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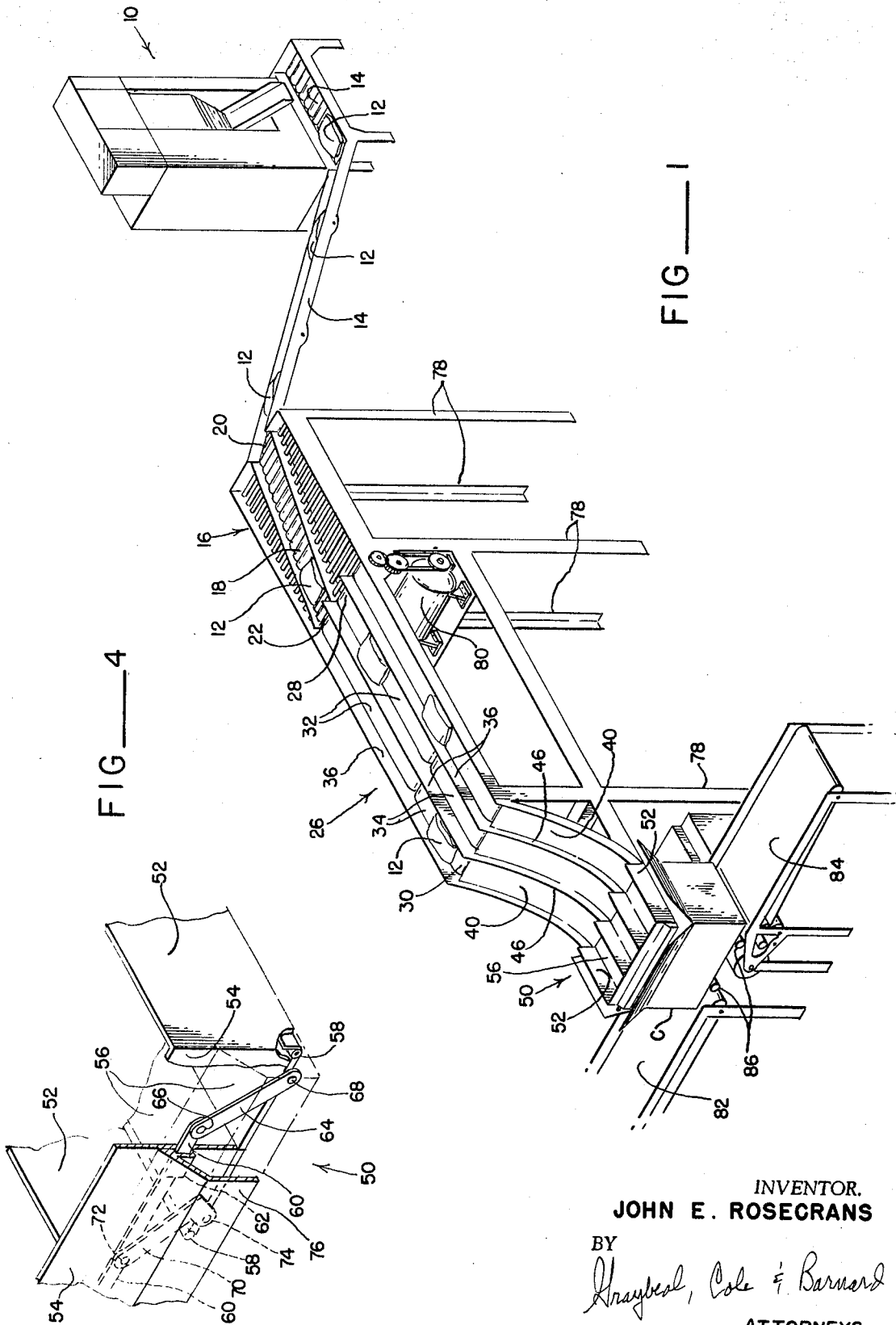
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3,512,336

APPARATUS FOR PLACING FLEXIBLE PACKAGES IN SHIPPING CONTAINERS

Filed Aug. 28, 1967

2 Sheets-Sheet 1



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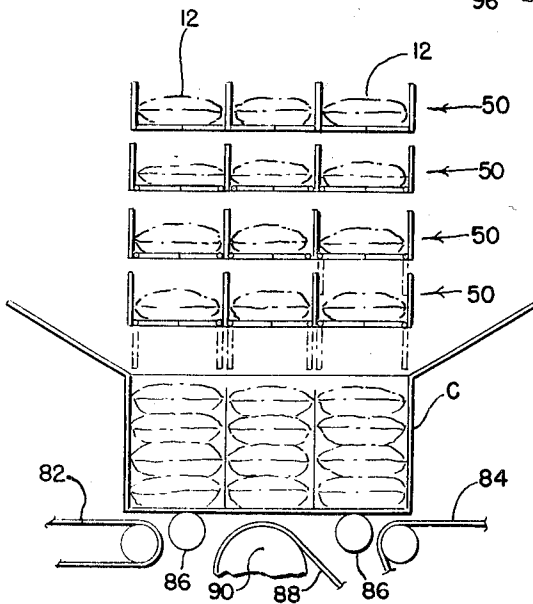
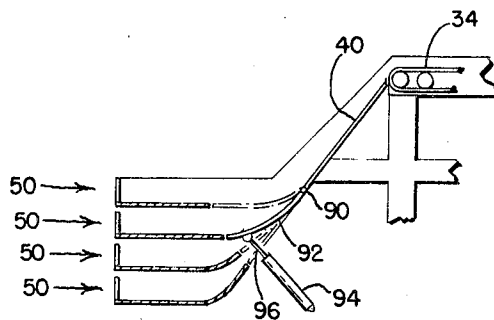
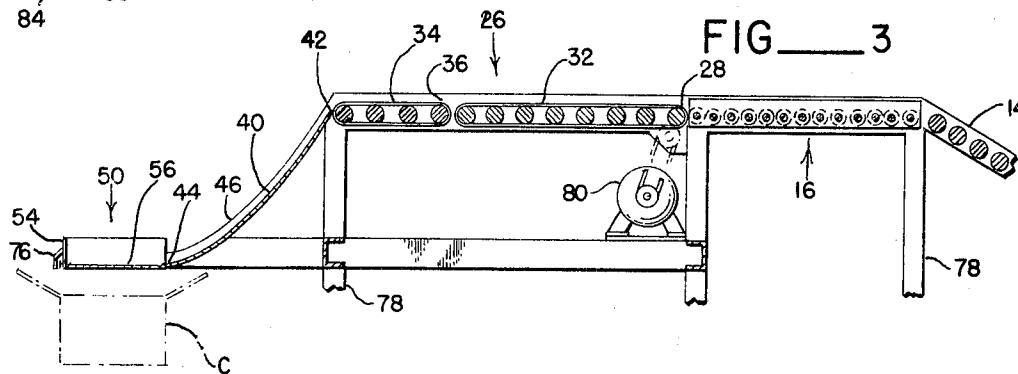
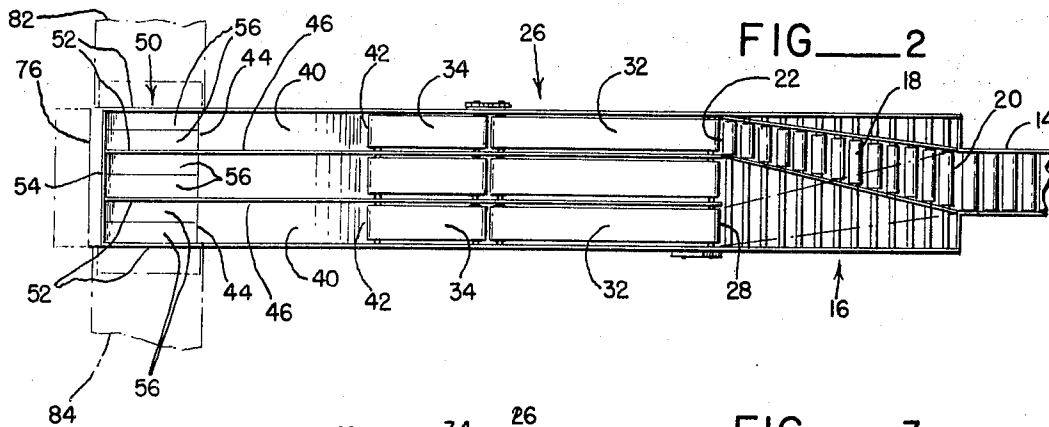
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3,512,336 APPARATUS FOR PLACING FLEXIBLE PACKAGES IN SHIPPING CONTAINERS

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12 Claims

ABSTRACT OF THE DISCLOSURE

Method and apparatus for depositing flexible pouches, bags or packages in shipping cartons or containers. Flexible or non-rigid bags are received from a forming, filling and sealing machine and channeled into a multiple conveyor system. The system advances the flexible bags to chutes which direct the bags into loading pockets located above the compartments in the shipping container. The loading pockets are provided with bottom door means so that the bags may be dropped directly into a compartment in a shipping container.

BACKGROUND OF THE INVENTION

This invention relates generally to the field of material handling and more particularly to packing of flexible bags in shipping cartons, boxes and other containers. Flexible bags, pouches, packages and the like, which are extensively used in industry to contain a wide variety of products, are usually plastic in nature holding products such as peas, beans, pulverulents, or other non-rigid materials. The number of products packaged in this way is numerous and certainly not confined to the food industry. The packages or bags are floppy or limp, vary in size and weight, and are difficult to manage. Such flexible packages have up to the present time, regardless of the nature of the products contained therein, been hand-packed in shipping containers, cartons or boxes. Manual packing of the bags in shipping containers results in excessive labor costs and therefore has become widely recognized as an area urgently in need of mechanization and/or automation. There is no known equipment to perform the task.

United States Pat. No. 2,969,629 is concerned with packing small, semi-rigid boxes in a larger container or bale. In this particular patent, the packages are fed to a charging station and then dropped vertically through openable bottom doors into a feeder station. From the feeder station the semi-rigid packages are then rammed into a bale or carton. Other United States patents of interest includes Nos. 2,857,721; 2,815,622; 3,169,354; and 2,857,599.

SUMMARY

The invention is directed to a series of features and method steps whereby flexible bags or packages are delivered from a bag forming, filling and sealing machine to a feed conveyor. The feed conveyor transfers the bags to a channeling conveyor which in turn delivers such bags to a plurality of channeled conveyors in the form of continuous belts position side by side. The belt conveyors have a slow section which receives bags from the channeling conveyor, and a fast section receiving the bags from the slow section but also delivering said bags to chutes or gravity feed slides. The chutes or gravity slides are position to direct individual bags into loading pockets which are positioned over the shipping containers. The number of conveyors, chutes and pockets will depend upon the number of compartments in the shipping container. As soon as all of the pockets have been filled, trap doors in the bottom of each pocket are opened down-

wardly so that the packages are dropped directly into the container compartment.

It is among the many features of this invention to provide a packing method and apparatus which eliminates operator handling of flexible bags and which relieves the operator from manual labor except for placing cartons or containers on a loading head and inserting partitions or dividers in the container. It is another feature of this invention to furnish a packing method and apparatus which is uniquely simple, reliable, and which requires for efficient performance a minimum of skill and attention on the part of the operator. It is still another feature of this invention to supply a packing method and apparatus which is capable of high speed handling and packing of flexible bags in shipping containers. It is yet another feature of this invention to furnish a shipping container packing apparatus and method which is substantially completely automatic in that the flexible bags do not have to be touched by human hands. It is a further feature of this invention to furnish a packing apparatus which is rugged in construction and economical to produce. An even further feature of this invention is to supply a method of uniform packaging of flexible bags without bunching or shifting of contents. A still further feature of this invention is to provide a packing method and apparatus which can be electrically controlled and cycled for high speed filling of such shipping containers.

The above and other and further objects, features and advantages will appear more fully below from the written description and accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view of the invention in relation to the bag forming, filling and sealing machine at the infeed end and the shipping carton or container loading head at the packing end;

FIG. 2 is a top plan view of the invention further illustrating details thereof;

FIG. 3 is a side elevational view of the structure of FIG. 2 further clarifying details of the invention;

FIG. 4 is a partial view in perspective showing a single loading pocket with its trap doors closed and also illustrating a common type actuating mechanism for opening the bottom doors;

FIG. 5 is an alternative embodiment of the invention showing multiple, tiered loading pockets; and

FIG. 6 is a front elevational view representing further detail of the multiple, tiered loading pocket arrangement of FIG. 5.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawings, wherein like numerals will refer to like parts throughout, there can be seen to be a non-rigid or flexible bag forming, filling and sealing machine 10 which deposits bags 12 on transfer conveyor 14. From transfer conveyor 14 the bags are taken to a channeling or sorting conveyor generally designated by the number 16. The channeling conveyor may take a number of forms but for purposes of illustration is shown to be a roller type conveyor having a horizontally disposed, laterally movable section 18 over which the bags will pass from infeed end 20 to discharge end 22. The movable section 18 may be moved by an air cylinder which positions the discharge end of the movable section 18 into alignment serially or in designated order with the channel conveyors to be described below. Movement of movable section 18 by an air cylinder or other means (not shown) is controlled by a micro trip or electric eye or other switching means. As a bag is passed off movable section 18 into a channel conveyor, the bag trips a

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switching device so that section 18 moves to its next position.

From the sorting conveyor 16 the packages are transferred to a generally horizontally disposed group or series of belt-type conveyors which as a section are generally identified by the number 26. Conveyor section 26 has receiving end 28 and discharge end 30. Receiving end 28 leads into a first or slow moving conveyor portion 32 which preferably occupies about two-thirds of the total length of channel conveyor 26. The remaining approximately one-third of the length is taken up by a second or fast conveyor portion 34. The individual channels are separated by walls or partitions 36 so that the bags move in a designated path. It should be mentioned that conveyor section 26 could be made up of a single belt for each channel, but that it has been found more advantageous to use a slow and a fast portion as just described. It will also be appreciated, depending upon the particular product and type of shipping container involved, that it may be necessary to use only a single channel conveyor. In many if not most situations, however, the multiple conveyor will be employed. The use of a three-channel conveyor is made herein merely for the purpose of illustrating and describing the invention. The slow conveyor portion 32 in the embodiment shown, because it has three channels, is set to move at one-third of the line speed as established by transfer conveyor 14 and sorting conveyor 18. Thus, belt 32 may be set to move slowly at one-third line speed, or may be set to move intermittently at one-third line speed so that the bags are received in each channel without being spaced apart or separated. As bags leave slow belt portion 32 and move on to faster belt portion 34, separation of the bags does take place. Fast section 36 will, for reasons which will become apparent hereinafter, move or advance intermittently.

At discharge end 30 of channel conveyor 26 is disposed a feed conveyor including downwardly sloping chutes or gravity feed slides 40 having upper end 42 and lower end 44. The chutes are also partitioned by divider walls 46. Chutes 40 will be made of appropriate material or lined as with Teflon in order to allow the bags to slide freely thereon. At the base of each chute 40 will be the loading pocket means generally designated by the number 50. The pockets are generally rectangular and upwardly open receptacles of the same general width as chutes 40. The loading pockets, of which there will be one for each conveyor channel, have side walls or longitudinal dividers 52 and outside wall 54. The pockets are open at the chute end and as can be seen are generally horizontally disposed. The bottom wall of each pocket is formed by trap doors 56 which are designed to swing down on actuation of opening and closing structure. As can be seen by reference to FIG. 4, each door is hinged at 58 near the bottom edge of a side wall 52. The trap doors may be opened and closed by any acceptable mechanism, the one shown illustrating a simple linkage mechanism comprised of sliding bar 60 which is held for slidable movement in guide sleeves or collars 62. An actuator link 64 is pivoted at one end as at 66 to bar 60 and at its lower end to an end edge of door 56 as at 68. In like manner, a link member 70 is also pivotally attached to bar 60 and pivotally attached to an end edge of the other trap door 56. Pivotal connections are made as can be seen at 72 and 74. It will be noted that the lower pivot points 68 and 74 are placed outwardly from the hinges 58. Thus, a simple actuator mechanism such as an air cylinder or solenoid can be attached to one end of bar 60 for quick opening and closing of trap doors 56. The actuating mechanism may be covered by housing 76. Appropriate frame structure including legs 78 are provided to support the invention. Motor means 80 is provided to supply drive power to the various conveyors. It will be understood that varying the speeds of the various conveyors or importing independent and/or intermittent motion thereto may be accomplished

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with solenoid actuated clutching devices with appropriate drive trains, gears, or belts to live pulleys.

At the loading end of this packing system is an empty container infeed conveyor 82 which terminates generally below one end of loading pocket means 50. In like manner, a loaded container take-away conveyor 84 is spaced from conveyor 82. Boxes are taken from the empty container conveyor 82 by the operator and placed on generally horizontally disposed support arms 86 located under the loading pockets. The supporting arms 86 are capable of being raised and lowered. An empty container C is placed on the lowered arms which are then raised into loading position as seen in FIGS. 1 and 3. The box or shipping container is filled and then lowered by arms 86 so that the bottom of container C engages an off-drive belt 88 passing around drive pulley 90. In the usual case, off-drive belt 88 will simply be an extension of take-away belt 84. As container C, which has been filled with bags, engages off-drive belt 88 the container is moved onto take-away conveyor belt 84 so that it can be sealed and readied for shipment. At the same time the operator will take an empty container off of belt C, place it on support arms 86 so that it can be raised into loading position with respect to loading pocket means 50.

FIGS. 5 and 6 show a multi-tiered embodiment of the invention amounting to using a loading structure formed by multiples of the single row loading pocket means 50 as shown in FIGS. 1 through 4. In such a case, chute 40 would have a shorter end point terminating at 90 at which point would be attached a flexible or movable extension 92. Chute extension 92 has connected thereto cylinder 94 and piston 96 to assist in directing bags into pockets 50. Those skilled in the art will appreciate that the open, receiving ends of the pockets adjoining chute extension 92 will have to be constructed so as to coincide with the positioning of the outer end of chute extension 92. Thus, chute extension 92 will be positioned by cylinder 84 so that bags coming down chutes 40 will be directed into the lowest tier of pockets. The cylinder would then be actuated to move extension 92 into line with the inside end of the second tier of pockets and bags directed therein. In like manner, the third and fourth tiers would also be filled. When all pockets were filled, all trap doors would be operated and opened simultaneously so that all bags 12 would drop into shipping container C.

In operation, the lane sorting or channeling conveyor, specifically movable portion 18 thereof, would be moved transversely in a predetermined sequence from channel to channel to direct bags into conveyor section 26. As mentioned above, the slow conveyor portions 32 will move intermittently or slowly so as to actually advance one-third the line speed of conveyors 14 and 18. Thus, packages would be deposited one behind the other in each lane or channel and advanced to the faster conveyor portion 34. Cycling of the faster conveyor belt 34 would be such that one bag would be deposited in a chute 40 and the conveyor then stopped. Obviously, the fast conveyor portions 34 could be advanced simultaneously. As soon as one bag has been deposited in a chute from a fast conveyor portion 34, such conveyor portion would then stop. As soon as all pockets have a bag, the trap doors are opened and the bags dropped into the shipping container C. As soon as the trap doors are closed, each fast conveyor 34 is advanced to drop one bag in a chute and the cycle is repeated. When the cycle has been repeated four times, for instance in a three-compartment container carrying bags four deep, the container C would be lowered and taken away and an empty carton placed on the loading head.

While the invention has been described in connection with preferred and alternative embodiments, it will be understood that those skilled in the art may readily devise modifications and equivalents which fall within the scope of the appended claims.

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What is claimed is:

1. Apparatus for packing flexible, non-rigid bags, pouches, sacks and packages in shipping containers, comprising:

- (a) channeling means for directing bags into a plurality of channels,
- (b) a plurality of channel conveyor means having a receiving end for receiving bags from said channeling means and also having a discharge end,
- (c) a plurality of conveyor chute means located at the discharge end of said channel conveyor means, and
- (d) a plurality of loading pocket means located so as to receive bags from said chute means, said loading pockets being positioned above supporting structure for shipping containers and including openable and closable bottom wall means for holding bags and for dropping bags into said shipping container.

2. The apparatus according to claim 1 and in which said channel conveyors have a slow accumulator section to receive bags from said channeling means and a fast feed section to discharge bags to said chute means.

3. The apparatus according to claim 2 and wherein said fast feed section is designed to feed single bags to said conveyor chute means so that bags must be dropped from said loading pocket means before another bag is fed into said chute means.

4. Apparatus for packing flexible, non-rigid bags, pouches, sacks and packages in shipping containers, comprising:

- (a) channeling means for directing bags into a plurality of generally side-by-side disposed channel conveyors, said channel conveyors having a receiving end and a discharge end,
- (b) a feed conveyor means located at the discharge end of each of said channel conveyors, said apparatus including means for advancing bags one-at-a-time from a channeling conveyor into a feed conveyor means, each of said feed conveyor means being designed to transfer a bag at speed sufficient to advance said bag into a loading pocket means, and
- (c) a plurality of loading pocket means located so as to receive bags from said feed conveyor means, said loading pockets being positioned above supporting structure for a shipping container and including openable and closable bottom wall means for holding bags and for dropping bags into said shipping container.

5. Apparatus for packing flexible, non-rigid generally flat bags, comprising:

channeling means for directing bags into a plurality of generally side-by-side disposed channel conveyors, said channel conveyors having a receiving end and a discharge end,

a feed conveyor means located at the discharge end of each of said channel conveyors, said apparatus including means for advancing bags one-at-a-time each channel conveyor into a feed conveyor means, said feed conveyor means having a discharge end,

a plurality of loading pockets having generally horizontal bottom walls located at the discharge end of said feed conveyor means so as to receive bags from said feed conveyor means,

said feed conveyor means including means to transfer a bag at speed sufficient to advance said bag onto said horizontal bottom walls in a flat condition, and said loading pockets including means for opening and closing said bottom walls for holding bags and for dropping bags in a flat condition.

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6. Apparatus according to claim 5 in which said loading pockets comprise:

longitudinally extending vertical walls overlying said bottom walls to form side-by-side pockets adapted to receive all said bags in substantially the same longitudinal orientation prior to dropping.

7. Apparatus according to claim 5 in which said feed conveyor means includes:

means at the discharge end of said channel conveyor means for increasing the velocity of a bag as it leaves said channel conveyor means.

8. Apparatus according to claim 5 further comprising: a single channel inclined transfer conveyor discharging at its upper end onto said channeling means.

9. Apparatus for packing flexible, non-rigid bags, in shipping containers, comprising:

channeling means for directing bags into a plurality of channels,

a plurality of channel conveyor means having a receiving end for receiving bags from said channeling means and also having a discharge end,

trap door means at said discharge end through which said bags are dropped,

means for separating the leading bag in each channel conveyor means from trailing bags and depositing said leading bags on said trap door means, and

loading structure including said trap door means located at the discharge end of said bag separating means, said loading structure including means for accumulating bags one above the other,

and means for simultaneously transferring said accumulated bags into a shipping container, whereby bags are introduced into said apparatus in single file and are accumulated in horizontal and vertical rows prior to being transferred into a container.

10. Apparatus according to claim 9 further comprising:

conveyor means located below said loading structure.

11. Apparatus according to claim 9 further comprising:

longitudinal divider means in said loading structure for separating adjacent bags from each other thereby facilitating transfer of said bags into a divided container.

12. Apparatus according to claim 9 in which said loading structure includes:

a plurality of tiers of loading pockets one above the other,

pivotal chute means at the end of said feed conveyor means for selectively directing bags from said feed conveyor means into said tiers of loading pockets.

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