APPARATUS FOR TRANSFERRING BAGS

Inventors: Charles E. Sheetz, Woodstock; Wayne L. McClintic, Edinburg, both of Va.

Assignee: FMC Corporation, San Jose, Calif.

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Primary Examiner—Travis S. McGehee
Attorney, Agent, or Firm—R. S. Kelly; C. E. Tripp

ABSTRACT

Apparatus for automatically clamping the mouth of a deformable bag, holding the bag open during filling with fruit from an automatic bag filler, and thereafter transferring the bag into an automatic bag tier. The deformable bag is clamped at the mouth by two pairs of complimentary finger assemblies that approach the bag laterally. The bag is held open by the finger assemblies as it is filled with fruit with the finger assemblies serving the further function of guiding the fruit into the bag. During transfer of the deformable bag the apparatus constricts the throat of the bag for easy entrance into the bag tier and for causing the fruit to nest into a more compact mass at the bottom of the bag. A bag sensing switch insures that the bag is properly clamped before filling, and a jam sensing switch signals any blockage across the mouth of the bag during filling.

24 Claims, 15 Drawing Figures
1. APPARATUS FOR TRANSFERRING BAGS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to package conveyors, and more particularly, to devices for transferring deformable bags containing a plurality of articles.

2. Description of the Prior Art

In the fruit packing industry freshly picked fruit is sorted, graded, processed and bagged along a processing line in a packing house. In recent years more and more of the processing steps in the packing house are being done automatically. Today, there are automatic processing machines in common use at nearly every station in the processing line except the visual grading station and the bag or box filling station.

A fruit packing house is basically a linear system since the fruit passes down the processing line step-by-step from one automatic machine to another. Because a fruit processing line is a linear system, the slowest and most troublesome operation to be performed forms a bottleneck for the entire system. Up to this time there has been a particular bottleneck in certain fruit packing systems in transferring the fruit between a fruit bagging machine and a bag tying machine. This particular bottleneck originates from many factors. The bags into which the fruit is packed are made of deformable materials such as, plastic, paper, and woven threads. The bags are very hard to grab with automatic machinery because of their deformable properties. Also, the bags are difficult to handle after filling because the fruit so deforms the bag that a filled bag is unable to stand upright without support. Moreover, the fruit is easily bruised, and the deformable materials cannot shield the fruit from either mechanical impact or from damage due to dropping of the bags.

One way of holding and lifting a deformable bag with automatic machinery is disclosed in U.S. Pat. No. 3,619,968 issued on Nov. 16, 1971 to Kapare for an apparatus to load small packages into large sacks. A matched pair of clamping fingers descends along the major axis of symmetry of the sack and clamps together along the top of the sack. The sack can then be lifted.

Another prior art method of transferring a filled bag to a tying machine utilizes a gripper assembly that cyclically moves along an elipsoidal path. Bag spreaders initially hold the bag open for the gripper assembly. A further method uses four opposed gripping assemblies that are supported from above the bag by a pendulum assembly. The four grabbing assemblies simultaneously grab the bag and arcuately swing the bag to a bag filler and then to a bag tier.

One other commercially used apparatus for transferring a filled bag to a tying mechanism generally comprises a pair of arms which are pivotally mounted in a common horizontal plane adjacent the upper portion of the bag. The arms are arranged to be pivoted into clamping engagement with a bag after it is filled, and the bag engaging faces of each of the arms are provided with endless belt conveyors which grip the bag and direct it in a linear path into the tying mechanism. This apparatus has been successfully used in the successive transfer of polyethylene bags from a wicket after they have been filled with predetermined quantities of fruit.

Heretofore, bag transferring machines, including those discussed hereinbefore, have generally utilized very complex gearing and driving mechanisms. Usually these machines were large, cumbersome and uneconomical to manufacture. In addition, these machines required long cycle times and consequently slowed the overall processing rate of the packing line. Also, by their complexity, these machines encountered functional problems that reduced their efficiency and reliability. Thus, none of the prior art devices have proved entirely successful and capable of replacing an operator at the bag transfer point in a bag packing line particularly in operations where gentle transfer of the bag and its contents is required.

SUMMARY OF THE INVENTION

The bag transferer of the present invention is an apparatus for automatically clamping the mouth of an open, deformable, empty bag, holding the bag open during filling with fruit or the like while guiding the fruit into the bag, and transferring the bag into an automatic bag tier. The clamping of the bag is performed by two pairs of complimentary finger assemblies that approach the open bag laterally over the margin of its open end. Each finger assembly comprises two clampable mating fingers mounted on a transfer arm. When the open bag is approached by the two fingers assemblies, the outer fingers on each finger assembly conform to the outer surface of the bag and center the bag in preparation for clamping. The inner fingers on each finger assembly pivot upwardly and pass over the margin of the open end of the bag. The inner fingers thereafter pivotally rotate down into the bag and clampingly engage the outer fingers through the surface of the deformable bag. A bag sensing switch on each finger assembly may be used to insure that an empty bag has been properly clamped and positioned before filling.

Next, the bag is automatically filled with fruit which is guided into the bag by the inner fingers on each finger assembly. A jam sensing switch may be used to signal any blockage of fruit across the mouth of the bag during filling. After filling the transferer conveys the filled bag to an automatic bag tier. During transfer to the tier the transferer constricts the throat of the bag by rapidly moving the two finger assemblies into apex relationship. The outer finger assemblies permit the bag to enter the bag tier more easily and provides a setting action on the fruit which permits the closure to be more dependably applied. After the closure is applied the transferer gently releases the bag for passage to the next processing station.

The primary object of this invention is to eliminate the operator now required to transfer the bags between the bag filling machine and the bag tying machine. The transferer permits the operator to supervise many transferring stations at one time whereas heretofore the operator was directly restricted to manual performance at one station.

A second object of this invention is to design an efficient bag transferer having both simplicity of design and simplicity of operation. The apparatus is substantially less cumbersome than the known prior art devices and provides longer, troublefree service because of the manner in which the finger assemblies operate.

An additional object of the invention is to process fruit at high speed without bruising the fruit during transfer.

A further object of this invention is the elimination of unsafe and hazardous machines from fruit process-
ing lines. The transferer is self-contained, automatic, and operable within a completely enclosed safety shield.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a perspective of the bag transferer of the present invention mounted between an automatic bag filler and an automatic bag tier, the bag transferer being shown in the bag filling position, certain parts being broken away and others shown in section;

FIG. 2 is a view substantially in plan taken generally in the direction of the arrows 2—2 of FIG. 1 showing the bag transferer in the bag filling position, certain parts being broken away;

FIG. 3 is a perspective of the bag transferer mounted between the automatic bag filler and the automatic bag tier, the bag transferer being shown in the bag constraining position, certain parts being broken away and others shown in section;

FIG. 4 is a view taken generally in the direction of the arrows 4—4 of FIG. 3 showing the bag transferer in the bag constraining position, certain parts being broken away;

FIG. 5 is a perspective of the bag transferer mounted between the automatic bag filler and the automatic bag tier, the bag transferer being shown in the bag tying position, certain parts being broken away and others shown in section;

FIG. 6 is a front elevation of the bag transferer taken generally in the direction of the arrows 6—6 of FIG. 5 showing the transferer in the bag tying position, certain parts being broken away.

FIG. 7 is an operational view illustrating the finger assemblies releasing the tied bag;

FIG. 8 is an operational view illustrating the finger assemblies during the return to the automatic bag filler;

FIG. 9 is an operational view illustrating the finger assemblies just prior to clamping;

FIG. 10 is a diagrammatic perspective of the bag transferer illustrating certain of the electrical and pneumatic control components, certain parts being broken away and others shown in section;

FIG. 11 is a diagrammatic perspective of the right finger assembly of the bag transferer illustrating one finger in full line and the other finger in phantom, certain parts being broken away;

FIG. 12 is a diagrammatic perspective of the right finger assembly similar to FIG. 11 but showing the other finger and its operating components in full line, certain parts being broken away;

FIG. 13 is an end elevation taken in the direction of arrows 13—13 of FIG. 12 and showing the jam sensing switch;

FIG. 14 is a schematic diagram of the electrical control system of the bag transferer; and

FIG. 15 is a schematic diagram of the pneumatic control system of the bag transferer.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring more particularly to the drawings, in FIG. 1 reference numeral 12 generally indicates a bag transferer, reference numeral 14 a fruit processing machine, reference numeral 16 an apparatus for applying a closure to a deformable bag, and reference numeral 18 a take-away conveyor. The fruit processing machine, the transferer, the tier and take-away conveyor together form an operative segment of a conventional fruit processing line. Within the operative segment, the fruit is first either weighed, counted, or sorted by the fruit processing machine and thereafter is conveyed in a bag held by the transferer. After the bag is filled, the transferer transfers the filled bag to the bag tier 16 where a closure is applied to the bag. The bag is next deposited by the transferer onto the take-away conveyor where the bag is transported to the next fruit processing station (not shown). After depositing the bag the transferer returns to the fruit processing machine to repeat the cycle.

The fruit processing machine 14 is comprised of a conveyor 20 that receives fruit 21 from an upstream fruit processing line (not shown). The conveyor is a multi-belt continuous conveyor that transfers the fruit from left to right in single file order as shown in FIG. 1. The fruit processing machine also includes a gate 22 that selectively blocks the passage of fruit through the processing machine as part of the processing operation of the machine. The fruit processing machine further includes a processing hopper 24 that either weighs or counts the fruit. The fruit processing machine stores a stacked supply of wicketed empty bags (in a manner not shown) and opens the end bag 26 in preparation for filling.

In operation, the fruit processing machine opens the deformable bag 26 while the conveyor 20 passes singulated fruit 21 into the hopper 24. When a predetermined quantity of fruit is deposited in the hopper, the processing machine shuts the gates 22 thereby cutting off further fruit passage into the hopper. Next, the hopper elevates at one end and pours the predetermined quantity of fruit into the open bag. After the bag is removed, the hopper descends and the gates open to start another cycle.

The fruit processing machine 14 can be any apparatus that batches fruit according to either size, weight, or number, stores and opens deformable bags in preparation for filling, and transfers the batched fruit into the open bags. The fruit processing machine is expressly not limited solely to the above functions. One fruit processing machine capable of performing the above functions is an Air-O-Matic Bagger manufactured by FMC Corporation, Agricultural Machinery Division, Jonesboro, Arkansas. The Air-O-Matic Bagger is the subject of U.S. Pat. No. 3,695,371 entitled "Apparatus for Delivering Singulated Fruit, Weighing and Bagging It," issued to Charles E. Sheetz on Oct. 3, 1972.

The tier 16 is a closure applying machine for applying a tie to a deformable bag. The tier has a supply wheel 28 on which a supply of tying wire is stored. The tier also has a tying notch 30. The tying notch gathers the side walls of the bag together prior to the application of the tie and also forms a protective cover around the tie applying linkage (not shown). When a deformable bag is brought into the tying notch, the tier is energized by a cycling switch (not shown). The tier brings a strip of tying wire from the supply wheel 28 and the linkage of the tier circles the wire around the throat of the deformable bag. One tier operable with the bag transferer of the present invention is a Super Mini-Tie, manufactured by Doboy Packaging Machinery, a division of Domain Industries, Inc., New Richmond, Wisconsin.

The take-away conveyor 18 is an endless belt conveyor having an upper run 32 and a lower run 34. The upper run travels from left to right as shown in FIG. 1.
Thus, after the closure is applied to the bag by the tier and the bag is deposited on the takeaway conveyor by the transferer, the take-away conveyor transports the bag to the next fruit processing station (not shown).

Referring now to FIG. 10, the transferer 12 will be seen to include a base 46. The base is generally U-shaped for accommodation to the fruit processing machine 14. The horizontal members comprising the base are rigidly and permanently affixed together and rest directly on the ground or other suitable supporting surface. Reference numerals 48, 49 indicate, respectively, a left forward vertical support and a right forward vertical support. Reference numerals 50, 51 indicate respectively a left rear vertical support and a right rear vertical support. The four vertical supports are rigidly and permanently affixed to the base 46 and provide a supporting structure for a safety shield (not shown) that completely encloses the transferer. The safety shield has transparent ports that allow an operator to observe the operation of the transferer and to be shielded from harmful contact with the moving apparatus. The left forward vertical support 48 and the right forward vertical support 49 also serve as the supporting structure for the tier 16 (FIG. 1).

Also rigidly attached to the base 46 are two bearing blocks 52. The bearing blocks are located in registry and provide a bearing support for an axle 54. The axle 54 is a transverse, circular rod that pivotally supports a transfer arm generally indicated by reference numeral 56. The transfer arm is comprised of a center support arm 58 that is transversely disposed to the flow of fruit in the production line. The transfer arm also includes a left supporting member 60 and a right supporting member 62. The lower ends of the two supporting members are attached to the axle 54 for pivotal support of the transfer arm. Rigidly connected between the supporting members 60, 62 and the center support arm 58 are a left connecting member 64 and a right connecting member 66. The central support arm, the supporting members and the connecting members are all rigidly and permanently affixed together and all pivot about the axis of the axle 54. Pivotally attached to the center support arm 58 are two complimentary finger assemblies 68, 70. The finger assemblies are constructed and operate in a manner hereinafter described.

The transfer arm 56 is selectively pivoted about the axis of the axle 54 by an arm movement cylinder 72. The arm movement cylinder 72 is a solenoid controlled, pneumatically operated, actuating cylinder of conventional construction. The arm movement cylinder has an actuating rod 74 that is connected to the right supporting member 62 of the transfer arm by a clevis pin assembly 76. The clevis pin assembly provides pivotal accommodation between the actuating rod 74 and the right supporting member 62. The arm movement cylinder 72 is also pivotally attached to the base 46 by a pivotal mounting assembly 78.

Rigidly attached to the forward left vertical support 48 is a forward stop plate 80. The forward stop plate arrests the forward, arcuate motion of the transfer arm 56 about the axis of axle 54 and also provides a mounting for two limit switches 82, 84. Each limit switch is of conventional construction and is positioned at a location on the forward stop plate 80 to signal when the transfer arm 56 has traveled to its most forward position as indicated by the contact of the left supporting member 60 with the switches. Limit switches 82, 84 are further described hereinafter with respect to the electrical schematic diagram (FIG. 14). Medially located between the left forward vertical support 48 and the left rear vertical support 50 is a vertical bracket 86. The vertical bracket is rigidly attached to the base 46 and is proximately located to the arcuate path of the left supporting member 60. Located upon the medial bracket 86 is a mechanical actuator 88. The mechanical actuator is a two-position, mechanical contact controlled, pneumatic flow control valve of conventional construction. The mechanical actuator is alternately turned between the two positions of orientation of its control valve by the arcuate movement of the left supporting member 60. When the transfer arm is moving forward, the mechanical actuator is turned in one direction. When the transfer arm is moving rearward, the mechanical actuator is turned in the other direction. The mechanical actuator is further described hereinafter with respect to the pneumatic schematic diagram (FIG. 15).

Rigidly attached to the right rear vertical support 51 is a rear stop plate 90. The rear stop plate arrests the rearward pivotal motion of the transfer arm 56 about the axis of axle 54 and thereby defines the most rearward position of the transfer arm. Located on the base 46 are two limit switches 92, 94. The limit switches are of conventional construction and are positioned at locations on the base to signal when the transfer arm 56 has traveled to its most rearward position. Limit switches 92 and 94 are further described hereinafter with respect to the electrical schematic diagram (FIG. 14).

Referring to FIG. 9, the finger assemblies 68, 70 each will be seen to comprise two opposed fingers. On each finger assembly 68, 70 reference letter A indicates a finger more outwardly positioned from the center line of the fruit flow and more near the corresponding supporting member 60, 62, respectively, of the transfer arm 56. On each finger assembly reference letter B indicates a finger more inwardly positioned toward the center line of the fruit flow and more near the medial portion of the center support arm 58. Because the finger assemblies 68, 70 have identical components and functions, only one finger assembly need be described in detail.

Referring to FIGS. 11 and 12, the right finger assembly 70 is operatively connected to the center support arm 58 of the transfer arm 56 by means to be described. Pivoting mounted on the center support arm by a primary pivot assembly 96 is a primary pneumatic actuator 98. The primary pneumatic actuator is a pneumatic piston and cylinder assembly of conventional construction and is operated in a manner hereinafter described with respect to the pneumatic schematic diagram (FIG. 15). The primary pneumatic actuator operatively controls the movement of an operating arm 100. Connected to the operating arm remote from the primary actuator is a clevis pin assembly 102. The clevis pin assembly is pivotally mounted to finger A. Finger A is also pivotally mounted to the center support arm 58 by a stub shaft 104. The stub shaft is rigidly mounted to the center support arm and is perpendicular to the plane of travel of the operating arm 100. A first sleeve 106 is journaled to the upper end of the stub shaft. The first sleeve is also welded to finger A. When the primary pneumatic actuator 98 moves the operating arm
100, finger A is correspondingly pivoted by this motion around the axis of the stub shaft 104.

Welded to the first sleeve 106 is a planar portion 108 of finger A. The planar portion pivotally rotates about the stub shaft 104 while remaining perpendicular to the longitudinal axis of the center support arm 58. Finger A also includes a finger portion 110. The finger portion is angularly disposed with respect to the planar portion 108, as illustrated in FIG. 8. Attached to the finger portion 110 of the A finger on the face directed toward the B finger is a friction pad 114. The friction pad is fabricated from conventional sponge rubber in order to grip the bag firmly when the A and B fingers are pressed together in clamping relationship. Mounted on the finger portion 110 of the A finger, surrounded by the friction pad 114, is a micro-switch 116. The micro-switch is of conventional construction and forms part of a bag sensing circuit that is described hereinafter. The micro-switch has an operating arm 117 that extends beyond the surface of the friction pad and is directed toward the B finger.

Perpendicular to both the planar portion 108 and the finger portion 110 of the A finger is a mounting and support structure 112. The mounting and support structure, the finger portion, and the planar portion are all components of one integral structure forming the A finger. Located on the mounting structure 112 is a secondary pivot assembly 118 (FIG. 12). The secondary pivot assembly pivotally mounts a secondary pneumatic actuator 120 to the A finger. The secondary pneumatic actuator is similar in construction and function to the primary actuator 98. Both actuators operate independently in a manner hereinafter described with respect to the pneumatic schematic diagram (FIG. 15). The secondary pneumatic actuator has an operating arm 122 that is rigidly connected to a clevis pin assembly 124.

Referring to FIG. 12, the B finger of the finger assembly 70 includes a planar portion 126 and a finger portion 128. The finger portion is angularly disposed with respect to the planar portion as illustrated in FIG. 8. Attached to the finger portion 128 of the B finger on the face directed toward the A finger is an abrasive surface 129. The abrasive surface can be a conventional sandpaper sheet adhesively mounted to the finger portion of the B finger. The finger portion of the B finger is designed to correspondingly engage the finger portion 110 of the A finger. When the A and B fingers are pressed together in clamping relationship, the sponge rubber friction pad 114 and the abrasive surface 129 firmly clamp the bag for transfer. The finger portion 128 of the B finger includes an aperture 130 that receives the operating arm 117 of the micro-switch 126 when the A and B fingers are in clamping relationship. If a bag is clamped between the A and B fingers, the aperture 130 is closed off by the wall of the bag and the operating arm of the micro-switch is prohibited from passing therethrough. If a bag is not clamped, the operating arm passes through without difficulty. The combination of the micro-switch and the aperture is a component of a bag sensing circuit hereinafter described with respect to the electrical schematic (FIG. 14).

The B finger also includes an arcuate portion 132 and a guide portion 134. The inwardly extending face of the B finger serves to channel and guide the fruit during the passage of the fruit from the fruit processing machine 14 (FIG. 1) to the bag 26 (FIG. 1). It will be appreciated that the finger assemblies 68, 70 thereby provide two functions: (1) the clamping of the sides of the bag, and (2) the guiding of the fruit into the bag. This latter function was heretofore provided by separate fixed guide members as shown, for example, in the previously mentioned U.S. Pat. No. 3,695,371. The planar portion 126, finger portion 128, arcuate portion 132 and guide portions 134 are all components of one integral structure forming the B finger. For clarity, the guide portion and the arcuate portion of the B finger have been omitted from most of the figures in the drawings. Finger B also includes a projecting finger stopper 136 that limits the movement of the B finger toward the central support arm 58. The clevis 124 at the end of the operating arm 122 is pivotally connected to a mounting member 136 that is attached to the back face of the B finger. Thus, it will be seen that actuation of actuator 120 and subsequent retraction of the operating arm 122 will result in the closing of the fingers.

Finger B is pivotally mounted to the center support arm 58 by the stub shaft 104. The stub shaft, as previously pointed out, is rigidly mounted to the center support arm and is perpendicular to the plane of travel of the operating arm 122. A second sleeve 140 is journeled to the lower end of the stub shaft. The second sleeve is also welded to the planar portion of the B finger. It should be noted that both the A finger and the B finger are pivotally mounted about the same stub shaft 104 and each finger is therefore capable of individual, angular rotation about the same axis. In addition, finger A and finger B are connected by a spring 142 that tends to open or to separate the finger portion 128 of finger B from the finger portion 110 of finger A.

By referring to FIGS. 8, 10, 11 and 12, the geometrical correspondence and mechanical interaction of the A and B fingers and the left and right finger assemblies can be better understood. The stub shaft 104 is orthogonally mounted to the center support arm 58 as illustrated in FIG. 8. The stub shaft forms an axis about which both the A finger and B finger can independently, pivotally rotate. Mounted on the A finger is a secondary actuator 120 that drives the B finger. Thus, the secondary actuator drives the B finger with respect to the A finger only. Mounted on the center support arm 58 is the primary actuator 98. The primary actuator primarily drives the A finger about the stub shaft. However, the primary actuator also drives the B finger through the rigid connection of the secondary operating arm 122 and the secondary clevis pin assembly 124. Consequently, when the primary actuator 98 moves, the entire finger assembly including finger A and finger B is rotated about the stub shaft. When the secondary actuator moves, only the B finger moves and the motion is with respect to the A finger. The spring 142 will separate the A and B fingers when the secondary actuator is vented.

Referring to FIGS. 2 and 13, reference numeral 141 generally indicates a bridge sensing switch. The bridge sensing switch is only located on the B finger of the right finger assembly 70 in the fruit guiding channel formed by the planar portion 126, the arcuate portion 132 and the guide portion 134. For clarity, the bridge sensing switch is only illustrated in FIGS. 2 and 13. The bridge sensing switch includes a hinge 144 having a pivotal axis parallel with the planar portion 126 of the B finger. The hinge connects the planar portion 126 of the B finger to a movable guide plate 146. The movable
The guide plate is positioned laterally to the flow of fruit as the fruit passes through the finger assemblies into the bag. The guide plate operably contacts a micro-switch 148. The micro-switch is of conventional construction and is further described hereinafter with respect to the electrical schematic diagram (FIG. 14). The bridge sensing switch measures any lateral thrust developed between the B fingers of the left and right finger assemblies by the fruit in the mouth (FIG. 2) of the bag. If, during the passage from the fruit processing machine 14 to the bag 26, the fruit jams up between the finger assemblies, the jamming will cause a lateral thrust to develop between the B fingers. That thrust will cause the guide plate 146 to pivot outwardly about the hinge 114 and to trip the micro-switch 148.

Referring to FIGS. 1–13, inclusive, the overall mechanical operation of the transferer will now be described. The bag filling position is illustrated in FIGS. 1 and 2. The transfer arm 56 rests against the rear stop plate 90 in its most rearward position. The left and right finger assemblies 68, 70 respectively, are clamped about the upper edge of the bag 26. In this operating position the primary pneumatic actuator 98 has pushed its operating arm 100 to the fully extended position. The secondary pneumatic actuator 120 has fully retracted its operating arm 122. The finger portions 110, 128 (FIGS. 11 and 12) of the A and B fingers are in clamping relationship. The hopper 24 (FIG. 1) is elevated at one end and is dumping a measured quantity of fruit 81 through the channel formed by the B fingers (FIG. 2) into the bag 26. Although the fruit processing machine 14 has a bag supporting floor 150, the bag is primarily supported during filling by the clamping relationship of the finger assemblies.

After the hopper 24 has completed dumping the fruit 21 into the bag 26, the fruit processing machine 14 electrically signals the transferer, in a manner hereinafter described, to commence transferring the filled bag to the automatic bag tier 16. The movement of the transfer arm 56 is controlled by the arm movement cylinder 72. As the actuating rod 74 extends, the transfer arm moves off the rear stop plate 90 and pivotally rotates about the axis of the axle 54 to the tier, the left supporting member 60 (FIG. 10) of the transfer arm physically moves and switches the mechanical actuator 88 (FIG. 10).

The bag constraining position of the transferer is illustrated in FIGS. 3 and 4. When the mechanical actuator 88 was moved by the forward motion of the transfer arm 56, the pneumatic control system forced the primary actuators 98 to fully retract their operating arms 100. The secondary actuators 120 (FIG. 12) remained fully retracted, unchanged from the earlier bag filling position. The retraction of the primary actuators causes the finger portions of each finger assembly to rapidly come together. Referring to FIG. 4, it can be appreciated that the two finger assemblies 68, 70 cause the deformable bag 26 to be constricted about its throat and the side walls of the bag to be neanked toward each other. The constriction prepared the bag for entrance into the notch 30 of the bag tier, and the rapid inward movement of the sidewalls of the bag causes the fruit to settle into a more compact mass so that the tie can be properly applied to the bag at a lower elevation than would otherwise be possible.

While the finger assemblies are being brought into apex relationship, the transfer arm 56 continues to move forward. The forward pivotal motion of the transfer arm about the axle 54 is ultimately arrested by the forward arm stop plate 80 (FIG. 10).

The bag tying position of the transferer is illustrated in FIGS. 5 and 6. The transfer arm 56 is resting against the forward arm stop plate 80 (FIG. 10), and the bag is within the tying notch 30 of the bag tier 16. In this position limit switches 82, 84 (FIG. 10) are actuated. While the transfer arm is at the bag tier 16, the primary actuators 98 (FIG. 6) maintain their operating arms 100 fully retracted. The secondary pneumatic actuators 120 (FIG. 6) also maintain their operating arms 122 (FIG. 12) fully retracted. The fingers are, therefore, in clamping relationship supporting the bag in the tier. There is no vertical supporting force exerted on the bag by either the tier or the take-away conveyor 18. The tier 16 automatically applies a closure to the deformable bag when the bag is within the tying notch 30. After the closure has been applied by the tier 16, the transfer arm 56 is ready to begin its rearward, or return, movement. The time interval that the transfer arm remains at the bag tier is preset by a time delay relay 2TD hereinafter described with respect to the electrical schematic (FIG. 14). In the embodiment of the invention disclosed the tier does not control the motion of the transfer arm except that it can prevent the transfer arm from moving in the event of a malfunction of the tier in a manner to be explained hereinafter.

The bag releasing position is illustrated in FIG. 7. When the return movement of the transfer arm 56 is initiated, the tied bag 26 is released by the finger assemblies 68, 70. In releasing the bag, the secondary pneumatic actuators 120 are vented to the atmosphere. The operating arms 122 (FIG. 12) of the secondary actuators travel to the fully extended position under the force of springs 142. The primary pneumatic actuators 98 remain with their operating arms 100 fully retracted. The tied bag 26 drops a short distance onto the take-away conveyor 18 that transports the tied bag onward toward the next processing operation (not shown).

It should be appreciated that the design of the transferer minimizes the drop of the tied bag from the finger assemblies in order to minimize bruising and damaging the fruit. To achieve this objective the take-away conveyor 18 is located as close to the tying notch 30 (FIG. 1) of the bag tier as possible and yet sufficiently remote to provide clearance for the initial approach of the bag to the tier.

The returning position of the finger assemblies 68, 70 is illustrated in FIG. 8. The transfer arm 56 continues rearwardly powered by the retraction of the operating arm 74 (FIG. 10) into the arm movement cylinder 72 (FIG. 10). As the transfer arm 56 moves rearwardly, the left supporting member 60 (FIG. 10) repositions the mechanical actuator 88 (FIG. 10). The repositioning of the mechanical actuator during the rearward travel of the transfer arm causes the primary pneumatic actuators 98 to extend their operating arms 100. It should be appreciated that the movement of the primary actuators in the disclosed embodiment of the invention is controlled only by the position of the mechanical actuator 88 (FIG. 10). In addition, while the transfer arm 56 travels rearwardly, the fruit processing machine 14 (FIG. 1) prepares another bag for clamping. The fruit processing machine carries a plurality of wicketed bags in a supply dispenser (not shown). The
fruit processing machine opens the bags one at a time by a small blast of air.

In FIG. 8 the finger assemblies 68, 70 are shown in position for the initial approach to the fruit processing machine 14. The primary pneumatic actuators 98 have their operating arms 100 fully extended. The secondary pneumatic actuators 120 also have their operating arms 122 fully extended. It should be appreciated that the finger portions 110 of each A finger are positioned perpendicular to the center support arm 58 and parallel to the flow of fruit through the processing line. Moreover, the tips of the finger portions 128 of the B fingers are substantially above the faces of the finger portions 110 of the A fingers. This geometrical relationship between the A and B fingers permits the transfer arm to approach a bag laterally, over the margin of the open end of the bag.

As the transfer arm 56 approaches the open bag 26" (FIG. 9) held by the fruit processing machine 14, the finger portions 110 of the A fingers pass around the outside of the bag near the open mouth of the bag. The bag is thereby centered by the finger portions of the A fingers which contact the outside surface of the bag. The finger portions 128 of the B fingers pass over the upper margin of the open mouth of the bag and down into the bag.

FIG. 9 illustrates the position of the transferer just prior to clamping the open bag. The transfer arm 56 is at rest against the rear stop plate 90 (FIG. 10) and has actuated the limit switches 92, 94 (FIG. 10). The A fingers have fully centered the bag 26" therebetween, and the B fingers have passed over the upper margin of the open end of the bag. Immediately thereafter, the secondary pneumatic actuators 120, controlled by the limit switch 92, fully retract their operating arms and thereby cause the B fingers to clamp with the A fingers. The transferer has, thus, returned to the bag filling position illustrated in FIGS. 1 and 2. The operating arm of the primary pneumatic actuators 98 are still fully extended. The secondary pneumatic cylinders 120 have their operating arms fully retracted to grasp the upper margin of the bag.

In operation the bag sensing switches 116 (FIG. 11) insure that each of the finger assemblies 68, 70 properly grasps a bag before the transfer cycle continues. Referring to FIG. 11, each micro-switch 116 will be seen to be attached to the finger portion 110 of each A finger. The operating arm 117 of the micro-switch extends beyond the surface of the friction pad 114. If the A finger clamps together with the B finger and there is no bag therebetween, then the operating arm of the micro-switch passes through the aperture 130 of the B finger without actuating. On the other hand, if a bag is clamped between the A finger and the B finger, the wall of the bag blocks the aperture and the operating arm is deflected to actuate the micro-switch. There is a micro-switch located on each finger assembly to insure that each assembly properly grabs each side wall of the bag.

In operation, the bridge sensing switch 148 (FIG. 13) insures the proper flow of fruit through the channel formed by the B fingers. Referring to FIG. 2, if the fruit is jammed or wedged across the B fingers, a lateral thrust is developed therebetween. The lateral thrust develops both from the arrested momentum of the fruit through the channel and the weight of the fruit behind the jam. The lateral thrust of the fruit across the B fingers forces the guide plate 146 (FIGS. 2 and 13) toward the planar portion 126 of the associated B finger. The motion of the guide plate actuates the micro-switch 148 that signals the jam to the electrical control circuit hereinafter described. If a jam is so indicated, the arm movement cylinder 72 (FIG. 1) cannot be moved, and the attendant (noticing the problem) will manually remove the jam so that the bagging cycle can continue.

The electrical schematic diagram for the transferer is illustrated in FIG. 14. The dashed lines indicate within which component of the overall fruit bagging apparatus the circuit elements are located. Those elements not enclosed by dashed lines are within the transferer structure. The various elements of the circuit are described from the schematic diagram starting from the top of the figure and working downward. Switch 152 is the power on-off switch for the apparatus and connects the transferer to standard 110 Volt AC service. Limit switch 92 is normally open and is located on the transferer base 46 (FIG. 10) on the right hand base member. Solenoid No. 2 is a conventional solenoid that electrically operates the control valve for the secondary pneumatic actuators 120, 120' (FIG. 12). When solenoid No. 2 is energized, the secondary actuators are pressurized by an air supply and the operating arms 122, 122' are fully retracted. Limit switch 84 is normally closed and is located on the forward stop plate 80 (FIG. 10). When the transfer arm 56 is at its most forward position against the stop plate, limit switch 84 is opened. Relay 1R is a conventional relay initially energized by the power circuit B1-L1-B2 in the fruit processing machine through a limit switch 156. Switch 156 is the hopper dump switch (not shown) and is closed when the hopper 24 (FIG. 1) on the fruit processing machine is fully elevated. The closing of switch 156 indicates that the hopper has completed dumping the fruit into the bag. Relay contact 1R2 is the second contact of relay 1R. Contact 1R2 is a holding contact that maintains energization of relay 1R after the hopper dump switch 156 opens and until the limit switch 84 is opened by the transfer arm 56 (FIG. 10). Limit switch 148 is the micro-switch in the bridge sensing circuit 141 (FIGS. 2 and 13). If the fruit forms a bridge across the mouth of the bag, switch 148 is moved to its alternate position. Limit switch 154 is a bag tier malfunction switch. If the bag tier 16 (FIG. 1) is unable to tie the bag, switch 154 moves to its alternate position. Solenoid No. 3 is a conventional solenoid that electrically operates a pneumatic control valve. When solenoid No. 3 is energized, the arm movement cylinder 72 (FIG. 10) is pressurized to extend the operating arm 74 (FIG. 10). Reference letter R indicates a flashing red, alarm light that serves to warn the operator of a transferer malfunction. Limit switch 94 is normally open and is located on the transferer base 46 (FIG. 10) on the right hand base member. When the transfer arm 56 is on the rear stop plate 90 (FIG. 10), switch 94 is closed. Relay contact 1R1 is the first contact of relay 1R. Contact 1R1 is normally closed and is an interlock contact within the hopper dump circuit of the fruit processing machine 14 (FIG. 1) to prevent the hopper from cyclically dumping. Limit switches 116, 116' are the bag sensing micro-switches on the A fingers (FIG. 11) of each finger assembly. If a deformable bag is properly grasped between each finger assembly, micro-switches 116, 116' move to their alternate positions. Reference letters
1TD indicate a time delay relay. Relay 1TD is used to delay slightly the operation of the arm circuit and the alarm light R. Solenoid No. 6 is the hopper dump solenoid (not shown) and is energized by the power circuit BL1-BL2 in the fruit processing machine. When solenoid No. 6 is energized, the hopper 24 (FIG. 1) is elevated at one end for dumping. Limit switch 82 is normally open and is located on the forward stop plate 80 (FIG. 10). When the transfer arm 56 (FIG. 10) moves against the forward arm stop plate 80, switch 82 closes. Reference characters 2TD indicate a time delay relay. Time delay relay 2TD is used to regulate the time interval that the transfer arm remains in front of the tier while the tier applies the closure. After the time interval expires, the time delay relay closes contact 2TD1. In one embodiment of the transferer that has been constructed, the second time delay relay closed contact 2TD1 at the end of a fourth-tenths of a second time interval measured from the initial energization through switch 82. Solenoid No. 1 and Solenoid No. 4 are conventional solenoids that operate pneumatic control valves. When solenoid No. 1 is energized, the secondary actuators 120, 120' are vented to the atmosphere and their operating arms 122, 122' become fully extended. When solenoid No. 4 is energized, the arm movement cylinder 72 (FIG. 10) is pressurized to retract the operating arm 74 (FIG. 10).

The schematic diagram of the pneumatic system is illustrated in FIG. 15. Reference numeral 158 indicates an air supply for the pneumatic system. The air supply can be any conventional source of air including an air compressor or a service air supply forming part of the fruit processing line. The air supply 158 is connected by a suitable manifold 159 to a pilot valve 160. The pilot valve 160 is operated by the mechanical actuator 88 located on the medial bracket 86 (FIG. 10) attached to the base 46 (FIG. 10) of the transferer and controls the operation of the primary actuators 98, 98'. The air supply is also connected to a pilot valve 162. Pilot valve 162 is electrically operated both by solenoid No. 1 and solenoid No. 2 and controls the operation of the secondary actuators 120, 120'. The primary actuator is additionally connected to a pilot valve 164. Pilot valve 164 is electrically operated both by solenoid No. 3 and solenoid No. 4. Pilot valve 164 controls the actuation of the arm movement cylinder 72 (FIG. 10).

With reference to FIGS. 10, 14 and 15 the operation of the pneumatic and electrical control systems will be described. In the bag filling position (FIG. 1) the transfer arm 56 is against the rear stop plate 90 and the arm movement cylinder 72 has retracted its actuating rod 74. Switch 92 is shut thereby energizing solenoid 2. Solenoid 2 has moved pilot valve 162 in the position to pressurize the secondary actuating cylinders 120, 120' thereby clamping the bag. The pilot valve 160 has been positioned as shown in FIG. 15 by the last rearward movement of the transfer arm toward the fruit processing machine 14 (FIG. 1). The primary actuators 98, 98' are thereby pressurized to fully extend their operating arms 100, 100'. The hopper 24 (FIG. 1) is elevated at one end and is dumping the fruit into the deformable bag because the hopper dump solenoid, solenoid 6, has been energized. Solenoid 6 was energized when micro-switch 94 closed because the transfer arm contacted the rear stop plate 90. Contact 1R1 is closed because relay 1 is de-energized. Micro-switches 116, 116' on the A fingers have moved to their alternate positions because a deformable bag has been properly clamped by each of the finger assemblies.

When the hopper 24 (FIG. 1) reaches the fully dumped position, limit switch 156 on the fruit processing machine moves to its alternate position. Relay 1R is energized thereby closing contact 1R2 and opening contact 1R1. Contact 1R1 prevents solenoid 6 from cycling the hopper. Relay 1R2 is a holding relay to maintain the energization of relay 1. The fruit bridge sensing switch 148 remains as illustrated in FIG. 14 if the fruit is not jammed. The tier malfunction switch 154 remains as illustrated in FIG. 14 if the tier is ready to apply a closure to the bag. Thus, when the hopper reaches the fully dumped position and the fruit has not bridged across the bag and the tier is ready to apply a closure, solenoid No. 3 is energized. The energization of solenoid 3 operates pilot valve 164 controlling the arm movement cylinder 72. The operating arm 74 begins to extend and the transfer arm 56 commences moving forward.

In the bag constricting position (FIG. 3) the finger assemblies 68, 70 (FIG. 10) are brought into apex relationship. When the transfer arm 56 passes the mechanical actuator 88 (FIG. 10) while traveling forward, the pilot valve 160 (FIG. 15) is moved to its alternate position. The primary actuators 98, 98' are pressurized to retract their operating arms thereby moving the finger assemblies into apex relationship.

In the bag tying position (FIG. 5) the transfer arm reaches its most forward position against the forward arm stop plate 80 (FIG. 10). Switch 84 is opened, thereby de-energizing relay 1 if the hopper dump switch 156 has returned to its original position. Limit switch 82 also closes thereby starting the second time delay relay 2TD. The tier automatically applies a closure when the bag is presented in the tying notch 30 (FIG. 5). After the predetermined time interval has elapsed, the second time delay relay 2TD closes contact 2TD1 and solenoids 1 and 4 are energized.

When solenoid 4 is energized, pilot valve 164 is moved to pressurize the arm movement cylinder 72 for retracting the operating arm 74. When solenoid 3 is energized, pilot valve 162 is moved to vent the secondary actuators 120, 120'. The venting of the secondary actuators causes the finger assemblies to separate and to drop the bag onto the take-away conveyor 18 (FIG. 7).

The transfer arm continues its rearward motion and again turns the mechanical actuator 88. The rearward motion of the transfer arm causes pilot valve 160 to align as illustrated in FIG. 15. The primary actuators 98, 98' are thereby pressurized to fully extend the operating arms 100, 100'. As the transfer arm approaches the rear stop plate 90, the primary actuators and the secondary actuators are both fully extended. A new deformable bag is being blown open automatically by the fruit processing machine 14. The preparation of a new deformable bag is controlled by the circuit within the fruit processing machine.

When the transfer arm reaches the rear stop plate 90, limit switch 92 is closed, thereby energizing solenoid 2. When solenoid 2 is energized, pilot valve 162 moves to pressurize the secondary actuators and thereby to cause the B fingers of each finger assembly to clamp with the associated A fingers. If the finger assemblies 68, 70 each properly clamp the edge of a bag, then micro-switches 116, 116' of the bag sensing circuit move
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15 to the alternate position to precondition solenoid 6 for energization.

When the transfer arm 56 reaches the rear stop plate, limit switch 94 is also closed. When limit switch 94 shuts, the first time delay relay 1TD is energized because the bag sensing switches 116, 116' have not yet had the opportunity to move. If the bag sensing switches 116, 116' do not both sense a bag between the finger assemblies and both move to the alternate position, the first time delay relay 1TD will close contact 1TD1 after a short time interval and energize the alarm R. The time delay relay 1TD is used to bridge the time interval between the closing of limit switch 94 closing as the transfer arm reaches the rear stop plate and the closing of the bag sensing switches 116, 116' as the bag is clamped. As soon as both of the bag sensing relays 116, 116' move to the alternate position, solenoid 6 is energized and the hopper 24 commences dumping fruit.

The alarm circuit will energize the red light R whenever the transfer arm 56 is against the rear stop plate 90 (FIG. 10) closing switch 94 and the bag sensing switches 116, 116' do not indicate that a bag is properly clamped between the fingers of each finger assembly, but only after the time delay relay 1TD has closed contact 1TD1. The red alarm light R can also be energized when either the fruit bridge sensing switch 148 records a jam up of fruit or the tier malfunction switch 154 indicates that the tier is unable to apply a closure. It should be appreciated that the transfer arm will not move from the fruit processing machine until the hopper 24 has fully dumped the fruit into the bag, until any jam up of fruit is cleared, and until the tier is ready to apply a closure. It should also be appreciated that relay 1R is provided to prevent the hopper on the fruit processing machine from cycling more than once until after the filled bag has been transferred.

In summary, the primary object of the transferer of the present invention is to eliminate the operator now required to transfer bags of fruit between a bag filling machine and a bag tying machine. As hereinbefore described, the transferer is a fully automatic, self-contained machine capable of independently operating between the two aforementioned pieces of equipment. Consequently, the transferer permits the operator to supervise many transferring stations whereas heretofore the operator was directly restricted to manually transferring at one station. Moreover, because the transferer is self-contained and completely automatic, the apparatus may be completely enclosed within a safety shield thereby eliminating unsafe and hazardous conditions within the fruit processing line. In addition, the simplicity of operation of the transferer and the small distance traveled between the fruit processing machine and the tier permits the apparatus to operate at high speeds. Finally, because the finger assemblies release the tied bag without a substantial drop to the take-away conveyor, the transferer is capable of processing fruit at high speed without bruising the fruit during transfer.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and variation may be made without departing from what is regarded to be the subject matter of the invention.

We claim:

1. Apparatus for transferring a deformable bag having an open end and a closed end by releasably clamping the margin of the open end; said apparatus comprising:
   a mounting arm movable between a clamping station and an unclamping station;
   first and second finger assemblies, each of said finger assemblies including a first member and a second member, said first member being adaptably mounted with respect to the mounting arm, said second member being adaptably mounted with respect to the first member;
   a first actuating means for adjustably positioning each of said first members with respect to said mounting arm and for conformally positioning each of said first members to the outside surface of the margin of the open end of the deformable bag thereby centering the margin of the deformable bag for clamping at the clamping station;
   a second actuating means for adjustably positioning each of said second members with respect to said mounting arm and for conformally positioning each of said second members to the inside surface of the margin of the open end of the deformable bag thereby clamping the margin of the deformable bag at the clamping station and unclamping the margin of the deformable bag at the unclamping station;
   means for moving said mounting arm whereby the clamped deformable bag is transferred between the clamping station and the unclamping station while the deformable bag is being clamped by the finger assemblies; and
   jam sensing means mounted on the finger assemblies for signaling a lateral thrust therebetween caused by a jam of articles blocking each other across the opening of said deformable bag.

2. Apparatus for clamping a deformable bag having a closed end and an open end while filling said deformable bag from a bag filling apparatus at a clamping station, for transferring said deformable bag between the clamping station and an unclamping station, for constraining the open end of the deformable bag during transfer for a subsequent application of a closure to the open end of the deformable bag, and for releasing the deformable bag for removal from the apparatus at the unclamping station; said apparatus comprising:
   a pivotal mounting arm arcuately movable between the clamping station and the unclamping station;
   means for moving said pivotal mounting arm in an arcuate path between the clamping station and the unclamping station;
   first and second finger assemblies mounted upon the distal end of said mounting arm for clamping the deformable bag at the clamping station, for unclamping the deformable bag at the unclamping station, and for transferring the deformable bag therebetween, each of said finger assemblies including a first member and a second member;
   means for pivotally mounting said first member with respect to the associated mounting arm so that said first member pivots about an axis extending generally in a plane parallel to that of said arcuate path, means for pivotally mounting said second member with respect to the associated mounting arm so that said second member pivots about an axis extending generally in a plane parallel to that of said arcuate path;
a first actuating means for adjustably positioning each of said first members with respect to the outside surface of said deformable bag and in clamping relationship with said second members and for pivoting the first and second finger assemblies in a plane transverse to the plane of said arcuate path to bring the free ends thereof into closely spaced relationship thereby constricting the open end of the deformable bag after clamping for the subsequent application of a closure; and

a second actuating means for pivoting each of said second members inwardly with respect to the said first members in a plane transverse to the plane of said arcuate path in order to permit said second members to move over the leading edge of said bag and said first members to move outside of the side edges of said bag at said clamping station.

3. Apparatus as set forth in claim 2 further including a bag sensing means for determining the presence of a deformable bag between the first and second members of one of said finger assemblies.

4. Apparatus for transferring a deformable bag as set forth in claim 2 wherein said second members of said finger assemblies are provided with guide portions extending outwardly from the clamped bag and serving to guide articles into the bag at said clamping station.

5. Apparatus according to claim 2 wherein said first actuating means acts to rapidly pivot said finger assemblies into apex relationship during a relatively short portion of their movement from the clamping station to the unclamping station so that articles which are filled in a bag held by said finger assemblies will be caused to settle into a compact mass.

6. Apparatus for transferring a deformable bag along an arcuate path between a bag filling station and a bag tying station by releasably clamping the margin of the open end of the bag; said apparatus comprising:

a mounting arm movable along an arcuate path through an upright position between the bag filling station at one end of the arcuate path and the bag tying station at the other end of the arcuate path; finger means mounted upon the upper end of the mounting arm for releasably clamping the margin of the open end of said deformable bag;

means for pivoting said finger means to permit them to move over the side edges of a bag at said bag filling station, said pivoting means being arranged to thereafter cause said finger means to move into clamping engagement with said side edges of the bag;

means for moving the mounting arm along the arcuate path; and

axle means disposed below said mounting arm for pivotally supporting said mounting arm whereby said deformable bag is arcuately moved by said moving means between the bag filling station and the bag tying station through the upright position.

7. Apparatus according to claim 6 wherein said finger means comprises two finger assemblies each including a pair of opposed fingers arranged to grip a side edge of said bag, and means for rapidly bringing said finger assemblies together during the movement of said mounting arm along said arcuate path in order to cause the articles in said bag to nest into a compact mass.

8. An apparatus for transferring a deformable bag filled with fruit or the like from a bag filling station to a bag tying station, said bag being oriented in a generally upright position at said bag filling station with its open end uppermost and in an expanded condition to permit the entry of said fruit or the like therein, said apparatus comprising a transfer arm, means for moving said transfer arm in a path from said bag filling station to said bag tying station, a pair of finger assemblies mounted on said transfer arm for movement in said path, each of said finger assemblies including a first and a second finger member arranged in opposed relationship with said second finger members being arranged laterally inwardly of said first finger members with respect to said path of movement of said transfer arm, means for pivotally mounting the finger members of each finger assembly, said finger members being mounted for pivotal movement about axes extending generally parallel to the plane of said path of the transfer arm, means for pivoting said second finger members inwardly and upwardly and said first finger members outwardly so that said second fingers will pass over the upper edge of a bag at said bag filling station and said first finger members will pass outside of said side edges of the bag as said transfer arm is moved to said bag filling station, said last named means being arranged to thereafter pivot said second finger members downwardly to bring said finger members into clamping engagement with the side edges of the bag while said bag is at said bag filling station and to thereafter pivot said finger assemblies inwardly toward each other to constrict the upper open end of the bag before the bag is moved into said bag tying station, said pivoting means being further arranged to pivot said first and second finger members apart when said bag is at said bag tying station to release the bag held by said finger assemblies.

9. An apparatus according to claim 8 including means mounting said transfer arm for pivotal movement with said finger assemblies being movable in an arcuate path from said bag filling station to said bag tying station.

10. An apparatus according to claim 9 wherein said transfer arm is mounted for movement about a pivot axis that is located between said bag filling station and said bag tying station and below the path of the bags which are transferred therebetween.

11. An apparatus according to claim 8 wherein said means for pivoting said finger members comprises a first pair of extensible members connected between said transfer arm and one of said finger members of each of said finger assemblies and a second pair of extensible members connected between said first and second finger members of each of said finger assemblies.

12. In a system for bagging fruit or the like which includes means for holding a supply of deformable bags with one of such bags being opened at the uppermost end thereof, means for delivering predetermined quantities of fruit or the like into said bag through said open end thereof, and a bag tying means spaced from said bag holding means for applying ties about said open ends of the bags, said improvement comprising a transfer arm, means for moving said transfer arm in a path from said bag holding means to said bag tying means, a pair of finger assemblies mounted on said transfer arm for movement in said path, each of said finger assemblies including a first and a second finger member arranged in opposed relationship with said second finger members being arranged laterally inwardly of said first finger members with respect to said path of movement of said transfer arm, means for pivotally mounting
the finger members of each finger assembly, said finger members being mounted for pivotal movement about axes extending generally parallel to the plane of said path of the transfer arm, means for pivoting said second finger members inwardly and upwardly and said first finger members outwardly so that said second fingers will pass over the upper edge of said opened bag on said bag holding means and said first finger members will pass outside of said side edges of said bag as said transfer arm is moved to said bag holding means, said means for pivoting said finger members being arranged to thereafter pivot said second finger members downwardly to bring said finger members into clamping engagement with the side edges of the bag while said bag is on said bag holding means and to thereafter pivot said finger assemblies inwardly toward each other to constrict the upper open end of the bag before the bag is moved into said bag tying means, said finger pivoting means being arranged to unclamp said side edges of the bag after said bag has been moved into said bag tying means.

13. In a system according to claim 12 wherein said transfer device includes means mounting said transfer arm for pivotal movement with said finger assemblies being movable in an arcurate path from said bag holding means to said bag tying means.

14. In a system according to claim 13 wherein said transfer arm is mounted for movement about a pivot axis that is located between said bag holding means and said bag tying means and below the path of the bags which are transferred therebetween.

15. In a system according to claim 12 wherein said second finger members of each of said finger assemblies include curved guide portions extending in a direction opposite to that of the clamping portion of said finger members and serving to guide said fruit or the like into the opened bag on said bag holding means as it is discharged by said fruit delivering means.

16. In a system according to claim 12 wherein said transfer device includes bag sensing means mounted on one of the finger members of each of said finger assemblies for determining the presence of a bag between the finger members of the finger assemblies, and control means operatively associated with said bag sensing means for preventing said fruit delivering means from operating in the absence of a clamped bag edge on each of said finger assemblies.

17. In a system according to claim 12 wherein said transfer device includes a jam sensing means for sensing a lateral thrust between said finger assemblies caused by a jam of fruit or the like blocking the opening into the opened bag on said bag holding means, and control means operatively associated with said jam sensing means for preventing the operation of said means for moving the transfer arm until after said jam of fruit or the like is removed.

18. An apparatus for bagging fruit or the like which comprises means for holding a stack of deformable bags with the outermost one of such bags being oriented in a generally upright position with its open end uppermost and in an expanded condition to permit the entry of said fruit or the like therein, means for delivering predetermined quantities of said fruit or the like into said opened bag through said open end thereof, a bag tying means operated from said bag holding means for applying ties about said open ends of the bags, a transfer device for moving filled bags from said bag holding means to said bag tying means comprising a transfer arm, means for moving said transfer arm in a path from said bag holding means to said bag tying means, a pair of finger assemblies mounted on said transfer arm for movement in said path, each of said finger assemblies including a first and a second finger member arranged in opposed relationship with said second finger member being arranged laterally inwardly of said first finger members with respect to said path of movement of said transfer arm, means for pivoting said second finger members being arranged to pivotally mounting the members of each finger assembly, said finger members being mounted for pivotal movement about axes extending generally parallel to the plane of said path of the transfer arm, means for pivoting said second finger members inwardly and upwardly and said first finger members will pass outside of said side edges of said bag as said transfer arm is moved to said bag holding means, said means for pivoting said finger members being arranged to thereafter pivot said second finger members downwardly to bring said finger members into clamping engagement with the side edges of the bag while said bag is on said bag holding means and to thereafter pivot said finger assemblies inwardly toward each other to constrict the upper open end of the bag before the bag is moved into said bag tying means, said finger pivoting means being arranged to unclamp said side edges of the bag after said bag has been moved into said bag tying means.

19. An apparatus according to claim 18 wherein said means for pivoting said fingers is arranged to pivot said finger assemblies inwardly toward each other as said transfer arm is moved to said bag tying means in order to constrict the upper open end of the bag held by said finger assemblies.

20. An apparatus according to claim 18 wherein said transfer device includes means mounting said transfer arm for pivotal movement with said finger assemblies being movable in an arcurate path from said bag holding means to said bag tying means.

21. An apparatus according to claim 20 wherein said transfer arm is mounted for movement about a pivot axis that is located between said bag holding means and said bag tying means and below the path of the bags which are transferred therebetween.

22. An apparatus according to claim 18 wherein said second finger members of each of said finger assemblies include curved guide portions extending in a direction opposite to that of the clamping portion of said finger members and serving to guide said fruit or the like into the opened bag on said bag holding means as it is discharged by said fruit delivering means.

23. An apparatus according to claim 18 wherein said transfer device includes bag sensing means mounted on one of the finger members of each of said finger assemblies for determining the presence of a bag between the finger members of the finger assemblies, and control means operatively associated with said bag sensing means for preventing said fruit delivering means from operating in the absence of a clamped bag edge on each of said finger assemblies.

24. An apparatus according to claim 22 wherein said transfer device includes a jam sensing means for sensing a lateral thrust between said finger assemblies caused by a jam of fruit or the like blocking the opening into the opened bag on said bag holding means, and control means operatively associated with said jam sensing means for preventing the operation of said means for moving the transfer arm until after said jam of fruit or the like is removed.