Jan. 28, 1969 F. H. MILLER, JR 3,423,903

BAG POSITIONING APPARATUS

Filed Nov. 28, 1966 Sheet 1 of 3

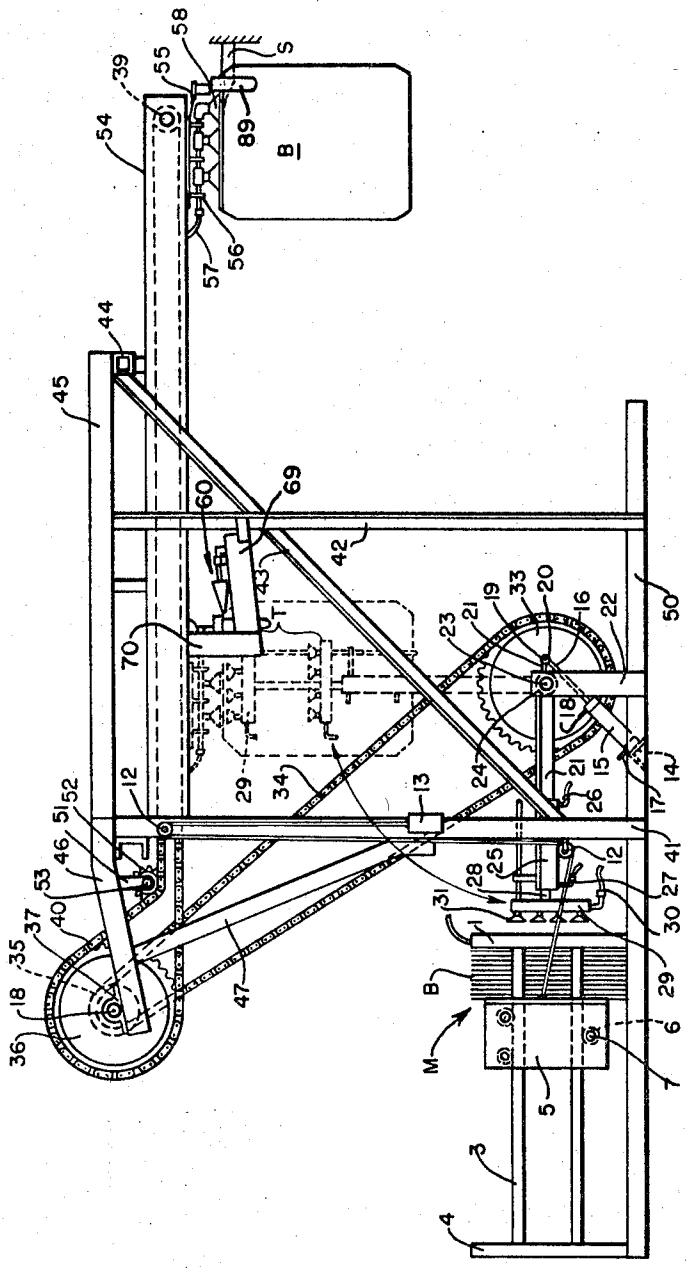

FIG. 1

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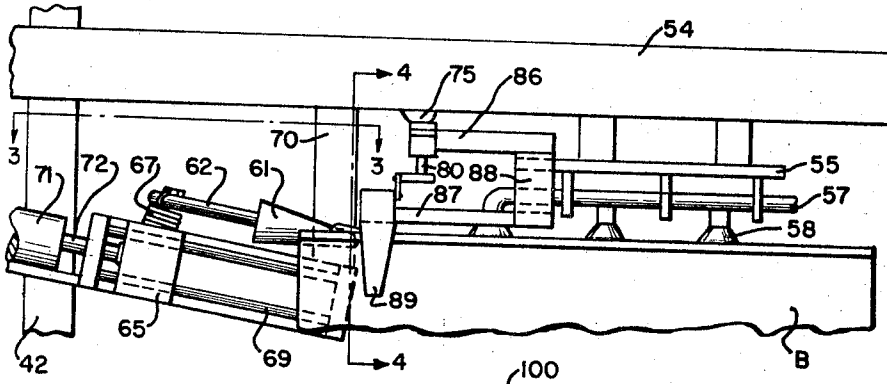


FIG.2

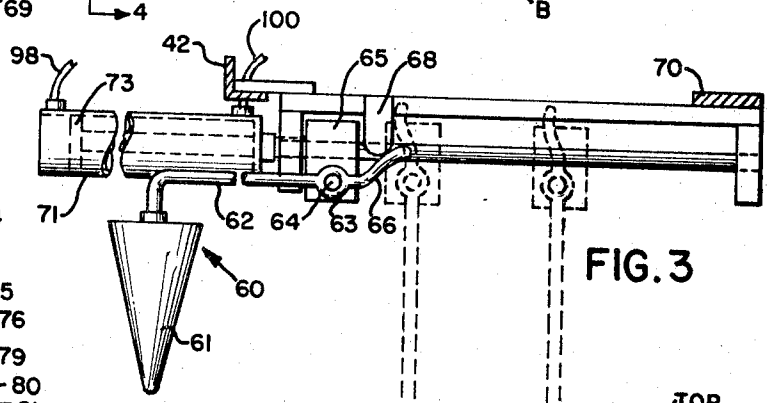


FIG.3

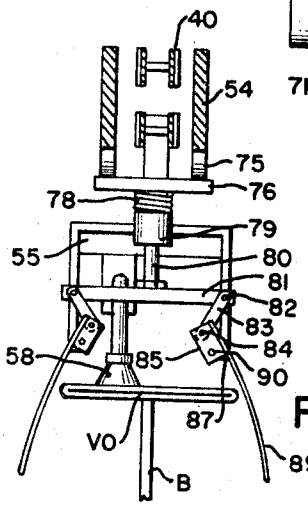
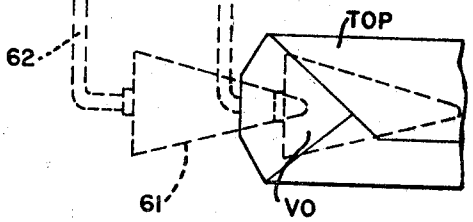


FIG.4



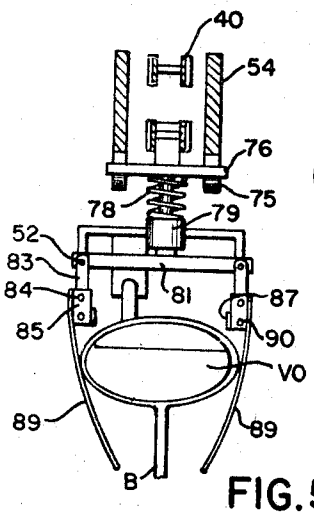


FIG.5

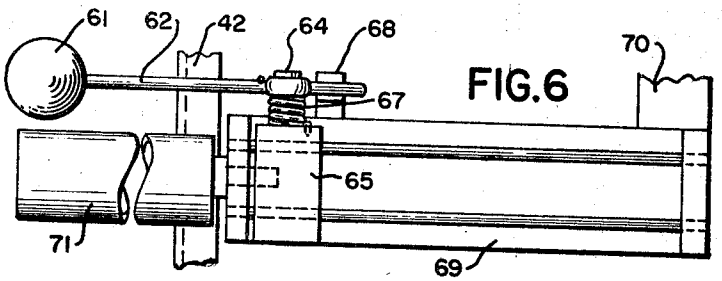


FIG.6

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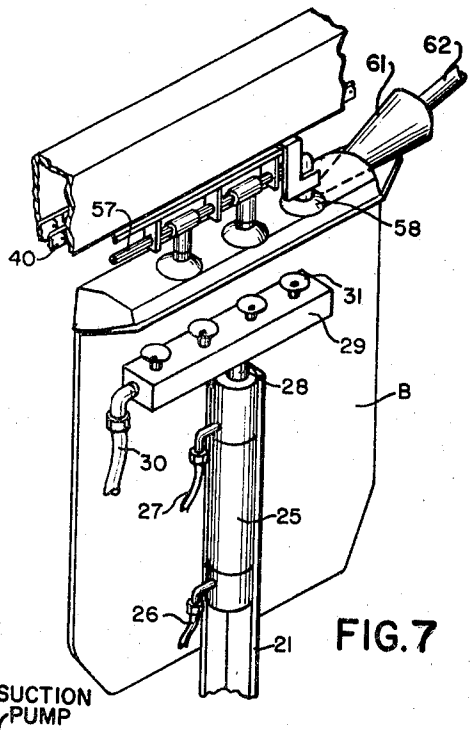

FIG. 7

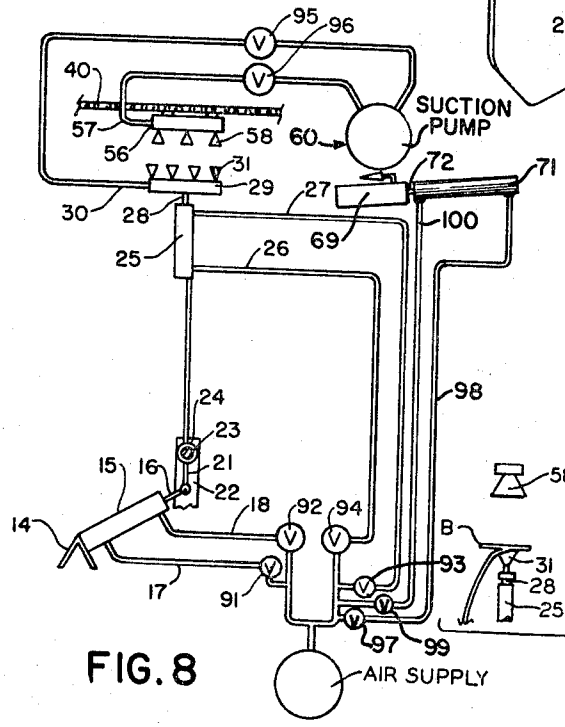

FIG. 8

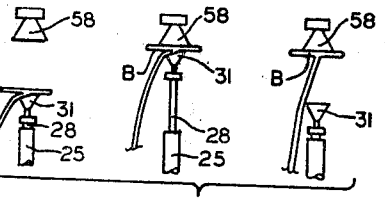

FIG. 9

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3,423,903

BAG POSITIONING APPARATUS

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Continuation-in-part of application Ser. No. 310,071, Sept. 19, 1963. This application Nov. 28, 1966, Ser. No. 597,320
U.S. Cl. 53—188 10 Claims
Int. Cl. B65b 1/02, 1/08, 3/08

ABSTRACT OF THE DISCLOSURE

An apparatus is disclosed for automatically dispensing and transporting valve bags to the spout of an automatic filling machine wherein the valve is positively opened prior to the bag being fitted over the filling machine spout.

Cross reference to related application

This application is a continuation-in-part of my co-pending application for Bag Dispensing, Transporting and Positioning Apparatus, Ser. No. 310,071, filed Sept. 19, 1963 now U.S. Patent No. 3,287,879 Nov. 29, 1966.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to the automatic filling of bags and more particularly to the automatic placement of valve type bags onto the spout of an automatic filler. In the art of filling bags, there are two prevalent methods. One involves the filling from the top of an open bag which is later sewn or sealed in well known manner. However, particularly with light and fluffy materials, it is difficult to fill an open bag from the top since the material tends to blow back out into the filling room. As a consequence, a species of bags known in the trade as "valve bags" have been developed. Bags of this general classification are disclosed by Contryman in U.S. 2,378,285; by Burroughs in U.S. 2,528,419 and by Lee in Reissue 23,230. These bags are of the multi-ply paper variety and instead of being open at the top are adhesively sealed at one end and along the length of the top with the other end of the top remaining open to form a valve opening. In some instances, the unsealed end is tucked in at 90° to the body of the bag; and such bags are termed internal valve bags. In other instances, the unsealed portion is not tucked in but remains open in the form of a spout. These bags are referred to as external valve bags and the unsealed portion is later tucked in and adhesively sealed after the bag is filled. (See, for example, the patent to A. R. Swenson, 3,083,780.) In any event, the valve opening occupies the upper corner of the bag and it is necessary to properly position the bag for transport to the filling spout so that the valve opening faces the filling spout and to provide means for fitting the spout into the valve opening.

Prior art

Initially, valve bags were placed onto the filling spout manually so that an operator would stand between two filling spouts and place a valve bag onto a spout with his right hand and with his left hand as each of the bags was filled. Attempts to automate the placement of the valve bags onto the filling spout have not been without difficulty. It has been found that in order to properly fit the bags onto the spout that it is necessary to positively open the valve prior to the bag reaching the area of the filling spout.

SUMMARY

The present invention provides a method and means whereby the valve is positively opened while the bag is in route from the bag pickup station to the filling spout. This is accomplished by use of a valve insertion member which is positively inserted into the valve of the bag while the bag is in its path of travel toward the filling spout. Additionally, there are provided depending finger members which grasp the valve portion of the bag to positively open same prior to the bag being placed over the filling spout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of the bag dispensing transporting and positioning apparatus of this invention.

FIG. 2 is a fragmentary side elevation illustrating the relationship of the valve insertion member to the depending fingers of the bag carrier.

FIG. 3 is a fragmentary plan view taken on lines 3—3 of FIG. 2 illustrating the movement of the valve insertion member.

FIG. 4 is a vertical section, partially in elevation, taken on lines 4—4 of FIG. 2, illustrating the depending fingers in open position.

FIG. 5 is a vertical section, partially in elevation, taken on lines 4—4 of FIG. 2, illustrating the depending fingers in closed position.

FIG. 6 is a fragmentary side elevation illustrating the relationship of the valve insertion member to the cylinder and track mounted on the frame of the apparatus.

FIG. 7 is a view in perspective illustrating the relationship of the head of the valve insertion member to the carrier and bag at insertion position.

FIG. 8 is a diagrammatic view of the pneumatic and suction systems.

FIG. 9 is a schematic view, illustrating the relation of the first suction means to the second suction means and to the bag at the bag transfer position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail, the magazine M comprises front post **1** and rear post **4** which are connected together by side rails **3**. Attached to the front post **1** is an inverted T shaped front member containing a curved lip at the top. The rear member of the magazine is made up of rear plates **5** containing rollers **6** connected to shaft **7** which engage on side rails **3** and in which the plates **5** are connected together by rear transverse rails. Side plates **5** contain an eye member to which a cable is attached, which is trained over pulleys **12** and attached to weight **13**. Thus, the rear member is always being pulled toward front member **2**. The side rails **3** are spaced apart the length of the bag B so that the bags may be stacked in the magazine with their longitudinal axes in a horizontal plane and their minor axes in a vertical plane with one edge resting on the floor member. The folded over top portion of the bag is dispensed in the magazine so that it faces the rear.

Referring now to FIG. 1, the frame of the apparatus comprises bottom beam **50** and upright beams **41** and **42**. Connected to uprights **41** and **42** is a diagonal brace **43** running to and attached to transverse beam **44** at the top, which is connected in turn to horizontal beam **45** and an angularly extending beam **46** at the top of upright **41**. Another diagonal beam **47** is connected to upright **41** and to beam **46** to support the latter. An angle iron **14**, disposed so that its vertex extends upwardly, is connected across base beam **50**. Welded to said angle iron is double action air cylinder **15** containing piston rod **16** and air connections **17** and **18**. The piston rod **16** is connected by clevis bracket **19** to arm **21** by means of clevis pin **20**. Arm **21** is pivoted on shaft **23** which is journaled in upright support **22** by bushing **24**. At the far end of the

arm 21 is a double action cylinder 25 containing air connections 26 and 27 and piston rod 28. The piston rod is connected to suction manifold 29 which in turn is connected to suction line 30 and contains a series of suction cups 31. The large sprocket 33 is keyed onto the shaft 23 so as to be revolved by the extension or retraction of piston rod 16 of drive cylinder 15. Chain 34 is trained over sprocket 35 which in turn is connected to large sprocket 36 by shaft 38 journaled in pillow block 37. Cooperating with the large sprocket 36 is idler sprocket 39 over which chain 40 is trained. Chain 40 is trained over tension sprocket 52 which is journaled in vertical support 51 attached to beam 46 of the upper frame of the machine. Support 51 contains a slot (not shown) for adjusting the tension on the chain or for replacing the chain. Sprocket 52 is mounted on shaft 53 journaled in support 51. Members 54 form a housing for the chain 40 which is connected to the carriage 55 in conventional trolley connection. Carriage 55 contains suction manifold 56 which is connected to suction line 57 and contains suction cups 58.

As is shown in FIG. 1, the valve insertion member 60 is mounted on the frame 42 and 70 of the apparatus on track 69. The valve insertion member consists of a conical head 61, supported by arm 62 which contains an eye 63 through which pivot pin 64 is fixed. The pivot pin 64 is mounted in a slidable bracket 65 which rides on track 69. The end of the arm 62 is curved as at 66 to form a trigger member. Surrounding pin 64 is spring 67 which is anchored in the slidable bracket 65 (Note FIG. 6). A projection 68 from track 69 forms a fulcrum for the trigger member 66 of arm 62. The entire valve insertion member 60 is moved along track 69 by means of a pneumatic cylinder 71 having a piston 73 and a piston rod 72 which is connected to slidable bracket 65. Connected to cylinder 71 are air connections 98 and 100, respectively, which cause the piston 73 to be extended to drive the slidable bracket forwardly via line 98. Line 100 causes the piston 73 to retract pulling the slidable bracket 65 rearwardly. It will be noted that as the slidable bracket 65 is pulled rearwardly the trigger member 66 of arm 62 contacts the projection 68 and thus winds spring 67 as the bracket is pulled back to starting position as is shown in FIG. 3. As the valve insertion member starts toward insertion position, the piston rod 72 starts to extend thus releasing the trigger member 66 from the fulcrum 68 allowing the spring to snap the valve insertion member into the position shown in broken lines. As the piston rod extends further, the head 61 of the valve insertion member comes into contact with the top of the bag and thus is inserted into the valve opening VO, as is shown in broken lines in FIG. 3. Retraction of piston rod 72 is at a rate faster than the travel of the bag B so that the valve insertion member becomes disengaged from the valve opening and from the bag as the trigger member 66 comes into contact with the fulcrum 68 and thus causes the arm to swing back through an arc of 90° to starting position, and simultaneously places tension on spring member 67.

Associated with the carrier 55 is a pair of depending members 89 which tend to grasp the valve opening portion of the bag and hold it in open position until the bag is placed onto the spout of the filling machine. Referring now specifically to FIGS. 4 and 5, the depending members 89 are connected to the carrier by means of a toggle joint having links 83 and 85 connected by pin 84 which in turn is connected to a transverse bar 81. Connected in the center of the transverse bar 81 is a rod member 80. Surrounding the rod is a fixed collar 79 and spring 78. Directly above the spring member 78 is upper plate 76 which is connected to the rod 80 and which rides along the surface of the tramway housing 54 and the cam surface 75, for reasons which will be explained. The collar 79 is rigidly supported by support bar 86 which is mounted to the mounting bracket 88 which in turn is mounted to carrier 55. At the bottom of the mounting bracket 88 is support member 87 which is connected to the lower link 85 of the toggle joint by means of pivot pin 90.

It will be noted that pivot pin 90 connecting the lower link 85 of the toggle joint to stationary support 87 remains stationary as does collar 79. The transverse bar 86, rod 80 and the upper plate 76 connected to rod 80 moves up and down depending upon the surface of the housing 54 or of the cam 75 located in the first portion of the housing. Referring now specifically to FIG. 4, it will be noted that when the upper plate 76 is in contact with cam surface 75, thus depressing the transverse bar 81, this causes the toggle joint to bend at pivot point 84. Since the depending fingers 89 are secured to the lower links 85 of the toggle joints, these fingers extend laterally. However, as is shown in FIG. 5 once the upper plate 76 has passed the cam surface 75, the rod member 80 and transverse bar 81 are pulled upwardly thus causing the upper link 83 of the toggle joint to move upwardly and straighten the connection between links 83 and 85 thus forcing the depending fingers 89 medially to closed position. It will be noted that when the fingers 89 are in closed position as illustrated in FIG. 5, they are in contact with the lateral edges of the top of the bag and thus open the valve opening VO for easy positioning onto the filling spout. As is shown in FIG. 2, the cam surface 75 runs along the first portion of the housing of the tramway 54 thus holding the depending fingers 89 in open position until the bag reaches the insertion point of the valve insertion member 60. As the valve insertion member is inserted into the mouth of the valve opening, the cam surface 75 abruptly stops, thus allowing the upper plate member 76 to raise, pulling through means of rod 80, transverse bar 81 upwardly, thus straightening out the toggle joints and closing the depending finger 89 on the valve portion of the bag as illustrated in FIG. 5. Thus, by this operation, there is insertion of the head 61 of the valve insertion member 60 into the valve opening VO and simultaneously therewith a grasping by means of depending fingers 89 over the top and edge of the valve portion of the bag to hold the valve open until the bag reaches the filling spout.

Referring now to FIG. 8, the air supply to fluid motor 15 is by lines 17 and 18 controlled by valves 91 and 92, respectively. Cylinder 25 is controlled by valves 93 and 94 located in lines 27 and 26 respectively. Suction line 30 is controlled by valve 95 located between the suction pump and the suction manifold 29. Suction line 57 to suction manifold 56 is controlled by valve 96. The pneumatic cylinder 71 is controlled by valve 99 in line 100 and by valve 97 in line 98.

OPERATION

When valve 91 is opened, piston rod 16 is extended to lower arm 21 to its initial horizontal position in proximity to the magazine M. In this position, valve 94 is opened to extend piston rod 28 and suction valve 95 is opened to apply suction to suction cups 31. Thus, suction cups 31 grip the top of the body of the bag, near the valve end. Valve 91 is closed and valve 92 is opened to retract piston rod 16, causing arm 21 to rise through an arc of about 90°, thus removing the bag over the curved lip of the front member of the magazine. Sprocket 33, keyed onto shaft 23 is revolved one quarter of a revolution driving sprocket 35 via chain 34 which in turn drives sprocket 36 and chain 40 trained over idler sprocket 39 to move carrier 55 away from the spout along the tramway to bag transfer position T. Simultaneously with the opening of valve 92, valve 93 is opened to retract piston rod 28 so that the suction manifold 29 is brought down and out of the way for the arrival of carriage 55. Valve 94 is then opened and valve 92 closed so that the suction cups 31 containing the bag which is now disposed with its longitudinal axis directed vertically and with the valve opening VO facing the spout, are raised by extension of piston rod 28 so tht the top of the bag contacts the suction cups 58 on suction manifold 56 of the carriage 55.

Valve 96 is opened and valve 95 is closed so that the suction cups 58 of the carriage engage the top of the bag. Valve 93 is opened and valve 94 closed so as to retract the

suction manifold 29 via retraction of piston rod 28 and valve 91 is opened and valve 92 closed so as to extend piston rod 16 to lower the arm 21 to its initial horizontal position and to revolve sprocket 33 one quarter of a revolution to drive chain 40 through the power train of sprockets and chains 34, 35, 36, 39 and 40 previously described to drive the carriage 55 along the tramway toward the spout.

As carriage 55 is driven along the tramway, valve 97 is opened and valve 99 is closed so as to extend piston rod 72 and drive the valve insertion member 60 down the inclined track 69 toward insertion position. As the piston rod 72 starts to extend the trigger member 66 of arm 62 comes into contact with fulcrum 68 to release the tension of the spring 67 and thus spring the entire arm through an arc of 90° so that the head 61 of the valve insertion member faces the valve opening VO of the oncoming bag B. The piston rod 72 continues to extend, pushing the movable bracket 65 and the valve insertion member attached thereon toward the valve opening. As the head 61 of the valve insertion member approaches the valve opening of the bag, in a slightly downwardly inclined manner, the tip of the head is inserted into the valve opening VO. At the same time, the upper plate 76 comes to the end of cam surface 75 and is pushed by the pressure of spring 78 upwardly, thus pulling the rod 80 and the transverse bar 81 upwardly to straighten the toggle joints around pivot pin 84. The depending fingers 89 secured to the lower link 85 of the toggle joints are thus closed over the lateral surfaces of the top of the bag, holding the valve opening VO of the bag in open position while the head 61 is still inserted therein.

Valve 97 is then closed and valve 99 is opened so as to force the piston 73 and the piston rod 72 driven thereby backwardly so as to retract the piston rod and pull the movable bracket 65 rearwardly thus pulling the head 61 out of engagement with the valve opening VO of the bag B. As the movable bracket 65 is retracted, the trigger member 66 of arm 62 comes into contact with fulcrum 68 and thus forces the arm 62 to pivot around pin 64 through an arc of 90° and thus apply tensioin to spring 67 for the next insertion operation.

The bag B continues its trip along the tramway to the filling spout with the valve opening VO held in open position by means of closed depending fingers 89. The valve opening VO is then placed over the spout and the whole operation is repeated.

The various valves may be opened and closed manually or through a series of controls arranged to open and close same in the sequence set forth.

Many modifications will be apparent to those skilled in the art from the detailed description of the invention which is meant to be exemplary in nature and non-limiting execpt as to be commensurate in scope to the claims attached hereto.

What is claimed is:

1. An automatic bag positioning apparatus, for use in picking up and positioning a valve bag onto a spout of a bag filling machine including:
- (A) a movable carrier,
- (B) a tramway, in operative relation with said carrier;
- (C) a gripping means associated with said carrier for gripping a bag at the top and moving said bag along a path defined by said tramway to said spout;
- (D) a frame for said apparatus,
- (E) the improvement which comprises means for positively opening the valve of said bag prior to positioning said bag onto said spout including:
  - (1) a valve insertion member mounted on said frame for movement,
    - (a) from a starting position out of the path of said bag,
    - (b) to an insertion position in the path of said bag at the level of said valve for insertion in said valve,
    - (c) thence out of engagement with the valve and back to said starting position,
  - (2) mounting means for said valve insertion member, and,
  - (3) operating means for moving said valve insertion member from said starting position to said insertion position and thence back to said starting position.

2. An automatic bag positioning apparatus, as defined in claim 1, in which:
- (A) said valve insertion member includes:
  - (1) a conical head, and,
  - (2) an arm pivotably mounted on said frame so as to swing from said starting position through an arc of 90° to said insertion position and thence swing backwardly through said arc to said starting position.

3. An automatic bag positioning apparatus, as defined in claim 1, in which the mounting means for said valve insertion member include:
- (A) a track mounted on the frame of said apparatus
- (B) said valve insertion member being mounted on said track so as to move,
  - (1) forwardly toward the path of said bag as said valve insertion member moves to insertion position,
  - (2) thence rearwardly in the direction of the path of said bag so that said valve insertion member moves back to starting position.

4. An automatic bag positioning apparatus, as defined in claim 3, in which:
- (A) said track is mounted so as to incline downwardly, so that:
  - (1) the valve insertion member, at starting position, is on a plane above that of the valve of said bag, and,
  - (2) at insertion position, is on a plane with the valve of said bag.

5. An automatic bag positioning apparatus as defined in claim 1, in which:
- (A) said operating means for moving said valve insertion member is operative to cause the rearward travel of said valve insertion member to proceed from insertion position back to said starting position at a rate greater than the rate of travel of said bag.

6. An automatic bag positioning apparatus as defined in claim 1
- (A) the further combination therewith of a pair of depending finger members mounted on said carrier,
  - (1) said finger members, in open position, extending laterally, and,
  - (2) in closed position, move medialy, so as to grasp the valve portion of said bag while the valve insertion member is inserted therein;
- (B) means for moving said finger members from open to closed position.

7. An automatic bag positioning apparatus, as defined in claim 6, in which:
- (A) said means for moving said finger members from open to closed position comprises:
  - (1) a pair of toggle joints operatively connected to move the finger members from an angular position to an extended position,
  - (2) A spring loaded member operatively connected to move the toggle joints; and
  - (3) means for actuating said spring loaded member.

8. An automatic bag positioning apparatus as defined in claim 7, in which:
- (A) said spring loaded member comprises:
  - (1) a bar connected near its end to a link of each toggle joint;
  - (2) a rod member connected to the middle of said bar; and
  - (3) a spring member surrounding said rod so as

to place biasing pressure on said rod to operate said toggle joint.

9. An automatic bag positioning apparatus as defined in claim 7, in which:

(A) said means for actuating said spring loaded member includes a cam member, located in proximity to said tramway at a point corresponding with the inserted position of said valve insertion member.

10. An automatic bag positioning apparatus for use in picking up and positioning a valve bag onto a spout of a filling machine including:

(A) a movable carrier;

(B) a tramway in operative relation with said carrier;

(C) gripping means associated with said carrier for gripping a bag at the top and moving said bag along a path defined by said tramway to said spout;

(D) the improvement of a means for opening the valve of said bag prior to positioning said bag onto said spout, including:

(1) a pair of depending fingers mounted on said carrier,

(a) said fingers, in open position, extending laterally and,

(b) in closed position, move radially to grasp the valve portion of said bag and open said valve;

(2) means for moving said finger members from open to closed position comprising:

(a) a pair of toggle joints operatively connected to said pair of depending fingers;

(b) a spring loaded member operative to move the toggle joints from an angular position to an extended position; and,

(c) means in proximity to said tramway for actuating said spring loaded member.

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E. F. DESMOND, *Assistant Examiner.*

141—68, 315; 53—384