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Durant et al.

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[45] **Feb. 13, 1973**

[54] **VALVE BAG PLACER**

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[52] **U.S. Cl.** **53/190,** 53/64, 53/386, 141/68

[51] **Int. Cl.** **B65b 43/26**

[58] **Field of Search** 53/188, 190, 386; 141/68

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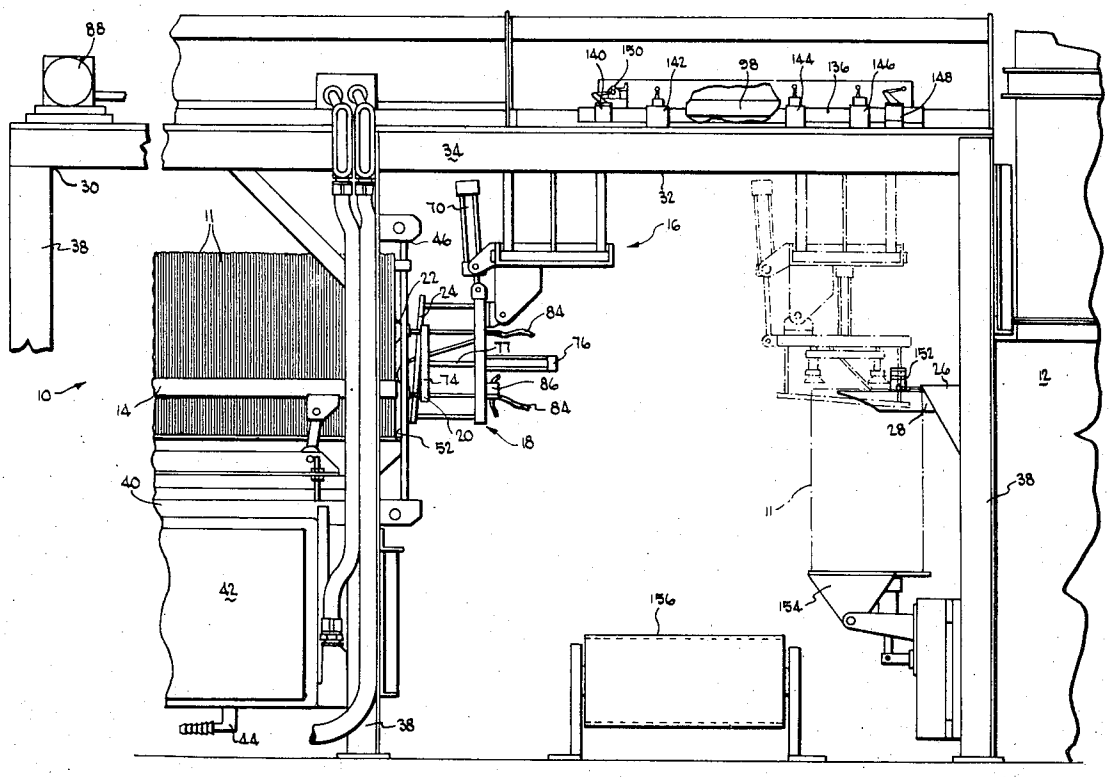
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[57] **ABSTRACT**

Apparatus for removing valve bags from a magazine and placing the bags onto a horizontal filler spout for filling with flowable material. Handling means having a pair of grippers picks the forwardmost bag from the magazine and then pulls the bag valve open using an associated opening element. The bag valve is positively held open while the handling unit travels to the filler where the valve is inserted over the aligned spout. The apparatus is adapted to serve a pair of side-by-side fillers from a single magazine because lateral shifting of the handling means can be effected during its travel to align it with either filler spout. The operation is fully automatic and embodies a pneumatic control system which regulates each step of the bag-placing operation.

10 Claims, 4 Drawing Figures



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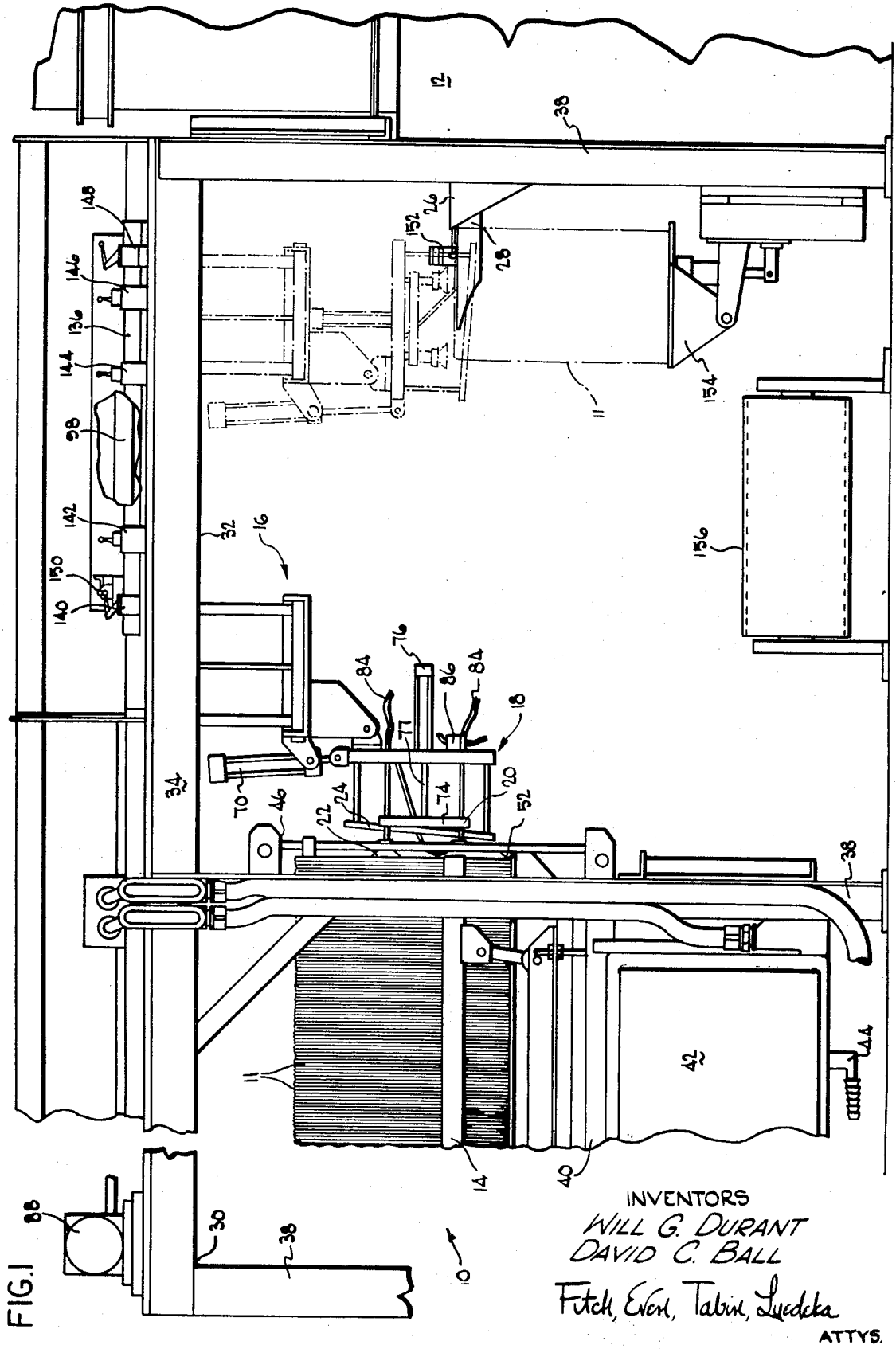


FIG. 1

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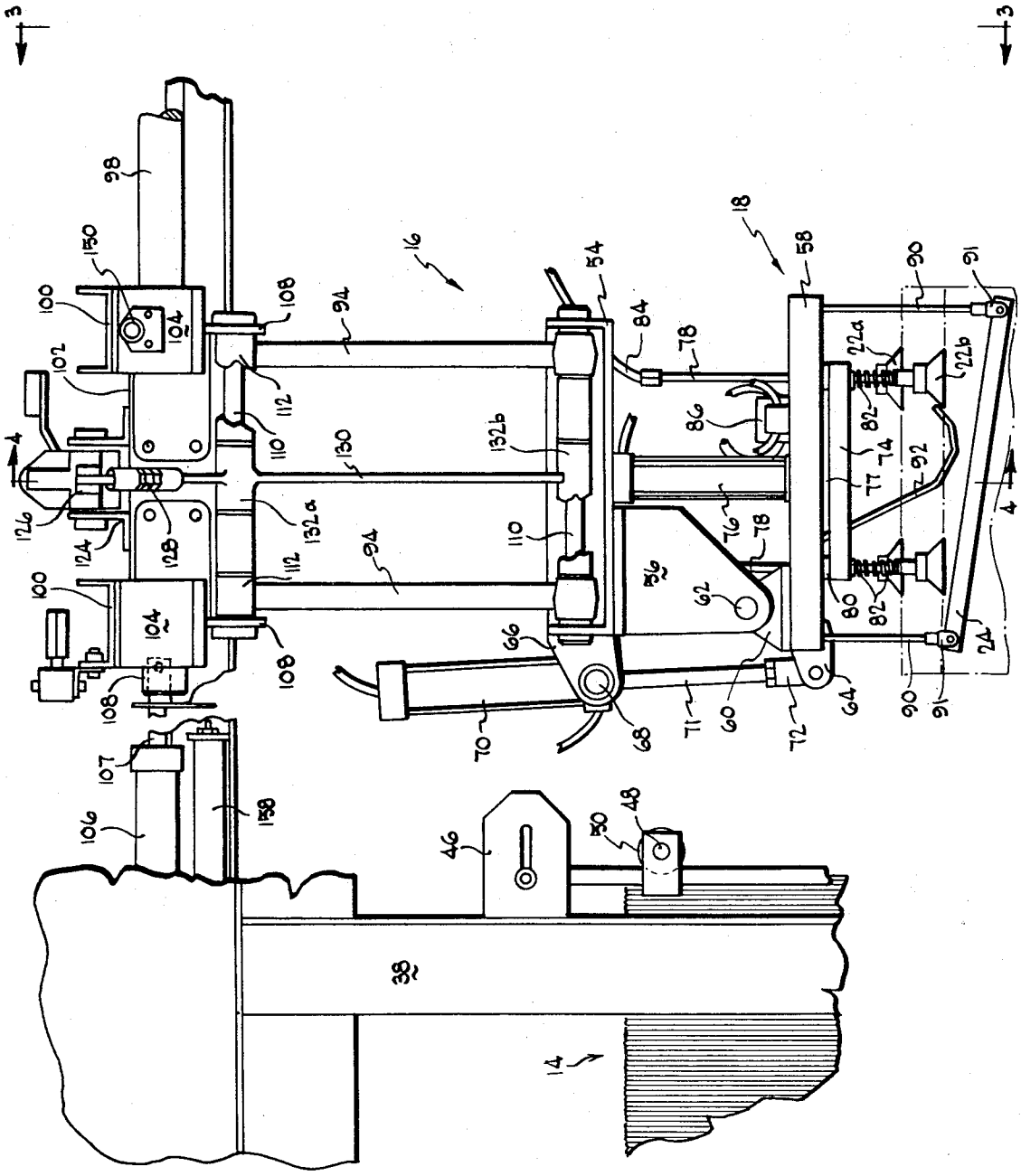
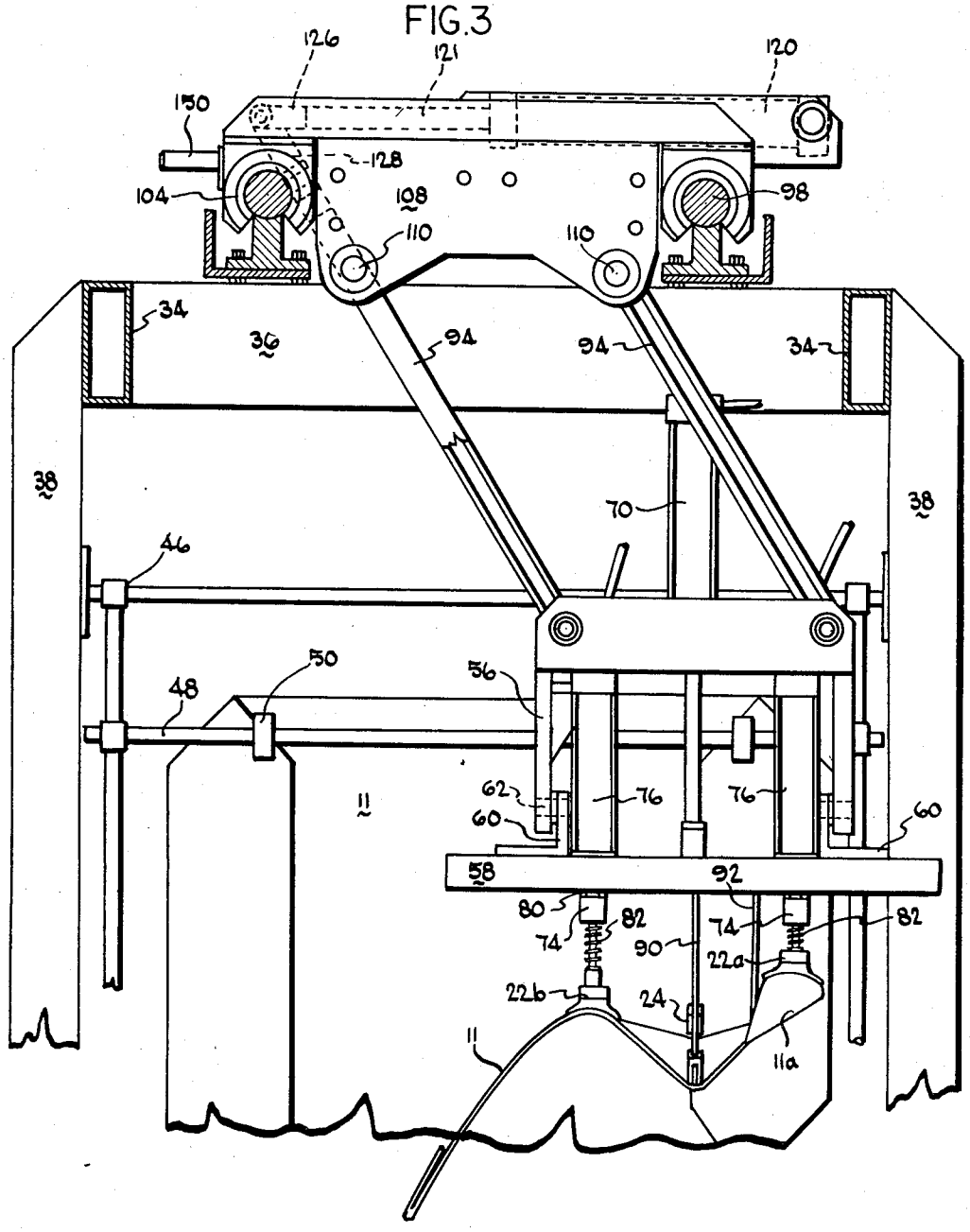


FIG. 2

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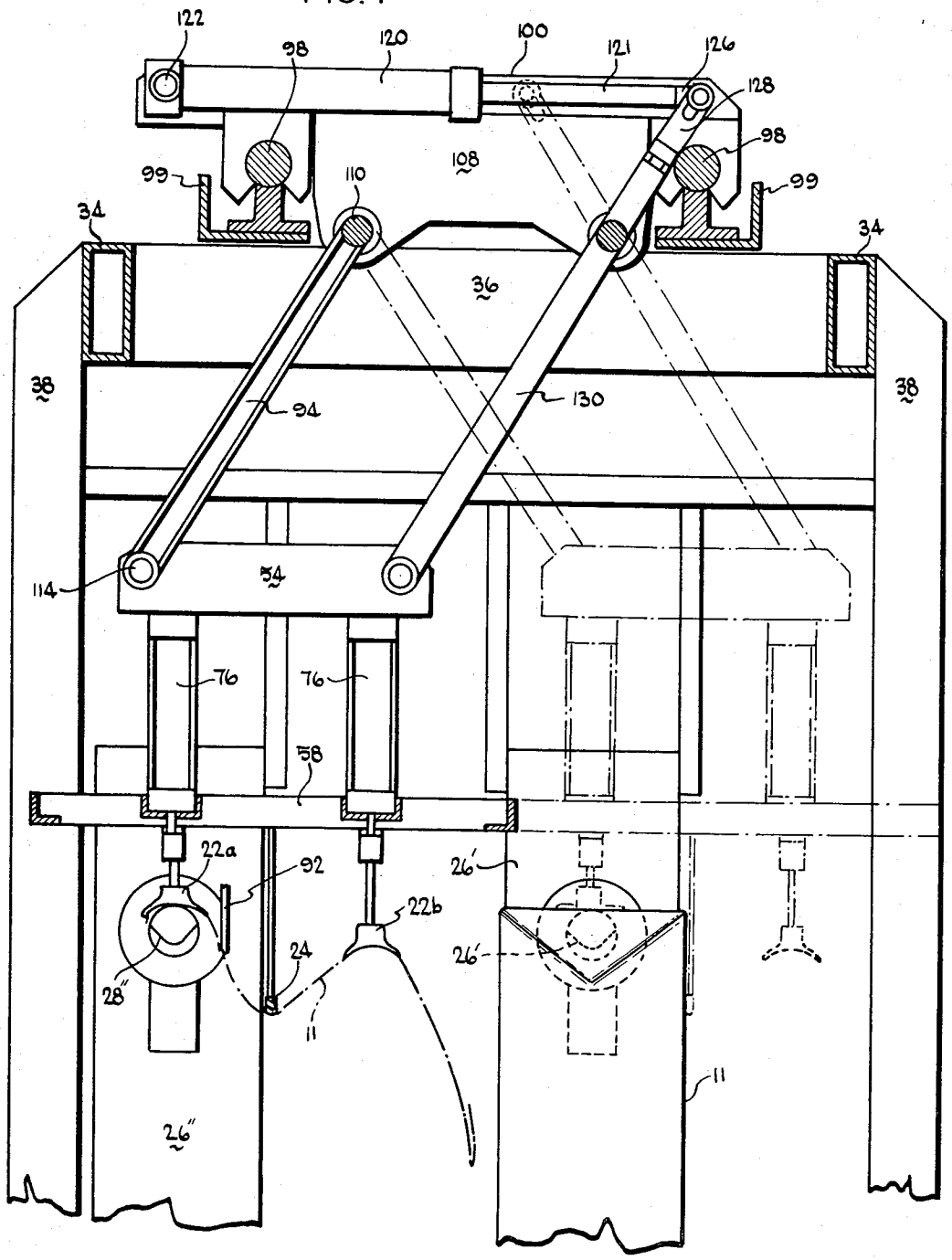
FIG.3



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FIG.4



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VALVE BAG PLACER

The present invention relates to apparatus for placing bags in position to be automatically filled by a suitable filler or packer. More particularly, the invention relates to apparatus for placing valve-equipped bags upon filling apparatus having a pair of horizontal spouts through which the bags are then filled with flowable, particulate material.

Valve-bags are a type of container widely used for the transport of flowable or particulate material, such as flour, cement, grain, fertilizer, granular plastics, pigments and the like. The valve provides a conveniently closable opening through which the bag can be filled, usually by automatic filling apparatus. The valve typically is in the form of a collapsible elongated sleeve providing an aperture adjacent one otherwise closed end of the sleeve which is adapted to receive the filling spout. The valve can be of the internal type that closes automatically upon removal from the spout or of the external type that is manually or automatically folded inward for closure.

Valve-equipped bags are sometimes manually positioned upon such filling spouts; however, apparatus has been developed, such as that shown in U. S. Pat. No. 3,466,837, issued Sept. 16, 1969 to Thomas B. Sturges, for automating the positioning of valve bags. Such apparatus generally removes the bags one-by-one from a stack supported within a magazine, opens the valve of bag upon removal from the stack and swings the bag so as to insert the open valve onto the filling spout of the filler or packer.

Depending upon the materials with which the bags are being filled, it is often desirable to allow a filled bag to remain in position on the spout of the filling apparatus for a short time period after the flow of material has been cut off, to allow air and dust to be released into a dust manifold incorporated within the filling apparatus. This procedure results in both cleaner bags and in a cleaner working environment; however, the delay necessarily increases the length of the filling cycle, thereby decreasing overall machine output which is sometimes unacceptable.

Improvements in automatic valve-bag placers are desired.

Accordingly, an object of the present invention is to provide improved apparatus for placing valve-bags onto spouts for subsequent filling with particulate material.

Another object of the invention is to provide improved apparatus for opening valve-bags and positively holding them in open condition until placing them upon the appropriate filling spout of a filling apparatus.

Still another object is to provide improved apparatus for removing valve-bags from a single magazine and placing them either upon one or the other of a pair of side-by-side horizontal filling spouts.

These and other objects of the invention will become apparent with reference to the following detailed description and accompanying drawings, wherein:

FIG. 1 is a front elevational view of apparatus embodying various features of the invention for placing valve-equipped bags on the spouts of a filling apparatus, showing, in broken lines, the position during placement of a bag upon a spout;

FIG. 2 is an enlarged elevational view of a handling unit portion of the apparatus shown in FIG. 1, illustrated after it has removed a bag from the magazine and is moving toward the filling apparatus, the bag being shown in broken lines for clarity;

FIG. 3 is a side sectional view taken generally along line 3—3 of FIG. 2 but showing the handling unit after a bag has been removed from the magazine and pivoting to the horizontal position has occurred; and

FIG. 4 is a side sectional view taken along line 4—4 of FIG. 2, looking at the handling unit from the opposite direction from FIG. 3 after it has completed its travel to the filler, and showing, in broken lines, the position of the handling unit after it has been laterally shifted to alignment with the foreground filler unit.

Very generally, there is illustrated apparatus **10**, often referred to as a bag-placer, for individually placing valve bags **11** onto a filling apparatus **12**. The bag-placer **10** includes a magazine **14** in which a stack of valve-bags **11** are contained and handling unit **16** for removing the bags seriatim from the magazine and transporting them to the filling apparatus **12**. The handling unit includes a picker unit **18** that is mounted for pivotal movement of about 90°. In solid lines in FIG. 1, the picker **18** is depicted in the vertical position with a pair of gripper heads **20***a* and **20***b* which it carries extended and in contact with the forwardmost bag **11** in the magazine stack. In dotted outline, the handling unit **16** is shown after it has traveled to a location adjacent the filling apparatus **12** with the gripper heads **20** in retracted positions and with the picker unit **18** pivoted to its horizontal position.

Each gripper head **20** includes a pair of vacuum cups **22** which engage the bag **11** in the magazine **14** and pull the bag therefrom upon retraction of the gripper heads. For reference purposes, the gripper head **20***a* is referred to as the first gripper which carries vacuum cups **22***a*. The second gripper **20***b* carries vacuum cups **22***b*. Disposed between the gripper heads **20** is an opening bar **24** which retards the movement of the bag causing the valve **11**a to be pulled open during the retraction of the gripper heads **20**. No further relative movement occurs between the gripper heads **20** and bar **24**, so the valve is positively held in the open position.

Filling apparatus **12** includes a pair of filler units **26** of identical construction disposed side-by-side each other, as seen in FIG. 4. Because both of the fillers **26** are identical, the construction of only one of them is described. For purposes of identification, the filler **26'** is hereinafter referred to as the foreground filler and the filler **26''** is hereinafter referred to as the background filler, reference being made to FIG. 1 wherein only one filler **26** is shown. Each of the fillers **26** has a horizontal spout **28** proportioned to fit into the open valve **11**a of a valve bag **11**. The fillers **26** themselves are conventional in construction and form no part of the present invention. For illustrative purposes, reference is made to U. S. Pat. No. 3,576,312, issued Apr. 27, 1971 in the name of Thomas B. Sturges.

Upon removal of the bag **11** from the magazine **14** and pivoting of the picker unit **18** to its horizontal position, the open valve **11**a of the bag will be in direct horizontal alignment with the spout **28''** of the background filler **26''** so that, upon travel of the handling unit **16** linearally to the filling apparatus, the bag

will be automatically fit over the spout **28** (as exemplified in broken outline in FIG. **1**). However, the handling unit **16** can be laterally swung from the rear position as shown in full lines in FIG. **4** to the foreground dotted line position. In the foreground position, the handling unit **16** and particularly the first gripper head **20a** are aligned with the filling spout **28'** of the foreground filler, and upon travel to the filling apparatus **12**, the valve-bag **11** is inserted over the filling spout of the foreground filler.

Accordingly, the bag placer **10** is able to automatically serve as a pair of fillers **26** from a single bag magazine **14**. This proves to be quite an efficient arrangement because, as a bag **11** on one of the fillers is being filled, the handling unit **16** can be withdrawing another bag from the magazine **14** and placing it onto the spout of the other filler.

Referring now to the bag placer **10** in more detail, a structural supporting frame **30** is provided which includes an upper subframe **32** made up of several longitudinal parallel beams **34** interconnected by a plurality of cross beams **36**. The upper subframe **32** is supported by six upstanding columns **38** designed to rest on the floor of the building. Suitable bracing members are included throughout. The magazine **14** is supported upon an intermediate subframe **40** affixed to four of the columns **38**, and space is provided for supporting a pneumatic control box **42** below the magazine. The control box **42** includes a depending connector **44** for attachment to a source of high pressure air.

The magazine **14** may be of conventional construction to hold a horizontally extending stack of valve bags **11** each of which, in its folded flat condition, generally occupies a vertical plane. As best seen in FIG. **3**, the bags **11** are arranged in the magazine **14** with their principal axes horizontal. In the illustrated embodiment, the bags **11** have righthand valves and in the magazine **14**, the valve is pointed downward and is at the righthand side (as viewed in FIG. **3**). The magazine mechanism is designed to press the bags to the end adjacent the filling apparatus **12**, and a bag retainer assembly **46** is provided to locate the forwardmost bag at the desired position. In the illustrated embodiment, the retainer assembly **46** includes a horizontal rod **48** which is suitably supported near the upper end of the magazine and which carries a pair of rollers **50** that position the bags in place but permit the forwardmost bag to be pulled thereunder by the action of the gripper heads **20**. A leaf spring **52** is preferably provided adjacent the lower edge of the magazine **14** to appropriately locate the lower side edge of the forwardmost bag. The magazine construction allows the forwardmost bag **11** to be pulled therefrom by the gripper heads **20** and thereafter locates the next bag in line in its place adjacent the retainer assembly.

The handling unit **16** includes a frame assembly **54** that supports a pair of depending brackets **56**. The picker unit **18** includes a plate or frame **58** having a pair of upstanding lugs **60**. A pair of pins **62** affixed in apertures in the lugs **60** and in bearings (not shown) in the depending brackets **56** pivotally connect the picker frame **58** to the underside of the handling unit frame **54**. As viewed in FIG. **2**, a clevis **64** is suitably affixed to the lefthand side of the picker frame **58** and a pair of pivot brackets **66** are carried at the lefthand edge of the overlying handling unit frame **54**. A pair of pivot pins **68** mount the lower end of an air cylinder **70** between the pivot brackets **66**. The rod **71** of the air cylinder **70** carries an eye **72** at its bottom which is connected by a pivot pin to the clevis **64**. In FIG. **2**, the air cylinder rod **71** is shown in its extended position which causes the picker frame **58** to be oriented horizontally. In its retracted position as shown in FIG. **1**, the air cylinder **70** has pivoted the frame **58** from the horizontal orientation to a substantially vertical orientation.

The two gripper heads **20** of the picker unit **18** each include a bar **74** which in FIG. **2** is seen directly underlying the picker frame **58**. Each bar **74** is suitably connected at its center to the end of a rod **77** of an air cylinder **76** that is fixedly mounted to the upper surface of the picker frame **60**. All four of the vacuum cups **22** which the gripper heads **20** include are mounted on the lower ends of four parallel pipes **78** which extend downward through suitable bushings in the picker frame **60** and also through apertures provided near the ends of the two bars **74**. Suitable collars **80** disposed about each of the pipes **78** are located between the underside of the frame **60** and the upper surface of the bars **74**. The position of the collars **80** on the pipes **78** determines the vertical level at which the vacuum cups **22** will be located in the retracted position as shown in FIGS. **2** and **3**. Disposed about the lower ends of each of the pipes **78** between the bar **74** and the individual vacuum cups **22** are compression springs **82** which yieldably force the vacuum cups against the bags **11** in the magazine **14**.

When the frame **58** has been pivoted to the vertical orientation as shown in FIG. **1** and the handling unit **16** is in position at the lefthand side of the apparatus adjacent the magazine **14**, the air cylinders **76** carried by the picker **58** may be actuated. Extension of the cylinder rods **77** drives the bar **74** to the left, applying force to the four compression springs **82** which in turn press the vacuum cups **22** on the ends of the pipes **78** against the forwardmost bag **11** in the magazine stack, as shown in FIG. **1**. Each of the four pipes **78** is connected at its opposite end to a flexible vacuum line **84** which leads to a manifold **86** which is mounted on the same side of the picker frame **58** as the air cylinders **76**. When the air cylinder rods **77** are fully extended so that the four vacuum cups **20** are in contact with the forwardmost bag **11** in the magazine, the control mechanism **42** connects the manifold **86** to a vacuum pump **88** causing the four vacuum cups **20** to securely grip the forwardmost bag.

At the end of a preset number of seconds, the air being supplied to the air cylinders **76** is removed by the control mechanism **42** causing retraction of the cylinder rods **77** and return of the gripper bars **74** to the position adjacent the frame **58**. The opening bar **24** is held by a pair of threaded rods **90** which at one end are threaded into tapped holes in the picker frame **58**. The other ends of the rods **90** carry threaded holders **91** which adjustably interconnect the opening bar **24** to the supporting rods. As best seen in FIG. **2**, the righthand rod **90** is longer than the lefthand rod so as to space the lower end of the opening bar **24** farther from the picker frame **58** than the upper end, with reference to the picker being in the vertical orientation. This arrangement assures that the valve **11a** of the bag **11** is

consistently opened without unduly distending the remaining portion of the bag. Furthermore, as seen in FIGS. 2 and 3, the collars 80 on the pipes 78 are located closer to the first or rear pair of vacuum cups 22*a* than to the front pair 22*b*. These rear two vacuum cups 22*a* engage the upper surface of the valve bag 11, and the differential in relative movement accommodates the unfolding which occurs as the valve 11*a* is pulled open.

Upon retraction of the cylinder rods 77, the bag 11 which is being gripped by the four vacuum cups 22 is pulled out from the magazine, passing under the pair of locating rollers 50. As retraction continues, the opening bar 24 which, as seen in FIG. 3, is located midway between the front and rear pairs of suction cups 22 engages the sidewall of the bag. Engagement first occurs near the bottom because of the longer length of the lower rod 90. As earlier indicated, the valve bags 11 are loaded into the magazine 14 with the valve pointing downward. In the illustrated version, the bag 11 depicted is known in the trade as righthand valve bag (because of the location of the valve relative to the front face of the bag), and accordingly the bags are loaded into the magazine with the valves at the rear side of the magazine 14 (see FIG. 3).

As the retraction of the bars 74 and the vacuum cups 22 continues, the upper portion of the bag 11 is first unfolded from its flattened position in contact with the sidewall. Then as a result of the difference in length of the supporting rods 90, the engagement between the lower end of the opening bar 24 and the sidewall of the bag causes the valve 11a to be pulled open, as illustrated in FIG. 3. In this position, as shown in FIG. 4, the rear pair of suction cups 20a are in alignment with and just slightly above the filling spout 28'' of the background filler 26''. Thus, when the handling unit 16 is driven to the other end of the apparatus 10, the filling spout 28 enters the valve 11*a* which is being positively held open. As can be seen in FIG. 3, the opening bar 24 remains in contact with the sidewall of the bag throughout travel from the magazine 14 to the filler 12, thus positively assuring that inadvertent closure of the valve 11a cannot occur during this time interval. This positive action contributes to the overall reliability of the bag placer 10.

The picker unit 18 also includes a bag-present detector in the form of a wire, the free end of which is located between the suction cups 22*a* and the opening bar 24. The detector wire 92 is supported on the picker frame 58, and the other end of the wire closes a valve or switch (not shown) when the wire is displaced by the presence of a bag 11. If a bag is not present, the control mechanism 42 causes the picking cycle to be repeated. When retraction of the piston rods 77 of the air cylinder 76 is complete and the detector wire 92 indicates the presence of a bag, the pneumatic control mechanism 42 actuates the doubleacting air cylinder 70 to cause the cylinder rod 71 to be extended. Extension of the cylinder rod 71 pivots the picker unit 18 from the vertical position as shown in FIG. 1 to the horizontal position as shown in FIGS. 2 and 3. As soon as the extension of the air cylinder 70 is complete and a signal is received from one of the fillers 26 that it is ready to receive a bag, the control system 42 causes the handling unit 16 to be transported toward the filling apparatus 12.

The handling unit 16 is supported by four parallel links 94 in swinging relation beneath an overhead carriage 96. The carriage 96 slides on a pair of parallel rails 98 of circular cross section which are mounted on the cross beams 36 which extend between the longitudinal beams 34 of the upper subframe 32. As best seen in FIGS. 3 and 4, the rails 98 are appropriately secured to underlying supports 99, which in the illustrated embodiment are of heavy angle iron construction, that are bolted or otherwise affixed to the upper surface of the cross beams 36. The carriage rails 98 are of circular cross section and extend for the major portion of the distance between the righthand pair of columns 38 illustrated in FIG. 1, thus permitting the handling unit 16 to be transported from the magazine 14 to the filling apparatus 12. The carriage 96 includes a frame made up of a pair of laterally extending parallel channels 100 (FIG. 2) which are appropriately interconnected by an underlying longitudinally extending plate and brace substructure 102. Affixed to the undersides of the two lateral channels 100 at each end thereof are four bearing housings 104 which hold bearings that generally surround the upper portions of the rails 98.

The carriage 96 is moved longitudinally along the track provided by the two parallel rails 98 by means of a long pneumatic cylinder 106 which is mounted atop the upper subframe at a location generally above the magazine 14. As seen in FIG. 2, a piston rod 107 extends from the righthand end of the cylinder 106 and is suitably attached to a coupling 108 carried by the carriage and disposed generally below the lefthand lateral channel 100. In FIG. 2, the cylinder rod 107 is shown as it is beginning its travel from the magazine, and complete extension of the cylinder rod 107 drives the carriage 96 to the far end of the track, to the location depicted in broken lines in FIG. 1.

Depending generally centrally from the carriage beams 100 at a location between the bearing housings 104 are a pair of laterally extending support plates 108. Suitably journaled in the support plates 108 and extending longitudinally of the apparatus are a pair of parallel shafts 110 upon which sleeves 112 affixed to the upper ends of the links 94 are disposed. A similar pair of parallel shafts 114 are journaled in the handling unit frame 54, and sleeves 116 affixed to the lower end of the links 94 are disposed upon the shafts 114. A plurality of spacers 118 are also disposed on the shafts 110 and 114 to maintain the desired separation of the sleeves 116 and 118. The sleeves at the upper and lower ends of the links 94 desirably carry bushings to permit the free rotation thereof about the shafts 110 and 114.

To locate the handling unit 16 in the two desired lateral positions and to accomplished the shafting therebetween, a generally horizontally disposed air cylinder 120 is mounted atop the carriage 96 extending laterally generally midway between the parallel lateral beams 100. The blind end of the cylinder 120 is pivotally mounted via a pair of pins 122 to appropriate brackets 124. The free end of the cylinder rod 121 has a clevis 126 threaded thereto which is connected by a pivot pin to an adjustable coupling 128. An operating link 130 has an upper sleeve 132*a* and a lower sleeve 132*b* which are respectively disposed about the lefthand pair of upper and lower shafts 110, 114 as viewed in FIG. 3. Affixed to the upper sleeve 132*a* is an

upper extension **134** which has a threaded upper end that receives the adjustable coupling **128**. Thus, when the double-acting air cylinder **120** is in its extended position, the handling unit **16** is located in the rear position wherein the pair of suction cups **22***a* are aligned with the filling spout **28'** on the background filler **26'**. This arrangement is illustrated in FIG. **4** wherein the foreground filler **26''** is shown having a valve bag **11** on the spout that is in the process of being filled. However, to illustrate the lateral shifting movement, a broken line illustration is provided that is representative of the retraction of the double-acting air cylinder which shows the shifted alignment of the handling unit **16** that now places the suction cups **22***a* in alignment with the filling spout **28''** on the foreground filler unit. If desired, an auxiliary cam rod may be suitably attached to the clevis **126** at the end of the double-acting cylinder rod **121**, and the cam carried by such a rod may be used to actuate a pair of limit switches (not shown). These limit switches may be employed to provide a signal to the pneumatic control mechanism **42** to positively identify in which lateral position the handling unit **16** is located.

The overall control of the apparatus is via a timing bar **136** that is mounted adjacent the foreground upper rail **98**. The timing bar **136** is parallel to the foreground rail upon which the carriage slides and carries five pneumatic switches or valves **140**, **142**, **144**, **146** and **148**. All of these switches have upwardly extending roller arms, and they are suitably clamped to the bar **136** in a manner to permit minor adjustment along the length of the bar to achieve the precision of operation desired. The switches are actuated by a laterally extending finger **150** which is mounted to the side of the carriage and which projects over the timing bar **136** to a location where it will engage the rollers. These five switches, in combination with the main pneumatic control mechanism **42**, control the complete operation of the apparatus **10**.

The far righthand switch **148** (as viewed in FIG. **1**) when actuated by the finger **150** on the carriage instigates the control sequence set forth hereinafter. Initially, the air being supplied to the elongated cylinder **106** which drives the carriage **96** is terminated, thereby stopping the carriage with the valve bag **11** in the desired location over the filler spout **28**. A small pneumatic clamping cylinder **152** mounted on the filler **26** is actuated to clamp the bag to the spout. The supply of vacuum to the manifold **86** on the handling unit **16** is also terminated causing the four vacuum cups **22** to lose their grip on the bag, thereby causing the bag to fall to hang vertically from the spout with its lower end disposed atop a tiltable plateform **154** that is a part of the filling apparatus **12**. In most fillers of this type, the tiltable plateform **154** also incorporates a scale mechanism that is employed to assure the precise amount of material desired is packed into each bag. When the filling of a bag is complete, a short delay occurs while the particulate material is allowed to settle, and the filler may incorporate a device for exhausting some of the dust from the very top of the bag. At the end of this short delay, the platform **154** is tilted rearward and the filled valve bag automatically falls onto a traveling belt conveyor **156** or the like.

As soon as a valve-bag **11** has been placed onto a spout **28**, the clamping cylinder **152** is actuated, and the source of vacuum is cut off from the vacuum cups, the carriage is driven back to the magazine. The control system **42** immediately actuates the elongated double-acting cylinder **106** causing the cylinder rod **107** to retract and thereby pull the carriage to the left along the track, as shown in FIG. **1**. The switches **142**, **144** and **146** are constructed so that they only operate when the roller arm is displaced in a predetermined direction, i.e., either clockwise or counter clockwise. Only the switch **146** is operable upon the return travel of the carriage.

As the carriage **96** begins to travel back toward the magazine, the projecting finger **150** first engages the switch **146** which supplies air to the cylinder **70** causing it to retract and thereby pivot the picker unit **18** of the handling unit **16** to its vertical orientation. Air is also supplied to the ram end of the lateral cylinder **120**; however no movement occurs if it is already in its extended condition. If the cylinder **120** should be in its retracted position, as a result of having placed a bag on the foreground filler, it is extended. The central switch **144** and the next switch **142** are only actuated when the roller arms are moved clockwise and thus do not function during the return of the carriage to the magazine.

When the projecting finger **150** engages the rearwardmost switch **140**, the supply of high pressure air to the main drive cylinder is terminated thus stopping movement of the carriage, and a shock absorber **158** is used to cushion the stop. The switch **140** also begins the sequence for with-drawing the next bag from the magazine. With the cylinder **70** in its fully retracted position, high pressure air is fed to the twin air cylinders **76** causing their extension and the ultimate pressing of the four suction cups **22** against the forwardmost bag in the magazine. As soon as the cylinder rods **77** are fully extended, so that the vacuum cups **22** are in engagement with the bag **11**, the vacuum pump **88** is connected to the vacuum manifold **86** on the picker unit **18** so that all four vacuum cups firmly grip the engaged surfaces of the bag. The high pressure air is removed from the twin air cylinders **76** to retract the pair of bars **74** thus withdrawing the vacuum cups **22** from the front of the magazine. Withdrawal causes the forwardmost bag **11** to slip under the upper retaining rollers **50** and out from the lower leaf spring **52**, thus freeing it from the magazine. As previously indicated, as a result of the location of the opening bar **24**, the valve **11a** is pulled open and points vertically downward. Inasmuch as there is no further relative movement between the vacuum cups **22** and the opening bar **24** until the valve-bag has been inserted over the spout **28**, there is positive insurance that the valve **11***a* will be fully open at the end of the carriage travel at which time the placing of the bag **11** occurs. The bag detector **92** will be moved by the presence of a bag on the picker unit **18**, and if for some reason a bag was not picked up, the picking cycle is repeated until a bag **11** is in position for placing.

After the retraction of the twin air cylinders **76** is complete, the handling unit **16** dwells in this position until a signal is received that one of the filler units **26** is ready for a bag. The signal is communicated to the pneumatic control unit **42** from the clamping cylinder

152 of the filler unit. The pneumatic control mechanism 42 begins the forward or placing sequence of the handling unit 16 by supplying high pressure air to the piston end of the main drive cylinder 106 causing the carriage 96 to begin to travel down the track toward the filling apparatus 12. The projecting finger 150 first engages and rotates counterclockwise the roller arm on the switch 142 which causes high pressure air to be supplied through to the piston end of the air cylinder 70 causing its extension. Extension of the cylinder rod 71 causes the picker unit 18 of the handling unit 16 to pivot 90° to its horizontal orientation. If the signal received by the control unit 42 was from the filling spout 28'' of the reareground filler 26'' then no lateral shifting of the handling unit 16 is needed. However, if the signal was received from the clamping cylinder 152 of the foreground filler 26', the control circuit is such that (when the projecting finger of the carriage hits the second switch 142) air is supplied to the rod end of the lateral cylinder 120 to retract the rod 121 and laterally shift the handling unit 16 forward to align the bag valve 11*a* with the spout 28' of the foreground filler 26'.

Clockwise movement of the roller arm on the center switch 144 is utilized as a safety feature. If the cylinder 120 is either fully extended or fully retracted, the switch 144 has no effect. However, if the cylinder rod 121 is being retracted and retraction has not been completed for some reason, the supply of air to the main cylinder 106 is discontinued temporarily to halt further travel of the carriage 96 until retraction is complete and the bag valve 11*a* aligned with the spout 28'.

The next switch 146 is ineffective. At the end of the carriage travel with the valve 11*a* inserted over the filling spout 28', actuation by the projecting finger 150 of the final switch 148 ends the extension of the main cylinder 106 and thus the movement of the carriage 96 toward the filling apparatus. As previously indicated, the small clamping cylinder 150 on the filler 26' is actuated to clamp the bag 11 to the spout 28' and the source of vacuum is cut off at the manifold 86 thereby disengaging all four vacuum cups 22 from the bag.

The timing is such that the bag placer 10 can effectively return to the magazine 14, withdraw another bag 11 and place it upon one filler while the other filler is completing the filling of the bag disposed thereupon. Thus, as the filled bag, after a short delay for settling, is discharged to the belt conveyor 156, the bag placer 10 has withdrawn another bag from the magazine and is waiting for a signal to place it upon that filling spout. Accordingly, as a result of the design of the bag placer 10, and particularly the positive opening of the valve 11*a* which is held throughout the carriage travel, the movement can be made rapid enough for the bag placer 10 effectively service a pair of fillers 26.

As previously indicated, the positive opening of the bag is assured by the relative placement of the opening bar 26 between the first and second gripper heads 20. The placement of the vacuum cups on the bag is also important to insure consistent performance. The first gripper 20*a* engages the upper portion of the bag 11 while the second gripper 20*b* should engage the sidewall of the bag at the location between about 25 and 50 percent of the distance below the top of the bag to assure that consistent opening of the valve 11a results.

While the application discloses and illustrates the best mode presently contemplated by the inventors, it should be apparent that various modifications such as would be obvious to one having the ordinary skill in the art may be made without departing from the scope of the invention that is set forth in the appended claims. For example, in order to adapt the bag placer 10 for operation with bags having a lefthand valve (which would be loaded into the magazine 14 with the valves adjacent the lefthand side as seen in FIG. 3) several controls are simply reversed so as to have the laterally disposed air cylinder 120 in its retracted condition when the handling unit 16 returns to the magazine. The position of the collars 80 on the pipes 78 that hold the vacuum cups 22 are also reversed so that the suction cups 22*a* would depend below the suction cups 22*b*. With such an arrangement, it can be seen that the opening of the bag will be just the same as shown in FIG. 3 except that the bag orientation will be reversed with the lefthand suction cups 22*b* gripping the upper surface of the bag.

Various features of the invention are set forth in the following claims.

What is claimed is:

1. Apparatus for placing bags having a valve at one corner thereof onto a horizontal filler spout for filling with flowable material, which apparatus comprises a magazine for holding a generally horizontal stack of aligned bags with the valve of each bag pointing downward, handling means for removing the bags seriatim from said magazine, said handling means including first gripping means for engaging the forwardmost bag along a vertical edge thereof which constitutes the upper portion of the bag and overlies the valve and second gripping means for engaging the sidewall of the bag, opening means mounted upon said handling means at a location between said first and second gripping means, means for moving said first and second gripping means between extended and retracted positions whereby movement to said retracted position results in engagement between the sidewall of the gripped bag causing the valve to be pulled open and held in the open position, means for pivoting said handling means about 90° **from a substantially vertical orientation at which it engages the forwardmost bag in said magazine to a substantially horizontal orientation so that the valve of the engaged bag is pointed horizontally, means for transporting said handling means from a position adjacent said magazine to a position adjacent the filling spout, said first gripping means being located so the spout enters the open valve of the bag during the final travel of said handling means toward the spout, and means for disengaging said first and second gripping means from the bag upon completion of travel toward the filling spout.**

2. Apparatus in accordance with claim 1 wherein said handling means includes a member which supports said first and second gripping means for movement between said extended and retracted positions, which movement occurs in directions normal to said support member, and wherein said opening means includes a bar that is mounted obliquely to said support member with the lower end thereof being spaced farther from said support member.

3. Apparatus in accordance with claim 2 wherein said opening bar lies in a vertical plane.

4. Apparatus in accordance with claim 1 wherein said first and second gripping means move in parallel directions, and wherein said first gripping means is spaced from said second gripping means a distance equal to between about 25 and 50 percent of the height of the bags.

5. Apparatus in accordance with claim 1 for placing bags upon a pair of generally side-by-side filling spouts wherein said handling means is aligned with one of said spouts at the time it removes a bag from the magazine and wherein means is provided for selectively laterally shifting said handling means to align it with the other filling spout.

6. Apparatus in accordance with claim 5 wherein said transporting means includes a carriage, wherein said lateral shifting means includes a plurality of links having horizontal pivot points and extending between said carriage and said handling means, which links support said handling means in depending relation from said carriage and wherein means is provided on said carriage for moving said links over-center between two positions wherein said handling means is at the same vertical level.

7. Apparatus in accordance with claim 6 wherein a fluid-powered cylinder is mounted laterally of said carriage and attached to one of said links whereby movement of said cylinder between extended and retracted positions aligns said first gripping means with a different filling spout.

8. Apparatus for placing valve-equipped bags onto a filler having two horizontally projecting filling spouts, which apparatus comprises a magazine for holding a plurality of valve bags, handling means for gripping the forwardmost bag in said magazine to remove the bags seriatim therefrom, opening means mounted upon said handling means for engaging a gripped bag to open the valve thereof and to hold same open until the bag is disposed upon one of the filling spouts, means for transporting said handling means from a position adjacent said magazine to a position adjacent the filler, and means for laterally shifting said handling means between a first and a second position, said handling means in said first position being aligned both with the bags in said magazine and with one of the filling spouts and in said second position being aligned with the other of the filling spouts, whereby incident to transportation of said handling means the bag carried by said handling means is placed onto the aligned spout at the end of its travel to the filler.

9. Apparatus in accordance with claim 8 wherein said transporting means comprises a carriage movable along a straight track extending generally between said magazine and the filler and a plurality of pivotable links supporting said handling means in depending relation from said carriage, and wherein said lateral shifting means includes reciprocating means movable between an extended and a retracted position for pivoting one of said links to thereby shift said handling means between said first and second positions.

10. Apparatus in accordance with claim 9 wherein means is provided for halting movement of said carriage toward the filler at a predetermined location along said track if, at that time, said handling means is not in either said first position or said second position.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,715,858 Dated February 13, 1973

Inventor(s) Will G. Durant and David C. Ball

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 6, line 55, cancel "accomplished the shafting" and insert --accomplish the shafting--.

Column 7, lines 56 and 58, correct the spelling of "platform".

Column 9, line 58, insert --to-- before "effectively".

Column 10, line 45, after "bag", insert --and said opening means--.

Signed and sealed this 5th day of February 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents

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