Sept. 9, 1969 I. L. LOPATA 3,465,693

METHOD AND APPARATUS FOR FILLING SOFT-BAKED GOODS

Filed Aug. 28, 1967 7 Sheets-Sheet 1

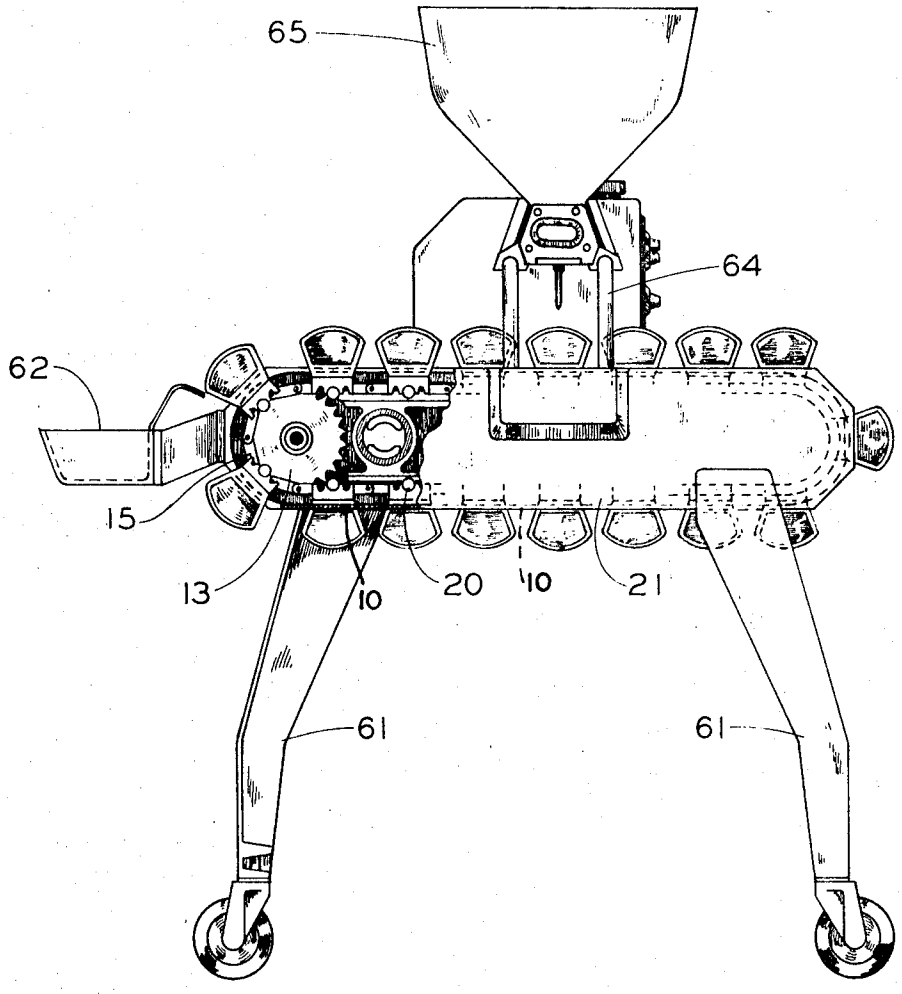


Fig. 1

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METHOD AND APPARATUS FOR FILLING SOFT-BAKED GOODS

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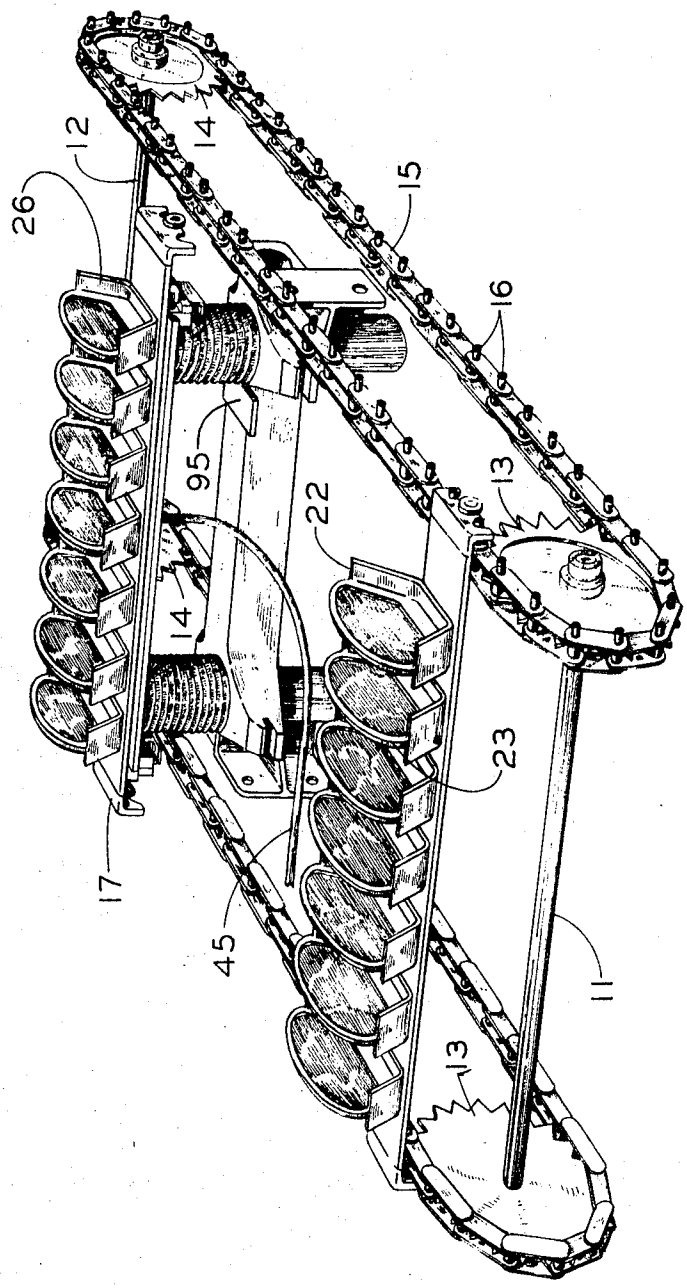


Fig. 2

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METHOD AND APPARATUS FOR FILLING SOFT-BAKED GOODS

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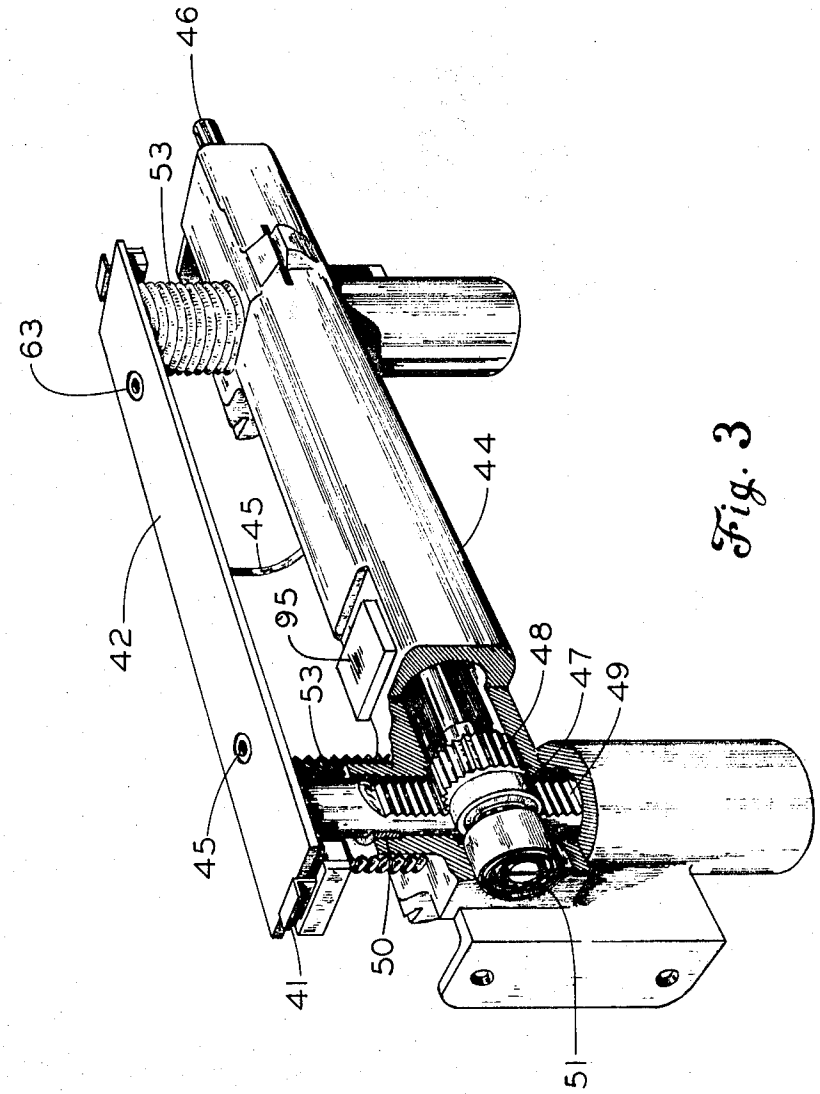


Fig. 3

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METHOD AND APPARATUS FOR FILLING SOFT-BAKED GOODS

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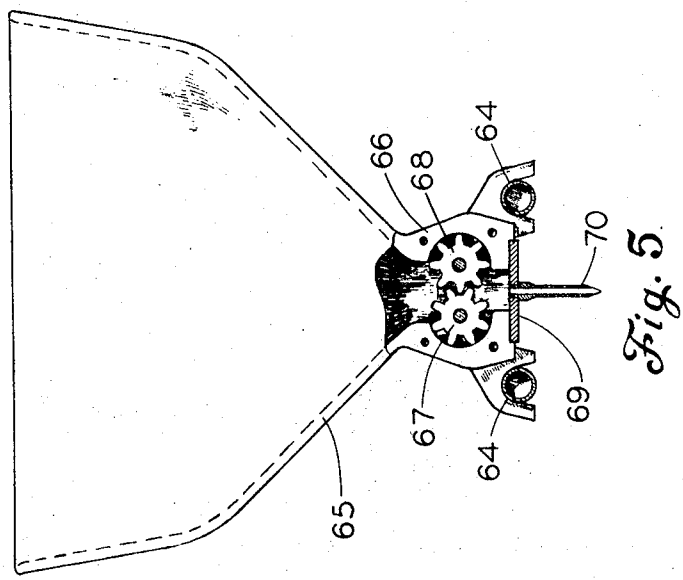


Fig. 5

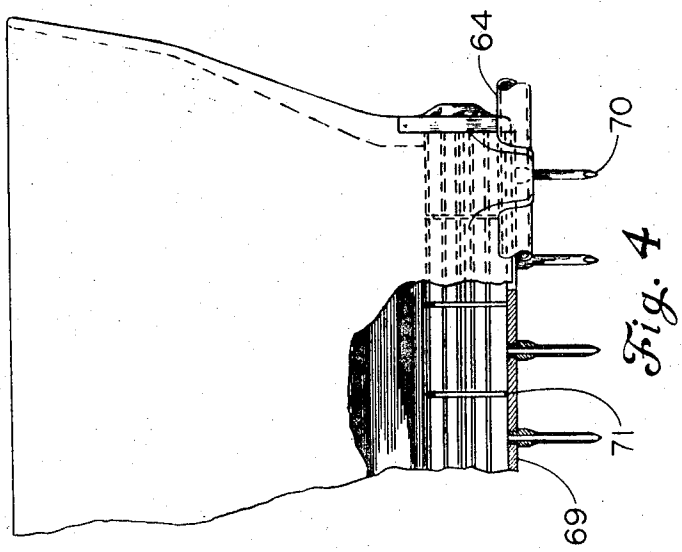


Fig. 4

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METHOD AND APPARATUS FOR FILLING SOFT-BAKED GOODS

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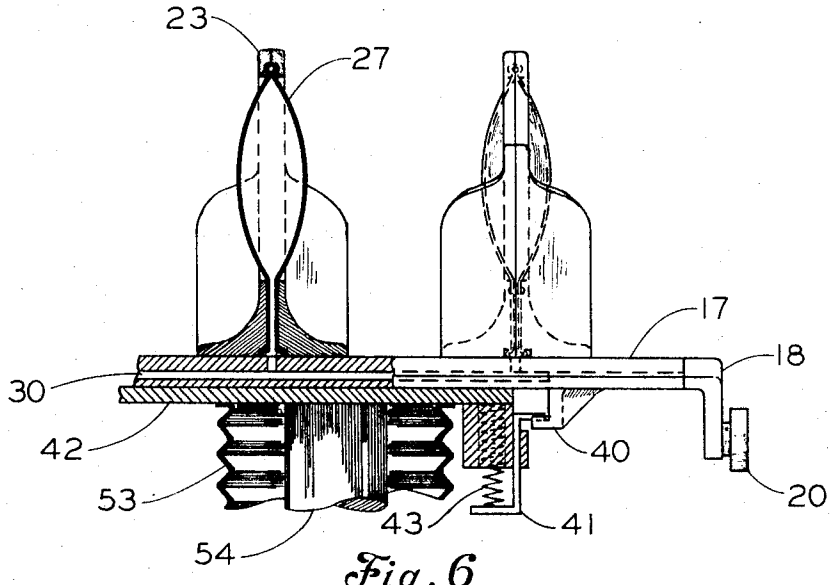


Fig. 6

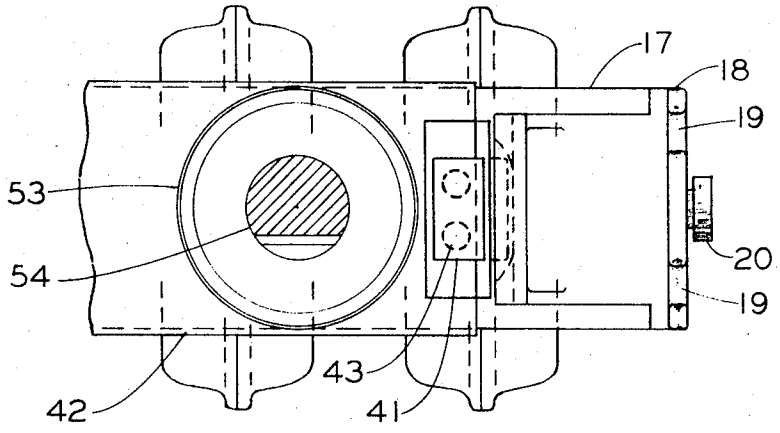


Fig. 7

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METHOD AND APPARATUS FOR FILLING SOFT-BAKED GOODS

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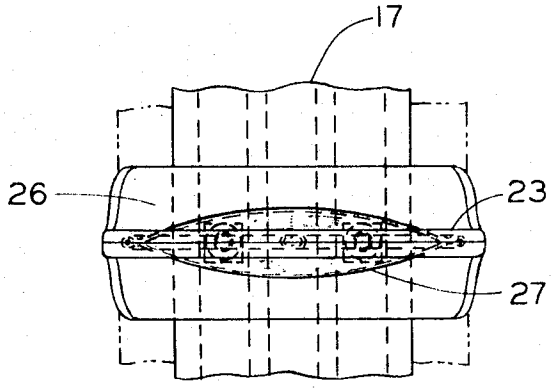


Fig. 8

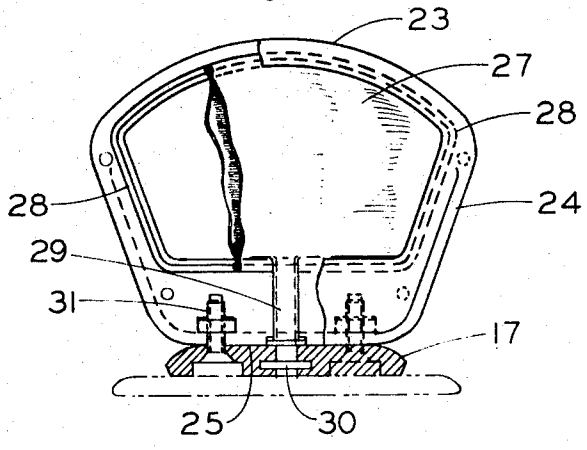


Fig. 9

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METHOD AND APPARATUS FOR FILLING SOFT-BAKED GOODS

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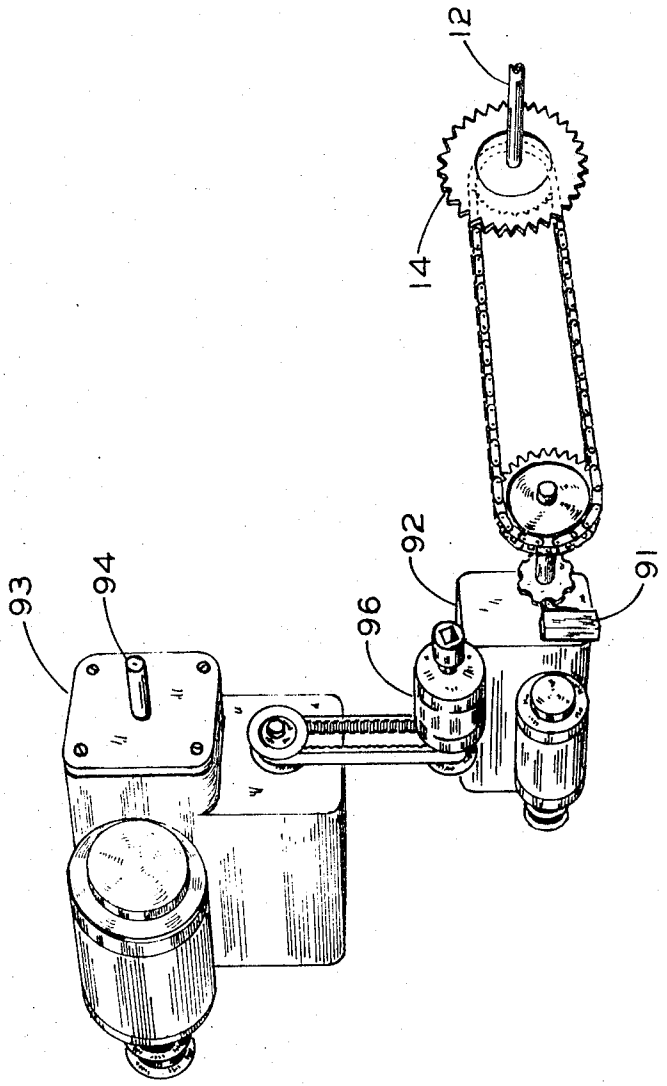


Fig. 10

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3,465,693

METHOD AND APPARATUS FOR FILLING SOFT-BAKED GOODS

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Int. Cl. A23g 3/20
U.S. Cl. 107—1 11 Claims

ABSTRACT OF THE DISCLOSURE

Filling soft-baked goods wherein a plurality of items are gently held between inflated diaphragms during the injection of a filling; the items are transported to a filling station, raised from a transport mechanism to receive a filler spout, and then returned to the transport mechanism.

The filling of soft-baked goods has in the past been mostly by tedious, slow, manual application of the goods to a filler spout. Delicate handling and positioning of the goods has been necessary, for without skill, the goods are broken, the filling misapplied so that the goods are ruptured or leak, and the filling may be misplaced. Where automatic filling has been devised, the same defects occur.

It has been found that a method and apparatus can be utilized which will delicately hold the soft-baked goods, and fill it precisely, and carry on such action at a high rate of speed simultaneously on a plurality of articles, with highly uniform results, with a minimum of breakage. While reference is had to soft-baked goods, the apparatus can also be utilized on unbaked goods, as well as other food articles, including relatively brittle and relatively firm products.

The objects and advantages as well as other objects and advantages can be attained by the device shown by way of illustration in the drawings in which

FIGURE 1 is a side elevational view of the apparatus;

FIGURE 2 is a perspective view of the conveyor and lifting assembly with the housing removed;

FIGURE 3 is a perspective view of the lifting assembly;

FIGURE 4 is a partial front elevational view of the filler with part of the wall exploded away;

FIGURE 5 is an end elevational view of the filler with part of the end wall exploded away;

FIGURE 6 is a sectional view of the diaphrgam assembly;

FIGURE 7 is a partial bottom plan view of the flight bar;

FIGURE 8 is a top plan view of the diaphragm assembly;

FIGURE 9 is a side elevational view of the diaphragm assembly;

FIGURE 10 is a perspective view of the drive assembly for the apparatus.

TRANSPORTATION OF SOFT-BAKED GOODS

The filling of soft-baked goods to be carried on simultaneously on a number of items, first requires a carrier to be transported to a filling station, transported to a loading station, then to a discharge station, and finally back to the loading station. An assemblage embodying such a carrier in a transportation system is shown in FIGURE 1. FIGURE 2 depicts the transportation system.

In FIGURE 2, there is shown a pair of sprocket shafts **11**, **12**. Idler sprockets **13** are mounted on a sprocket shaft **11**. Drive sprockets **14** are mounted on the shaft **12**. Conveyor chains **15** are mounted on the sprockets **13**, **14**. The links of the chain **15** are connected by pins which are extended beyond the links to define drive studs **16**. The drive studs **16** support numerous flight bars **17**, which

are generally flat, transverse platforms. Each flight bar is provided with a downturned portion **18** at each end (see FIGURES 6 and 7). The end portions **18** have pairs of arcuate notches **19** which are spaced to engage adjacent drive studs **16**. In this manner, the drive studs **16** carry the flight bars **17** along the chain. Between the notches **19**, there is a support roller **20** on the end portion **18**, which rides on a partial track **10** (see FIGURE 1) on the inside of the conveyor housing **21**, whereby the flight bars **17** are kept from falling off the studs **16** during their inversion as they return to the loading station. Each flight bar **17** contains numerous holders **22**.

THE HOLDERS

The transportation means is provided with seats or holders **22** for a plurality of soft-baked goods. The seats are formed of diaphragm frames **23** which have side edges **24** extending in an upward and outward direction. The top of the holder spans the edges **24** and is upwardly arcuate. The bottom edge **25** of the frame is horizontally straight. The side edges **24** and the bottom edge **25** are provided with an outwardly extending flange that defines a generally U-shaped seat **26**. When a pair of frames **23** are arranged back to back, and are placed adjacent to another pair of frames **23**, the seats **26** will complement each other to provide a place for a soft baked article. Of course, the seats **26** may be varied in shape to accommodate various sizes and shapes of soft baked articles. By way of illustration, a shape suitable for a doughnut has been drawn.

If it is desirable to seize the baked article, the frames are provided with an inflatable diaphragm **27** shaped to conform to the opening in the frame. This diaphragm **27** will have its edges gripped in a channel **28** in the edge of the frame. The diaphragm has an inflation stem **29** which is led down through a channel in the bottom of the frame **23**. The channel communicates with an air chamber or passage in the flight bar **17**. The frames **23** are attached to the flight bars **17** by recessed bolts **31**. The introduction of air into the chamber **30** will distend the cheeks of the diaphragm **27** outwardly on both sides of the frame **23**, to seize the soft-baked article on the seat **26** lying between adjacent frames and hold it gently during filling.

ELEVATING MECHANISM

Reference has been made to a filling station; there the flight bars **17** are raised from the conveyor chain drive studs **16**, to engage with a filler. It will be borne in mind that the flight bars **17** are carried to the filling station by the conveyor chain **15**. The movement of the chain **15** is stopped when a flight bar **17** reaches the filling station. Each of the flight bars **17** is provided with a locking-lug **40** (see FIGURE 6). The chain **15** stops with the locking-lug **40** in registration with a latch **41** which is mounted on a platen or table **42**, (see FIGURE 3). This latch **41** is loaded by a spring **43**. When the platen is down, the flight bars **17** pass over the platen, as the locking-lugs **40** pass under the latch **41**. The latch is in raised position by reason of its resting on the housing **44**. When the platen **42** is raised, the spring urges the latch **41** to engage the locking-lug **40**. The flight bar **17** is then pressed firmly to the platen **42**. A flexible air line **45** introduces compressed air into passages in the platen, conducting the air to air ports **45** in the top of the platen **42**. As the platen **17** rises, the latches **41**, urged by the springs **43**, firmly press the ports **45** to similar air ports in the flight bar **17**. The air so conducted, passes into the air chamber **30**, through the diaphragm stem **29**, and inflates the diaphragm **27**, until the platen **42** is lowered and the flight bar **17** is released and returned to the conveyor chain **15**.

The elevation of the platen **42** is accomplished in the following manner. The elevating mechanism housing **44** is attached across the conveyor housing **21**. A pinion shaft

46 passes through a horizontal passage in the housing 44. It is supported on bearings 47 at each end. Pinion gears 48 are attached to each end of the shaft 46.

The housing 44 also has vertical passages at each end, in each of which a rack 49 is positioned in engagement with the pinion gears 48. The racks 49 are slidable on bearings 50. A counterbalance spring 51 normally maintains the racks 49 in lowered position. The platen 42 is secured to the tops of the racks 49. When the racks 49 are raised, they raise the platen 42. The counterbalance springs 51 keep the platen 42 in lowered position after the power drive to the racks 49 is relieved.

Accordion dust shields 53 are applied to cover the exposed parts of the rack shaft 54.

THE FILLER

The conveyor housing is mounted on legs 61 and has a loading tray 62 at one end, where the soft-baked goods can be stacked and manually positioned in each seat 26. As the platen 42 lifts the flight bar 17, the diaphragms are inflated to seize the soft-baked goods. An air seal 63 is applied to each air port 45 to minimize air losses.

Hopper supports 64 are attached to the conveyor housing 21. An interchangeable hopper 65 is positioned on the supports 64. Other hoppers are readily substitutable so that fillings may be substituted at will and speedily. The bottom of the hopper 65 has a pump chamber 66 in which is located a pair of star impellers, one driven impeller 67, and the other a drive impeller 68. A template 69 provides a floor for the pump chamber 66. At appropriate spaced intervals, filler spouts 70 are attached to the template 68. The impellers 67, 68 are provided with radial slots to accommodate pump separators 71 which provide discrete, separate subchambers for each filler spout. When the flight bar 17 has risen to such a point that the filler spouts 70 penetrate the soft baked item, the impellers 67, 68 rotate to feed filling through the spout to deliver a predetermined amount of filling through each spout 70. The impellers 67, 68 then reverse briefly to withdraw filling from the spouts 70, to avoid dripping during the withdrawal of the filled baked goods and the presentation of the next unfilled baked articles.

When the flight bar 17 is disengaged from the platen 42, air pressure on the diaphragm 27 is relieved, the filled article is no longer seized, and is discharged by the inversion of the diaphragm assembly at the discharge station at the other end of the machine.

THE CYCLE

When a flight bar 17 reaches a position at the filling station where it is over the platen 42, an index wheel on the sprocket shaft 11 engages an electroswitch 91 (see FIGURE 10). The electroswitch 91 opens a circuit to a lower drive clutch-brake 92, which thereupon becomes disengaged and the conveyor 15 is stopped. The same signal from the electroswitch 91 actuates an infinitely and positively adjustable metering driving mechanism (in accordance with the inventor's U.S. Patent No. 3,002,599 of Oct. 3, 1961). This driving mechanism 93 operates a jog clutch 96 which couples the shaft 46 (see FIGURE 3) with a motor.

The shaft 46 rotates the pinion 48 to raise the platen 42 to lift the flight bar 17 until the soft-baked goods article is fully engaged by the nozzle 70. At the same time, the upper clutch-brake assembly 93 is connected through drive shaft 94 to operate the impellers 67, 68 pumping filling material from the pump chamber into the nozzle 70 which has entered the soft baked goods article. The jog clutch 96, having raised the flight bar to its highest position, is now slipping, holding the platen 42 at this position. When the metering mechanism setting is satisfied, the upper clutch-brake assembly 93 reverses the drive shaft 94, which causes the impellers 67, 68 to reverse and to withdraw filling material from the nozzles so that it will not drip out. As this reversal takes place, the drive mechanism 93 also reverses the drive to the job clutch 96, lowering the flight bar 17 on the platen 42, before any of the filled material can be sucked out, and restoring the flight bar 17 to the conveyor chain 15. An electroswitch (not shown) on the platen 42 is engaged by the plate 95 when the platen 42 reaches its lowest position. The electroswitch bypasses the electroswitch 91, and starts the conveyor again. The cycle repeats.

What is claimed:

1. A method for filling soft-baked articles comprising
   (a) loading a plurality of articles onto a plurality of seats on a bar, at a loading station,
   (b) conveying the bar to a filling station,
   (c) lifting the bar from the conveyor at the filling station until the articles are entered by filling nozzles,
   (d) distending diaphragms of the seats to seize the article,
   (e) pumping a filling through the nozzles into the articles,
   (f) lowering the bar to disengage the filling nozzles, to restore the bar to the conveyor, and collapsing the distended diaphragms,
   (g) moving the bar to a discharge station,
   (h) dumping the articles from the seats.

2. An apparatus for filling soft-baked goods comprising
   (a) a seat assembly for a baked article at a filling station,
   (b) a first means to move the seat assembly to bring the baked article into penetrating engagement with a means to fill the baked article and to remove the seat from the means to fill after the filling operation,
   (c) a means to penetrate and fill the baked article,
   (d) a means to seize the baked article on the seat assembly during the filling operation,
   (e) a second means to move the seat for the baked article from a seat loading station to the filling station, and after the baked article is filled, to move the seat from the filling station to a discharge station comprising
      (A) a continuous loop conveyor,
      (B) studs on the conveyor to receive a separate support for the seat,
      (C) a support for the seat engageable and disengageable with the studs,
      (D) a track under the conveyor positioned to engage the support for the seat during the inverted return of the support from the discharge station to the filling station.

3. An apparatus for filling soft-baked goods comprising
   (a) a seat assembly for a baked article at a filling station,
   (b) a first means to move the seat assembly to bring the baked article into penetrating engagement with a means to fill the baked article and to remove the seat from the means to fill after the filling operation,
   (c) a means to penetrate and fill the baked article,
   (d) a means to seize the baked article on the seat assembly during the filling operation; the seat assembly comprising
      (A) a pair of generally U-shaped flanges positioned side by side,
      (B) abutting diaphragm frames on each of the flanges,
      (C) inflatable diaphragms positioned between each of the frames and distensible outwardly therefrom, toward the adjacent pair of frames,
      (D) air ports in the flange connected to the inflatable diaphragms,
      (E) means to inflate the diaphragms,
      (F) the diaphragms, when inflated, defining the means to seize the baked article during the filling operation.

4. The apparatus according to claim 3 comprising
(a) a plurality of seat assemblies,
(b) the diaphragms distensible in opposite directions from the frames,
(c) each of the sides of the diaphragms with the side of an adjacent diaphragm defining a plurality of pairs of means to seize the baked article during the filling operation.

5. The apparatus according to claim 4 comprising
(a) the seat assemblies mounted side by side on a flight bar,
(b) air ports in the flight bar communicating with the air ports in the flanges and the means to inflate the diaphragms.

6. An apparatus for filling soft-baked goods comprising
(a) a seat assembly for a baked article at a filling station,
(b) a first means to move the seat assembly to bring the baked article into penetrating engagement with a means to fill the baked article and to remove the seat from the means to fill after the filling operation,
(c) a means to penetrate and fill the baked article,
(d) a means to seize the baked article on the seat assembly during the filling operation; the first means comprising
(A) a platen positioned at a filling station,
(B) a rack attached to the platen,
(C) a pinion operably engaged with the rack for raising and lowering the rack,
(D) a spring attached to the pinion for normally driving the pinion to lower the rack,
(E) a means to drive the platen to overcome the spring and raise the platen,
(F) an air line connected to air discharge ports in the platen,
(G) the air discharge ports in the platen engageable with the air ports in the seats positioned on the platen.

7. An apparatus according to claim 6 comprising
(a) a spring loaded latch on the platen normally engaged in holding relation with a seat on the platen,
(b) an abutment engageable with the latch to overcome the spring that loads the latch and to disengage the seat on the platen.

8. An apparatus for conveying and holding soft-baked goods to be filled comprising
(a) a pair of generally U-shaped flanges positioned side by side.

(b) abutting diaphragm frames on to each of the flanges,
(c) inflatable diaphragms positioned between each of the frames and distensible outwardly therefrom toward the adjacent diaphragm,
(d) air ports in the flanges connected to the inflatable diaphragms,
(e) means to supply air under pressure to the diaphragms,
(f) the diaphragms, when inflated, defining means to seize between them the baked article during the filling operation.

9. An apparatus for filling soft-baked goods comprising
(a) a seat for a soft-baked article,
(b) inflatable diaphragms positioned on opposite sides of the U-shaped seat and distensible toward each other,
(c) means to inflate the diaphragms to seize between them a soft-baked article disposed on the seat.

10. The apparatus according to claim 9 comprising
(a) pairs of open frames generally coincident with the edges of the diaphragms, seizing the edges of the diaphragms between them; the frames, diaphragms, and U-shaped seat defining a seat assembly.

11. The apparatus according to claim 9 comprising
(a) a flight bar,
(b) a plurality of seat assemblies mounted on the flight bar.

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