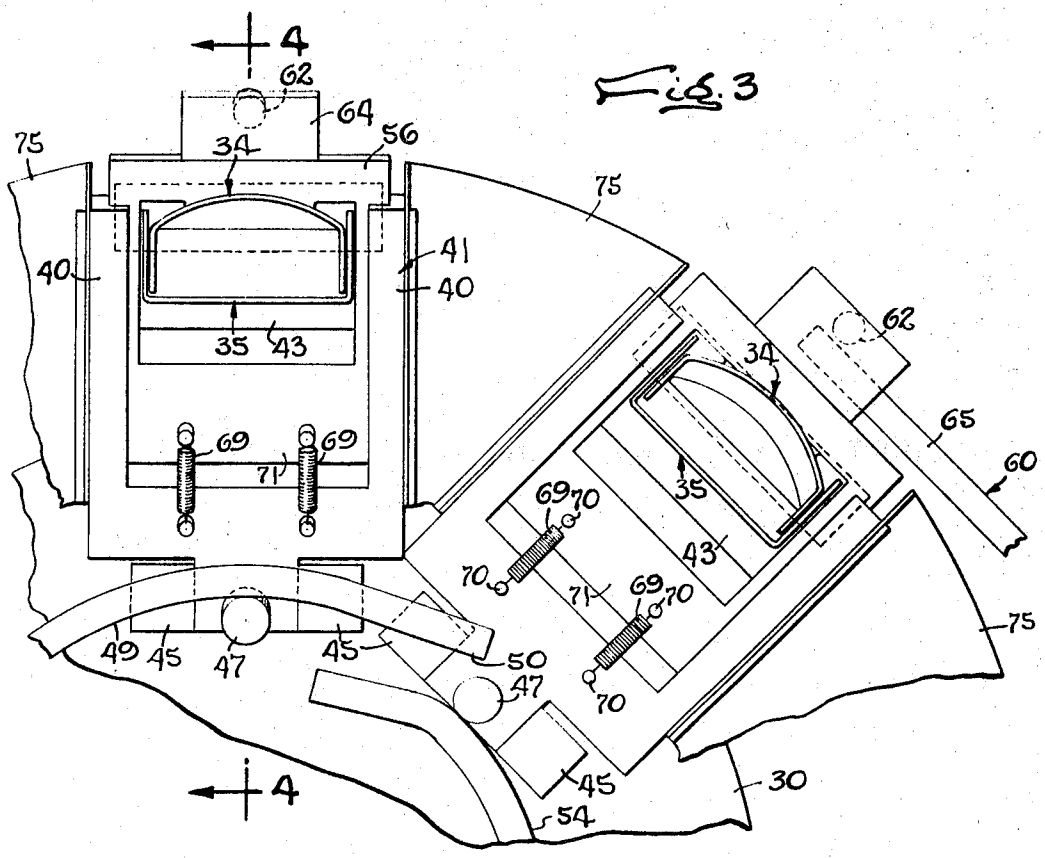
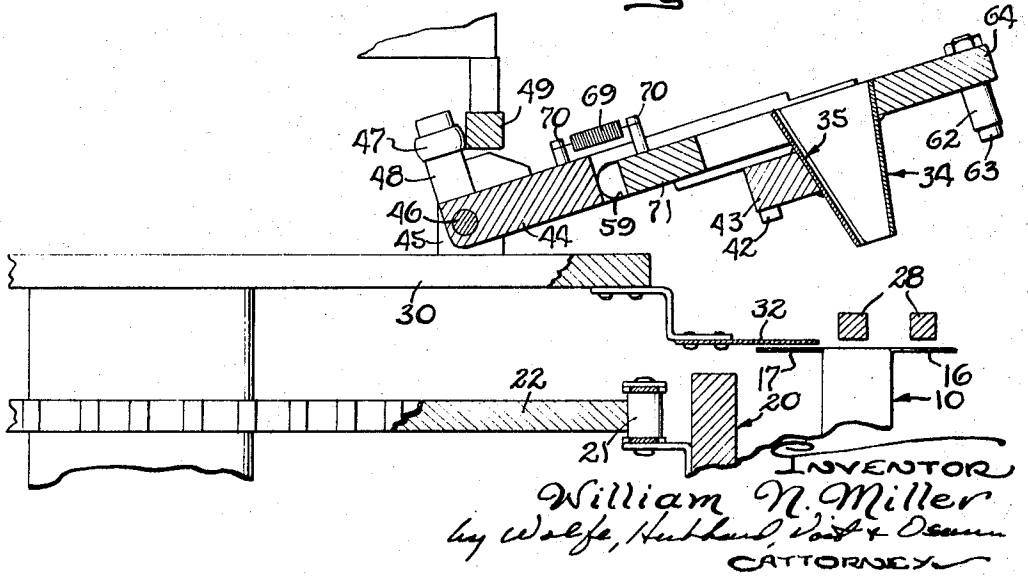


Fig. 4



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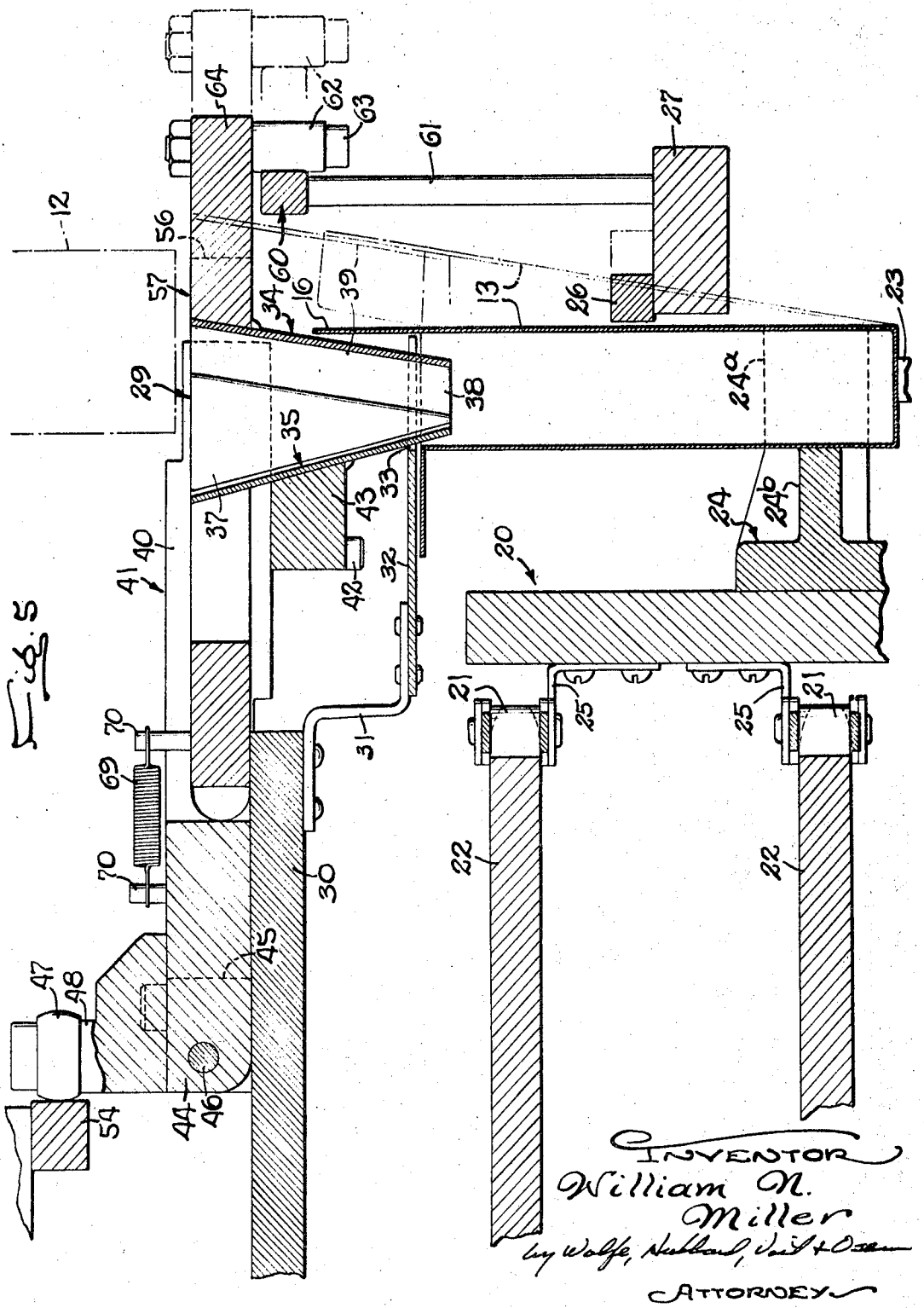


Fig. 5

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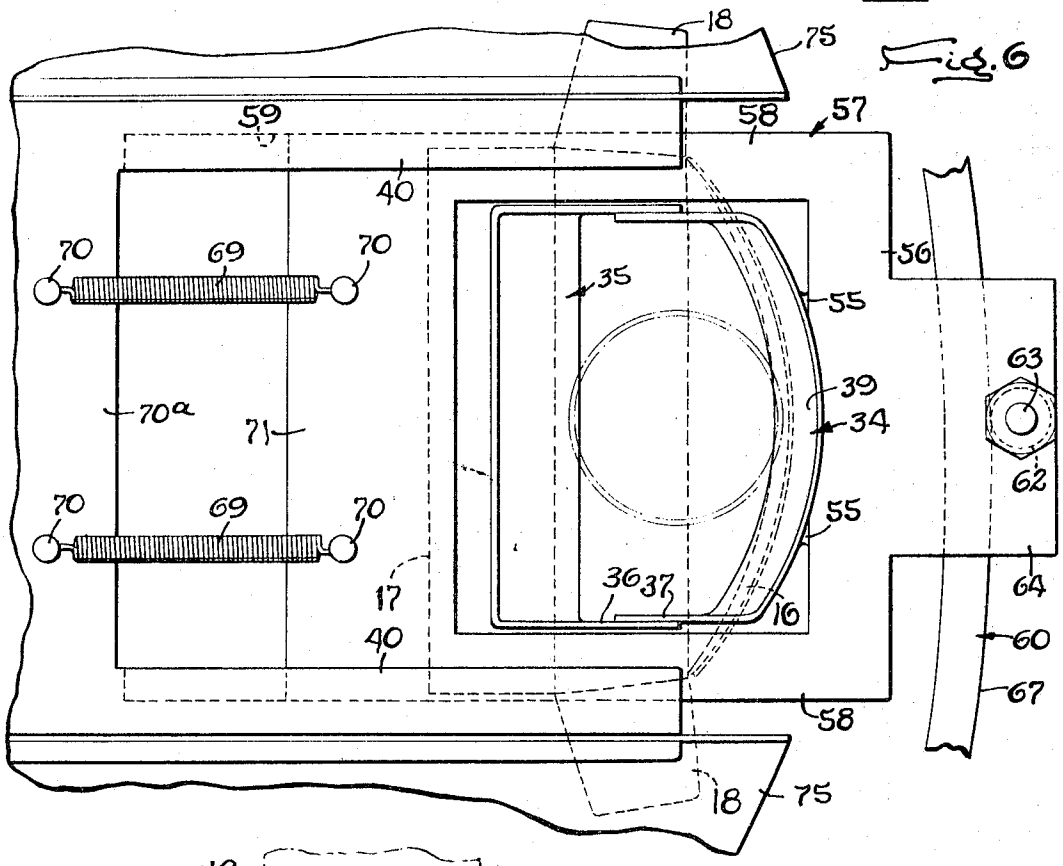


Fig. 6

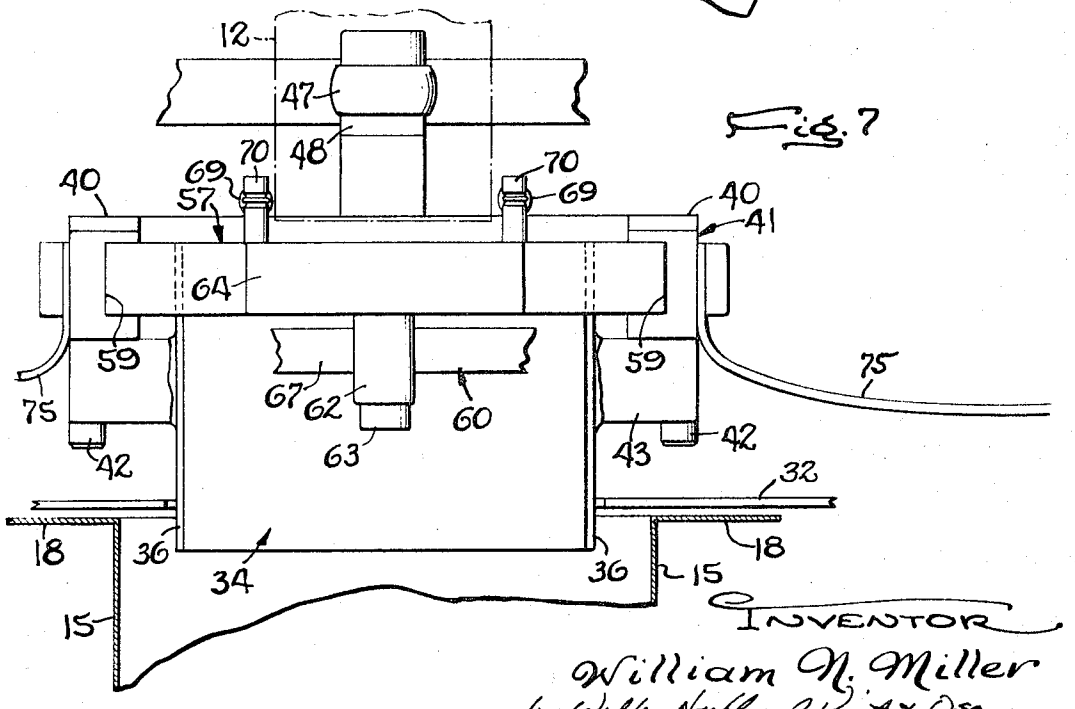


Fig. 7

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United States Patent Office 3,431,703
Patented Mar. 11, 1969

3,431,703

MACHINE FOR FILLING CARTONS

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Filed Apr. 25, 1966, Ser. No. 544,935
U.S. Cl. 53—381 7 Claims
Int. Cl. B65b 43/26, 5/02, 1/02

ABSTRACT OF THE DISCLOSURE

A machine for depositing a quantity of product into the open upper ends of flexible walled cartons with upstanding hinged closure flaps as the cartons are advanced along a predetermined path into a filling station. The machine includes a plurality of spouts each comprising a pair of separable shells which are inserted downwardly into one of the cartons as the latter approaches the filling station. Before the carton is filled, one of the shells is moved bodily away from the other shell in a sidewise path to bow the adjacent carton wall outwardly and to spread the carton widely for filling without folding the hinged closure flap from its upstanding position and without tearing the carton.

This invention relates to a machine for filling flexible walled cartons, and more particularly, to a machine in which the cartons to be filled have end closure flaps normally upstanding from and hinged to the upper ends of opposing side walls and in which the cartons are rapidly advanced by a carrier through a filling station for charging with a measured amount of product.

The general object of the invention is to provide in a machine of the above character a novel spout mechanism which bows the walls of the cartons outwardly to permit the latter to be filled accurately and at a high rate of speed, and which, at the same time, insures that cartons will not be torn during such bowing.

A related object is to provide a spout formed by a pair of separable shells which fit into the cartons, one of the shells being movable bodily in a straight path away from the other shell to bow the adjacent carton wall outwardly and to spread the carton without folding the hinged closure flap from its upstanding position.

A more detailed object is to provide a machine in which a plurality of spouts move in timed relation with the advancing cartons and are mounted on separate supports for movement into and out of the cartons as the latter approach and leave the filling station, and in which a spreader shell is slidably mounted on each of the supports for sidewise movement toward and away from the other shell when the spouts are within the cartons.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

FIGURE 1 is a perspective view of a carton after the latter has been filled and closed.

FIG. 2 is a fragmentary perspective view schematically illustrating the path of the cartons through the filling station and one of the spout mechanisms of the machine.

FIG. 3 is a fragmentary plan view of a machine embodying the novel features of the present invention.

FIG. 4 is a fragmentary cross-section taken substantially along the line 4—4 of FIG. 3.

FIG. 5 is an enlarged fragmentary vertical cross-section of the machine shown in FIG. 2 taken when the spout mechanism is positioned along the line 5—5 of FIG. 2.

FIG. 6 is a fragmentary plan view of the spout mechanism shown in FIG. 5 and showing the spout and cartons in a spread position.

FIG. 7 is a fragmentary end elevation of the spout mechanism shown in FIG. 6.

As shown in the drawings for purposes of illustration, the invention is embodied in an automatic packaging machine operable to dispense measured amounts of material such as strawberries and their juice into upright cartons **10** which are advanced continuously at a high rate of speed through a filling station **11** (FIG. 2) with their open upper ends passing beneath a discharge nozzle **2** (FIGS. 2 and 5) to receive the material delivered to the nozzle from a suitable hopper or tank (not shown). After the cartons have been filled, their open ends are sealed closed and the product is frozen within the cartons prior to shipment.

Each of the cartons **10** herein comprises a closed bottom and two opposed flexible side panels **13** and **14** (FIG. 2) connected along opposite side margins to two narrow rectangular edge panels **15**. To close the upper ends of the cartons, side flaps **16** and **17** and edge flaps **18** projecting upwardly from the panels are folded across the upper ends. The closure flaps are resiliently hinged at **19** to the panels and normally assume upright positions until folded over and sealed closed.

In this instance, the cartons **10** are supported and advanced in a U-shaped path through the filling station **11** and beneath the discharge nozzle **12** on an endless carrier **20** (FIG. 5) comprising a pair of parallel horizontal chains **21** trained around vertically spaced sprocket wheels **22** journaled on a frame (not shown) and suitably driven at a high rate of speed. The bottoms of the cartons ride on a stationary track **23** extending around the outside of and beneath the chains while the lower ends of the carton edge panels **15** and the side panels **14** fit into and are carried by forks **24** equally spaced along the outer sides of the chains and fastened thereto by angle brackets **25**. Each fork is formed with outwardly projecting legs **24a** engaging the edge panels and with a web **24b** spanning the legs and supporting the side panel **14**. To prevent the cartons from tipping outwardly, a curved horizontal rail **26** is positioned alongside the carton path on a frame member **27** and guides the side panels **13** as the cartons are advanced. As shown in FIG. 2, a pair of parallel horizontal rails **28** disposed above the initial portion of the carton path press downwardly upon and fold the closure flaps **16**, **17** and **18** away from the carton mouths and into horizontal positions to insure that the flaps will not interfere with the filling operation as the cartons pass beneath the discharge nozzle.

As each carton **10** approaches the filling station **11**, a spout **29** is inserted into the upper end of the carton, and the side panel **13** is bowed outwardly to spread the carton for receiving the charge of material from the discharge nozzle **12**. A plurality of the spouts **29** are carried by a wheel **30** (FIGS. 2 and 3) rotatably driven on the frame at a speed correlated with the speed of the carton carrier **20** and disposed within the U formed by the latter carrier. Fastened to the underside of the wheel by means of brackets **31** is a circular templet **32** (FIG. 5) for maintaining the closure flaps **17** and **18** in their horizontal positions after the cartons have advanced beyond the hold-down rails **28**. The templet is a flat metal plate spaced radially from the rim of the wheel to overlie the carton path, and is formed with a plurality of circumferentially spaced slots **33** in its outer periphery, the slots having slightly greater dimensions than the mouths of the cartons. As each carton passes from beneath the hold-down rails, the side flaps **17** and the edge flaps **18** move beneath the templet with the carton mouth being alined with one of the slots. Thus, the templet continues to hold these flaps in their horizontal folded positions. The side flap **16**, however, being spaced outwardly from the templet, snaps upwardly about the resilient hinge **19** as the carton moves past the rails **28** and assumes an upright position so that

it will not act as a brace against the side panel 13 when the latter is subsequently bowed.

In accordance with the present invention, the spouts 29 are constructed and mounted in a novel manner to engage and bow the carton side panels 13 outwardly thereby enabling rapid and accurate filling of the cartons 10 at the filling station 11, and at the same time, to engage and bow the panels without horizontally folding the upstanding closure flaps 16 thus insuring that the cartons will not be torn as the panels are bowed. To these ends, each spout is formed by a pair of complementary shells 34 and 35 which are inserted automatically into a carton as the later approaches the filling station. After each pair of shells has been inserted into a carton and before that carton reaches the filling station, the shell 34 is moved bodily sidewise away from the shell 35 to engage the side panel 13 and the flap 16 and to bow these members away from the opposite side panel 14. Accordingly, the carton is spread widely as it moves beneath the discharge nozzle 12 so that a large quantity of material can be discharged from the nozzle, through the shells, and into the carton in a short interval of time. Since the spreader shell 34 moves in a straight path toward the panel 13 and the flap 16, the latter is bowed before it tends to fold horizontally and thus remains in an upright position so as not to act as a brace and cause tearing between the side panels and the edge panels 15 as the carton is bowed.

In this instance, the shells 34 and 35 of each spout 29 are generally U-shaped in cross-section and face each other with the side flanges 36 (FIG. 6) of the inner shell 35 overlapping the side flanges 37 of the spreader shell 34 and with the two shells tapering downwardly to an open lower end 38 (FIG. 5) smaller than the mouths of the cartons 10. The spreader shell 34 is formed with an arcuate outer surface 39 which is bowed away from the inner shell and toward the carton side panels 13. With this arrangement, substantially the entire width of the panel is engaged and backed by the shell when the panel is bowed.

The spouts 29 are mounted in equally spaced relation on the upper side of the rotary wheel 30 (FIG. 3) and radiate outwardly therefrom with the spacing between the spouts being equal to the spacing between the cartons 10 on the carrier 20. As the wheel rotates, the path of the spouts coincide with the path of the cartons along an arc extending from the ends of the hold-down rails 28, through the filling station 11, and to a point on the opposite side of the carton path spaced approximately 180° from the initial point. Each spout is mounted for downward movement into a carbon as the latter passes from beneath the hold-down rails and then for upward movement out of the carton after the carton has passed beneath the discharge nozzle and has been filled with the product. For this purpose, the inner shell 35 of each spout is straddled by the legs 40 of a U-shaped yoke or support 41 (FIGS. 2, 3 and 6) and is fastended to the underside of the legs by means of screws 42 (FIG. 7) extending through a horizontal bar 43 welded to the inner side of the shell 35. At its inner end, the yoke is formed with a tongue 44 (FIG. 2) which fits between a pair of spaced lugs 45 fast on the wheel 30, the tongue being pivotally conected to the lugs by a pin 46. A roller 47, journaled for rotation on a stubshaft 48 projecting upwardly from the tongue, rides along the inner surface of a curved stationary cam track 49 positioned above the shell and suitably fastended to the frame. This track is spaced radially inwardly from the path of the spouts and extends alongside the portion of the spout path that does not coincide with the carton path. As the wheel rotates, the cam track forces the roller inwardly toward the center of the wheel threby causing the yoke 41 to pivot upwardly about the pin 46 and causing the spout to assume an elevated position above the level of the carton path as shown in FIG. 4.

As each elevated spout 29 it rotated to a position overlying a carton 10 passing from the hold-down rails 28, the roller 47 passes beyond the end 50 of the cam track 49, and the spout falls downwardly about the pin 46, into one of the slots 33 in the templet 32, and then into the carton. During the period that the spout is within the carton, the roller 47 engages the outer surface of a second stationary cam track 54 (FIGS. 2 and 5) disposed above the wheel 30 on a frame member (not shown) to retain the spout in its lowered position.

Shortly after each spout 29 has been inserted into a carton 10 and before that spout and carton have reached the filling station 11, the spreader shell 34 is moved sidewise away from the other shell 35 to bow the carton panel 13 outwardly. For this purpose, each spreader shell is welded near its upper end at 55 (FIG. 6) to a cross-member 56 of a horizontal U-shaped slide 57 formed with inwardly projecting legs 58 which are slidably received within complementary grooves 59 cut in the opposing sides of the legs 40 of the pivoted yoke 41. After the spout has been inserted into a carton, a third stationary cam track 60 (FIGS. 2 and 5) disposed outside of the carton path and connected to the frame member 27 by unstanding posts 61 is engaged by a roller follower 62 journaled on a bolt 63 fastened to a tongue 64 (FIGS. 3 and 6) projecting outwardly from the cross-member 56 of the slide 57. The track 60 is formed with a straight portion 65 which diverges outwardly from the carton path and then merges at 66 just short of the filling station with a curved portion 67 concentric with the carton path. As the follower 62 rides along the diverging portion of the track, the slide is pulled outwardly and the spreader shell 34 is moved toward the carton panel 13. The arcuate surface 39 of the spreader shell thus engagaes the panel 13 and the closure flap 16 to bow these members outwardly and to spread the carton as shown in broken lines in FIG. 5. The carton remains spread as the follower engages the concentric portion of the track and as the spout passes under the discharge nozzle 12. Accordingly, material discharged by the nozzle may pass through the spout and into the carton at a very rapid rate.

After each carton 10 has been advanced through the filling station 11, the follower 62 on the slide 57 rides beyond the end 68 of the cam track 60 and the spreader shell 34 is drawn inwardly toward the other shell 35 by a pair of horizontally spaced contractile springs 69 (FIGS. 5 and 6) stretched between vertical pins 70 upstanding from the cross-piece 70a of the yoke 41 and a cross-piece 71 spaning the legs 40 of the slide 57. Thereafter, the roller 47 on the yoke 41 engages the outer surface of the flared portion 72 of the cam track 49 to pivot the yoke upwardly about the pin 46 and to raise the spout out of the filled carton, the later being advanced to a terminal station (not shown) to be sealed closed.

When relatively sticky material such as strawberries is being dispensed into the cartons 10, it is desirable to clean each spout before another quantity of material is passed through it. Thus, each spout lowers momentarily to pass under steam and water jets 73 (FIG. 2) as the follower 47 rides across a dip formed in the car track 49 about midway between its ends. As a protective measure, flexible shields 75 (FIGS. 3 and 7) may be fastened between opposing legs 40 of adjacent yokes 41 to prevent material dripping from the discharge nozzle 12 from splashing on the exteriors of the cartons.

From the foregoing, it will be apparent that the new and improved machine of the present invention is effective to spread the cartons 10 for rapid and accurate filling and yet does not damage the cartons during such spreading. In addition, the novel disposition of the cam tracks 49 and 60 on opposite sides of the carton path affords a relatively simple arangement for moving the spouts 29 while enabling operation of the machine in comparatively little space.

I claim as my invention:

1. In a machine for filling cartons having opposed side panels and open upper ends, the combination of, a frame, a first carrier on said frame operable to support a succession of equally spaced cartons and advance the same open end up along a predetermined path through a filling station, a second carrier on said frame movable in timed relation with said first carrier and having a plurality of equally spaced spouts each formed by first and second separable shells alined with said path along a portion thereof extending through said filling station, supports fast on said first shells and hinged to said second carrier for up and down movement about horizontal axes, slides fast on said second shells and mounted on adjacent supports for up and down movement therewith whereby said spouts are movable between elevated positions above the level of the cartons and lowered positions in which the lower ends of the spouts are inserted into the cartons, means guiding said slides on said supports for back and forth sliding laterally of said portion of said path whereby said second shells are bodily movable toward and away from said first shells, means for moving said spouts into said lowered positions and into the cartons as the spouts approach said filling station, followers on said slides operable when moved in one direction to shift the slides in one direction thereby to move said second shells away from said first shells, and a cam on said frame positioned to move said followers in said one direction after said spouts have been inserted into the cartons whereby each successive second shell moves away from its associated first shell and engages the adjacent side panel of a carton to bow the same away from the other panel and to spread the carton for receiving a charge of product at the filling station.

2. A machine as defined in claim 1 further including springs acting between said supports and said slides for shifting the latter reversely after said spouts leave said filling station thereby to move each successive second shell away from the adjacent side panel of the carton and toward its associated first shell.

3. In a machine for filling cartons having opposed side panels and open upper ends, the combination of, a frame, a first carrier on said frame operable to support and advance a carton open end up along a predetermined path through a filling station, a second carrier on said frame movable in timed relation with said first carrier and having a spout disposed above said path along a portion thereof, said spout comprising first and second shells mounted on said second carrier for up and down movement between an elevated position above the level of the carton and a lowered position in which the lower ends of the shells are inserted into the carton, said second shell having an arcuate surface bowed away from said first shell and toward the adjacent side panel of the carton, means mounting said second shell for sidewise movement toward and away from said first shell, mechanism enabling movement of said shells into said lowered position and into the carton as the latter approaches said filling station, an operator on said second shell operable when moved in one direction to move the second shell in a straight path away from said first shell, and means positioned on said frame for engaging said operator and moving the latter in said one direction after said shells have been lowered into the carton whereby the second shell moves from the first shell and said arcuate surface engages the adjacent side panel of the carton and bows the engaged panel away from the other panel thereby spreading the carton for receiving a charge of product at the filling station.

4. A machine as defined in claim 3 including a support hinged to said second carrier and mounting said shells for movement between said elevated and lowered positions, said means for mounting said second shell for movement toward and away from said first shell including a slide guided on said support for reciprocation laterally of the portion of said predetermined path extending through said filling station.

5. A machine as defined in claim 4 in which said mechanism includes a follower fastened to said support and a cam fast on said frame, said cam being disposed on one side of said predetermined path and operable to engage the said follower.

6. A machine as defined in claim 5 in which said operator is fastened to said slide, and said means for engaging the operator comprises a second cam disposed on the opposite side of said predetermined path.

7. A machine as defined in claim 3 further including a spring operable to move said second shell away from the adjacent panel of the carton and toward said first shell after the carton leaves the filling station, said mechanism including means for thereafter moving said shells to said elevated position and out of the carton.

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U.S. Cl. X.R.

53—186; 141—114, 154, 316