

Aug. 16, 1955

F. AHLBURG ET AL

2,715,511

BAG FILLING AND WEIGHING APPARATUS

Filed Oct. 11, 1949

2 Sheets-Sheet 1

FIG. 1

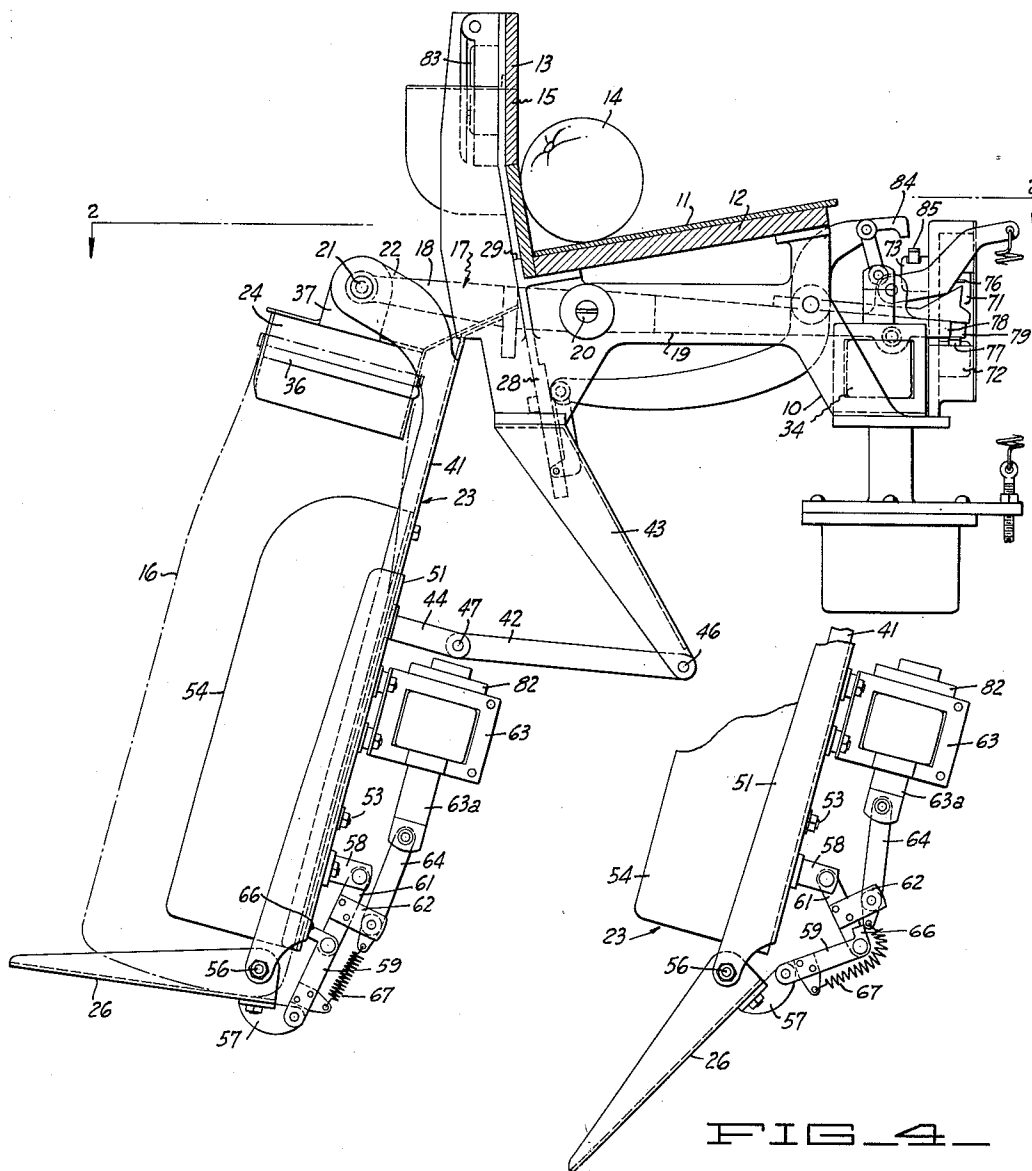


FIG. 4

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2 Sheets-Sheet 2

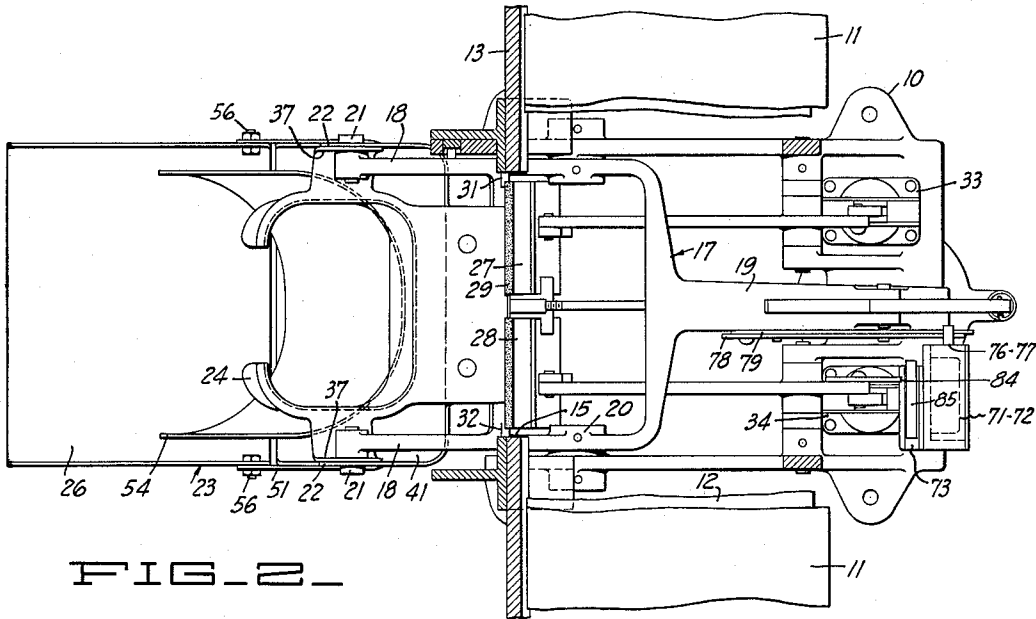


FIG. 2

FIG. 3

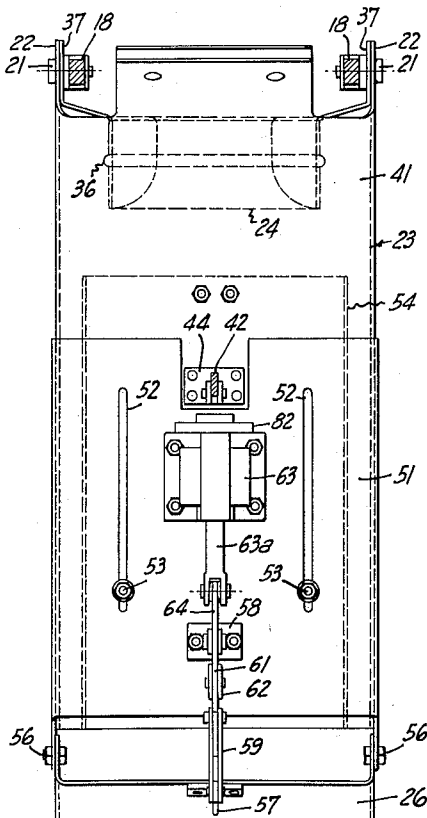
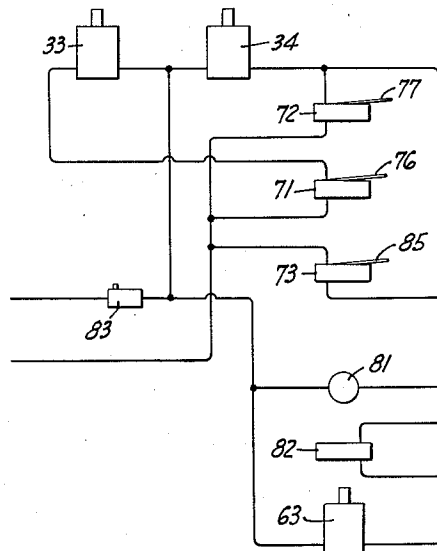


FIG. 5



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BAG FILLING AND WEIGHING APPARATUS

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9 Claims. (Cl. 249—60)

This invention relates generally to devices for handling and automatically weighing predetermined quantities of articles such as citrus fruit, apples, potatoes and the like. More particularly it relates to apparatus capable of weighing out a predetermined weight of such articles and, when the receptacle within which the articles have been deposited contains said predetermined amount, causing said receptacle or container to be freed from the machine and deposited upon means for removing the same to a remote position for further handling.

Items of produce such as citrus fruit, apples or potatoes are being marketed in cellophane bags. Each bag must be of a given weight within certain limits. Therefore, it is desirable that the contents of the bags be carefully measured prior to further handling. Weighing operations such as indicated herein are complicated by the fact that one or more of the articles being weighed may cause the total weight of the bag greatly to exceed the desired weight.

Furthermore utilization of weighing devices such as will further be described herein has in the past required manual handling of the weighed and filled bag. For example, the bag filling machine disclosed in Ahlburg and Hunt Patent 2,464,545 dated March 15, 1949 illustrates the device in which produce such as oranges is to be received and ultimately sold to the purchaser, consisting of a mesh bag. Mesh bags of this character were subject to the difficulty that they required the removal of the bag from the bag retaining means and the utilization of a draw string and clip to keep the bag closed. This requires the constant presence of an operator and is found materially to reduce the output of the machine.

It is an object of this invention to provide means and apparatus to be used in conjunction with a filling machine of the type described and claimed in Ahlberg et al. Patent 2,464,545 above referred to, which may be utilized in conjunction with a cellophane or Pliofilm bag of the type in which such articles of produce are now customarily marketed. Generally speaking we prefer that the bags to be utilized be of the type which is adapted to be closed by an elastic means which is sewed or otherwise molded into the upper opening of the bag. The opening may be enlarged by stretching the elastic member. However, when the stretching medium is removed from the upper end of the bag the elastic means returns to normal position thereby, then and there, closing the bag.

It is a further object of this invention to provide a device of the character described which may be used with a bag filling machine of the type disclosed in said Ahlburg et al patent in such a manner that when the contents of the bag total a predetermined weight the bag will be discharged from the machine onto a suitable carry-away mechanism.

It is a further object of this invention to provide means for supporting the cellophane or Pliofilm bag which is being filled in such a manner that fruit or other produce

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being introduced therein will not tear the bag or produce undue strains thereon.

Other objects and advantages of this invention will appear from the following description taken in conjunction with the accompanying drawings in which:

Figure 1 illustrates a side elevational view of the device incorporating our invention;

Figure 2 represents a top plan view of the apparatus shown in Figure 1;

Figure 3 represents a partial rear elevational view of the device shown in Figure 1;

Figure 4 is a fragmentary view of the apparatus shown in Figure 1 with the head plate or release plate in discharge position; and

Figure 5 is a wiring diagram showing the preferred means of operating this invention.

As previously explained, our device is adapted to be utilized in conjunction with a bag filling machine of the general character illustrated in Ahlburg and Hunt Patent 2,464,545, patented March 15, 1949.

As illustrated in Figures 1 and 2, the device is adapted to be mounted upon a suitable frame 10. Suitable conveying means such as the upper run of an endless belt 11 extends laterally across the frame 10 and is supported by suitable means such as a wall 12. Along one side of conveyor 11 there is an upright stationary guide wall 13, and both the wall 12 and belt 11 are tilted whereby articles, such as oranges 14, being moved by the conveyor 11 normally crowd together toward the wall 13. Guide wall 13 is provided with an opening 15 (Fig. 2) through which articles may pass to drop by gravity into a bag 16 or other article receiving means provided.

Below the conveyor there is a weighing beam 17 consisting of two laterally spaced forwardly extending arms 18 and a rearwardly extending arm 19. Arms 18 have fulcrum connections 20 with the frame 10 whereby the beam 17 extends generally horizontal and may rock about a horizontal axis.

The forward ends of the beam arms 18 have pivotal connections 21 with the arms 22 of a bag hanger 23. The bag hanger 23 will more fully hereinafter be described, it being sufficient at this point to state that the same is provided with a collar 24 over which the open upper end or throat of a bag 16 or other article receiving means may be mounted. The collar 24 is formed in such a manner as to facilitate mounting of the bag 16 thereon and to retain the bag properly located with respect to the axis of the pivotal connections 21. In addition, the hanger 23 is provided with a foot 26 against which the lower end of the Pliofilm or cellophane receptacle 16 is adapted to rest whereby, when produce such as oranges, etc. is introduced into the upper end of the bag the same will engage the foot. The foot 26 and the collar 24 will receive the entire weight of the contents of the bag 16 and will, through the arms 22 actuate the forwardly extending arms 18 and the rearwardly extending arm 19 for a purpose to be described more fully hereinafter. When the bag 16 is suspended in this manner, articles may be dropped therein through the throat 24 and the hanger 23 will oscillate about the axis of the pivotal connections 21 without material displacement of the bag with respect to its vertical axis and with the weight of the bag being applied to the foot 26.

In order to control passage through the opening 15 in a predetermined manner, we utilize the apparatus disclosed in Ahlburg and Hunt Patent 2,464,545. As disclosed in that patent the means for controlling passage of articles through the opening 15 in a predetermined manner consists of a pair of slidable gates or barriers 27 and 28. These members are in the form of metal plates having their upper edges 29 faced with

rubber or like resilient material. Their vertical edges are carried within grooved guides 31 and 32 carried by the frame 10. Each gate is movable between two limiting positions, one being a lower or retracted position in which the upper edge of the gate does not interfere with the passage of articles through the opening 15 and the second being a raised or elevated position in which the upper edge of the gate serves to block movement of articles through the opening 15 and to thus retain the articles upon the conveyor belt 11. Where oranges are being handled, the raised portion may, for example, be at a height of the order of one inch or more above the conveyor.

Since the means for operating the gates 27 and 28 is fully disclosed in said Ahlburg and Hunt patent previously referred to, it is deemed unnecessary at this time to include a complete description of the same. It is thought sufficient to state that a suitable electric circuit serves to energize a pair of solenoids 33 and 34 in such a manner that the gates 27 and 28 are operated in sequential order during a weighing operation. In other words, during the initial part of a bag filling cycle both gates are in their lowered positions whereby two or more articles may pass through the opening 15 substantially simultaneously. Toward the end of the weighing cycle, however, the solenoid 33 is energized to raise the gate 27 thus blocking passage of articles through one-half of the opening 15, and permitting articles to continue to pass one-by-one through the other portion of the opening 15 until the desired weight within the bag 16 has been obtained or approximated. Then the second solenoid 34 is energized to raise the gate 28. Solenoid 34 remains energized to prevent delivery of additional articles until after the operator has recycled the machine in a manner to more fully hereinafter be described.

The hanger 23 as has been indicated comprises means for retaining a cellophane or Pliofilm bag 16 in proper position to receive a number of articles and, when a predetermined quantity of said articles has been received within the same, to actuate one or both of the gates 27 and 28 to prevent the introduction of a greater number of oranges or other items into the bag.

Generally speaking, the hanger 23 consists of a collar 24 and a bag retaining apparatus 26. The collar is preferably made generally as shown in Figures 1, 2 and 3, and is adapted to receive the open end of a bag 16. As is indicated, the collar 24 is provided with a pair of ribs 36 over which the elastic upper end of the bag is adapted to be slipped. The ribs 36 are of sufficient depth that they normally retain the bag 16 upon the collar 24. However, when the foot 26 is swung downwardly from the position shown in Figure 1 to the position shown in Figure 4, the weight of the contents of the bag will exceed the effect of the frictional engagement of the bag 16 upon the collar 24 and rib 36 and the bag will drop from the collar 24.

The collar 24 is provided with a pair of tabs 37 which are mounted on the hanger 23 at the pivot points 21 and is further secured to the hanger 23 by means of riveting or any suitable manner as more clearly illustrated in Figures 1 and 2. The hanger 23 consists generally of a backing plate 41. The backing plate 41 is maintained in the position generally shown in Figure 1 by a link member 42, one end of which is secured to a downwardly extending arm 43, secured to the frame 10, and the other end of which is secured to a stud 44, secured to the back of plate 41. This assembly forms a parallelogram between pivot points 46 and 47 and pivot points 20 and 21.

Also secured to the backing plate 41, I have provided a second plate 51 which is provided with a pair of parallel slots 52 which cooperate with a pair of threaded members 53 on the plate 41 whereby the position of the plate 51 with respect to the plate 41 may be adjusted

to accommodate the entire hanger 23 to a particular length of bag 16. The plate 51 and the foot 26 are adjusted with respect to the plate 41 in such a manner that the bottom of the bag 16 is in engagement with the foot 26 at all times when the foot 26 is in the retaining position illustrated in Figure 1. In this manner the full weight of the contents of the bag 16 is communicated to the weighing mechanism through the plate 41 and the arms 18 and 19. The plate 41 is further provided with a bag retaining device 54 which, as shown particularly in Figures 1, 2 and 4, consists of a bent plate which is adapted loosely to engage the side walls of the bag 16 in such a manner as to prevent sideways movement of the bag 16 with respect to the hanger 23.

As has previously been pointed out, the plate 51 is provided with a foot 26 whose purpose has more fully previously been explained. The foot 26 is hingedly connected to the lower end of the plate 51 and is adapted to pivot with respect thereto about the pivot 56.

Means for operating the foot 26 may briefly be described as follows: It will be noted that the foot 26 is provided with an extending arm 57 which is rigidly secured thereto in any suitable manner. The backing plate 51 is likewise provided with a rearwardly extending arm 58 which likewise is rigidly secured thereto in any suitable manner. The arms 57 and 58 are connected by a pair of links 59 and 61, the latter of which is provided with an arm 62. Also secured to the rear of the plate 51 there is a solenoid 63 which is connected to the arm 62 through a link 64. The link 59 is further provided with a stop 66 which is adapted to abut the rear of the plate 51 as shown.

Energization of the solenoid 63 will retract the member 63a and cause the link 61 to swing away from the plate 51. This will likewise cause link 59 to be swung away from the plate 51 with the result that the foot 26 will be swung downwardly about pivot 56. For so long a period as the solenoid 63 remains energized, the foot 26 will remain in that position. However, when the solenoid 63 is de-energized the member 63a will be extended as shown in Figure 1, with the result that the links 59 and 61 will return to the position generally shown in Figure 1 with the stop 66 abutted against the rear of plate 51. A spring 67 may be mounted between the end of the link 64 and the lower end of the link 59, to draw links 62 and 59 toward each other with the dual effect of returning the plunger 63a to the position generally as shown in Figure 1 and of retaining the member 66 against the rear of the plate 51. While the member 66 engages the rear of the plate 51, it is obvious that the foot member 26 cannot be pivoted about the point 56. Therefore, no amount of weight upon the member 26 will cause the same to be moved unless the solenoid 63 is energized. Energization of the solenoid 63 occurs only a fixed time after the second of the gates 27 or 28 have been raised and after the last remaining fruit passing through the opening 15 has passed through the collar 24 into the bag 16. The manner of energizing and de-energizing the solenoid 63 is more or less the same as the means for opening and closing the gates 27 and 28 as described more fully in Ahlburg and Hunt Patent 2,464,545.

As has previously been pointed out, a suitable electric circuit serves to energize the solenoids 33 and 34 in such a manner that the gates 27 and 28 are operated in sequential order during a weighing operation. In other words, during the initial part of a bag filling cycle both gates 27 and 28 are in lowered positions whereby two or more articles may pass through the opening 15 more or less simultaneously. Toward the end of the weighing cycle, however, the solenoid 33 is energized to raise the gate 27, thus blocking passage of articles through one-half of the opening 15 and permitting articles to pass one-by-one through the other half of the opening until the desired weight has been obtained or approximated. Then the second solenoid 34 is energized to raise the

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second gate 28. Thereafter both solenoids remain energized to prevent delivery of additional articles until the bag 16 has been removed from the hanger 23. The operator then recycles the machine. The contacting means included in this electrical circuit includes the switches 71 and 72, together with a holding switch 73.

Switches 71 and 72 can be of the Microswitch type and are shown carried at the rear of the machine. The switches have operating fingers 76 and 77 respectively which are adapted to be operated by fingers 78 and 79 respectively, which are adjustably carried by arm 19 of the weighing beam. In general, the finger 78 is adjusted whereby when the desired fractional part of the complete weight has been delivered to the bag 16, the operating finger 76 is engaged and moves to effect operation of the switch 71. The finger 79 is adjusted whereby when the beam is substantially balanced and the complete weight has been delivered to the bag, switch finger 77 has been moved a sufficient distance to operate the contacts of the switch 72.

Holding switch 73 is adapted to be operated by a lever 84 and finger 85.

Figure 5 illustrates suitable circuit connections for the three solenoids and the various switches. The entire machine is suitably connected to a source of electric current. The switches 71 and 72 are adapted to be connected to the said source of current generally as shown, as are the solenoids 33 and 34. Switches 71 and 72 are of such a type that when their operating fingers 76 and 77 are permitted to elevate a given amount, under the urge of spring tension provided within the switch, their contacts close. The contacts of the switch 82 are operated in the same manner. The contacts of the switch 73 are normally closed but are momentarily opened with snap action upon actuation of the holding switch 83.

Assuming the contacts of the switches 71, 72 and 73 are initially opened, operation of the circuit during a weighing cycle is as follows: When a given amount of articles have dropped into the bag 16, the beam 19 rocks a sufficient amount to actuate the switch 71, whereby the solenoid 33 is energized. When the solenoid 33 is energized the gate 27 is closed. Thereafter articles continue to fall one-by-one into the bag 16 until the beam 19 is substantially completely balanced at which time the switch 72 is closed to energize the solenoid 34. Energizing the solenoid 34 not only operates the corresponding gate 28 but in addition switch 73 is operated to close its contacts. Closing of the switch 73 short circuits both switches 71 and 72 whereby the solenoid 34 continues to be energized irrespective of possible opening of the switches 71 and 72.

In addition to energizing the solenoid 34, closing of switch 72 also closes the circuit to the time delay device 81 and in turn closes the time delay Microswitch 82 and energizes the solenoid 63. As has previously been explained, energization of the solenoid 63 serves to operate the foot 26.

Operation of the machine as a whole will be evident from the following: An operator places the upper open end of a bag 16 around the collar 24 with the elastic upper end of the bag over and above the bag retaining rib 36. The lower end of the bag is in contact with the foot 26. Assuming that the conveyor 11 is in operation and that suitable means is provided to supply an ample quantity of articles, such as oranges, to the conveyor 11, the articles are moved along the guide wall 13 and tend to crowd against this wall because of the tilt of the conveyor.

The switch 83 is opened with the result that all of the solenoids 33, 34 and 63 are de-energized, the gates 27 and 28 will be in their lower retracted positions whereby articles may pass freely through the opening 15, over the upper surfaces of the gates 27 and 28 to drop into the bag 16. When a major part of the total weight desired has thus dropped into the bag, the weighing beam 19 rocks upon its fulcrum 20 sufficiently to close the switch

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71 and thereby operate the solenoid 33 and elevate the corresponding gate 27. This serves to block oranges from passing through one-half of the opening 15 with the result that oranges must now pass one after another through the remainder of the opening. When the number of oranges thus introduced one at a time, brings the weight up to the predetermined value desired, the weighing beam will engage the operating lever 85 to close the Microswitch 72 and energize the solenoid 34. The energization of solenoid 34 will close the gate 28 thereupon preventing the passage of any more fruit through the opening 15.

Closing of the Microswitch 72 will energize the time delay 81. The purpose of the time delay mechanism 81 is to permit a sufficient interval of time to elapse from the time the last piece of fruit passes through the opening 15 for it to safely enter the bag. It will be noted that the fruit passing through the opening may engage the upper edge of the hanger 23 and thereupon its weight may be transmitted to the weighing device prior to the time the fruit has entered the bag. However, the time delay mechanism which may be set for a full second, for example, will prevent the too quick action of the solenoid 63. After the last fruit has entered the bag, current is supplied by the time delay apparatus 81 to the Microswitch 82 and ultimately to the solenoid 63 with the result that the foot 26 is dropped downwardly from the position shown in Figure 1 to that shown in Figure 4.

When the foot 26 is lowered to the dump position shown in Figure 4, the weight of the contents of the bag 16 will be sufficient to overcome the frictional engagement between the elastic upper end of the bag 16 as it engages the collar 24 and the bag retaining rib 36. The bag then drops free of the hanger 23 onto a suitable conveyor belt mechanism (not shown).

The operator then places a new bag 16 over the collar 24 and above the bag retaining ribs 36. The holding switch 83 is then actuated with the result that the entire circuit is de-energized. When the circuit is de-energized the solenoids 33, 34 and 63 are likewise de-energized with the result that the gates 27 and 28 return to their lower or retracted position, as shown in Figure 1, and the foot 26 is likewise returned by the action of the spring 67 to its normal position, as shown in Figure 1.

We claim:

1. In a filling and weighing machine for handling articles such as citrus fruit, potatoes and apples, a pivoted weighing beam, means for supporting a bag from one end of said beam, said bag supporting means including a foot movable between bag retaining and bag releasing positions, said foot being pivotally mounted at the lower end of said bag supporting means, a pair of links attached to said foot and adapted to form a toggle joint, said links serving to hold said foot in bag retaining position when in straight line abutting relationship, and a solenoid adapted to flex said joint to cause said foot to drop to bag releasing position when said solenoid is actuated responsive to movement of said beam.

2. In a filling and weighing machine for handling articles such as citrus fruit, potatoes and apples and having a pivoted weighing beam, means for supporting a bag from one end of said beam during the filling and weighing operation, said bag supporting means comprising a throat member for supporting a bag from one end of said beam, a backing member for generally holding a bag against lateral movement, and a foot adapted to support a bag during the filling and weighing operations and movable to bag releasing position, said foot being pivotally mounted at the lower end of said bag supporting means, a toggle joint formed of a pair of links and having its outer ends attached to said foot and to said backing member, said links serving to hold said foot in bag retaining position when in straight line extended

relationship, and a solenoid adapted to flex said joint to permit said foot to drop to bag releasing position when said solenoid is actuated responsive to movement of the weighing beam.

3. A device as in claim 2 in which a helical spring is attached to the outer ends of said links to urge said toggle joint into extended straight line relationship.

4. In a filling and weighing machine for handling articles such as citrus fruit, potatoes and apples and having a pivoted weighing beam, means for supporting a bag from one end of said beam, said bag supporting means including a device for holding the upper end of a bag open and in engagement with said machine, backing means for preventing lateral movement of a bag during the weighing and filling operations, a foot pivotally mounted at the lower end of said bag supporting means, said foot being movable between substantially horizontal and substantially vertical positions to thereby provide bag retaining and bag releasing means, a pair of inter-connected links attached to said foot and to said backing means, said links being adapted to form a toggle joint whereby said foot is held in substantially horizontal position when the links are in substantially straight line extended relationship, and a solenoid adapted to flex said joint to permit said foot to drop to substantially vertical position to cause said bag to be released from said bag supporting means when the solenoid is actuated responsive to movement of said beam.

5. In a filling and weighing machine for handling articles such as citrus fruit, potatoes and apples, a pivoted weighing beam, means for supporting a bag connected to one end of said beam, said bag supporting means including a foot movable between bag retaining and bag releasing positions, said foot being pivotally mounted at the lower end of said bag supporting means, a toggle joint connected to said foot and said supporting means, said toggle joint in one position serving to hold said foot in a bag retaining position, and a solenoid adapted to move said toggle joint from said holding position allowing the movement of said foot to a bag releasing position, said solenoid being responsive to the movement of said weighing beam.

6. A device as in claim 5 together with means for moving said foot from a bag releasing position to a bag retaining position.

7. In a filling and weighing machine for handling ar-

ticles such as citrus fruit, potatoes and apples, and having a pivoted weighing beam, means for supporting a bag from one end of said beam, said bag supporting means including a device for holding the upper end of the bag open and in engagement with said machine, backing means for preventing lateral movement of a bag during the weighing and filling operations, a foot pivotally mounted at the lower end of said bag supporting means, said foot being movable between substantially horizontal and substantially vertical positions, to thereby provide bag retaining and bag releasing means, holding means connected to said foot, said holding means in a holding position serving to keep said foot in a bag retaining position, and means actuated by said weighing beam to move said holding means from said holding position allowing the movement of said foot to a bag releasing position.

8. A device as in claim 7 together with means for moving said foot from a bag releasing position to a bag retaining position.

9. In a filling and weighing machine for handling articles such as citrus fruit, potatoes and apples, a pivoted weighing beam, means for supporting a bag connected to one end of said beam, said bag supporting means including a foot movable between bag retaining and bag releasing positions, said foot being pivotally mounted at the lower end of said bag supporting means, holding means connected to said foot, said holding means serving to keep said foot in a bag retaining position, means actuated by said weighing beam to move said holding means from said retaining position allowing the movement of said foot to a bag releasing position, and means for moving said foot from a bag releasing position to a bag retaining position.

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