United States Patent [19]

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[11] **3,715,857**

[45] **Feb. 13, 1973**

[54] BAGEL BAGGING MACHINE

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[22] Filed: **Sept. 8, 1971**

[21] Appl. No.: **178,619**

[52] **U.S. Cl.** **53/62,** 53/189, 53/385

[51] **Int. Cl.**.....**B65b 57/20,** B65b 43/36

[58] **Field of Search**.....53/62, 189

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[57] **ABSTRACT**

An apparatus for packaging bagels and other articles, said apparatus comprising a solenoid operated gate and counter for permitting the passage of predetermined number of bagels into a sloped chute, a drive mechanism for advancing and pushing the bagels in a stacked manner beyond the chute and into an inflated bag for sealing and shipping. The bags are stacked upon a pair of tiers, one of which is automatically shifted into alignment with an inflation blower when the other bag supply becomes exhausted.

23 Claims, 10 Drawing Figures

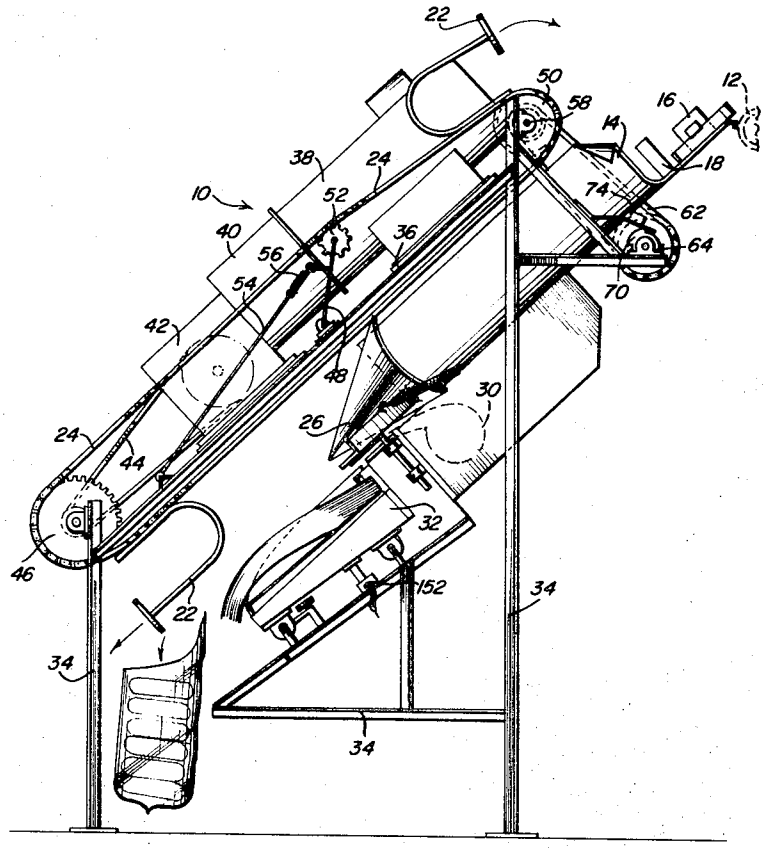


Fig. 1

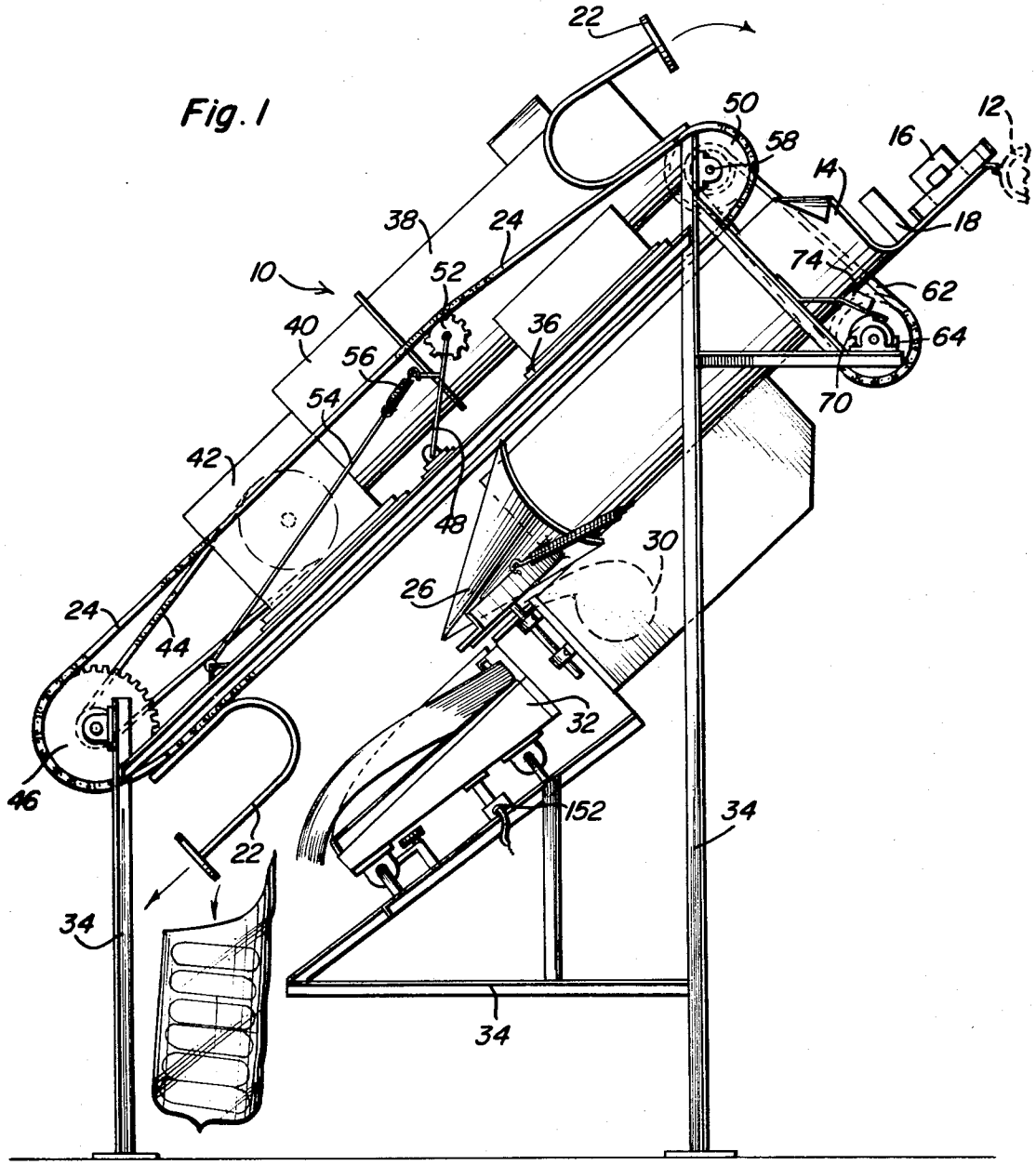
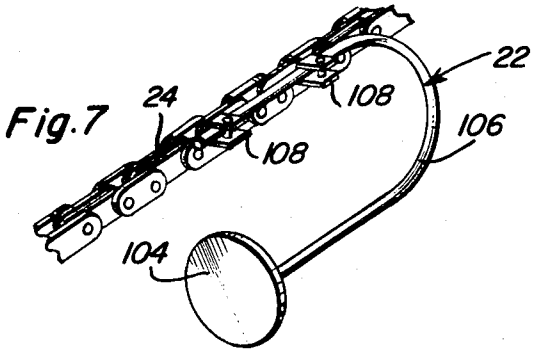


Fig. 7



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Fig. 2

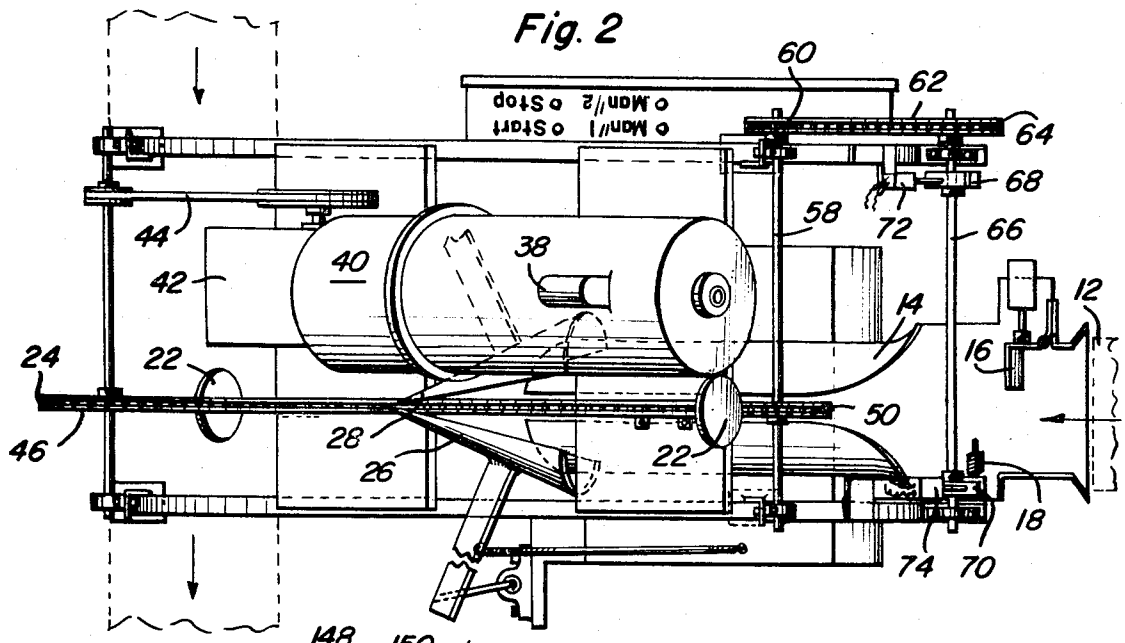


Fig. 4

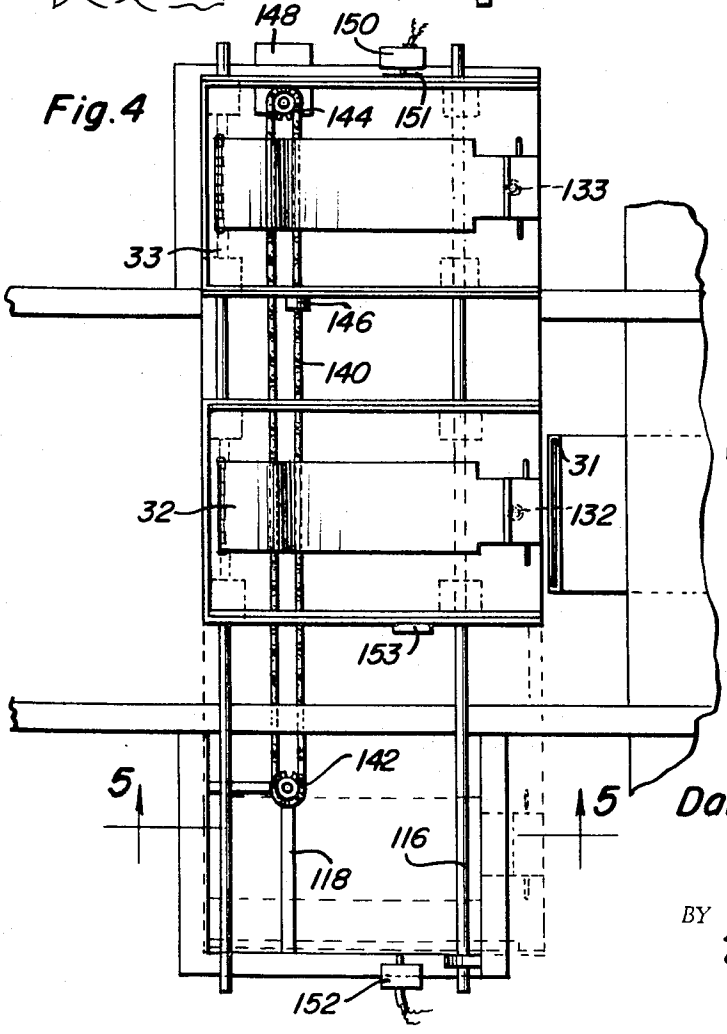
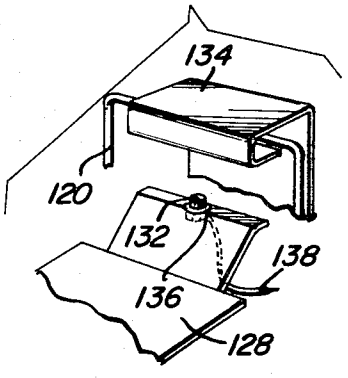


Fig. 10



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Fig. 3

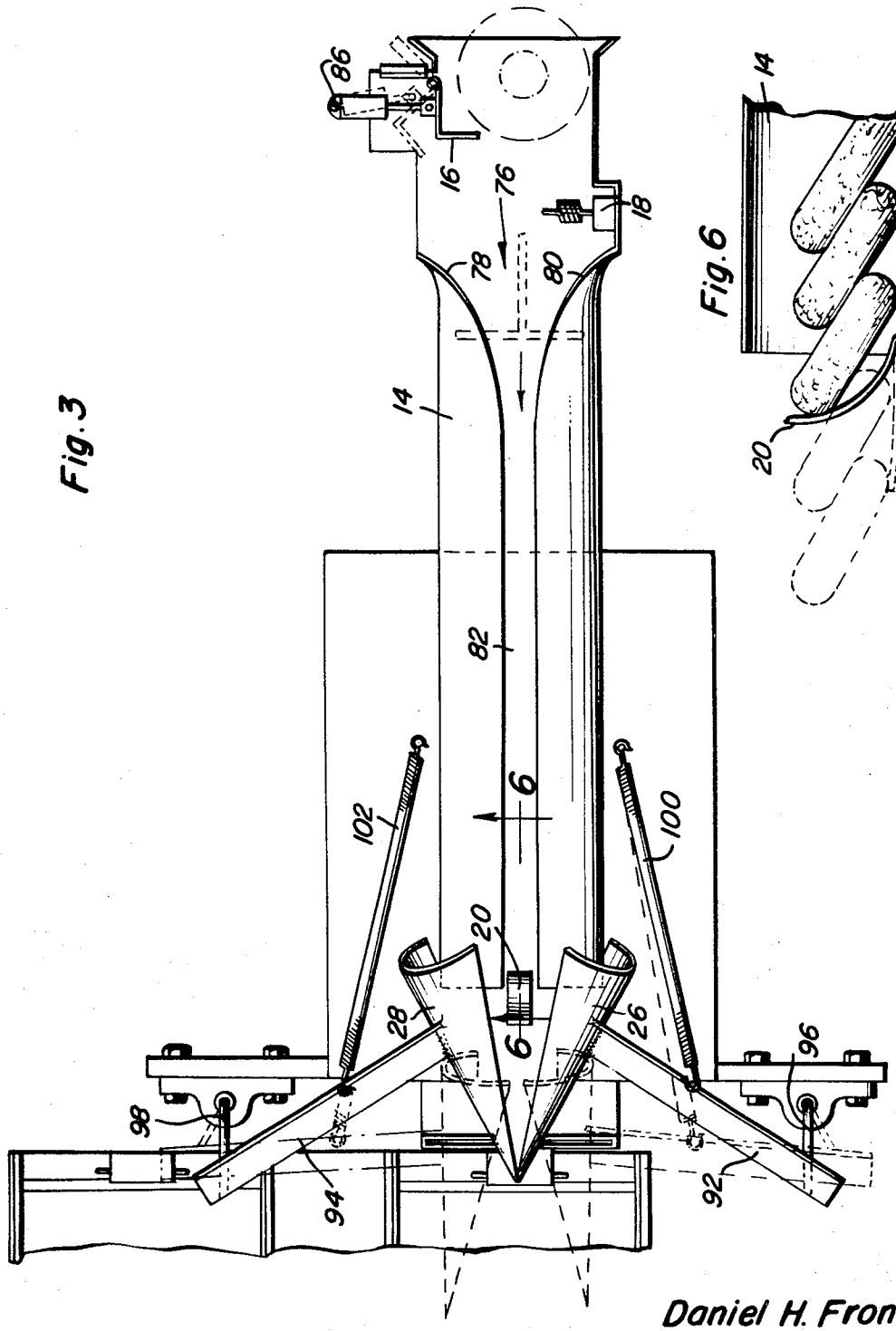
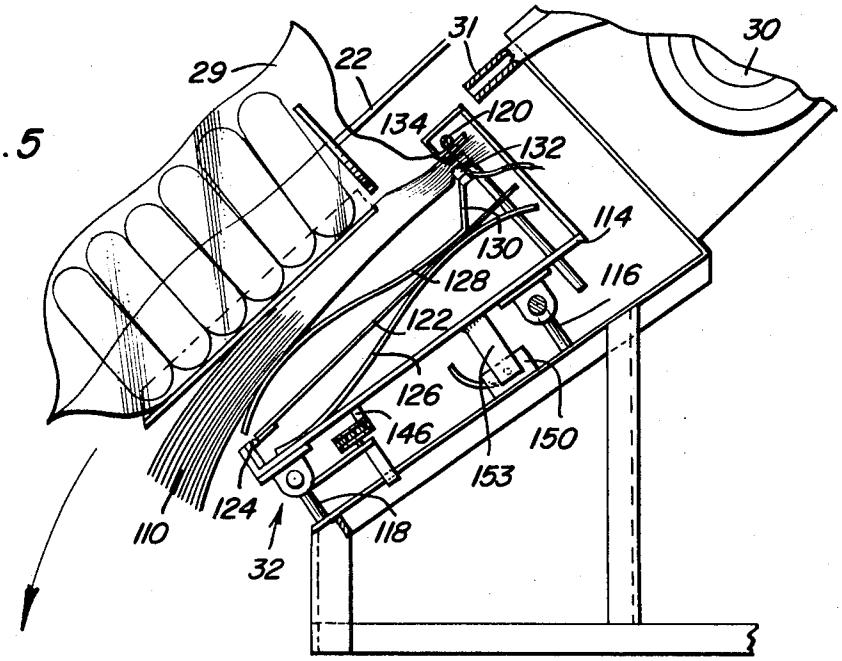


Fig. 6

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Fig. 5



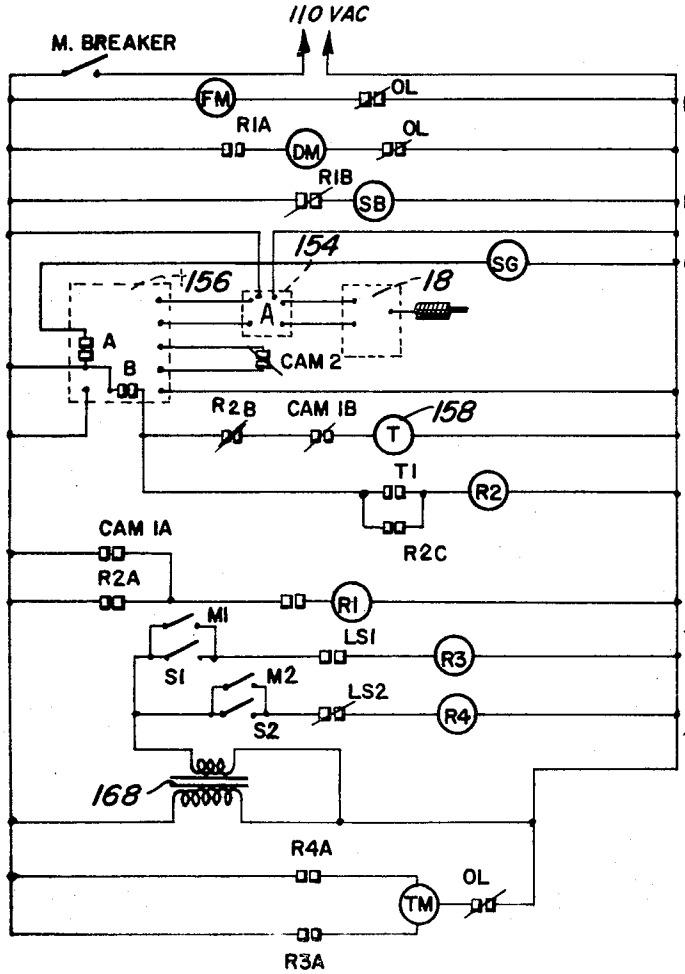
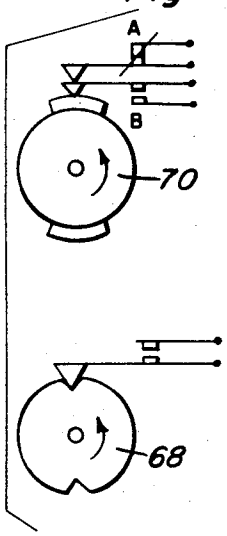


Fig. 8

Fig. 9



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BAGEL BAGGING MACHINE

In the past, various machines have been provided for the packing of dough products such as bagels and the like. Many of these machines, however, have been found to be unacceptable in that they either do not properly orient the dough products as they enter the bags or they cause considerable damage to the products during the bagging process. Furthermore, these conventional machines often required a worker to count and orient the product during the bagging process, thereby greatly increasing the operating costs.

It is an object of the present invention to provide a novel apparatus for automatically counting, stacking and bagging articles, such as bagels, in a continuous manner and without the need for a machine operator, thereby significantly reducing the costs of the bagging operation.

Another object of the present invention is to provide a unique bagging apparatus comprised of a solenoid gate and counter which automatically feed a predetermined number of articles into a dispensing chute for passage into an inflated plastic bag under the influence of a synchronized chain-driven pusher arm which moves in response to the completion of each article count.

It is a further object of the present invention to provide a versatile bagging apparatus which automatically performs a plurality of steps or functions in a bagging operation in such a manner that there is no interference between the members of the apparatus and the articles being bagged, thereby significantly reducing the percentage of articles damaged by the bagging operation.

Still another object of the present invention is to provide a novel bagging apparatus including a sloped chute which stacks and properly orients the articles to be bagged and a pusher arm which gently inserts the articles into inflated bags and discharges such from the bagging apparatus.

It is yet another object of the present invention to provide a versatile automatic bagging apparatus for bagels and similarly shaped articles which carefully bag such articles with the percentage damage kept to a minimum, yet, is of heavy duty construction, long lasting and relatively inexpensive to operate.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a side elevational view of the bagging apparatus of the present invention.

FIG. 2 is a plan view of the bagging apparatus shown in FIG. 1.

FIG. 3 is a view taken along section 3—3 of FIG. 1.

FIG. 4 is a plan view of the bag tier assembly associated with the present invention.

FIG. 5 is a sectional view along section 5—5 of FIG. 4 illustrating the bag tier assembly associated with the present invention, illustrating the removal of a filled bag.

FIG. 6 is a partial sectional view taken along section 6—6 of FIG. 3.

FIG. 7 is a partial perspective view of a mounted pusher arm associated with the present invention.

FIG. 8 is a schematic of the electrical circuitry associated with the present invention.

FIG. 9 is a simplified illustration of the cam switches associated with the present invention.

FIG. 10 is a partial perspective view of a bag dispensing wicket and switch associated with each bag tier.

Referring now, more particularly, to FIGS. 1–4, the dispensing and bagging apparatus of the present invention is generally indicated by the numeral 10 and is adapted to receive bagels or other similarly shaped dough products or articles by way of a conveyor 12. The dough products enter the upper end of an inclined delivery chute 14 by way of a solenoid operated gate 16. Each bagel advances past a proximity sensor 18 before entering delivery chute 14, wherein it slides downwardly until it engages a tilt tongue 20 located near the lower end of the delivery chute.

A pusher mechanism includes a pair of pusher arms 22 which are advanced by a drive chain 24 to pass through the interior of delivery chute 14 and remove the bagels located therein from the lower end of the chute. A pair of pivotally mounted, oppositely disposed funnel members 26 and 28 are adapted to extend into the opening of a bag inflated by blower 30 as the bagels are advanced from the delivery chute by way of one of the pusher arms 22. After the bag has been filled, the pusher arm continues to move in such a manner that the bag is freed from its bag tier 32, and falls from the end of the bagging apparatus to a conveyor or other piece of equipment, not shown.

The structure of the bagging apparatus of the present invention is comprised of a rigid support framework made up of a plurality of angle irons 34, welded or otherwise fastened together. A bed plate 36 is connected to the support framework and is adapted to mount an electric motor 38, the output of which is connected to a brake 40 and gear reducer 42. A power transmission chain 44 is connected to the gear reducer output for advancing a drive sprocket 46, which in turn advances drive chain 24 around a second sprocket 50. An idler sprocket 52 is mounted to a pivotally mounted lever arm 48 to provide proper tension to drive chain 24 by way of an adjustment cable 54 and tension spring 56.

Sprocket 50 is keyed to a first jack shaft 58, which, in turn, is keyed to a sprocket 60 for advancement of a timing chain 62 and rotation of timing sprocket 64. A timing shaft 66 is keyed to sprocket 64 and is adapted to rotate a pair of timing cams 68 and 70 mounted thereon. Microswitches 72 and 74 are mounted adjacent to timing cams 68 and 70, respectively, for actuation thereby, dependent upon the position of timing shaft 66. It will be appreciated that by utilizing timing chains and sprockets, the positions of pusher arms 22 are synchronized with the angular positions of timing cams 68 and 70. This provides signalling for the desired starting and stopping positions, as hereinafter explained.

Referring now, more particularly, to FIGS. 3 and 6, the means for dispensing the bagels through delivery chute 14 may be understood in more detail. The delivery chute, preferably of stainless steel, is generally cylindrical in configuration and has an opening or mouth 76 formed at its upper end and adapted to

receive bagels, other dough products, or the like. Opening **76** is defined by a pair of tapered, flared edges **78** and **80** which curve inwardly and terminate in a longitudinal slot **82** extending the remaining length of the delivery chute to accommodate passage of pusher arms **22** therethrough. The enterance of bagels into delivery chute **14** is controlled by way of a pivotally mounted arm or gate **16** which is actuated by a solenoid **86** in response to an electronic counter, as hereinafter explained. Assuming that gate **84** is open, each bagel which enters delivery chute **14** passes a proximity sensor **18** which is connected to the aforementioned electronic counter. Due to the incline of the delivery chute, the bagels slide downwardly until they engage tilt tongue **20** which intersects their path of travel and is mounted to the lower sliding surface **90** of the delivery chute. Preferably, the tilt tongue is made of a resilient, flexible material, such as plastic, which has sufficient rigidity to prevent passage of the bagels due to their weight alone. Also, it has been found that by forming tilt tongue **88** to be somewhat arcuate in shape, the front edge of the first bagel to enter the delivery chute engages the tilt tongue in a manner to tilt it on its side, the following bagels being generally oriented in the same manner. This arrangement tends to properly align the bagels for advancement by one of the pusher arms **22**.

After a predetermined number of bagels has passed the proximity sensor **18** and entered the delivery chute, gate **84** is automatically closed and the pusher assembly is advanced by motor **38**, such that a pusher arm **22** moves through the delivery chute, engaging the topmost bagel and forcing stop tongue **20** in the downward position, as best illustrated in FIG. **6**. As the pusher arm continues to advance, funnel members **26** and **28** are pivoted to the open position to permit passage of the bagels into an awaiting inflated bag **29**, as shown in FIG. **5**. Preferably, funnel members **26** and **28** are semiconical in shape and are pivotally mounted to the bagging apparatus by way of angle arms **92** and **94** affixed to pivot pins **96** and **98**, respectively. The angle arms are provided with biasing springs **100** and **102** which tend to pull the funnel members toward the closed position.

It will be appreciated, that prior to movement of the funnel members by a pusher arm, a bag is inflated by a blower **30** with its opening in alignment with the tips of the funnel members. Thus, as the funnel members are pivoted outwardly, their tips or end portions extend into the opening of the inflated bag to assure its proper positioning and to provide a guide for the bagels as they enter the bag. The combined effect of the inclined delivery chute with tilt tongue and the pivoted funnel members assures that the bagels are in proper alignment and stacked upon each other as they are pushed into the awaiting inflated bag. The importance of this arrangement cannot be over-emphasized. With conventional bagging machines, the improper orientation of the dough products as they advanced into a bag often resulted in improper bagging or damage to the product, thereby increasing the costs of the over-all operation.

Referring to FIG. **7**, the shape and mounting of each pusher arm may be seen in more detail. Preferably, each pusher arm is comprised of a flat circular plate **104** which is adapted to engage the bagel or other dough product in the delivery chute. The plate is supported by way of a relatively rigid, yet somewhat resilient, curved support **106** which extends in a 180° arc and terminates in a relatively straight portion for connection to drive chain **24** by way of mounting links **108**. The bend in each pusher arm provides a degree of resiliency which tends to cushion the impact of the pusher with a bagel, thereby reducing the chances of damage during the bagging operation. Of course, if desired, somewhat differently shaped pusher arms may be utilized.

Referring to FIG. **5**, the operation of dispensing a filled bag may be seen in more detail. Blower **30** is provided with a funnel-shaped mouth **31** of rectangular cross section which provides a steady stream of air for the inflation of a single plastic bag **29** at the top of a stack **110** of such bags. The bags are mounted on a bag tier generally indicated by the numeral **32** and including a mounting bracket **114** slidably connected to a pair of transversely extending slide rods **116** and **118** for transverse movement relative to the delivery chute and blower mouth, as hereinafter explained. The lower side of each plastic bag is somewhat longer than the remainder of the bag and is provided with holes or other means for mounting to a wicket **120**, such that the upper edge of the bag is blown upwardly by the airstream, the lower edge being held in place by the wicket. This provides an inflated bag with an opening adapted to receive the bagels, or other dough products. A support plate **122** is pivotally mounted to bracket **114** by way of hinges **124**. A support spring **126** of resilient sheet metal, or the like, is welded to member **114** at one end and curves gently upwardly to engage the bottom of hinged support plate **122**. Thus, as the weight of bag stack **110** is reduced due to a diminished number of bags, the relative position of the top bag with respect to blower mouth **32** is maintained by support spring **126**. In addition, a bag orienting spring **128** is welded to the top surface of support plate **122** and curves gently downwardly toward hinge **124** to maintain the bag stack in proper alignment for inflation by lifting the lower end of the stack to compensate for depletion. Spring **128** is also provided with an upwardly extending portion **130** adapted to engage the bottom of the bag stack and carrying an electrical contact **132** which engages a wicket frame member **134** upon depletion of all bags. This provides a bag depletion signal, the purpose of which is hereinafter explained.

Referring to FIG. **10**, the arrangement of the bag depletion contact may be seen in more detail. Preferably, contact **132** is insulated from spring **128** and the remainder of the support framework by way of a grommet or gasket **136** of insulating material surrounding a mounting hole formed in the spring. An electrical lead **138** is connected to the contact **132** for connection to the circuitry hereinafter explained. The signal-producing circuit is completed through wicket frame-work member **134** which is connected to the circuit grounded framework of the bagging apparatus.

Referring to FIG. **4**, it will be appreciated that the bagging apparatus is provided with a pair of bag tiers **32** and **33** which are slidably mounted to slide rods **116** and **118** for movement thereon to achieve proper alignment with the delivery chute and blower mouth. The

bag tiers are coupled together for movement transversely in unison by way of a chain 104 extending between a pair of sprockets 142 and 144 and coupled to tier 33 by way of link member 146. The chain is advanced by way of a reversible gear motor 148 controlled by circuitry hereinafter explained. A pair of limit switches 150 and 152 are positioned at the opposite ends of travel of the bag tier assembly to provide signals indicative of the completion of transfer from one bag tier to the other. A pair of switch actuating members 151 and 153 are affixed to bag tiers 32 and 33 for engagement with the limit switches. This arrangement permits automatic replenishment of the bag supply upon depletion of the bags associated with one of the bag tiers. A signal provided by contact 132 causes energization of gear motor 148 which, in turn, positions a fully loaded bag tier in alignment with the delivery chute. Limit switches 150 and 152 are effective to de-energize gear motor 148 upon proper alignment of the new bag tier.

The circuitry associated with the present invention is illustrated in the schematic diagram of FIG. 8. Basically, the circuitry performs two separate functions, synchronized advancement of the pusher arms and switching of the bag tier assembly upon exhaustion of bags associated with one of the bag tiers. Advancement of the pusher arms is initiated by signals received from proximity sensor 18, these signals being fed through an amplifier 154 to an electronic counter 156. The proximity sensor, amplifier and counter are each commercially available components, the counter being of the electromechanical type under the trade name "DURANT" and including normally closed and normally open output contacts A and B, respectively. The counter is also provided with a pair of reset contacts which are effective to reset the counter to zero upon opening.

In the preferred embodiment, reset is achieved by way of microswitch 72 associated with cam 68. Since it is essential that the bagels or other dough products be properly oriented in the delivery chute, as explained above, prior to engagement by a pusher arm, the circuitry is provided with a time delay relay 158 which delays energization of drive motor 38 after the preset article count has been completed.

Operation of the pusher arm circuitry may be explained as follows. The normally closed contact A of counter 156 is effective to energize solenoid SG which, in turn, opens gate 16 to permit passage of the bagels into the delivery chute. Each bagel entering the chute is sensed by proximity sensor 18 which furnishes a counting signal to counter 156. Upon counting the preset number of bagels or articles passing proximity sensor 18, counter 156 is actuated to open contact A and close contact B. This de-energizes solenoid SG, thereby closing gate 16, and energizes time delay relay 158 through normally closed contacts R2B and contact B associated with cam 1.

Upon completion of the time delay interval setting of time delay relay 158, contact T1 is closed, thereby energizing relay R2, which in turn closes interlocking contact R2C. Energization of relay R2 is also effective to open contact R2B, thereby de-energizing time delay relay 158. Also. contact R2A is closed to energize relay R1 which simultaneously de-energizes the brake coil through relay SB and energizes the drive motor 38 through relay DM.

As the pusher arms 22 are advanced by the drive motor, timing cams 68 and 70 are advanced in synchronization. Referring to FIG. 9, cam 68 is provided with a pair of diametrically opposite indentations, while cam 70 is provided with a pair of diametrically opposite cam lobes. When the pusher arm cycle is almost completed, the contacts associated with cam 2 are opened, thereby resetting the counter, opening contact B and deenergizing relay R2. However, drive motor 38 continues to run since relay R1 remains energized through contacts of cam 1A. The drive motor continues to run until timing cam 70 reaches a point where cam contacts 1A are opened, thereby de-energizing relay R1 and motor relay DM. At this position, one of the pusher arms 22 has just discharged a filled bag from the bagging apparatus. This stop position for the pusher arms is illustrated in FIG. 1. Thus, it will be appreciated that the circuitry associated with the present invention is effective to automatically control the flow of articles into the delivery chute, and advance the pusher arms a predetermined distance, whereupon they are automatically stopped.

Referring again to FIG. 8, operation of the bag tier assembly may be more fully appreciated. A 24 volt circuit is provided through transformer 168 for selective energization of bag tier contactors R3 and R4. Assuming that the assembly is in the extreme left position and that bag tier 32 is aligned with the delivery chute, contacts LS2 associated with limit switch 152 will be closed. Upon depletion of the bags associated with tier 32, contact 132 engages wicket frame 134, thereby closing switch S2 to energize relay R4. This closes contact R4A and energizes the reversible tier motor TM to move the tier assembly to the right. Engagement of actuator 153 associated with tier 32 with limit switch 152 is effective to open contacts LS2. It should also be noted that upon initiation of the movement of the tier assembly, contacts LS1 associated with limit switch 150 are closed, thereby conditioning the circuitry for return to that position upon depletion of the bags of tier 33. Preferably, the circuitry is also provided with a pair of manual switches M1 and M2 which are effective to override switches S1 and S2 for manual switching of the bag tier assembly. If desired, an electrical alarm may be included to audibly or visually signal depletion of bags in either tier.

It will be appreciated that the circuitry associated with the bagging apparatus of the present invention provides a means of completely automatic control such that the apparatus may operate unattended, thereby reducing the overall operation costs. Furthermore, by using standard commercially available components throughout the circuitry, ease of maintenance and rapid repair further enhances the versatility of the apparatus. Of course, minor changes in the circuitry or mechanical components may be made and still fall within the scope of the present invention.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. An apparatus for automatically dispensing and bagging articles, said apparatus comprising a delivery chute adapted to deliver the articles to bags, gate means for opening and closing the entrance to said delivery chute to control the passage of articles thereto, counting means for counting the number of articles entering said delivery chute, said gate means being responsive to said counting means upon completion of a predetermined count to stop the passage of articles into said delivery chute, bag dispensing means at the end of said delivery chute for dispensing a bag for each predetermined count of articles, and means responsive to the completion of said predetermined count for pushing the articles from said delivery chute into a bag at said bag dispensing means and freeing the bag therefrom.

2. The structure set forth in claim 1 wherein said bag dispensing means includes blower means for inflating a single bag prior to filling with the articles.

3. The structure set forth in claim 1 wherein said bag dispensing means includes a pair of bag tiers one of which is aligned with the end of said delivery chute, and means for transverse movement of said bag tiers to switch the tier aligned with the end of said delivery chute.

4. The structure set forth in claim 3 wherein said bag dispensing means includes motor means for transversely moving said bag tiers.

5. The structure set forth in claim 4 wherein each of said bag tiers includes switch means for sensing depletion of the bags mounted thereon to energize said motor means to align the other bag tier with the end of said delivery chute, thereby replenishing the supply of bags utilized by the apparatus.

6. The structure set forth in claim 5 wherein said bag dispensing means includes limit switch means for de-energizing said motor means upon completion of the transverse movement of said bag tiers and alignment of one of said bag tiers with the end of said delivery chute.

7. The structure set forth in claim 4 wherein said dispensing means includes switch means for energizing said motor means to move the bag tiers, and limit switch means for de-energization of said motor means upon alignment of a different one of said tiers with the end of said delivery chute.

8. The structure set forth in claim 7 wherein said bag dispensing means includes blower means for inflating a single bag prior to filling with the articles.

9. The structure set forth in claim 1 wherein said delivery chute is inclined downwardly from the end where said gate means is located such that the articles move into the delivery chute under the influence of gravity.

10. The structure set forth in claim 9 wherein said delivery chute includes a lower surface upon which the articles slide and a tilt tongue extending upwardly from said lower surface into the path of travel of the articles to stop movement thereof and align the articles in the delivery chute prior to movement by said pusher means.

11. The structure set forth in claim 10 wherein said apparatus includes a pair of oppositely disposed, pivotally mounted funnel members at the lower end of said delivery chute, said funnel members being movable between a first position wherein they intersect the path of travel of the articles from said delivery chute and a second position where they extend partially into the awaiting inflated bag to provide a guide for the articles as they move into the bag.

12. The structure set forth in claim 11 wherein said apparatus includes means for biasing said funnel members toward said first position, said pusher means being effective to move said funnel members toward said second position upon advancing the articles from said delivery chute toward the inflated bag.

13. An apparatus for automatically bagging bagels and other dough products, said apparatus comprising an inclined delivery chute having an upper end for receiving the dough products and a lower end for dispensing the dough products into a bag, means for opening a single bag at the lower end of said delivery chute, a pair of oppositely disposed funnel members pivotally mounted at the lower end of said delivery chute and movable between a first position wherein they intersect a path of travel of the dough products from the delivery chute and a second position wherein they extend partially into a bag, and pusher means for pushing the dough products from the lower end of said delivery chute and moving said funnel members from their first position to their second position to provide a guide for the dough products into the bag.

14. The structure set forth in claim 13 wherein said apparatus includes means for biasing said funnel members toward the first position, said pusher means being effective to overcome the biasing means to move the funnel members to the second position.

15. The structure set forth in claims 13 wherein said apparatus includes a tilt tongue near the lower end of said delivery chute and intersecting the path of travel of the dough products, said tilt tongue being effective to stop and align the dough products prior to advancement from the lower end of the delivery chute by said pusher means.

16. The structure set forth in claim 15 wherein said delivery chute includes a sliding surface upon which the dough products slide, said stop tongue extending upwardly from said sliding surface and being made of yieldable resilient material such that it bends downwardly to permit passage of the dough products under the influence of said pusher means advancing the dough products from the lower end of said delivery chute.

17. The structure set forth in claim 16 wherein said delivery chute is generally cylindrical in shape with a longitudinal slot formed therein to permit the passage of part of said pusher means therethrough.

18. An apparatus for automatically dispensing and bagging articles, said apparatus comprising a delivery passage adapted to deliver the articles to bags, gate means for opening and closing the entrance to said delivery passage to control the passage of articles thereto, counting means for counting the number of articles entering said delivery passage, said gate means being responsive to said counting means upon completion of a predetermined count to stop the passage of articles into said delivery passage, means responsive to the completion of said predetermined count for pushing the articles from said delivery passage into a bag, said pushing means including a drive mechanism having at least one pusher member adapted to engage an

article in said delivery passage for removal therefrom, motor means for advancing said drive mechanism and moving said pusher member along a predetermined path with predetermined stop locations therealong, synchronization means operatively connected to said drive mechanism, electric circuit means for controlling means and including first switch means responsive to said synchronization means for permitting starting of said motor means when said pusher member is in one of said stop locations and said counting means has completed its predetermined count of articles.

19. The apparatus set forth within claim **18** wherein said circuit means includes second switch means responsive to said synchronization means for stopping said motor means upon completion of movement of said pusher member to one of said stop locations.

20. The apparatus set forth in claim **19** wherein said circuit means includes third switch means responsive to said synchronization means for resetting said counting means to zero and conditioning it for a subsequent count.

21. The apparatus set forth in claim **20** wherein said counting means opens said gate means in response to said reset signal from said third switch means.

22. The apparatus set forth in claim **18** wherein said circuit means includes time delay means responsive to the completion of said predetermined count of articles by said counting means for delaying the start of said motor means for a pre-selected time interval after said count has been completed.

23. The apparatus set forth in claim **22** wherein said time delay means include a time delay relay connected to said first switch means.

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