

Sept. 16, 1969

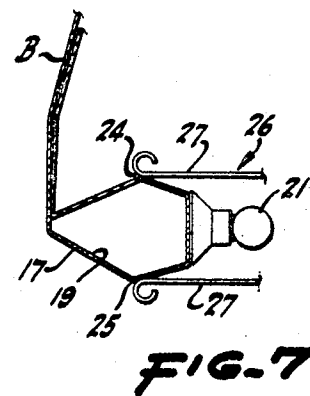
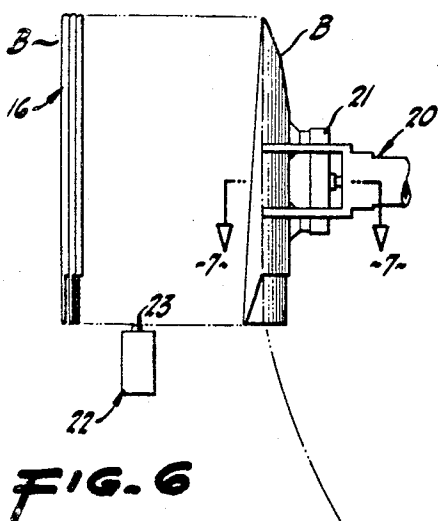
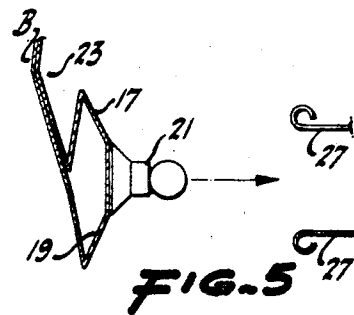
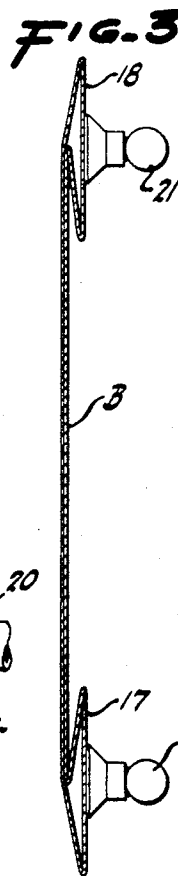
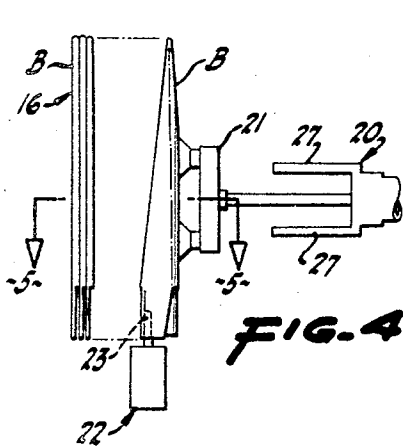
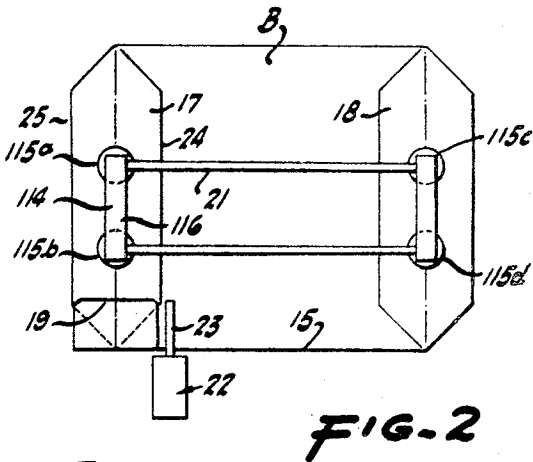
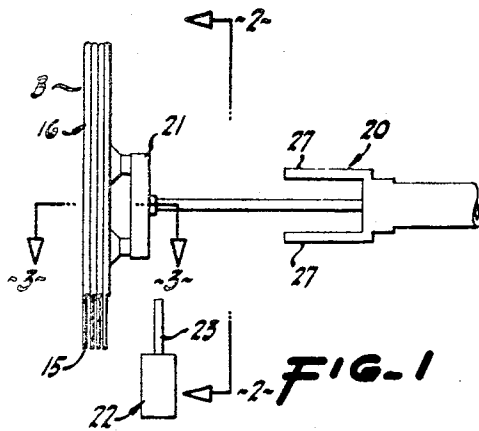
T. B. STURGES

3,466,837

BAG PLACER MECHANISM AND METHOD

Filed June 27, 1966

6 Sheets-Sheet 1



INVENTOR
THOMAS B. STURGES
BY Stanley Bialos
ATTORNEY

Sept. 16, 1969

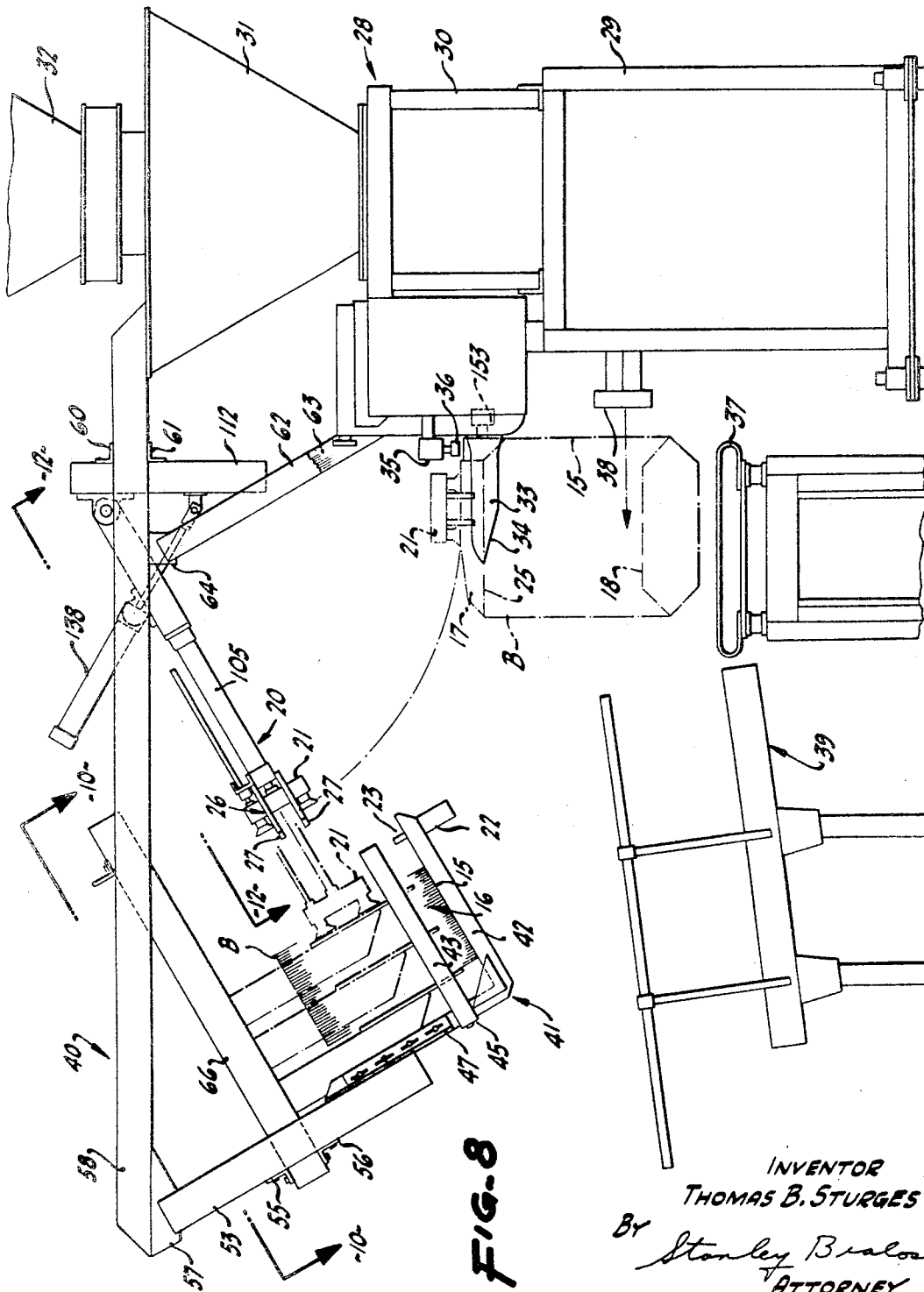
T. B. STURGES

3,466,837

BAG PLACER MECHANISM AND METHOD

Filed June 27, 1966

6 Sheets-Sheet 2



Sept. 16, 1969

T. B. STURGES

3,466,837

BAG PLACER MECHANISM AND METHOD

Filed June 27, 1966

6 Sheets-Sheet 3

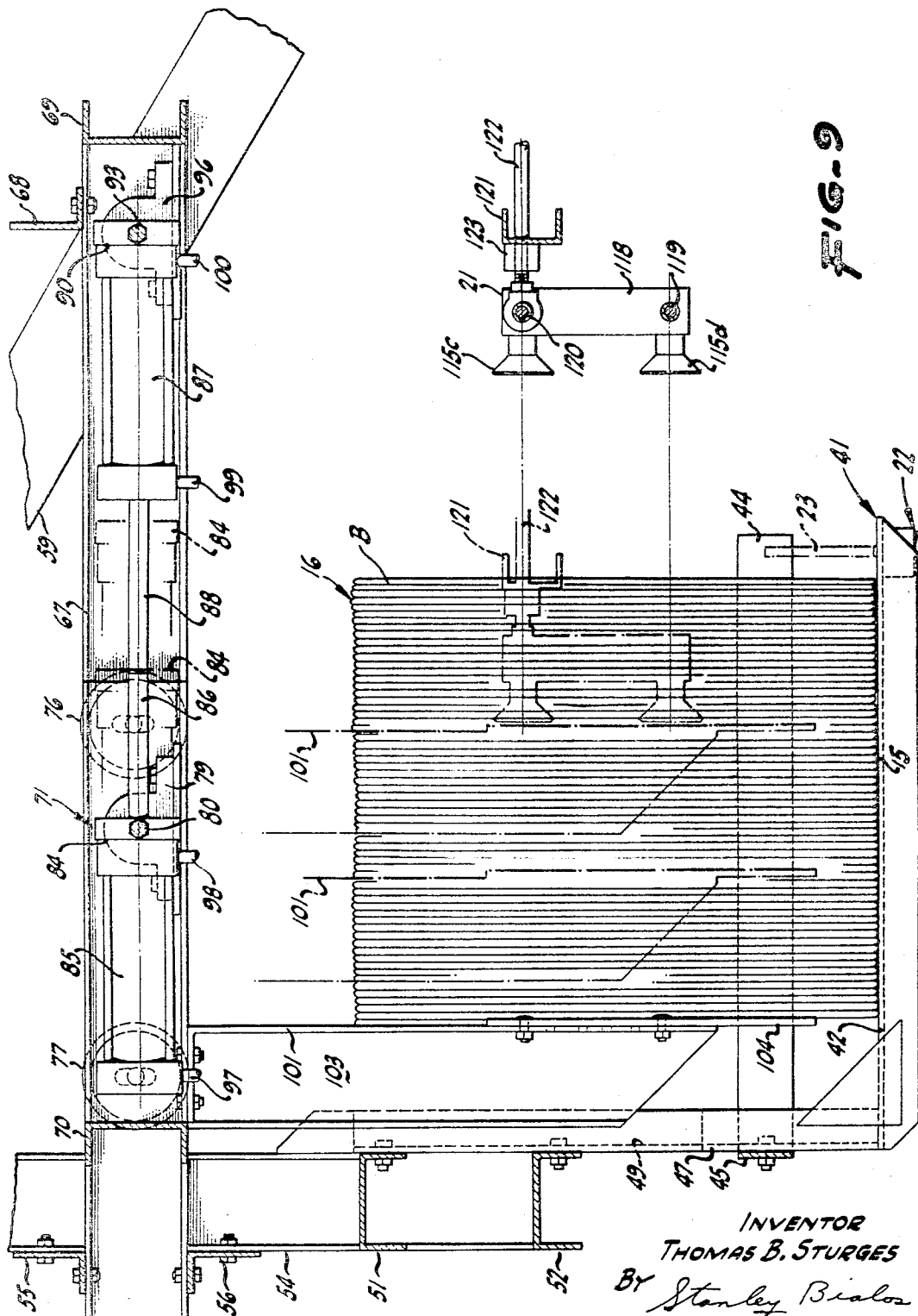


FIG-9

INVENTOR
THOMAS B. STURGES
BY Stanley Bialos
ATTORNEY

Sept. 16, 1969

T. B. STURGES

3,466,837

BAG PLACER MECHANISM AND METHOD

Filed June 27, 1966

6 Sheets-Sheet 4

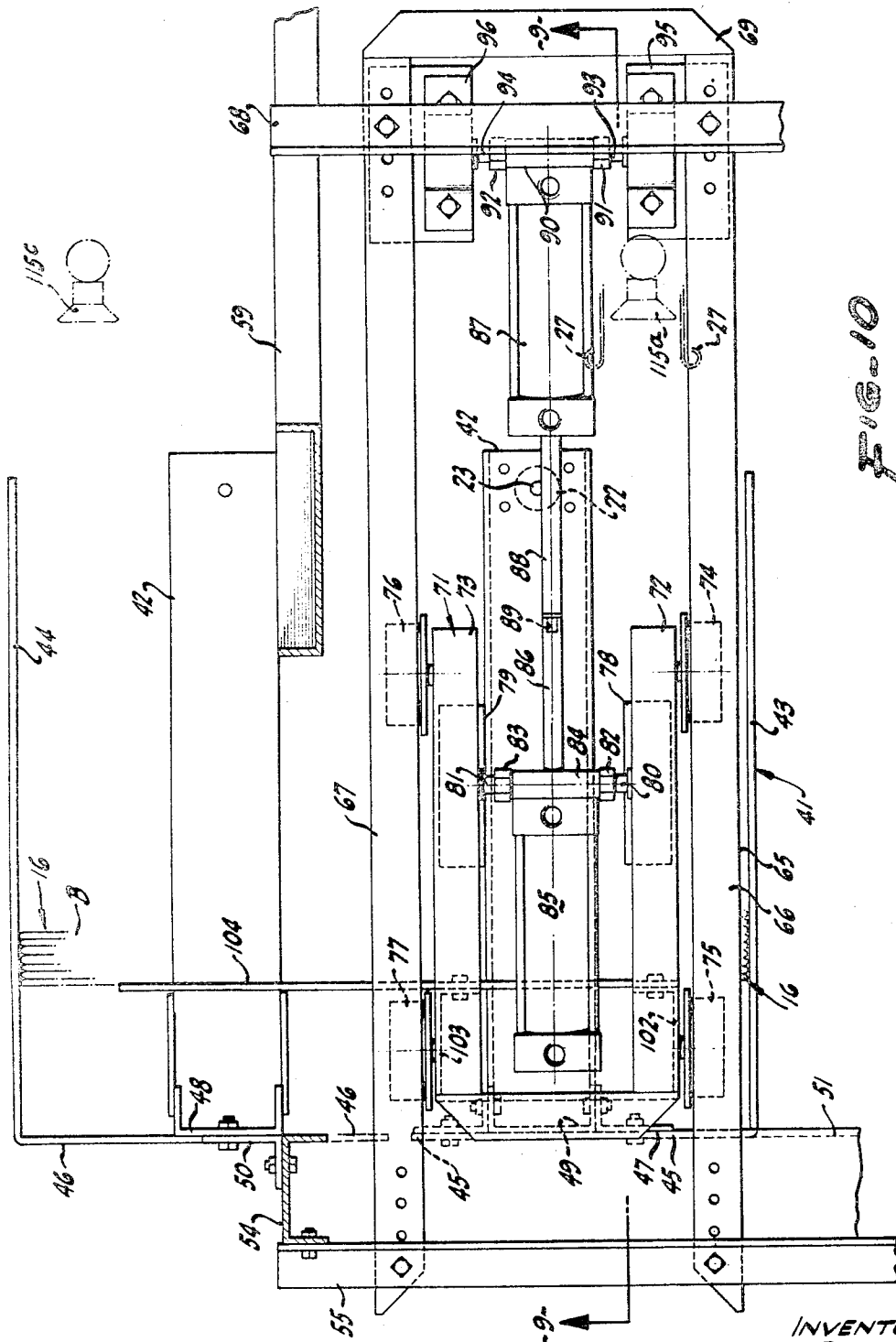


FIG-10

INVENTOR
THOMAS B. STURGES
By *Stanley Bralor*
ATTORNEY

Sept. 16, 1969

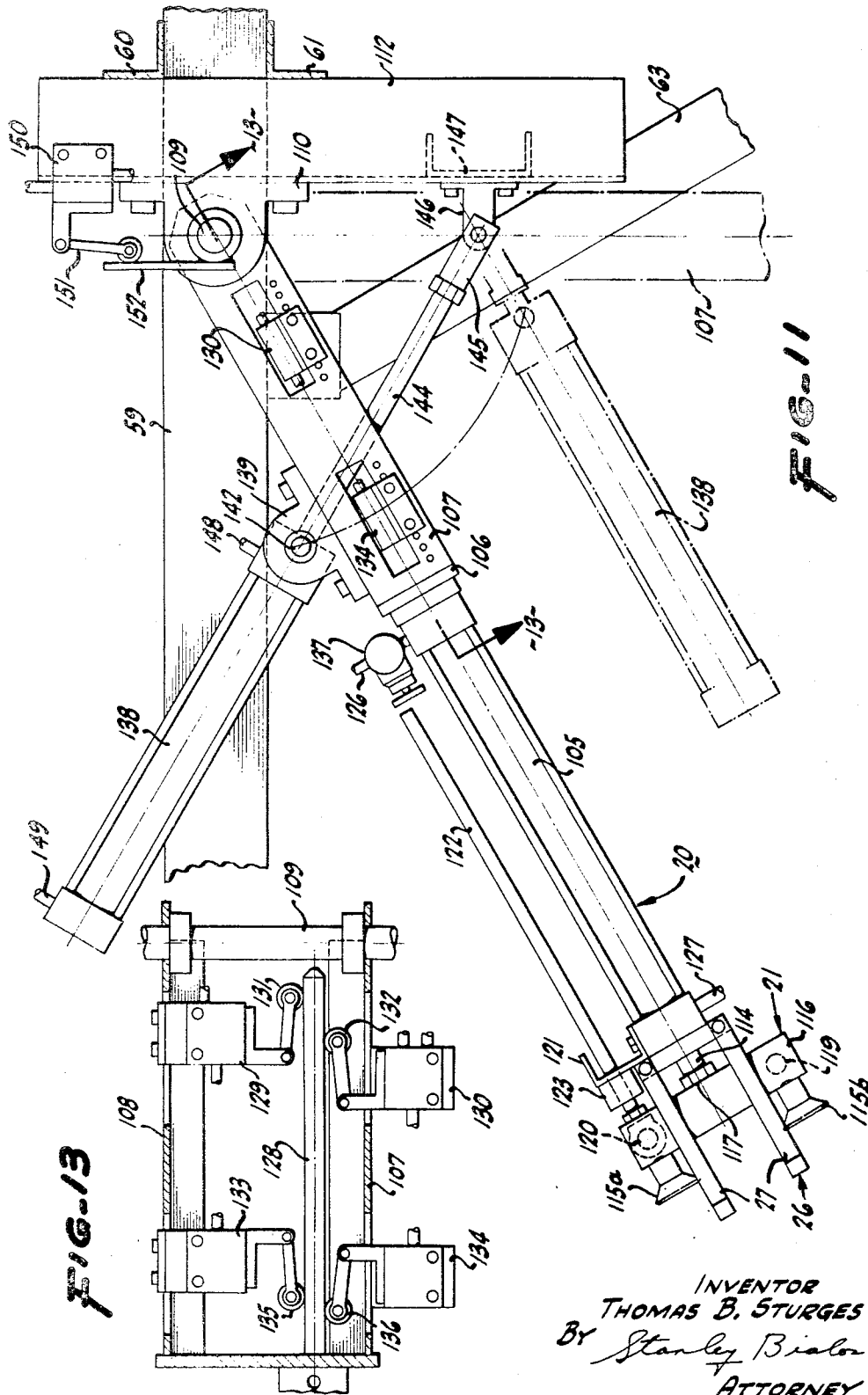
T. B. STURGES

3,466,837

BAG PLACER MECHANISM AND METHOD

Filed June 27, 1966

6 Sheets-Sheet 5



Sept. 16, 1969

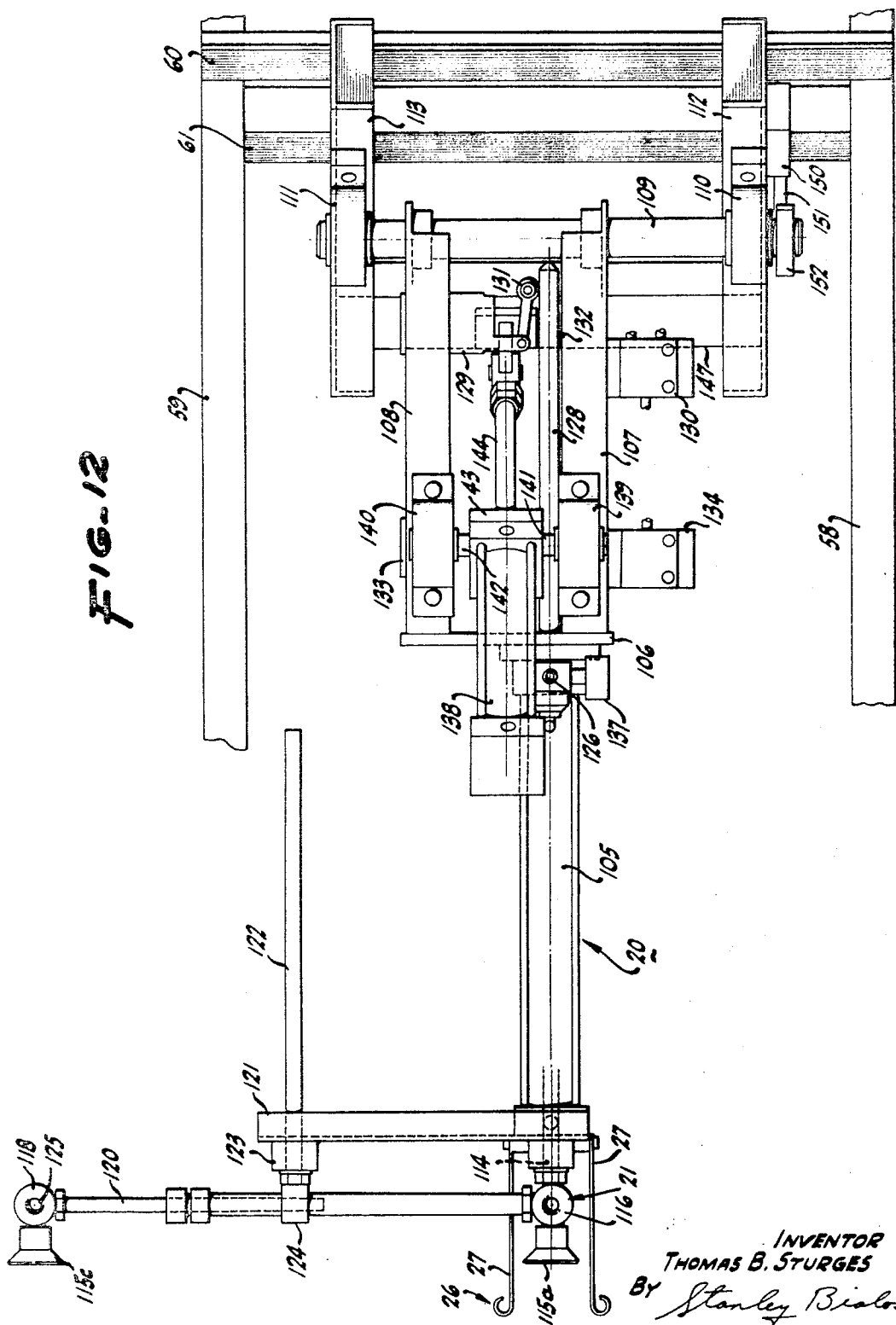
T. B. STURGES

3,466,837

BAG PLACER MECHANISM AND METHOD

Filed June 27, 1966

6 Sheets-Sheet 6



1

2

3,466,837

BAG PLACER MECHANISM AND METHOD
Thomas B. Sturges, Menlo Park, Calif., assignor to Crown
Zellerbach Corporation, San Francisco, Calif., a corporation of Nevada

Filed June 27, 1966, Ser. No. 560,725

Int. Cl. B65b 43/32

U.S. Cl. 53—29

9 Claims

ABSTRACT OF THE DISCLOSURE

Method of and mechanism for placing a valve-equipped bag on the spout of a filler machine to fill the bag there-through with a flowable particulate material such as flour, cement, grain, fertilizer, and the like. The method includes the steps of withdrawing the forwardmost bag from a stack thereof supported within a magazine, opening the valve of such bag while withdrawing the same from the magazine by arresting movement of an intermediate portion of the bag as the valve-equipped end thereof is continued in motion, and then inserting the spout of a filler machine through the open valve of the bag. The mechanism includes a magazine adapted to support a plurality of valve-equipped bags in stacked juxtaposition on a longitudinal edge thereof, gripper apparatus for engaging and withdrawing each successive forwardmost bag from the magazine, and an abutment located along the path of movement of each such bag and operative to arrest movement of an intermediate portion thereof and thereby open the valve of the bag. After the valve is open, the gripper apparatus moves the bag toward the spout of a filler machine and positions the bag thereon by inserting such spout through the open valve of the bag.

This invention relates to a mechanism for and to a method of placing a bag or the like onto the spout of a filler machine operative to fill the bag through such spout with a flowable particulate material such as flour, cement, grain, fertilizer, etc. The mechanism and method are especially suited for use with valve-equipped bags, and more particularly, with bags known in the industry as pasted-valve bags.

One form of container used in great quantity for the storage and transport of particulate material is a bag sealed or otherwise completely closed at both ends except for the inclusion at one of its ends of a valve through which the bag can be filled with such particulate material. The function of the valve is to provide a conveniently closable opening through which the bag can be filled, and, in certain instances, through which the contents of the bag can be discharged should this be desired by the consumer. Generally stated, a typical valve is in the form of an elongated sleeve underlying the closed end of the bag and providing an aperture adjacent one end adapted to have a filler spout inserted therethrough, which spout then discharges a particulate material entrained in a gaseous medium into the interior of the bag to fill the same. Following such filling operation, the bag is removed from the spout and the valve closed to prevent egress of the bag contents. The valve can take various forms and may be of the type that closes automatically upon removal of the spout, or it may be of the type that must be manually folded and tucked in toward the interior of the bag to close the same. The bag itself may be formed of paper or plastic, combinations thereof, or be formed of any other suitable material, and in the usual case it will be a multiwall bag which provides considerable strength and may protect the contents of the bag from atmospheric conditions (e.g., moisture).

Valve-equipped bags of this type are well-known commercially, as are filler machines therefor; and although such filler machines comprise a filler spout upon which each bag to be filled is positioned for a filling operation, positioning of the bags thereon has been a hand operation in which each bag is gripped by an operator, the valve opened and the spout inserted therein, and the filler machine then actuated to fill the bag. After the bag has been filled to the appropriate capacity (which is usually, although not necessarily, determined by weight), the filled bag is displaced from the spout to condition the same for receipt of a subsequent bag thereon.

In view of the foregoing, an object, among others, of the present invention is to provide an improved bag placer mechanism for and method of placing a bag or the like upon a filler or discharge spout through which the bag is then filled with a particulate material, and which mechanism is automatic in its operation and functions to remove bags one-by-one from a magazine, open each bag valve, and place successive empty bags on the filler spout upon demand from the filler machine. Additional objects and advantages of the invention will become apparent as the specification develops.

An embodiment of the invention is illustrated in the accompanying drawings, in which:

FIGURE 1 is a diagrammatic view illustrating the operation of gripping the forwardmost bag in a stack thereof supported in a magazine therefor preparatory to removing the gripped bag therefrom;

FIGURE 2 is a vertical sectional view taken along the plane 2—2 of FIGURE 1;

FIGURE 3 is a horizontal sectional view taken along the plane 3—3 of FIGURE 1;

FIGURE 4 is a diagrammatic view illustrating an intermediate position of the gripped bag following removal thereof from the magazine, and showing in particular the step of opening the valve component of the bag;

FIGURE 5 is a broken, horizontal sectional view generally similar to that of FIGURE 3 and taken along the plane 5—5 of FIGURE 4;

FIGURE 6 is a diagrammatic view in the nature of FIGURES 1 and 4, and illustrates the final position of the gripped bag after withdrawal thereof from the magazine and preparatory to moving the bag toward the discharge spout of a filler machine;

FIGURE 7 is a broken, horizontal sectional view similar to that of FIGURES 3 and 5 and being taken along the plane 7—7 of FIGURE 6;

FIGURE 8 is a side view in elevation of the bag placer mechanism shown in association with an essentially conventional filler machine;

FIGURE 9 is an enlarged, broken side view in elevation of the magazine component of the bag placer mechanism as shown in FIGURE 8, and being taken along the plane 9—9 of FIGURE 10;

FIGURE 10 is a longitudinal sectional view taken along the line 10—10 of FIGURE 8;

FIGURE 11 is an enlarged side view in elevation of a portion of the bag placer mechanism as shown in FIGURE 8;

FIGURE 12 is a longitudinal sectional view taken generally along the line 12—12 of FIGURE 8; and

FIGURE 13 is a broken longitudinal sectional view taken along the line 13—13 of FIGURE 11.

The bag placer mechanism, in a cycle of operation, performs the over-all function of successively removing each forwardmost bag from a magazine containing a supply of such bags arranged in stacked juxtaposition, opening the valve of the removed bag, and then of placing or positioning the bag on the discharge spout of a filler machine which performs its usual functions of discharging particulate material into the interior of the bag and

3

displacing the bag from the discharge spout after a sufficient quantity of material has been inserted therein. For convenience of description, the over-all function of the bag placer mechanism can be sub-divided into two operations—first, the removal of the bag from the magazine and opening of the bag valve; and second, the displacement of the bag toward the discharge spout and telescopic insertion thereof into the valve opening therefor. The first operation of removing the bag from the magazine and opening the valve is illustrated in FIGURES 1 through 7 in somewhat diagrammatic form and will now be described with reference to these figures.

Shown diagrammatically in FIGURE 1 and a plurality of bags B disposed in stacked juxtaposition with each bag being supported upon a longitudinally extending edge 15 thereof. Thus, the bags are upwardly extending or generally vertically disposed, although each bag and the stack 16 thereof are inclined in the actual apparatus, as is evident in FIGURE 8, to the extent necessary to make the stack self-supporting without constraint at the forward end thereof. The particular bags shown are conventional and are known in the industry as pasted valve bags, and the ends 17 and 18 thereof are sealed or closed and are folded against the side wall of the bag so that the bag in its entirety is relatively flat. The end 17 of the bag is equipped with a valve generally indicated at 19, through which the bag is filled, after which the valve 19 forms a closure to seal the contents of the bag therewithin.

The valve may take various forms, and may be a self closing valve or a "tuck-in" type. In any event, the bag and its valve may be completely conventional, forming no part of the present invention; and in this respect the bag may be a single or multiwall bag, and in the latter instance the various plies forming the wall may be of the same or of different materials as, for example, the combination of paper and polyethylene.

The bags B are removed in sequence one by one from the magazine contained stack 16 thereof by a bag gripping apparatus generally denoted 20. The bag-gripping apparatus 20 is equipped with a bag gripper 21 supported for reciprocable movement between an extended bag engaging position shown in FIGURE 1 and a retracted position illustrated in FIGURE 6. In its extended position, the gripper 21 engages the forwardmost bag in the stack 16 thereof and grips such bag at its ends 17 and 18 (as shown in FIGURES 2 and 3) preparatory to withdrawing the gripped bag from the stack.

The bag gripper 21 is then displaced longitudinally to the right, as seen in FIGURES 1, 4 and 6, toward the retracted position thereof and carries the gripped bag B therewith. Disposed in the path of movement of the bag is an abutment device 22 having a retractable abutment or finger 23 adapted to engage the side wall of the bag, as shown best in FIGURE 5. Such abutment of the finger 23 with the side wall of the bag while the gripper 21 continues its displacement toward the retracted position thereof interrupts or constrains such side wall of the bag against further displacement, thereby tending to deform or bow the bag outwardly at its ends. Such deformation of the bag results in the end 17 thereof assuming a somewhat spread position, as shown in FIGURE 5, and as a consequence the valve 19 commences to open.

After the end 17 of the bag has been displaced relative to the side walls thereof to the point that the valve 19 has opened to an appreciable extent (about the extent illustrated in FIGURE 5), the finger 23 is retracted, as shown in FIGURE 6, to enable the bag to move with the gripper device 21 toward and finally into its fully retracted position. The final displacement of the gripper device 21 into its fully retracted position brings the edges 24 and 25 of the bag end 17 into engagement with a stationary holder 26 defined by a plurality of holder fingers 27, thereby causing the valve 19 to become fully open because of the relative movement defined between the holder-engaged edges 24 and 25 of the bag end and the

4

face thereof gripped by and in engagement with the gripper device 21. The fully open position of the valve 19 is illustrated in FIGURES 6 and 7, and it may be noted that the exact location of the edges 24 and 25 with respect to the holder 26 may vary from bag to bag, and will vary in accordance with the bag end dimension defined between such edges 24 and 25 thereof. In this respect, the width of the bag end varies in accordance with the size of the bag and sometimes in accordance with the bag design as related to the material to be contained therein.

After the gripping device 21 of the apparatus 20 has been returned to its fully retracted position and the valve 19 is open, the second operation of the bag placer mechanism commences, which operation entails the bag being swung downwardly toward the discharge spout of the associated bag filler machine and the ultimate insertion of the discharge spout thereof into the open valve 19 of the bag. This movement is indicated by the broken lines in FIGURE 6, and will be described in further detail hereinafter.

The bag placer mechanism is illustrated in FIGURE 8 in association with a bag filler machine which may be essentially conventional and, for example, can be a machine of the type disclosed in United States Patent No. 2,996,858. As a matter of convenience, it may be noted that the filler machine, designated in its entirety with the numeral 28, includes a base 29 bolted or otherwise fixedly secured to a building floor or other suitable support member, and intermediate filler section 30 disposed above the base, and an upper funnel-shaped bin 31 supplied with a flowable particulate material in any appropriate manner such as via a pneumatic supply system partially shown in FIGURE 8 and denoted 32.

Forming a part of the intermediate section 30 is a filler or discharge spout 33 having a generally horizontal disposition and being substantially cylindrical in cross section except at the outer end portion 34 thereof which tapers somewhat toward a point and is provided along the bottom thereof with a discharge opening. Also forming a part of the section 30 is a clamp 35 having a reciprocable plunger 36 movable toward and away from the upper surface of the spout 33. The clamp 35 is energized after a bag B has been mounted upon the spout 33 to reciprocate the plunger 36 downwardly and into engagement with the bag to clamp the same upon the spout.

Disposed beneath the spout 33 is a support platform 37 which is adapted to seat thereon the lower end 18 of a bag B after the bag has been filled to an extent sufficient to unfold the end 18 and bring the same into engagement with the upper surface of the platform. The platform 37 is arranged with vibration-imparting mechanism adapted to cyclically displace, or vibrate the platform which, in turn, transmits the vibratory motion to the bag B and particulate material filling the same to agitate the material and cause it to settle within the bag, thereby facilitating the filling operation.

Once the bag has been filled to a predetermined extent, which is usually determined by weight (the weighing operation being performed by scale structure associated with the platform 37, or sometimes associated with the spout 33), a reciprocable ram 38 carried by the base 29 intermediate the spout 33 and platform 37 is energized, substantially concurrently with de-energization of the clamp 35 to release the plunger 36 thereof, to displace the filled bag (in the direction of the arrow in FIGURE 8) from the platform 37 and into an inclined chute or discharge apparatus 39.

So far as described, the filler machine 28 both in terms of structure and function is essentially conventional, and the operations performed thereby are accomplished automatically, as in the past, once a bag B has been properly positioned upon the spout 33. As indicated hereinbefore, in the past bags have been positioned upon the spout by hand, and as a protective measure a manually oper-

able switch has been employed to initiate a filling cycle including clamping the bag to the spout, filling the bag to the desired extent, and subsequent energization of the ram 38 and release of the clamp to discharge a filled bag from the machine to condition it for a subsequent cycle of operation.

The bag placer mechanism is generally denoted in FIGURE 8 with the numeral 40, and it includes a magazine 41 adapted to receive and support a stack 16 of bags B on the longitudinally extending edge 15 thereof. The magazine, as seen most clearly in FIGURES 9 and 10, comprises a platform or bottom wall 42 adapted to seat along the upper surface thereof the edges 15 of the bags B constituting a stack 16 thereof. A pair of longitudinally extending guides 43 and 44 are located exteriorly of the platform 42, and are spaced apart by a distance sufficient to accommodate the length of the bags B, as is evident in FIGURE 10.

The spacing between the guides can be changed selectively to enable the magazine 41 to accommodate bags of different length; and for this purpose, each of the guides is turned inwardly at the rear end portion thereof so as to have a generally L-shaped configuration, and such inwardly turned end portions (respectively denoted 45 and 46) are provided with a plurality of transversely spaced openings therein, each elongated in the transverse direction, by means of which the guides are clamped to upwardly extending supports or hangers 47 and 48. Evidently, this arrangement permits selective positioning of the guide ends 45 and 46 with respect to the hangers 47 and 48, and elongation of the various openings in the transverse sense enables the spacing between the two guides 43 and 44 to be tailored to the exact length of the bags B. To facilitate a reading of FIGURE 10, it may be observed that the hanger 47 is generally L-shaped and that the hanger 48 has a U-shaped configuration.

The platform 42 is vertically adjustable, and for this purpose the hangers 47 and 48 are slidably related to depending supports to which they can be clamped at various locations therealong. More particularly, and as seen in FIGURE 8, the hanger 47 is disposed along the outer surface of a depending support 49, and the hanger 47 is provided with a plurality of vertically spaced openings therein adapted to pass the shank of a bolt therethrough. The openings are elongated in the vertical direction to enable the exact location of the hanger 47 to be selectively determined relative to the support 49. A similar arrangement is provided as between the hanger 48 and the support 50 thereof. Accordingly, the vertical location of the platform 42 can be adjusted in accordance with the requirements of various bag widths.

The support 49 is bolted or otherwise fixedly secured to a pair of vertically spaced and transversely extending support channels 51 and 52 which are carried by a pair of upwardly extending, generally U-shaped support columns 53 and 54 (respectively shown in FIGURES 8 and 10) adjacent the ends thereof. The support 50 is bolted or otherwise fixed to the support column 54, as illustrated in FIGURE 10. The columns 53 and 54 are rigidified in the transverse direction by one or more reinforcing channels 55 and 56, and are rigidly secured at their upper ends through gussets 57 to one end of a pair of longitudinally extending beams 58 and 59, which at their opposite ends are fixedly secured to suitable frame structure of the filler mechanism 28. The beams 58 and 59 may be further rigidified by transversely extending reinforcing channels 60 and 61; and since the beams generally define a cantilever-type structure as respects their relationship with the filler mechanism 28, braces 62 and 63 are included which extend angularly from the filler mechanism 28 to the beams and are secured to the latter through gussets or brackets 64.

Bolted or otherwise fixedly secured to the transversely extending channels 55 and 56 is a carrier 65 defined by a pair of generally U-shaped channels 66 and 67 which

are disposed above the platform 42 of the magazine and are substantially parallel with respect thereto. Accordingly, the channels 66 and 67 extend forwardly and upwardly intermediate the beams 58 and 59 to which they are fixedly secured by an L-shaped channel 68 that may be welded adjacent the ends thereof to such beams. Adjacent their forward ends the U-shaped channels 66 and 67 are interconnected by a reinforcing member 69. A similar reinforcing member 70 (FIGURE 9) extends between and is secured to the channels 66 and 67 adjacent the opposite ends thereof.

Reciprocable along the carrier 65 defined in part by the U-shaped channels 66 and 67 is a carriage 71 forming part of an indexing device operative to advance the stack 16 of bags forwardly along the platform 42 as the supply of bags in such stack diminishes through cyclic removal of the successive forwardmost bags from the stack. The carriage 71 includes a frame of generally U-shaped configuration in top plan, as seen in FIGURE 10, which frame comprises spaced apart legs 72 and 73.

The leg 72 adjacent the opposite ends thereof is equipped with wheels or rollers 74 and 75 adapted to ride along the rail or trackway defined by the lower flange of the U-shaped channel 66. Each of the wheels is in the nature of a wheel for a railway car, and is provided adjacent the inner edge thereof with an enlarged rim adapted to abut the flanges of the channel 66 to prevent lateral displacements with respect thereto in one direction. This relationship is indicated best in FIGURE 9 which, along with FIGURE 10, shows that the leg 73 is similarly equipped with wheels or rollers 76 and 77 which ride along the rail or trackway defined by the U-shaped channel 67. Evidently then, the carriage 71 is freely movable longitudinally along the track defined by the channels 66 and 67, and is constrained against lateral displacements with respect thereto in one direction by the flanges of the wheels 74 and 75 and in the opposite direction by the flanges of the wheels 76 and 77.

Intermediate the ends thereof, the legs 72 and 73 are respectively equipped with bearing blocks 78 and 79 which may be bolted or otherwise fixedly secured thereto. Extending inwardly from the bearing blocks and journaled for rotation with respect thereto are a pair of axles 80 and 81 which project into bosses 82 and 83 provided at diametrically opposite locations along an annular enlargement 84 located at the end of a fluid motor 85 in the form of piston-cylinder structure having a piston (not shown) reciprocable longitudinally with respect to the cylinder and equipped with a rod 86 extending outwardly from the cylinder at the forward end thereof.

Axially aligned with the cylinder 85 is a similar fluid motor 87 in the form of piston-cylinder structure having a piston (not shown) longitudinally reciprocable with respect to the cylinder and equipped with a rod 88 extending outwardly from the cylinder at the rear end thereof, which rod 88 is fixedly secured to the piston rod 86 in a manner preventing relative movement therebetween, as by means of the threaded inter-connection generally denoted at 89. The cylinder 87 adjacent the forward end thereof is equipped with an annular enlargement 90, having bosses 91 and 92 at opposite locations therealong from which axles 93 and 94 extend outwardly and are journaled for rotation in bearing blocks 95 and 96 bolted or otherwise rigidly secured to the U-shaped channels 66 and 67 so as to be constrained against longitudinal movements with respect thereto.

As indicated hereinbefore, the piston-cylinder structures 85 and 87 are adapted to be energized by the delivery of a gaseous fluid such as air thereto, but quite apparently liquid fluids may be employed should this be desired. In either event, each of the structures is reversely operable in the sense that the piston thereof can be positively displaced in either longitudinal direction. Accordingly, fluid connections are made to both end portions of each of the cylinders by means of conduits 97, 98, 99 and

100 respectively associated therewith. As will be brought out in greater detail hereinafter in the description of a cycle of operation, the cylinders 85 and 87 are adapted to be energized in turn to displace the carriage from a first position shown by full lines in FIGURE 10 into a second position to the right thereof (upon energization of the cylinder 85), and finally in to a third position still further to the right (upon energization of the cylinder 87).

These three positions of the carriage 81 are shown in FIGURE 9 by the location of a stop or support 101 which extends downwardly from the carriage toward the platform 42 of the magazine. The position of the stop 101 shown by full lines in FIGURE 9 is the aforementioned first position thereof, which is the most extreme position of the carriage toward the left as viewed in this figure. The next successive position toward the right for the stop 101 (which position is shown by broken lines) is the aforementioned second position; and the next successive position toward the right (also shown by broken lines) is the aforementioned third position thereof. The carriage 71 and stop 101 carried thereby are indexed through these successive positions automatically in accordance with the supply of bags B contained by the magazine 41, and the control means for such indexing operation will be explained subsequently.

It may be noted that the stop 101 comprises a pair of U-shaped channels 102 and 103 respectively secured, as by means of bolts, to the legs 72 and 73 of the carriage in depending relation therefrom, and further comprises a plate 104 bolted or otherwise secured to the channels 102 and 103 and extending substantially beyond the channel 103 toward the aforementioned guide 44, as shown in FIGURE 10. The stop 101, and especially the plate 104 thereof, is effective to support the inclined stack 16 of bags, the rearmost bag of which rests against the plate.

As indicated hereinbefore, the bag-gripping apparatus 20 is operable to move the bag gripper 21 toward and away from the magazine 41 to engage the forwardmost bag thereat, to grip such bag, and then to remove the bag from the magazine. The details of the apparatus 20 will now be described, and in this connection reference will be made to FIGURES 11 and 12 in particular. As shown in these figures, the apparatus 20 includes a fluid motor 105 in the form of piston-cylinder structure, the cylinder component of which is welded or otherwise rigidly secured at its forward end to a mounting plate 106 welded or otherwise fixedly related to one end of a pair of spaced apart support brackets or members 107 and 108. The support members 107 and 108 at their opposite ends are carried by a pivot shaft 109 journaled for rotation adjacent the opposite ends thereof in bearing blocks 110 and 111 respectively fastened as by cap screws to a pair of depending brackets 112 and 113 secured to the aforementioned longitudinally extending beams 58 and 59 by means of the L-shaped channels 60 and 61. Evidently then, the support members 107 and 108 are swingably related to the beams 58 and 59 and, in particular, are movable along a generally vertical plane about the horizontally disposed pivot axis defined by the shaft 109.

The reciprocable piston of the motor 105 is provided with a rod or shaft 114 that projects rearwardly from the cylinder; and secured to the rod 114 is the aforementioned bag gripper 21 which comprises a plurality of bag-engaging grippers or cups that, in the particular apparatus being considered, constitute a total of four (FIGURE 2) respectively denoted with the numerals 115a through 115d. More especially, the cups 115a and 115b are secured to a flow conduit structure 116 in vertically spaced relation therealong, and the interiors of such cups are in open communication with the flow passage defined within the conduit 116. Adjacent its upper end, the conduit 116 is threaded or otherwise fixedly secured to the

piston rod 114, and a lock nut 117 may be employed to prevent inadvertent release of the conduit 116 from the rod 114. The cups 115c and 115d are similarly secured to a flow conduit structure 118, which conduit 118 is rigidly related to the conduit 116 by a shaft or bar 119 and also by a tube of flow conduit 120.

The flow conduit structures 116 and 118 together with the shaft 119 and tube 120 define a generally rectangular configuration, as is most evident in FIGURE 2. The entire structure defined by these components 116, 118, 119 and 120, together with the cups 115 carried thereby, comprises the bag gripper 21 and is reciprocable along the longitudinal axis of the cylinder 105 upon displacements of the piston therein and of the rod 114 secured to the piston. Such reciprocable displacements of the bag gripper 21 are stabilized by means of guide structure comprising a transversely extending, generally U-shaped channel 121 bolted or otherwise secured to the cylinder 105 adjacent the rear end thereof. The guide structure further includes a longitudinally disposed guide bar 122 extending through the channel 121 and supported for slideable displacements with respect thereto by a bearing collar 123 welded to the channel. The guide bar 122 is secured to the tube 120 by a clamp collar 124, whereupon the guide bar 122 in cooperation with the channel 121 tends to support and thereby stabilize the outer end portion of the reciprocable bag gripper 21, which outer end portion includes the cups 115c and 115d and the conduit 118.

The cups 115 are conventional devices and in the usual form thereof are provided with a resilient bag-engaging bellows having a relatively soft lip which will conform readily to the surface of the bag, which surface thereof might be slightly irregular. A source of reduced pressure is applied selectively to the cups 115 through the flow system therefor that includes the conduits 116 and 118 and the tube 120 interconnecting the same. Connection of the reduced pressure source may be made with such flow system at any convenient location therealong, as through a connector 125 carried by the conduit 118. Evidently, a reduced pressure is established at the cups 115 whenever a bag is to be gripped and held, and the reduced pressure is terminated when the bag is to be released after the positioning thereof upon the discharge spout 33 of the filler machine 28. The fluid motor 105 is reversible in the sense that it can be energized to displace the piston therein selectively in one or the other longitudinal directions; and for this purpose, the cylinder is connected adjacent the opposite ends thereof to a suitable source of pressurized fluid through the conduits respectively denoted with the numerals 126 and 127.

The piston of the motor 105 is also equipped with a control rod 128 projecting forwardly from the cylinder intermediate the support members 107 and 108. The control rod 128 is operatively associated with control devices 129 and 130 (FIGURE 13) respectively mounted upon the support members 108 and 107 along opposite sides of the rod. The control devices 129 and 130 are in the form of limit devices and may be electrical switches (micro-switches for example), or fluid type devices such as pilot valves. In the apparatus being considered, the control devices 129 and 130 are pneumatically operated pilot valves respectively provided with roller equipped actuator arms 131 and 132 adapted to ridingly engage the surface of the control rod 128.

The mechanism in the condition thereof illustrated in FIGURE 12 has the bag gripper 21 in its fully retracted position, and in such position the control rod 128 is in engagement with each of the actuator arms 131 and 132 of the control devices 129 and 130. As the bag gripper 21 is displaced from its retracted position toward the magazine 41 (i.e., toward the left as viewed in FIGURES 12 and 13), the actuator arm 131 will first ride-off of the control rod 128 which will cause a change in the condition of the control device 129, and still further displacement of the bag gripper 21 toward the left will cause

the actuator arm 132 to ride-off of the control rod 128 which will cause a change in the condition of the control device 130. The control device 129 is operatively associated with the aforementioned bag placing operation, described in detail hereinafter, in which a bag is positioned on the discharge spout 33 of the filler machine 28; and the control device 130 is operatively associated with the aforementioned abutment device 22 and is effective to energize and de-energize the same in accordance with the position of the control rod 128.

The abutment device 22, as shown most clearly in FIGURE 9, is mounted upon the platform 42 of the magazine 41 and constitutes a fluid motor in the form of piston-cylinder structure with the finger 23 being a rod secured to the piston of the abutment device and movable therewith between the extended position shown in FIGURES 9 and 1, for example, and the retracted position illustrated in FIGURE 6. The control device 130 is operative to condition the abutment device 22 in a manner such that the finger 23 thereof is retracted whenever the actuator arm 132 of the control device is riding upon the control rod 128 and such that whenever the actuator arm 132 rides-off of the control rod 128, the abutment device 22 will be energized so as to displace the finger 23 into its extended position for engagement thereof by a bag B.

Also located along the support members 108 and 107 rearwardly of the control devices 129 and 130 are two additional control devices 133 and 134 respectively provided with roller-equipped actuator arms 135 and 136 adapted to ridingly engage the control rod 128. The control devices 133 and 134 are respectively associated with the cylinders 85 and 87 of the magazine 41 and control the energization of such cylinders. In this respect, whenever the control rod 128 is displaced toward the left, as viewed in FIGURE 12, to the extent that the actuator arm 135 rides-off of the control rod, the cylinder 85 will be energized to index the stop 101 forwardly from the aforementioned first position thereof (shown by full lines in FIGURE 9) into its second position (shown by broken lines in the same figure). Subsequently, if the control rod 128 is displaced toward the left to the extent that both of the actuator arms 135 and 136 ride-off of the control rod, the cylinder 87 of the magazine will be energized to index the stop 101 from the second position thereof and into its third position. Quite evidently, the extent to which the bag gripper 21 is displaced (and therefore the control rod 128) in the direction of the magazine 41 will depend upon the precise location of the forwardmost bag B in the magazine because the cups 115 of the bag gripper 21 are always displaced into firm engagement with such forwardmost bag irrespective of its exact position.

More particularly in this connection, the fluid supply system for the motor 105 is provided with a pressure regulator 137 operative to reduce the magnitude of the fluid pressure delivered to the motor cylinder adjacent the forward end thereof to displace the bag gripper 21 toward the left and into engagement with the forwardmost bag B in the magazine. The pressure regulator 137 controls the pressure delivered thereby to a value such that movement of the bag gripper 21 is terminated by firm engagement of the cups 115 with the forwardmost bag in the stack 16 thereof. By way of example, in one installation the bag gripper 21 exerts a force in the order of 100 pounds developed from a line pressure of about 80 p.s.i.g. reduced to about 40 p.s.i.g. to energize a piston having a diameter of approximately 1.78 inches.

At the initiation of a cycle of operation, the bag gripper 21 may be taken to be in the retracted position thereof shown in FIGURES 8, 11 and 12; and the cycle commences (the initiation being effected by means to be described hereinafter) with the cylinder 105 being energized by the delivery thereto of fluid through the pressure regulator 137. In response to the delivery of such

pressure fluid, the piston is displaced toward the left, as viewed in these three figures, until the cups 115 engage the forwardmost bag B in the stack 16 thereof supported within the magazine 41. At about this same time the cups 115 will be vacuumized by the application of a reduced pressure thereto through the inlet 125, whereupon the forwardmost bag B will be gripped by and pressure-clamped to the cups 115.

Thereafter, the cylinder 105 is energized in the opposite direction by the delivery of pressure fluid thereto through the conduit 127, whereupon the bag gripper 21 commences its displacement to the right toward its fully retracted position. Since the bag is clamped to the gripper 21 it travels therewith, and such movement of the bag causes engagement of the sidewall thereof with the retractable finger 23 of the abutment device 22, as shown in FIGURES 4 and 5. However, movement of the bag gripper 21 toward the right continues, and when the control rod 128 reaches the position at which the actuator arm 132 of the control device 130 is displaced laterally, the finger 23 will be retracted, as explained heretofore, to permit the bag to be further carried by the bag gripper 21 into its fully retracted position.

In such retracted position, the edges 24 and 25 of the bag end 17 are engaged by the holder-fingers 27, as shown in FIGURE 7, which engagement has the effect of opening the valve 19 completely, whereupon the entire apparatus is ready to be swung downwardly and into the position shown by broken lines in FIGURE 8 to position the bag upon the filler spout 33. The bag is released by the gripper 21 after being positioned upon the spout 33 and after being clamped to the spout by the reciprocable plungers 36, following which the apparatus is returned to the starting position shown in FIGURES 8, 9 and 11 preparatory to commencing another cycle of operation.

The apparatus by which the bag gripper 21 is swung between the upper position adjacent the magazine 41 and the lower position adjacent the spout 33 will now be described, and in this connection reference will be made to FIGURES 8, 11 and 12 in particular. Referring thereto it will be seen, as explained heretofore, that the support members 107 and 108 are carried by the pivot shaft 109 which is supported in bearing blocks 110 and 111 for angular displacements generally between an upper position in which the bag gripper 21 is oriented for engagement with the forwardmost bag in the magazine 41 and a lower position adjacent the spout 33 to position a gripped bag thereon.

Movement between these two positions is enforced upon the support members 107 and 108, which members are constrained against relative displacements because of their connection to the mounting plate 106, by a fluid motor 138 in the form of piston-cylinder structure of which the cylinder is pivotally secured at one end thereof to the support members 107 and 108 by bearing blocks 139 and 140 respectively carried thereby. More particularly, the bearing blocks are secured to the support members by cap screws, and a pair of axles or shafts 141 and 142 are respectively journaled in such bearing blocks and extend therefrom into an enlarged mounting member 143 carried by the cylinder 138 adjacent the forward end thereof. Accordingly, the cylinder 138 is supported for pivotal movement along a generally vertical plane about a pivot axis defined by the aligned shafts 141 and 142.

The reciprocable piston of the cylinder 138 is equipped with a rod 144 that extends forwardly and downwardly between the support members 107 and 108, and at its forwardmost end the rod is pivotally secured through a bifurcated coupling 145 and tongue 146 pivotally related thereto to a cross brace 147 welded or otherwise rigidly related to the depending brackets 112 and 113. Evidently then, the cylinder 138 is pivotally carried by the support members 107 and 108, which

members 107 and 108 are pivotally supported by the depending brackets 112 and 113, and the piston rod 144 in turn is also pivotally carried by such brackets 112 and 113.

The fluid motor 138 is reversely operable and is energized in either direction by the selective delivery of pressure fluid to the opposite ends of the motor cylinder through supply conduits 148 and 149. In the position of the apparatus shown by full lines in FIGURE 11, the piston rod 144 has been displaced, relative to the cylinder 138, to its outermost position and, correspondingly, the piston carrying such rod is located adjacent the forward end of the cylinder. Accordingly, energization of the motor in this position requires the delivery of pressure fluid to the motor cylinder through the conduit 148 which will cause the piston to be displaced toward the left relative to the cylinder 138 or, more specifically, will cause the cylinder 138 to descend along the rod 144 toward the tongue 146.

In order to enable such relative movement between the cylinder 138 and rod 144, it is necessary that the distance between the tongue 146 and adjacent, forward end of the cylinder be reduced. In the present apparatus, such reduction in distance is afforded by downward swinging movement of the support members 107 and 108 about the axis of the pivot shaft 109 therefor. Such swinging movement of the support members 107 and 108 is permitted because of the pivotal connection of the cylinder 138 with the support members and further because of the pivotal connection of the rod 144 with the tongue 146. The arcuate path of movement described by the pivot shafts 141 and 142 as the support members swing downwardly is indicated in FIGURE 11 by the broken line extending through the axis of such shafts.

The position of the cylinder 138 at the termination of such downward swinging movement is shown in FIGURE 11 by broken lines, and it will be noted that in this position of the cylinder the support members 107 and 108 have a substantially vertical orientation. Since the bag gripper 21 is disposed in a normal orientation with respect to the longitudinal axis of the support members 107 and 108, it is substantially parallel to the axis of the spout 33 whenever the support members are in such vertical disposition, as shown in FIGURE 8. It will be evident that the support members are returned to the uppermost position thereof whenever the cylinder 138 is reversely energized by the delivery of pressure fluid to the opposite end thereof through the supply conduit 149.

It will be noted in FIGURE 11 that a control device 150 is actuated by engagement of the actuator arm 151 thereof with a stop or abutment 152 secured to the shaft 109 so as to rotate therewith as the support members 107 and 108 are swung between the two extreme positions thereof. The device 150 is carried by the depending bracket 112, and it functions to control energization of the gripper cylinder 105 to displace the bag gripper 21 toward and away from the magazine 41. In this respect the cylinder 105 is energized to displace the gripping device 21 toward the magazine 41 by engagement of the stop 152 with the actuator arm 151 of the control device 150.

A further control device 153 (FIGURE 8) is positioned so as to be actuated by movement of a bag B onto the spout 33, and such control device is operative through the filler machine 28 to cause the clamp 35 thereof to displace the reciprocable plunger 36 into engagement with the bag to clamp it to the spout 33. Movement of the bag B onto the spout so as to actuate the control device 153 further has the effect of terminating the connection of the reduced pressure source to the gripper cups 115, whereupon the bag B can swing downwardly of its own weight into the position shown in FIGURE 8. Such movement of the bag onto the spout further has the effect of

causing energization of the cylinder 138 so as to swing the bag-grapping apparatus 20 upwardly into a position of alignment with the magazine 41 as shown in FIGURE 8.

As indicated hereinbefore, movement of the bag-gripping apparatus 20 into its upper position causes the control device 150 to be actuated, thereby allowing the cylinder 105 to be energized to displace the bag gripper 21 toward the stack 16 of bags to engage the forwardmost bag with the gripper cups 115. In the particular apparatus being considered, reciprocable movement of the bag gripper 21 is synchronized with displacement of the ram 38 so that the bag gripper moves toward the magazine 41 concurrently with outward movement of the ram to discharge a filled bag from the platform 37 and so that both the bag gripper and ram are concurrently retracted inwardly. Also, vacuumization of the cups 115 is controlled in timed relation with the discharge of material from the spout 33 so that the cups are vacuumized throughout those periods that there is no discharge of material but not otherwise. Thus, a reduced pressure is present at the cups 115 throughout such reciprocable movement of the bag gripper 21 and until a bag carried thereby has been placed upon the spout 33 to start a filling operation.

Upon completion of the bag-filling operation, the ram 38 is energized through the usual controls of the filler machine 28 so as to displace the filled bag from the platform 37 and into the discharge device 39. Reciprocable displacement of the ram 38 also actuates a further control device (not shown) provided in the filler machine 28 in association with the ram, which control device, when actuated, is effective to energize the cylinder 138 to swing the bag-gripping apparatus 20 downwardly toward the spout 33 to position another bag thereon. Thus, a cycle of operation will have been completed, and such cycles are carried on repetitively so long as bags are present in the magazine 41.

The stack 16 of bags placed within the magazine 41 may vary in size, and in this respect the stop 101 of the magazine can be returned manually to the first position thereof (shown in full lines in FIGURES 8 and 9) by appropriate manipulation of a valve structure (not shown) or it may be located in either of the second or third positions thereof by means of appropriate manipulation of such valve structure. Accordingly, the magazine 41 can be filled to capacity, it may be filled to some lesser extent, and still smaller groups of bags may be added thereto, depending upon the desires of the operator. In any event, the stop 101 will be indexed forwardly from either the first or the second position thereof in accordance with the extent to which the bag stripper 21 is displaced because such displacement thereof, when sufficient, is effective to actuate the control device 133 or both of the control devices 133 and 134, which devices 133 and 134 respectively control the cylinders 85 and 87 of the indexing apparatus, as described hereinbefore.

To condition the apparatus for automatic operation, the selector switch of the filler machine 28 will be turned to the "automatic" position so that the machine will be ready to perform automatically. Next, the indexing stop 101 is moved into the first position thereof (for example) by appropriate manipulation of the aforementioned valve structure, and a stack of bags is then placed upon the platform 42 of the magazine 41, and because of its angular orientation, as shown in FIGURE 8, each bag is inclined upwardly and rearwardly so as to be supported by the immediately prior bag except in the case of the rearmost bag in the stack which is supported by the stop 101. Following this procedure, the manually manipulatable control on the filler machine 28 is actuated to energize the ram 8 through a cycle of operation with the result that the reciprocable displacement thereof actuates the aforementioned control device provided by the filler machine to initiate automatic operation of the entire apparatus.

If at this time a bag is not being held in engagement with the cups 115, the cylinder 105 will be energized to cause the bag gripper 21 to be displaced toward the magazine 41 to engage and then grip the forwardmost bag therein. Upon return of the bag gripper 21 to its retracted position, the cylinder 138 is energized to cause the bag-gripping apparatus 20 to swing downwardly and place the bag gripped thereby upon the spout 33 whereupon the cycle of operation hereinbefore described is carried on repetitively.

During each such cycle, the valve-opening abutment finger 23 is displaced into its extended position as the bag gripper 21 moves toward the magazine 41 because of the co-action of the control rod 128 with the control device 130, and the finger 23 is retracted during the return movement of the bag gripper 21 by co-action of the same components. As shown in FIGURE 13, the control device 130 can be adjustably positioned along the support member 107 because of the longitudinally-elongated slot through which the actuator arm 132 extends. This adjustment permits precise control over the instant of actuation of the abutment device 22 so that the timing thereof can be related to the rate of displacement of the bag gripper 21 and also to the type or character of the bags B being processed. It will be noted from FIGURE 13 that the control devices 129, 133 and 134 are similarly mounted upon the support members 107 and 108 so as to permit adjustment of these control devices for timing purposes.

It will be understood that the various control devices are suitably connected in a fluid supply system and that such system will ordinarily include appropriate interlocking arrangements to prevent simultaneous operation of the motor 105 controlling reciprocable displacements of the bag gripper 21 and of the fluid motor 138 controlling swinging movement of the apparatus 20 between the raised and lowered positions thereof. Similarly appropriate inter-connections and interrelationships are provided in the fluid supply system so that suitable dependancy is established where one particular phase of a cycle of operation is intended to follow the completion of a prior phase. However, all of these arrangements, connections and relationships are conventional and well understood, and for this reason the fluid supply system in its entirety is not illustrated in schematic form since it is unnecessary to a complete understanding of the present invention and because there are no departures from conventionality present in such system.

While in the foregoing specification an embodiment of the invention has been set forth in considerable detail for purposes of making a complete disclosure thereof, it will be apparent to those skilled in the art that numerous changes may be made in such details without departing from the spirit and principles of the invention.

What is claimed is:

1. In a method of placing a bag or the like having a valve at an end thereof upon a filler spout through which the bag is to be filled with a flowable material, the steps of gripping such bag at its valve-equipped end and at a location spaced therefrom and withdrawing the bag bodily from a magazine adapted to support a stack of such bags thereat, arresting movement of a portion of such bag intermediate said valve-equipped end and said location spaced therefrom and during such arrestment continuing the movement from such stack of the valve-equipped end and said location spaced therefrom to open the valve, and positioning the bag upon such filler spout by inserting the spout through the open valve of the bag.

2. The method according to claim 1 in which such bag is supported within the magazine in an upwardly extending orientation upon a longitudinally disposed edge thereof, and in which such bag after withdrawal thereof from the magazine is swung through an arcuate path from such upwardly extending orientation into a generally horizontal orientation for positioning thereof upon

the filler spout, such bag after positioning thereof upon the filler spout being released whereupon it swings downwardly and assumes a generally vertical orientation.

3. In a bag placer mechanism, a magazine adapted to support a plurality of elongated bags or the like in stacked juxtaposition each of which bags is equipped with a valve at an end thereof, gripper apparatus movable toward and away from such magazine to grip at longitudinally spaced locations therealong each successive forwardmost bag and withdraw such gripped bag from the magazine, said gripper apparatus also being movable from a bag-gripping position adjacent said magazine to a position remote therefrom for locating a gripper bag upon the discharge spout of a filler machine, actuator mechanism for selectively moving said gripper apparatus toward and away from said magazine, and valve-opening means for opening the valve of each such successive forwardmost bag including an abutment in the path of movement of each bag withdrawn from said magazine by said gripper apparatus to engage and constrain an intermediate portion of such bag as the gripped portions thereof continue to be moved by said gripper apparatus.

4. The mechanism of claim 3 and further comprising apparatus for selectively moving said gripper apparatus between such bag-gripping position and such discharge spout location.

5. In a bag placer mechanism, a magazine adapted to support a plurality of valve-equipped bags or the like in stacked juxtaposition, gripper apparatus movable toward and away from such magazine to grip each successive forwardmost bag thereat and withdraw such gripped bag therefrom, said gripper apparatus also being movable from a bag-gripping position adjacent said magazine to a position remote therefrom for locating a gripped bag upon the discharge spout of a filler machine, actuator mechanism for selectively moving said gripper apparatus toward and away from said magazine, and apparatus for selectively moving said gripper apparatus between such bag-gripping position and such discharge spout location, said magazine being provided with indexing means for advancing bags supported within said magazine toward the discharge end thereof as the supply of bags becomes depleted, said indexing means being operative to step the bags forwardly as a group, and control mechanism for periodically energizing said indexing means to effect such step advancement of the bags within the magazine, said control mechanism being arranged with said gripper apparatus and being operatively responsive to the extent of movement thereof required for gripping engagement of the forwardmost bag in said magazine to effect such step advancement of the bags.

6. In a bag placer mechanism, a magazine adapted to support a plurality of valve-equipped bags or the like in stacked juxtaposition, gripper apparatus movable toward and away from such magazine to grip each successive forwardmost bag thereat and withdraw such gripped bag therefrom, said gripper apparatus also being movable from a bag-gripping position adjacent said magazine to a position remote therefrom for locating a gripped bag upon the discharge spout of a filler machine, actuator mechanism for selectively moving said gripper apparatus toward and away from said magazine, and apparatus for selectively moving said gripper apparatus between such bag-gripping position and such discharge spout location, and apparatus for opening the valve of such bag, said valve-opening apparatus including a retractable abutment selectively extensible into the path of movement of a bag being withdrawn from said mechanism and effective to constrain that portion of a bag engaged thereby from continued movement away from said magazine to effect opening of the valve of such bag.

7. The mechanism of claim 6 in which said retractable abutment comprises a finger selectively reciprocable between an extended position in the path of movement of

15

such bag and a retracted position out of the path of movement thereof.

8. In a bag placer mechanism, a magazine adapted to support a plurality of elongated bags or the like in stacked juxtaposition each of which bags is equipped with a valve at an end thereof, gripper apparatus movable toward and away from such magazine to grip at longitudinally spaced locations therealong each successive forwardmost bag and withdraw such gripped bag from the magazine, said gripper apparatus also being movable from a bag-gripping position adjacent said magazine to a position remote therefrom for locating a gripped bag upon the discharge spout of a filler machine, actuator mechanism for selectively moving said gripper apparatus toward and away from said magazine, apparatus for selectively moving said gripper apparatus between such bag-gripping position and such discharge spout location, and valve-opening means for opening the valve of each such successive forwardmost bag and including a retractable abutment selectively extensible into the path of movement of each bag withdrawn from said magazine by said gripper apparatus to engage and constrain an intermediate portion of such bag as the

16

gripped portions thereof continue to be moved by said gripper apparatus.

9. The mechanism of claim 8 in which said magazine is provided with indexing means operative to advance bags forwardly toward the discharge end of said magazine as the supply of bags therein becomes depleted.

References Cited

UNITED STATES PATENTS

10	2,996,858	8/1961	Swenson	53—126	X
	3,053,027	9/1962	Frost	53—190	
	3,213,588	10/1965	Peterson	53—188	X
	3,225,515	12/1965	Inglett	53—190	
	3,287,879	11/1966	Miller	53—188	
15	3,312,038	4/1967	Knauf	53—190	

THERON E. CONDON, Primary Examiner

R. L. SPRUILL, Assistant Examiner

U.S. Cl. X.R.

53—190, 381