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Lomerson, JR.

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(54) **QUAD WICKET EXCHANGE SYSTEM**

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(71) Applicant: **Roland Lomerson, JR.**, Bradenton, FL (US)

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(72) Inventor: **Roland Lomerson, JR.**, Bradenton, FL (US)

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(57) **ABSTRACT**

Two series of work products move along parallel paths into open bags mounted on wickets and carry the bags to shipping containers. When the bags on the wickets are depleted, the wickets are automatically removed and replaced by wickets loaded with a new supply of bags.

Related U.S. Application Data

(60) Provisional application No. 62/274,454, filed on Jan. 4, 2016.

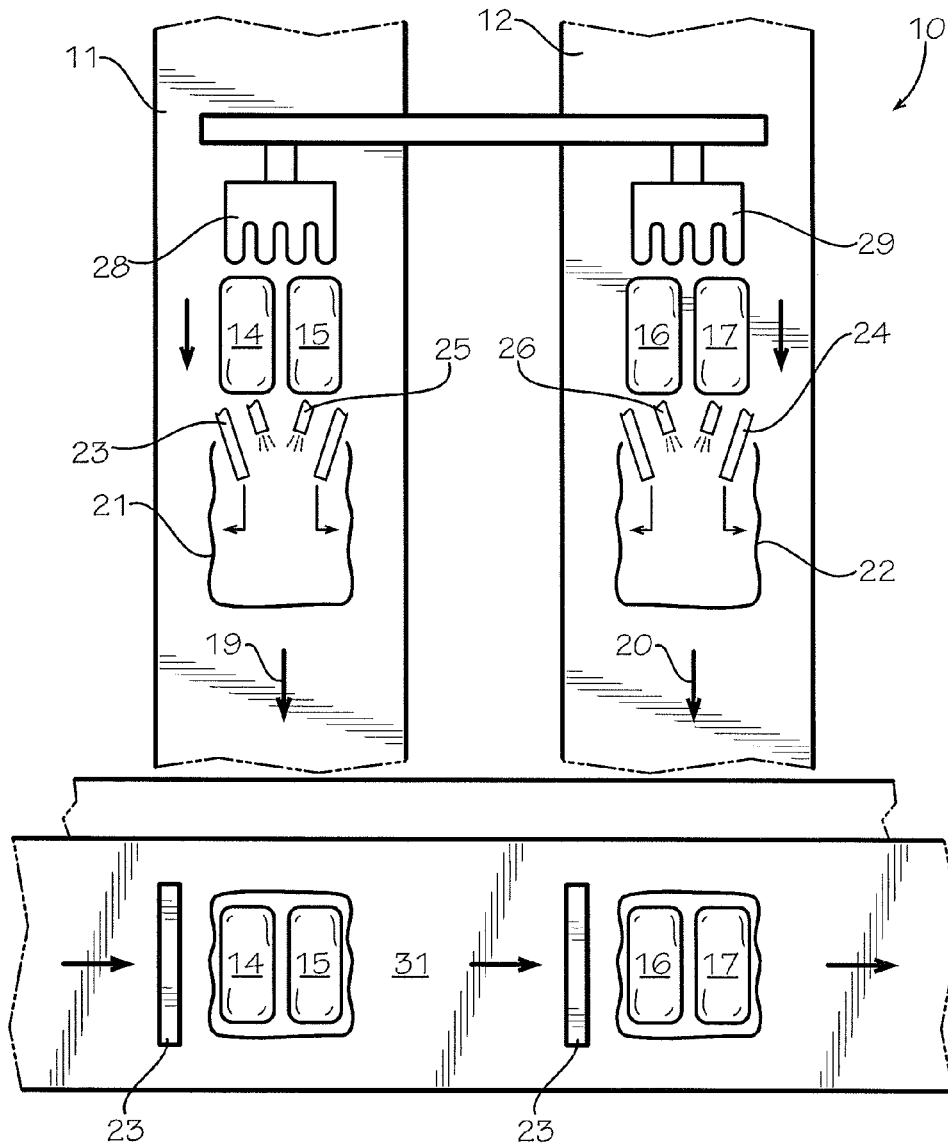
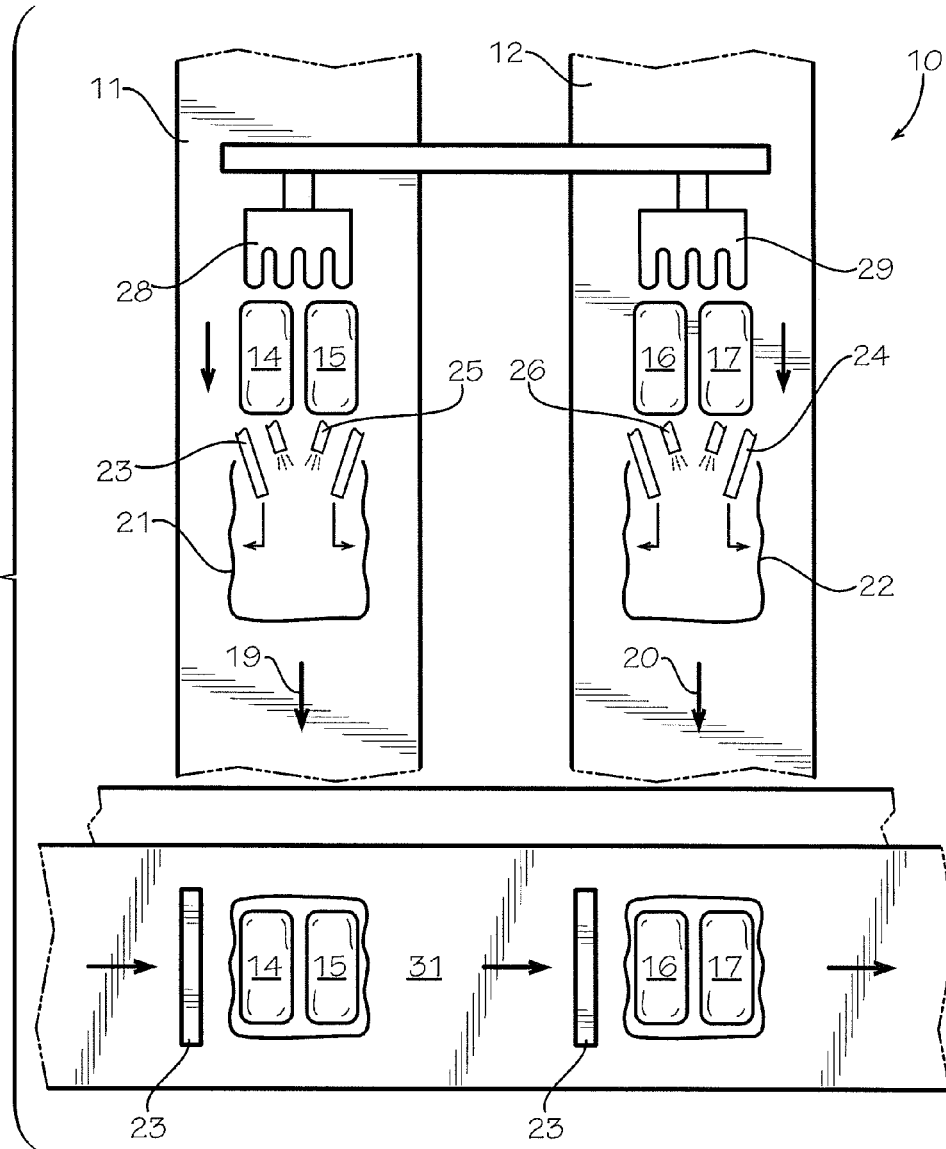


FIG. 1



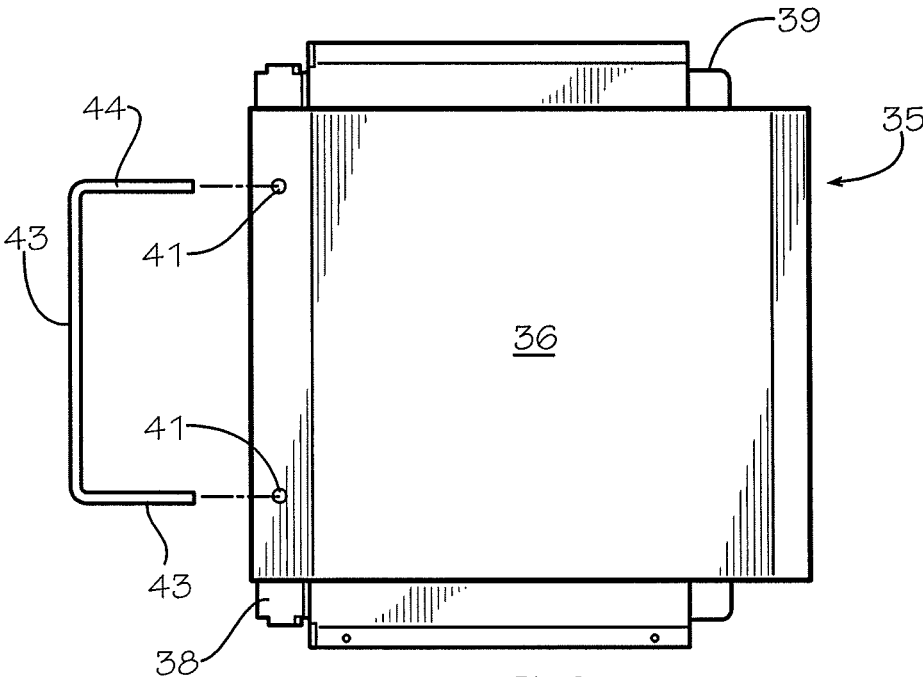


FIG. 2

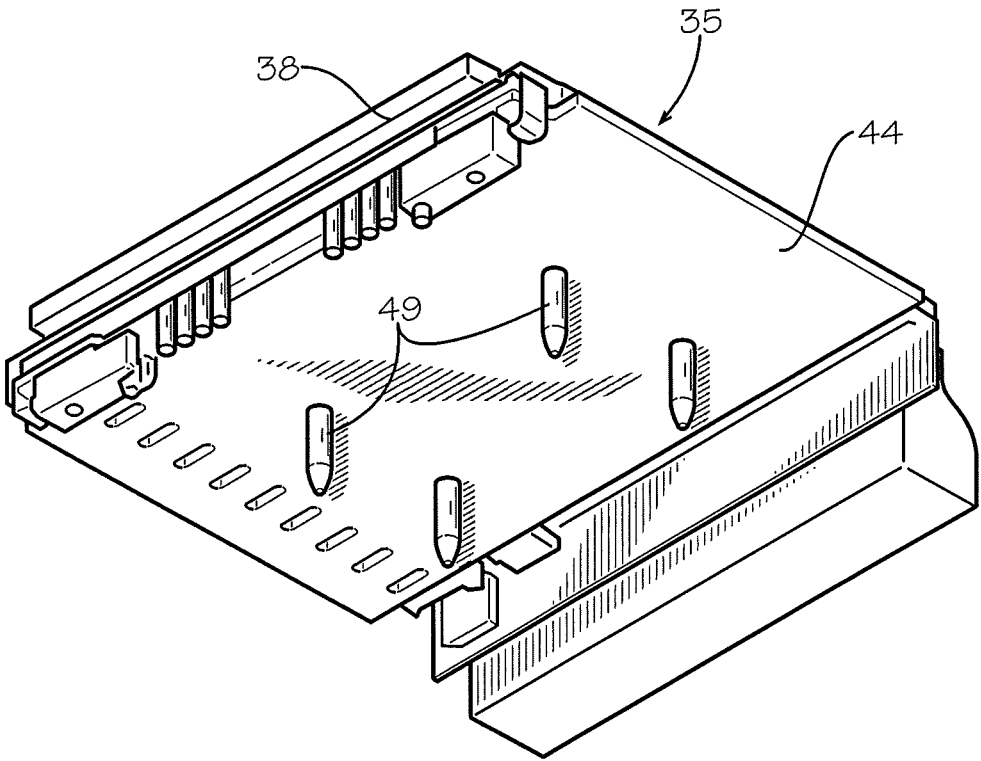
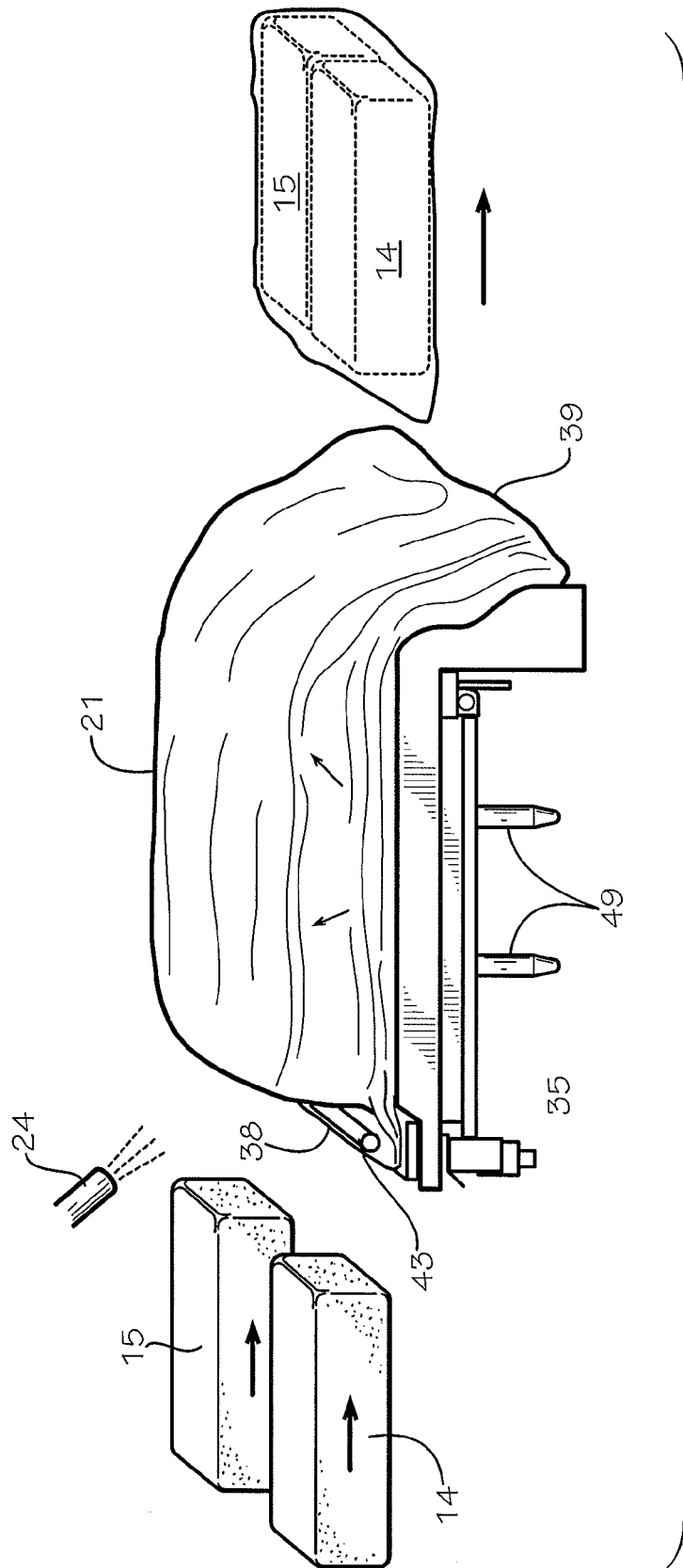


FIG. 3



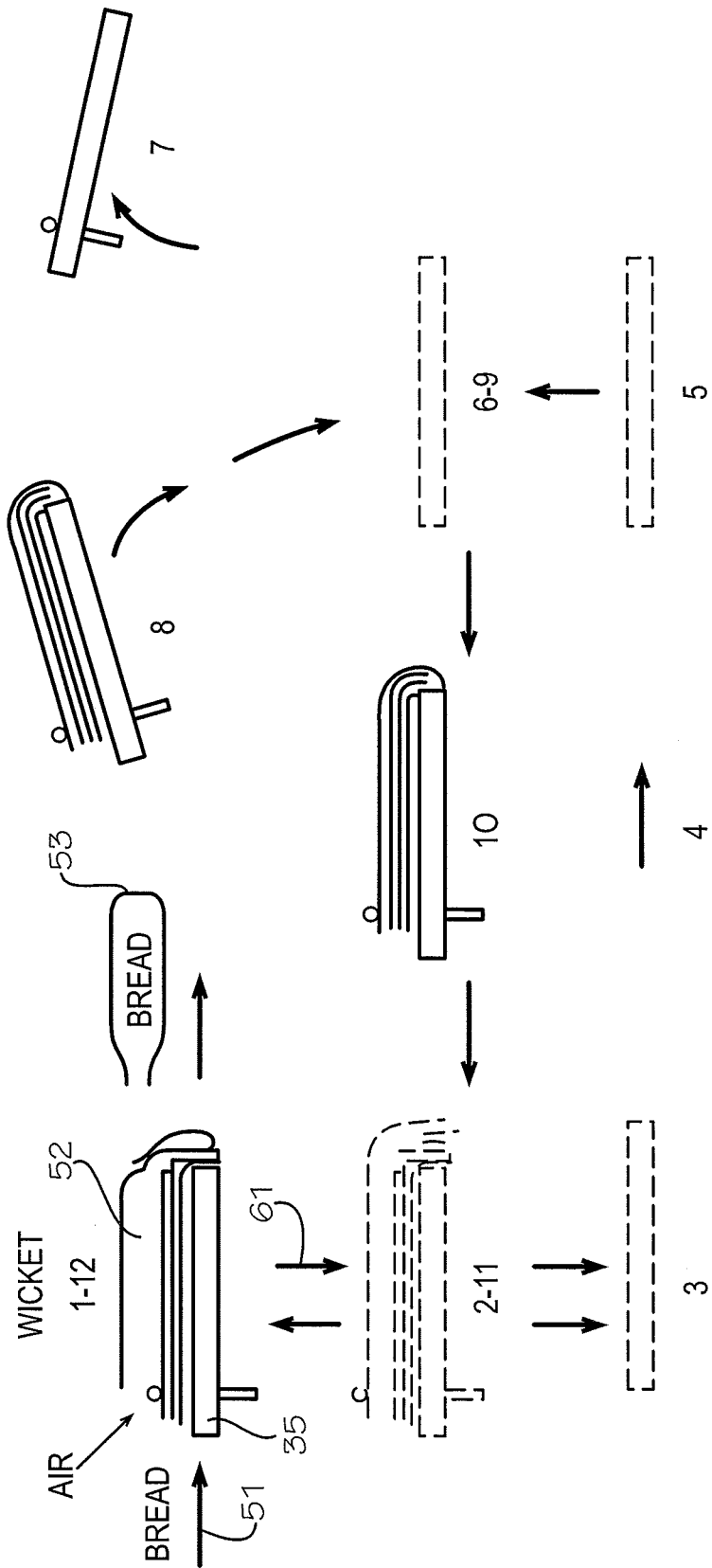


FIG. 5

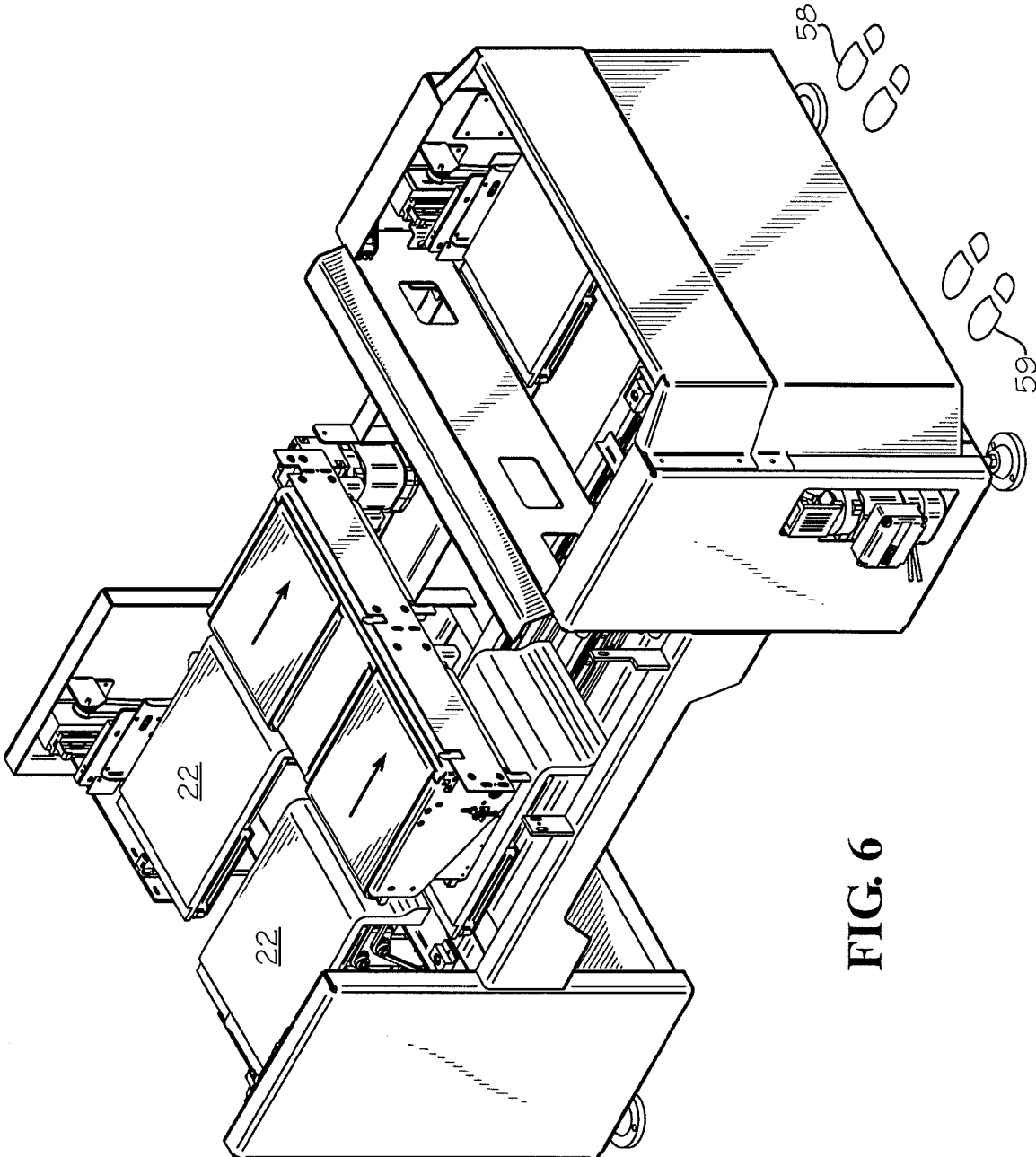


FIG. 6

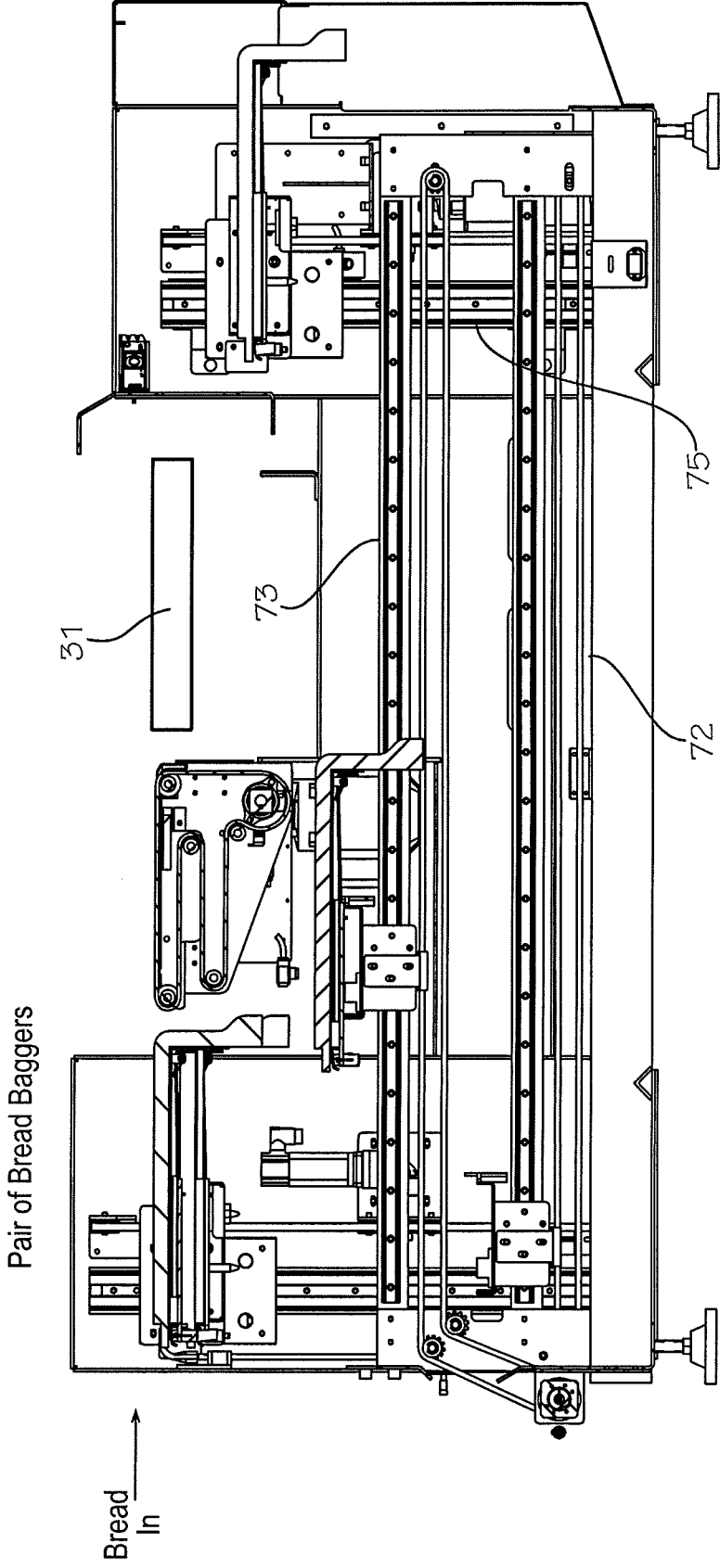


FIG. 7

QUAD WICKET EXCHANGE SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority with respect to U.S. provisional patent application Ser. No. 62/274,454, filed in the U.S. Patent and Trademark Office on Jan. 4, 2016.

BACKGROUND OF THE INVENTION

[0002] A typical commercial bakery mass production system for bread and rolls products moves dough continuously through a series of processing devices and finally into bags or other receptacles to be delivered to the retail store and to other customers. A dough processing system may include dough mixer and a dough pump as described in U.S. Pat. No. 4,449,908 that moves the dough from the mixer in a stream through a dough divider that forms the stream of dough in separate volumes for baking. A dough divider is described in U.S. Pat. 4,332,538. From the divider the dough may pass through rounder bars that form the dough into desired shapes as described in U.S. Pat. No. 4,008,025. The shaped separate volumes of dough then may pass through an open ended oven that progressively cooks the dough.

[0003] The final products may be loaves of bread or smaller products such as hamburger and hot dog buns. After loaves of bread have been baked they continue their movement and usually are placed in bags.

[0004] A prior art bread bagging system, sometimes referred to as a "bread bagger," is placed in line at the end of the bread processing system described above. Each loaf of bread is moved in sequence into an open bag. A currently used prior art bread bagger is a single line bagger and it includes a bagging "wicket" that has a bag support tray that supports a vertical stack of bags with the bag openings facing the on-coming loaves of bread. The bags in the stack are closed and lie on their sides. The uppermost bag in the stack is opened with a stream of air, with its open end facing the on-coming loaf of bread for receiving the loaf of bread. As a loaf of bread continues its movement into the top bag in the stack of bags, the loaf of bread pushes against the closed end of the its bag and tears its bag away from the stack of bags on the wicket tray, and the now bagged loaf moves onto a surface conveyor and to a packing station where the bagged loaves are placed in containers for shipment.

[0005] A wicket that is used in the bread bagger includes a bag support tray that has an upwardly facing horizontal bag support surface. It also includes an inverted U-shaped wicket bar with legs that fit downwardly into openings in the bag support surface. A plurality of wicket bags are stacked flat on the horizontal bag support surface and the wicket bags are positioned with the bag openings all facing the on-coming loaves of bread in the processing line so that the loaves of bread may be pushed through the bag openings and into the wicket bags. The wicket bags have a lower side longer than the upper side, and retaining holes are formed at the edge on the longer side. The inverted U-shaped wicket bar has its ends inserted through the aligned retaining holes in the wicket bags and into support holes of the bag support surface so that the wicket board and its U-shaped rod maintain the bags with the openings of the bags to be faced toward the on-coming loaves of bread.

[0006] A stream of air is directed toward the open end of the uppermost bag on the wicket and the air blows the top bag open to receive an on-coming loaf of bread being pushed into the bag. The movement of the loaf of bread along the processing line and into the uppermost wicket bag and against the closed end of the bag tears the upper bag away from the wicket. The now bagged loaf of bread continues with its movement onto a surface conveyor for delivery to a shipping container. Usually, the operation of the above described bagging process is continuous until the supply of bread bags on the bag support tray is exhausted.

[0007] When the bread bags have been exhausted from the wicket support tray, the empty bag support tray must be removed from its position in the processing line and replaced by a full bag support tray. The task of replacing an empty wicket tray with a loaded wicket tray requires the movement of the bagging line to be terminated and the replacement is done manually and is difficult. The empty bag support tray must be removed and a loaded bag support tray must be carefully and firmly placed in its position in a receptacle of the framework of the machine.

[0008] If two prior art bagging lines as described above were put together in a side-by-side arrangement, the manual replacement of wickets in the two machines would likely be even more difficult and more time consuming than twice the time required for a single processing line. The bagging process of such a double machine would likely have to pause to allow the operator to retrieve the empty wicket and mount a full wicket securely and accurately in the system.

SUMMARY OF THE INVENTION

[0009] The invention presented herein concerns a bagger for placing loaves of bread, buns or other work products in bags. The invention includes a bag support wicket and a substitute bag support wicket, and an automated wicket reloading apparatus, so that when the bag support wicket gives out of bags and is empty, the empty wicket is automatically removed from the processing line and sent to a reloading station, and a substitute loaded wicket automatically replaces the empty wicket in the bagging machine.

[0010] Also, the reloading system may be used on a dual line bread and buns bagger, in which two reloading systems work side-by-side independently of each other to reload the two bagging machines with full wickets.

[0011] More particularly, the new dual lane bread and buns bagger has been developed that uses most of the principles of operation of the prior art single lane bagger described above. The dual lane bagging system has two lanes through which the bread and buns are aligned both longitudinally and laterally and may be bagged simultaneously.

[0012] Briefly described, this invention concerns an improved method and apparatus for automatically and expediently and simultaneously bagging loaves of bread that move in parallel paths from an open ended continuous baking oven of the type described above. This new system is designed for a dual lane bread and buns bagger, has four wickets, two of the wickets that are in operation as described above to apply bags about the bread and buns being pushed along the two processing paths, and two substitute wickets that are loaded with bags and are automatically moved from a refill station where they are available for immediate substitute for an empty wicket in the bagger. When one or both of the bags on a wicket become depleted, the empty wicket is automatically removed from the processing line

and its loaded substitute wicket is automatically moved into the position vacated by the empty wicket.

[0013] The wicket exchange system includes two independent lanes of bag loading zones that are each in line with one of the lanes of the bagging system, so two loaded substitute bags may be loaded individually or simultaneously while the bagging system, continues to operate to fill bags with bread or buns. Any one or both of the bagging lanes can run out of bags at any time, allowing a full set to be delivered to the empty loading area independently of the other lane. When the empty wicket has been displaced with the full wicket, the empty wicket is delivered back to an operator loading area where the operator removes the empty wicket and places a full set of wicket bags back onto the bag support tray. Once the new bags have been placed on the empty bag support tray, this new full substitute wicket with its set of bags travels to a stand-by position, ready for another exchange.

[0014] The exchange of wickets from the standby position to the loading location can be accomplished on either lane, independent from one another. If lane "A" runs out of bags, the exchange can occur on lane "A", not effecting the bags on lane "B". After an exchange occurs, the empty wicket is delivered to a position where the machine operator can safely remove the empty wicket and replace it with the wicket fully loaded with bags. Once the new full set of wicket bags have been added, the operator activates a switch to send the new wicket bags to the standby position to replace the wicket being used in the bagging line.

[0015] There are two wicket trays for each bread and buns bagger on each lane, one in operation to fill the bags with bread and buns and another being refilled with bags and waiting for movement in the bagging machine.

[0016] Other objects, features and advantages of the present invention will become apparent upon reading the following specification, when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is a schematic plan view of the dual lane bagger that places the loaves of bread or buns in bags.

[0018] FIG. 2 is a top view of a bag support wicket, the U-shaped wicket bar displaced at an angle from the bag support tray.

[0019] FIG. 3 is a bottom perspective view of the bag support tray, with the front and bottom portions of stacked bags extending over the front and rear edges of the bag support tray.

[0020] FIG. 4 is a side perspective view of the bag support tray loaded with bread bags and with the wicket bar extending through the protruding long edges of the bread bags.

[0021] FIG. 5 is a schematic view of the movements of the four bag support wickets through the apparatus.

[0022] FIG. 6 is a perspective view of a two lane bagger with the quad wicket exchange system mounted in alignment with the bread and buns bagger.

[0023] FIG. 7 is a side view of the quad wicket exchange system.

DETAILED DESCRIPTION

[0024] Referring now in more detail to the drawings, FIG. 1 is a top view of the multiple row bagger 10 that is positioned at the delivery end of a pair of surface conveyors

11 and 12 that deliver loaves of bread or buns 14, 15, 16 and 17, in pairs, in the direction as indicated by arrows 19 and 20. The bread or buns 14-17 are moved into bags 21 and 22, primarily by the motion of the surface conveyors, but as assisted by a pair of spreader bars 23 and 24, respectively. In addition, streams of air are moved from nozzles 25 and 26 toward the open ends of the bags so as to induce the top layer about the bag opening to lift away from the bottom surface of the bag, forming spaces in which the bread or buns 14-17 move. The pusher forks 28 and 29 also move in unison with the surface conveyors to urge the bread or buns 14-17 into the bags 21 and 22.

[0025] Once the bags 21 and 22 have been substantially filled with pairs of loaves of bread 14, 15, 16, 17, they move continuously with the motions of the surface conveyors 11 and 12 to a lateral surface conveyor 31 that moves at a right angle with respect to the motions of the surface conveyors 11 and 12. In order to avoid misplacement of the loaves on the lateral surface conveyor 31, positioning blocks 23 are located behind each anticipated space where the loaves of bread in their bags will be received. The surface conveyor moves the loaves of bread to a staging position where the loaves will be placed in containers for delivery to the customers, etc.

[0026] FIGS. 2-4 illustrate one of the bag support wickets 35 that is to be positioned at the location where the bread or buns are to be introduced into the bags 21. FIG. 2 is a top view of the wicket tray that has a flat top surface 36, and a stack of bags 21 is placed on its side on the top surface 36 of the wicket tray.

[0027] The length of the bags may be greater than the length of the flat top surface 36 so that the open ends 38 of the bags are positioned at the front edge 39 of the top surface 36 and the bottoms of the bags may drape over the other edge.

[0028] The bottom sheet of each bag is longer than its top layer so that the edge of the bottom layer protrudes beyond the top layer. The protruding edge of the bottom layer has wicket openings 41 formed therein. An inverted U-shaped wicket bar 43 has its parallel legs 44 and 45 spaced apart distances equal to the spacing between wicket openings 41 so that the parallel legs 44 and 45 can be threaded through the wicket openings in the bread bags 21 and 22. Another pair of openings (not shown) is formed through the flat top surface 36 of the bag support wicket tray, so that the parallel legs of the wicket bar fit into the top surface of the bag support wicket tray. This anchors the longer edges of the stacked bags to the wicket tray and when each bag is uncovered, this allows the shorter edge to lift away from the longer edge in response to a stream of air to open the top bag in the stack of bags.

[0029] As shown in FIG. 1, the nozzles 25 and 26 direct a stream of air toward the edges of the open ends of the bags, lifting the shorter edge upwardly while passing over the rear edge that is anchored to the flat top surface of the bag support tray. This opens the top bag and makes the top bag available to receive the loaves of bread 14-17, as illustrated in FIG. 1.

[0030] As shown in FIG. 3, the bottom surface 47 of the bag support wicket 35 includes several locating pins 49 that extend at a right angle from the bottom surface of the bag support wicket and are spaced apart at distances appropriate for the locating pins 49 to be received in sockets (not shown) in the surface of the conveyor system. This maintains the bag

support wicket **35** in a static position as the surface conveyors move the loaves toward the lateral surface conveyor **31**.

[0031] As illustrated in FIG. 4, the ends of the bags **38** may be allowed to overlap the back edge of the flat top surface **36** of the bag support wicket **35**.

[0032] When the supply of bread bags **21** and **22** has been depleted and a new supply of bags is required to continue the bagging process, the bag support trays can be automatically replaced when they are empty of bags.

Reloading the System

[0033] FIG. 5 illustrates a pattern of movements of the bag support wickets through a bag reloading process. The bag support wicket **35** is shown at the top left portion of FIG. 5 in position **1**. The bread or buns will have entered the space inside the top bag, as shown by arrow **51**, with the bread having been moved into the space **52**. The bread will then have moved on beyond that position as shown at **53**, with the bread being safely received in the bag and moved to the next conveyor.

[0034] As the bags become finally depleted from the bag support wicket **35**, the now the empty wicket, will move downwardly, from position **1** as shown by arrow **61**, through position **2** to corner position **3**, then continuing laterally from position **3** through space **4** and to corner space **5**, and immediately on upwardly to stop at retrieval space **6** where a person may retrieve the empty wicket tray at position **7** and reload it.

[0035] The person will have a second tray previously loaded with bags at position **8** and insert the previously loaded tray back into the system which immediately moves the reloaded tray to position **9** and the reloaded tray moves laterally to standby position **10** where its movement is terminated until another cycle of the reloading system starts.

[0036] When the reloading system begins another loading cycle, the empty tray moves as previously described on through the position **2** so the reloaded tray can move through position **11** and then upwardly to the operative position **12**. Only two wicket trays are required for the replacement system for each of the lines of bread moving through the overall system.

[0037] The system shown in FIG. 5 is provided for each side of the machine so that the empty wickets of both sides of the process can be independently refilled as needed.

[0038] As shown in FIG. 6, the wicket tray removal and replacement positions for both sides of the system at the removal and supply locations **7** and **8** of FIG. 5 are shown and the footprints **58** and **59** of the attendant show where the trays can be refilled.

[0039] FIG. 7 also shows the system where the operator station **58** is located, and where the bag load station is located. The rails **72** and **73** and their respective chains guide the wickets from their operative positions to their reloading positions and the elevator rails **74** and **75** guide the wickets vertically. The operation of the device is controlled by photo sensors that detect the presence and absence of the bag support wickets at the several stations of the system.

[0040] While the invention is described herein as a bagger for loaves of bread, it should be understood that the invention may be used for packing other work products.

[0041] Although a preferred embodiment of the invention has been disclosed in detail herein, it will be obvious to those skilled in the art that variations and modifications of the

disclosed embodiment can be made without departing from the spirit and scope of the invention as set forth in the following claims.

1. A process of bagging work products, comprising advancing two series of work products along parallel paths,
 - in each of the parallel paths placing a stacked supply of flexible wicket bags on each of a pair of bag support wicket trays at a bagging position with the openings of the flexible wicket bags in the stacked supplies of flexible wicket bags facing the advancing series of work products,
 - directing a stream of air toward the opening of the flexible wicket bag on the top of the stacked supply of wicket bags to induce the flexible bag on top of the stack of wicket bags to open,
 - advancing the work products from the parallel paths into the inflated flexible wicket bags and against the closed ends of the wicket bags,
 - separating the top wicket bag away from the other wicket bags in the stacked supply in response to the movement of the work product against the closed end of the wicket bag,
 - in response to the last wicket bag being removed from a wicket tray, moving the wicket tray to a position to be reloaded with flexible wicket bags, and
 - reloading the moved wicket trays with more wicket bags.
2. The process of claim 1,
 - wherein each of the flexible wicket bags in the stacked bags has a pair of opposed side walls with one side wall having a longer edge portion, and aligned wicket openings formed in the longer edge portions of the stacked bags, and
 - extending the legs of a U-shaped wicket rod through the aligned openings of the wicket bags and into the trays.
3. The process of claim 1, and moving the reloaded wicket tray toward a position facing the advancing series of work products at the loading station, terminating the movement of the reloaded tray in a standby position before it reaches the loading station.
4. The process of claim 3, and further including returning the reloaded tray from the standby position in response to removing a wicket tray from the bagging position.
5. A process of bagging work products comprising:
 - advancing a series of work products along parallel paths,
 - placing stacked supplies of flexible wicket bags on each of a pair of bag support wicket trays with the openings of the flexible wicket bags in the stacked supplies facing the advancing series of work products,
 - directing streams of air toward the openings of the flexible wicket bags in directions to inflate the opening of the flexible wicket bag on the top of the stacked supplies to induce the flexible bags to open and
 - simultaneously advancing work products from the parallel paths into the inflated flexible wicket bags.
6. A process of bagging work products comprising:
 - advancing two series of work products along parallel paths into open bags on the top of two supplies of bags, each mounted on a wicket,
 - carrying the bags with the advancing work products away from each wicket;

in response to depleting the last bag on a wicket, removing the depleted wicket and replacing the depleted wicket with a wicket having a supply of bags.

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