

Oct. 13, 1953

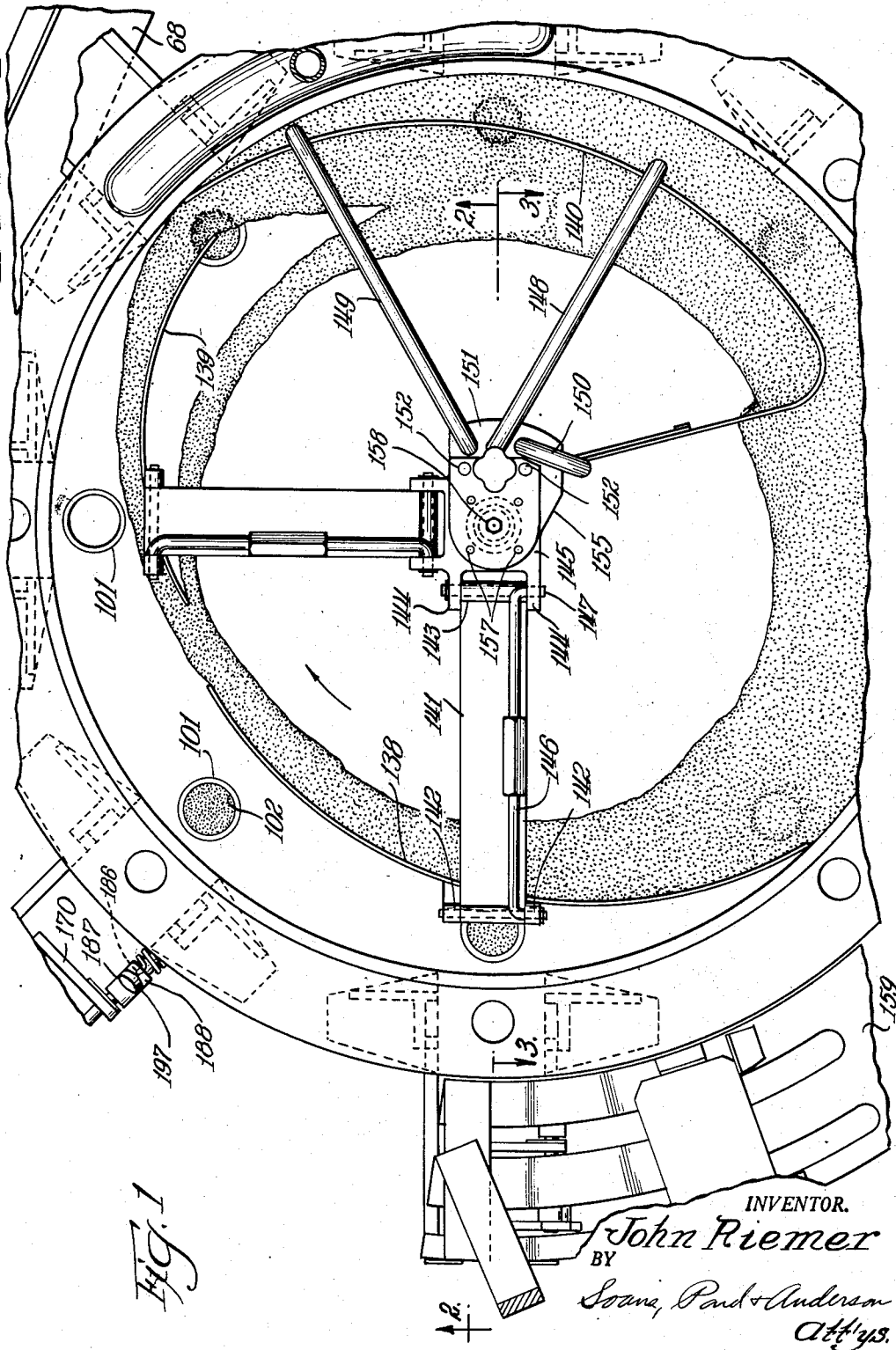
J. RIEMER

2,655,301

CONTAINER HANDLING DEVICE WITH PLURAL CONTAINER
MAGAZINES FOR FEEDING CONTAINERS TO THE
HANDLING DEVICES IN FILLING MACHINES

Filed June 28, 1946

9 Sheets-Sheet 1



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Fig. 2.

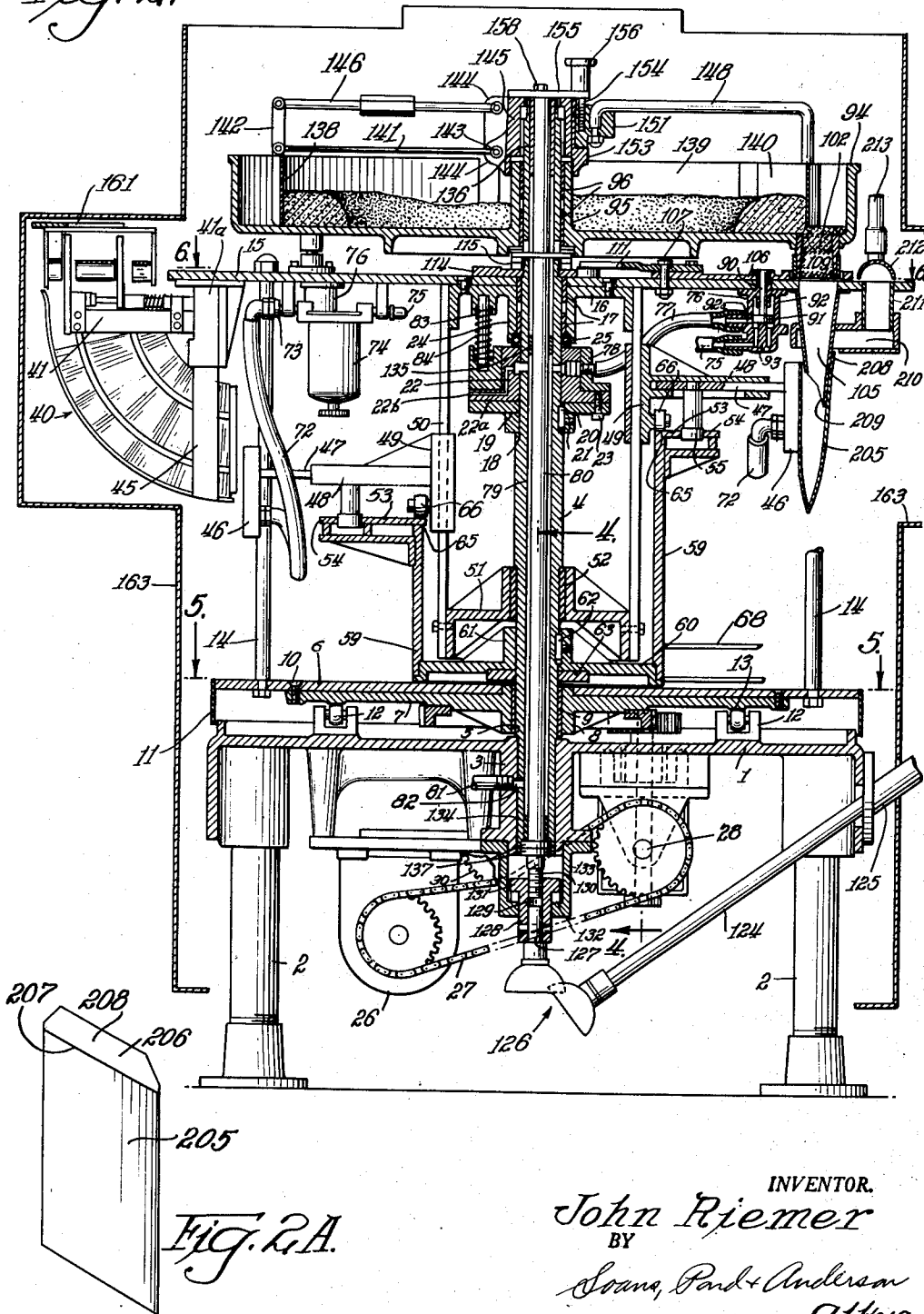


Fig. 2A.

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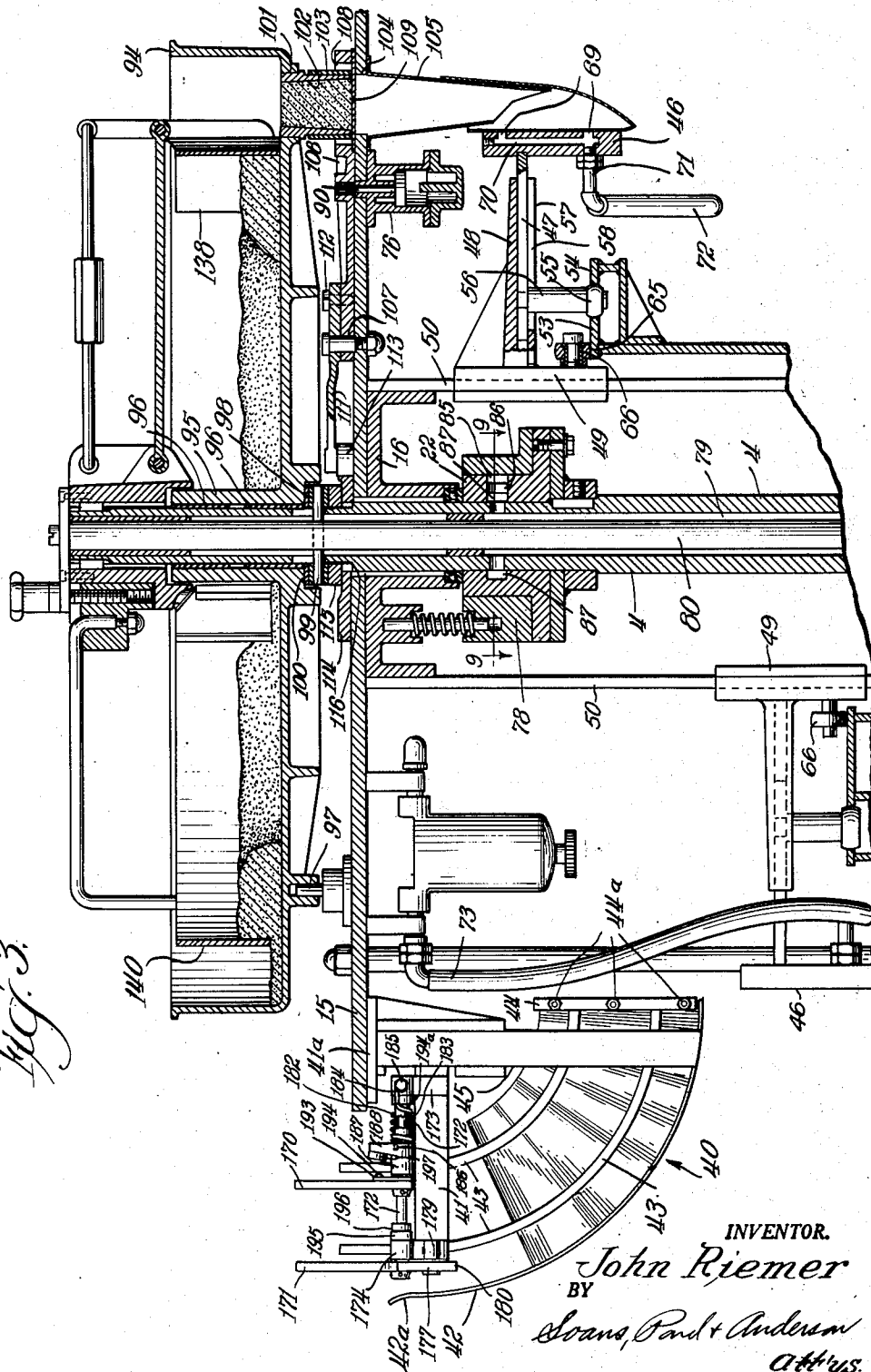
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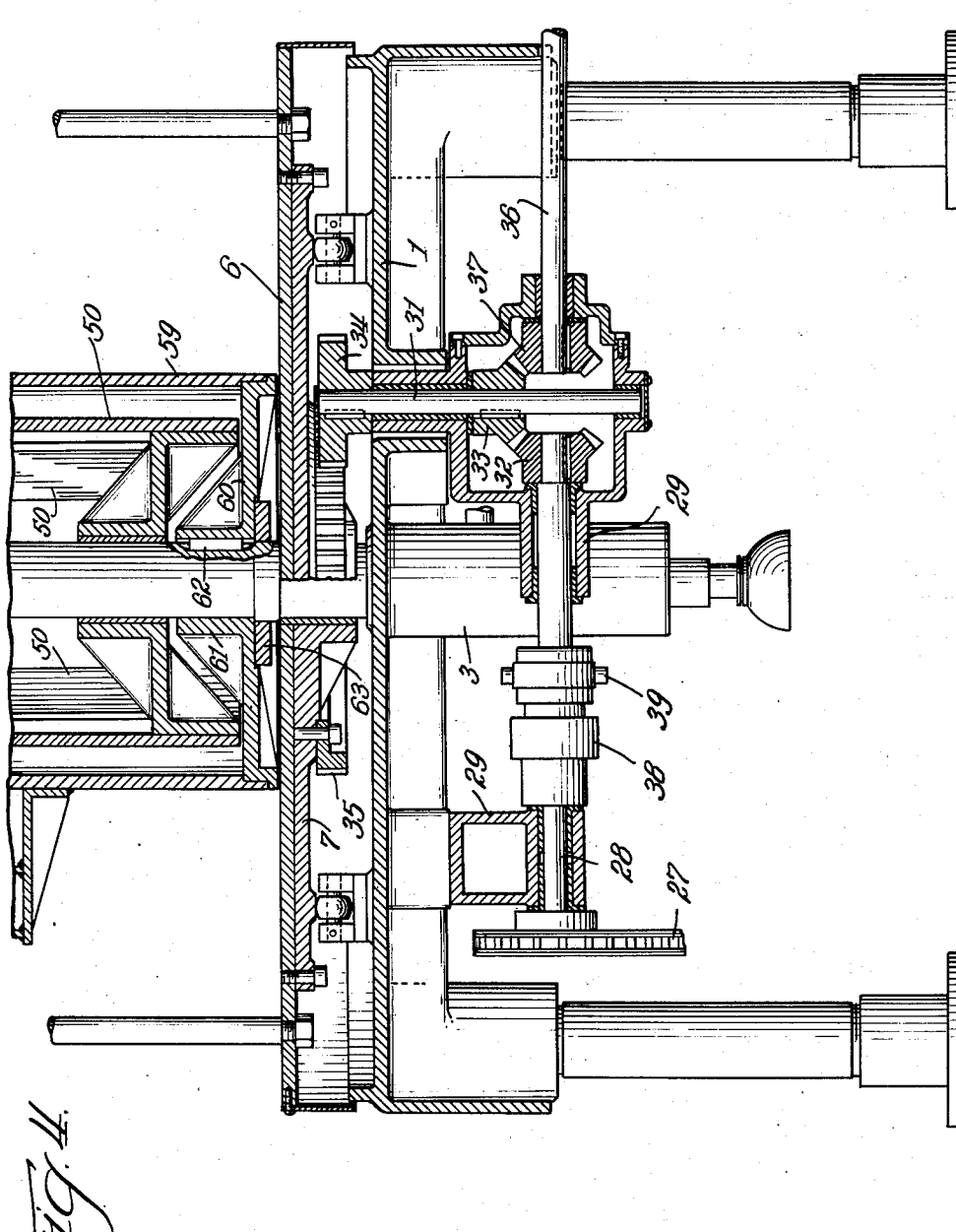


Fig. 4.

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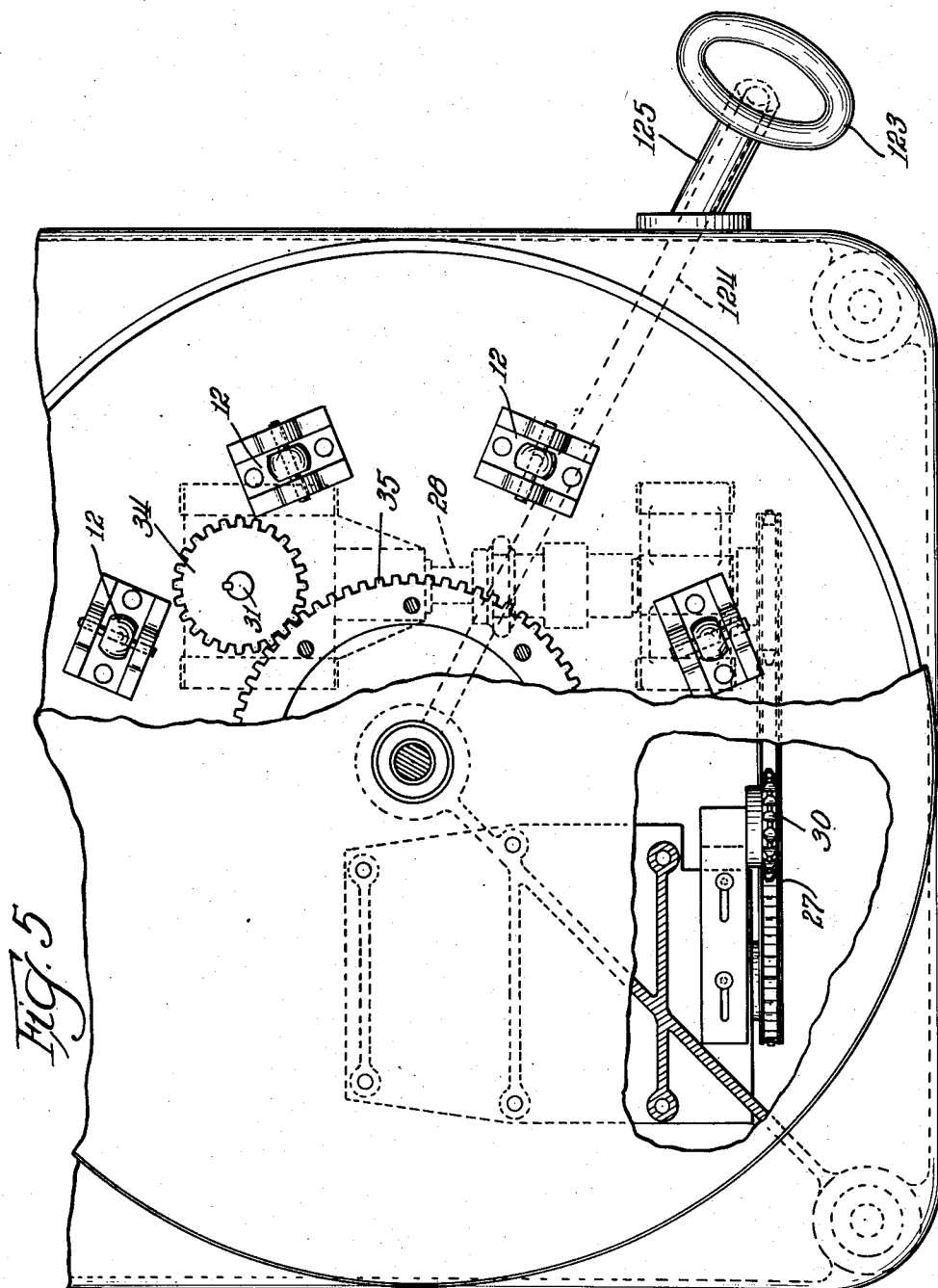


Fig. 5

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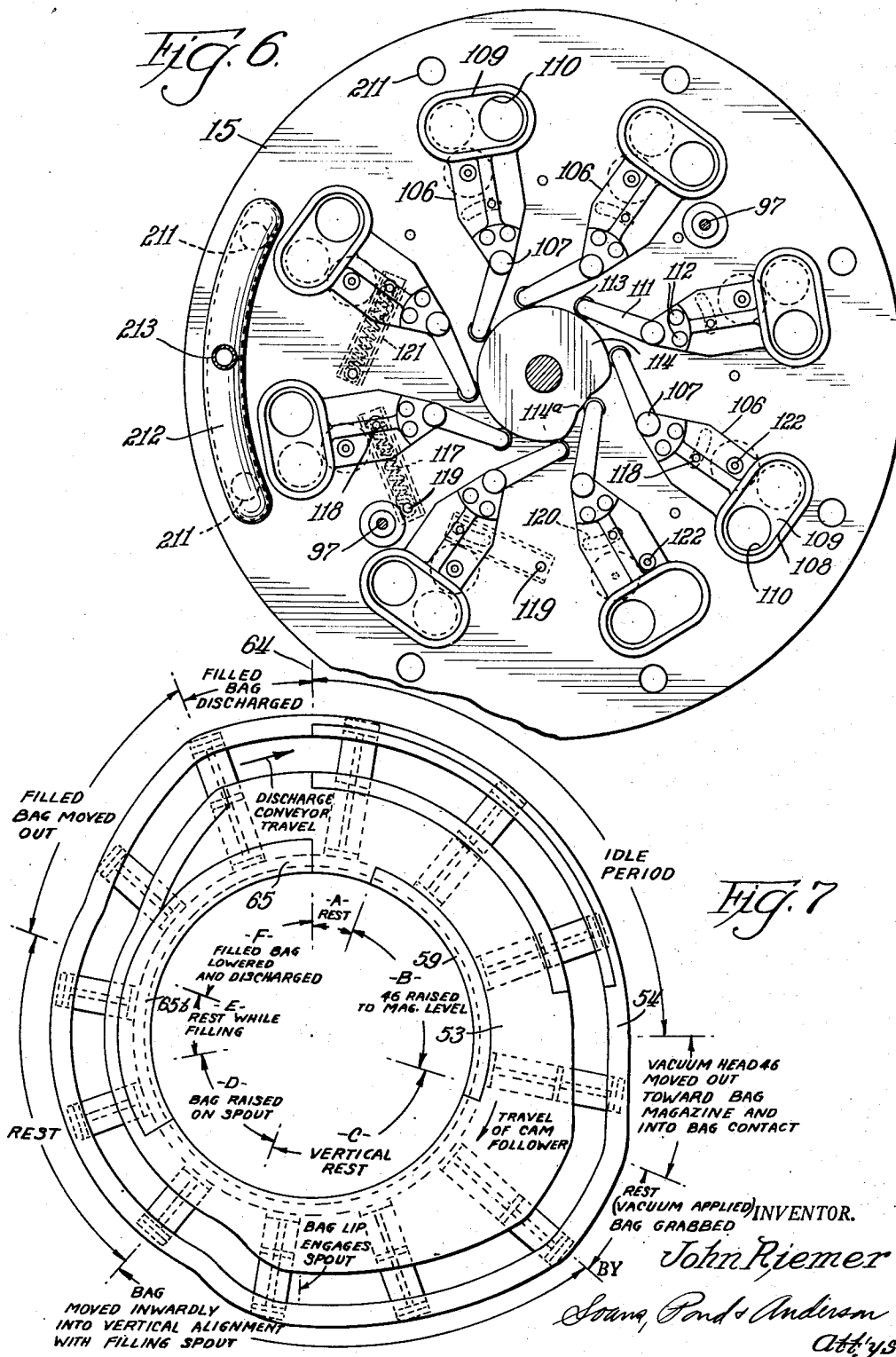
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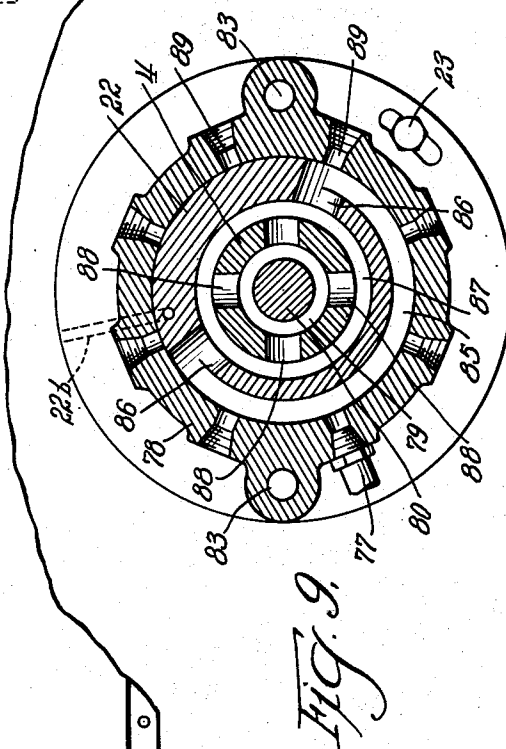
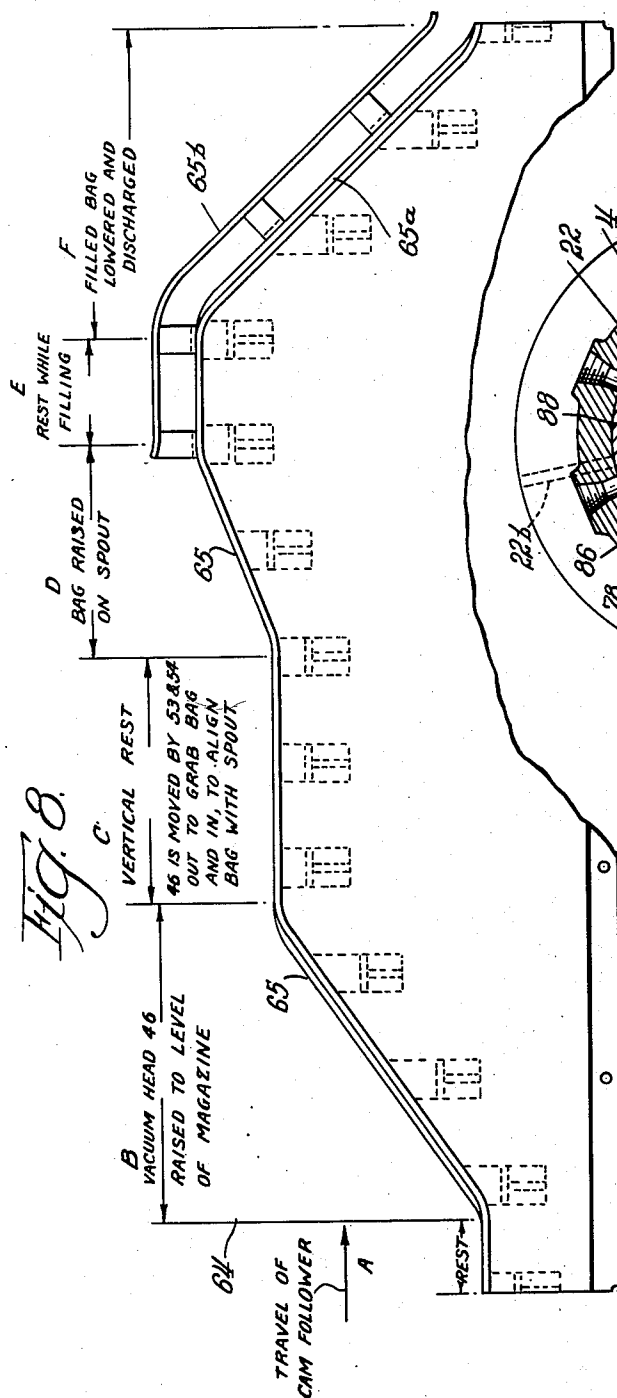
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CONTAINER HANDLING DEVICE WITH PLURAL CONTAINER
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Fig. 10.

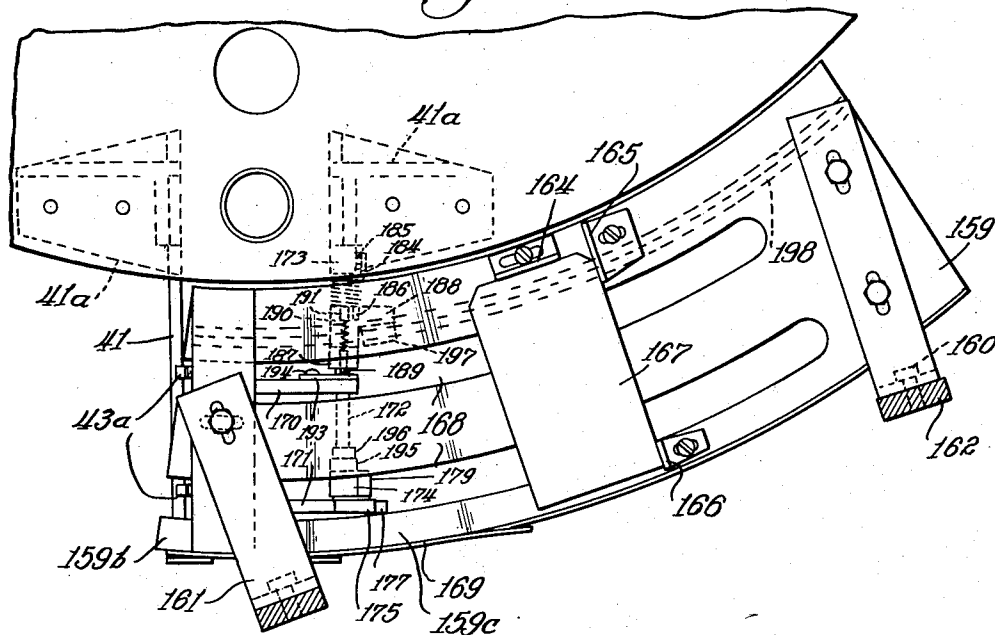
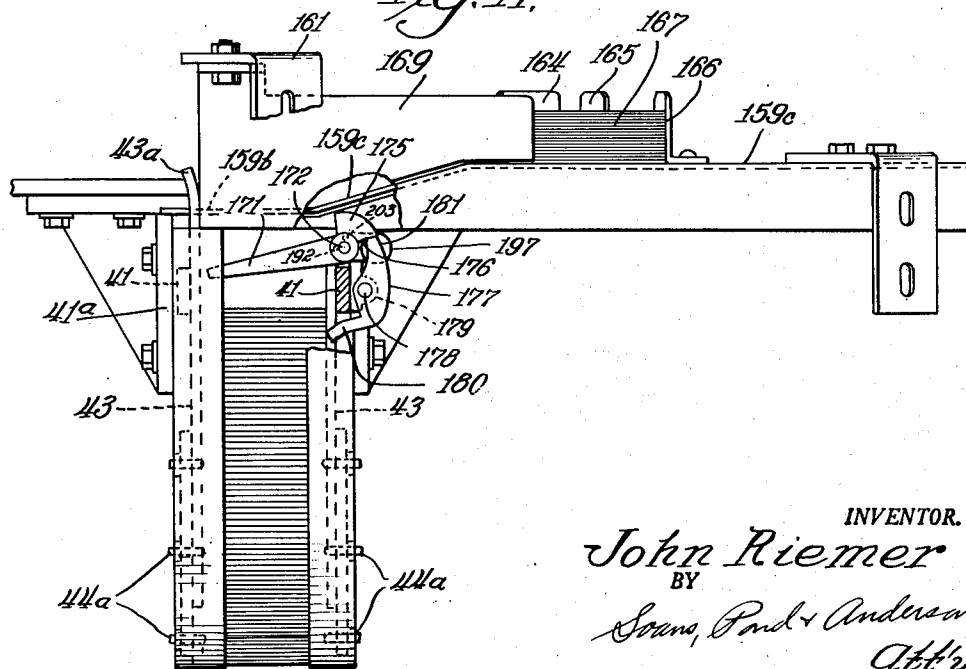


Fig. 11.



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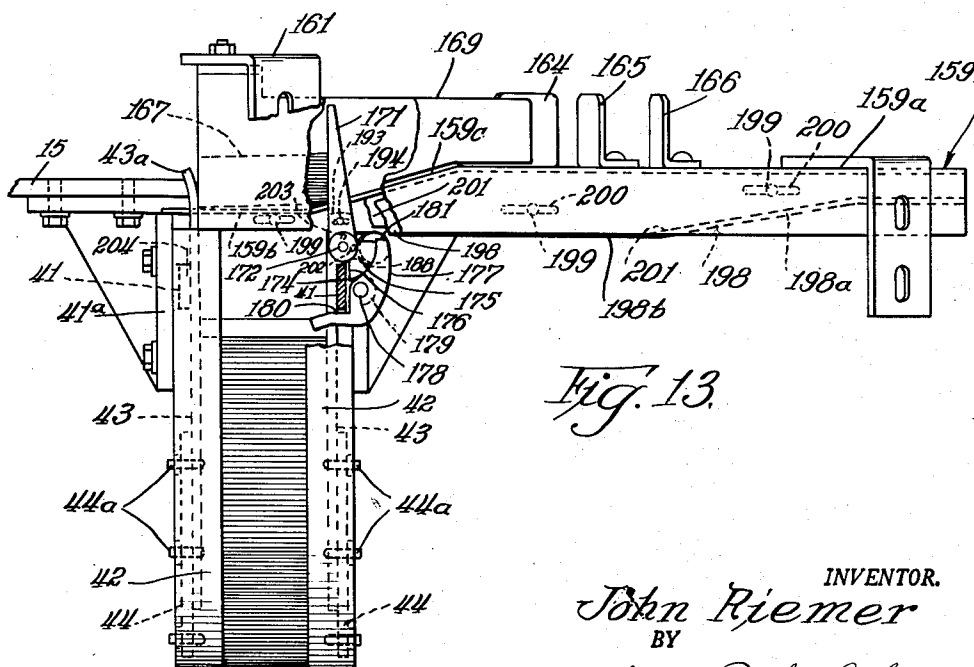
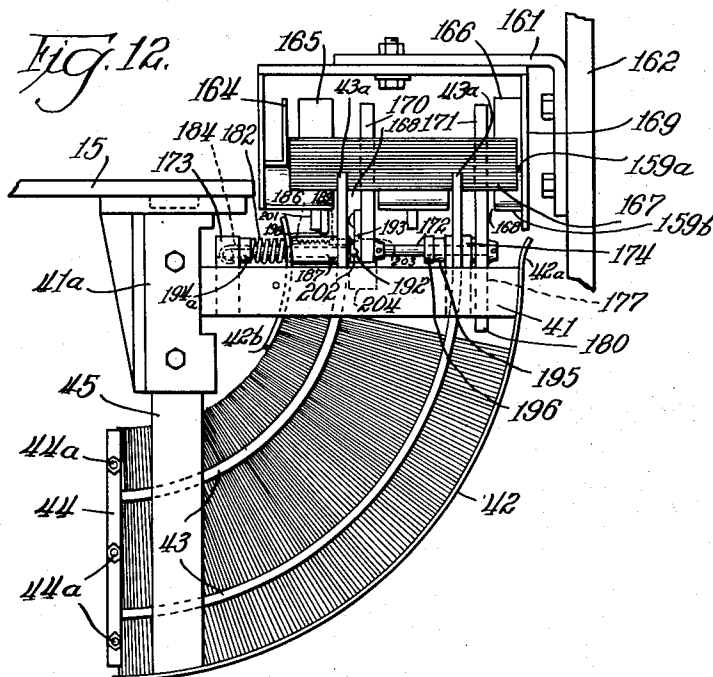


Fig. 13.

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UNITED STATES PATENT OFFICE

2,655,301

CONTAINER HANDLING DEVICE WITH
PLURAL CONTAINER MAGAZINES FOR
FEEDING CONTAINERS TO THE HAN-
DLING DEVICES IN FILLING MA-
CHINESJohn Riemer, Green Bay, Wis., assignor to Kraft
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Application June 28, 1946, Serial No. 680,309

10 Claims. (Cl. 226—49)

1

This invention relates to improvements in a bag filling machine and more particularly to a machine for filling powdered or granular, or like material into paper or like bags or containers.

The main object of the invention is to provide a machine of the character indicated, which will operate at a relatively high rate of speed and which, notwithstanding its high speed of operation, will operate to fill the bags or containers with an accurately measured quantity of material.

Other objects are to provide improved apparatus of the character mentioned in which the measured quantity of material to be fed to the bags or containers may be readily adjusted, and in which such adjustment may be made while the apparatus is in operation; to provide improved means for delivering empty bags or containers to the filling mechanism; to provide means for automatically servicing the bag or container supply means while the machine remains in operation; to provide apparatus of the character indicated which is of relatively simple construction considering the operations performed; and to provide means for controlling the dusting of the powdered material being handled.

In general it is the object of the invention to provide an improved bag or container filling machine of the character indicated.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings (9 sheets) wherein there is illustrated a bag filling machine embodying a selected form of the invention.

In the drawings,

Fig. 1 is a top view;

Fig. 2 is a vertical section through the axis of the machine on the plane represented by the line 2—2 of Fig. 1;

Fig. 2a is a perspective of a typical bag which may be filled by the machine illustrated;

Fig. 3 is a section on the line 3—3 of Fig. 1 but showing the upper portion only of the machine, the figure being on a somewhat larger scale than Fig. 2;

Fig. 4 is a section on the line 4—4 of Fig. 2;

Fig. 5 is a plan section approximately on the plane represented by the line 5—5 of Fig. 2, certain parts being broken away to more clearly illustrate other parts;

Fig. 6 is a plan section on the line 6—6 of Fig. 2;

Fig. 7 is a plan illustrating the arrangement of certain cams which appear in section in Fig. 2;

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Fig. 8 is a development of the cam structure shown in plan in Fig. 7;

Fig. 9 is a section on the line 9—9 of Fig. 3;

Fig. 10 is a fragmentary plan view corresponding to a portion of Fig. 1, but on a somewhat larger scale;

Figs. 11 and 12 are a side elevation and an end elevation, respectively, of the mechanism shown in Fig. 10;

Fig. 13 is a view corresponding to a portion of Fig. 11, but showing certain parts in a changed position.

The machine shown in the drawings is an eight station machine, that is to say, it embodies eight filling units. The eight units are built into a cage or drum-like structure which rotates on a vertical axis, and each of the eight units is equipped to position an empty bag or container in filling position, to fill the bag or container and to discharge the bag or container to a receiving conveyor. The eight units are of substantially identical construction so that in the following specification the details of a single unit will be referred to.

The machine, as best shown in Fig. 2, comprises a base embodying a top casting 1 and four supporting legs, such as represented at 2. The central portion of the top casting 1 is equipped with a depending boss 3 into which there is fitted the lower end of a tubular post 4. The post 4 has its lower end portion reduced in diameter so as to form a shoulder 5 which engages the top of the boss 3 to limit insertion of the post into the boss. The reduced lower end portion of the post is made a drive or press fit in the boss 3 so that the post becomes, in effect, rigid with the base member 1. If desired, additional means such as keys, set screws, and the like may be employed for further securing the post in fixed relation to the base member 1.

On the post, immediately above the base casting 1, there is rotatably mounted the bottom plate 6 of a cage or drum which is rotatable about the post 4. The plate 6 is supported on a casting 7 which has an apertured hub 8 rotatably mounted on an appropriately finished journal portion of the post 4, a suitable bearing bushing 9 being provided as shown. The plate 6 may be bolted as indicated at 10 to the member 7 around its periphery, or otherwise secured thereto, and a depending flange 11 is secured to the periphery of the plate 6 to close up the space between said plate and the base casting 1. The flange 11 serves to prevent the entrance of foreign matter into the space between the plate 6 and base member 1.

The plate 6 and the member 7 to which it is attached are supported by means of a plurality of circumferentially arranged roller bearings 12 which are suitably mounted on the base member 1 and arranged to engage a circular boss 13 which projects from the bottom face of the member 7.

A plurality of rods or posts 14 spaced circumferentially around the plate 6 a short distance inwardly from the periphery thereof, have their lower ends bolted to the plate as indicated, and their upper ends similarly secured to a top plate 15 which constitutes the top part of the drum or cage previously mentioned.

The top plate 15 has its central portion secured to a hub member 16 which, with the plate 15, is journaled on the post 4 through the agency of bushings, such as indicated at 17. To provide support for the central portion of the top plate 15, the post 4 is shouldered as indicated at 18 to receive a flanged collar 19 which is preferably keyed as indicated at 20 to the post so as to be held against rotation. A set screw 21 may be provided in the collar 19 for locking the key in place.

On top of the flanged collar 19 there is provided a valve member 22 which has a hub portion fitting around the post 4 and a flange portion resting on the flange of the collar 19. The valve member 22 is normally stationary, being held in fixed position relative to the member 19 by means of a clamping screw 23 which passes through an arcuate slot in the flange of the member 19, and screws into a tapped hole in the flange of the valve member 22. This arrangement permits a desirable amount of rotary adjustment of the member 22 relative to the post 4 and collar 19, the purpose of which will hereinafter be explained.

The member 16 on which the central portion of the plate 15 is mounted has a hub portion 24 which is suitably recessed at its lower end to receive a ball or other suitable anti-friction bearing 25 through which the member 16 and plate 15 are supported on the upper end of the hub portion of the valve member 22.

It will be seen that the bottom plate 6, the posts 14, and the top plate 15 form a rigid drum or cage structure which is rotatable about the post 4, and which has its central top portion supported on the post 4 and its lower peripheral portion rotatably supported on the base plate 1.

The rotatable cage structure is driven by means of an electric motor 26 which is suitably mounted on the bottom of the base member 1 and connected by means of a suitable belt or chain drive represented at 27 to a shaft 28 suitably journaled in bearings such as indicated at 29 suspended from the base member 1. (See Figs. 2, 4 and 5.) An adjustably mounted idler 30 is provided for engaging the driving member 27 to maintain it at the desired tautness.

The horizontal shaft 28 drives a vertically disposed shaft 31, which is suitably journaled in a bearing boss provided in the base member 1, through the agency of bevel gears 32 and 33 respectively keyed on the shafts 28 and 31. The shaft 31 has a spur gear 34 secured to its upper end in meshing relationship to a ring gear 35 which is bolted to the bottom of the bottom supporting member 7. (See Figs. 2 and 4.) If desired, a shaft 36 may be suitably journaled in the supporting base of the apparatus and equipped with a bevel gear 37 in mesh with the bevel gear 33 to permit manual jogging of the

rotary cage structure for facilitating adjustment, cleaning, and other operations. If desired, the shaft 28 may have incorporated in it a safety clutch 38 which is adapted to become disengaged in the event that the resistance of the rotary cage to turning movement becomes too great. Also, an adjusting coupling 39 may be incorporated in the shaft 28 to facilitate adjustment of the relationship of the gear 32 to the gear 33.

Each bag filling unit of mechanism carried by the rotary cage structure comprises a bag magazine 40. Such magazine is supported by suitable side bars 41, 41 which project from brackets 41a, 41a secured to the bottom of the top plate 15. A pair of arcuate metal strap members 42 (see Figs. 1, 2, 3 and 10) form the bottom of the magazine and pairs of rods, such as indicated at 43, form the opposite sides of the bag magazine. The bottom forming strap members 42 extend downwardly and inwardly from the outer ends of the bracket arms 41 and they are of such widths that substantial portions of their widths project toward each other and beyond the respective inner faces of said bracket arms, as best shown in Fig. 13.

The side rods 43 depend from the bracket arms 41 and at one side of the magazine the said rods 43 have upper end portions 43a extended upwardly beyond the top plane of the arms 41 to cooperate with similar upwardly projecting end portions 42a of the bottom forming straps 42 to facilitate positioning of bags for insertion flatwise into the magazine. The rod portions 43a extend upwardly a greater extent than do the bottom strap portions 42a. The inner or delivery end of the magazine is disposed in a vertical plane and embodies side frames or plates 44 carried by the delivery ends of the side rods 43. The delivery end portion of the magazine may be supported by means of hangers or straps 45 which depend from the brackets 41a.

The side plates 44 of the magazine embody adjustable screws 44a (see Figs. 11 and 12) which have inner ends adapted to project inwardly over narrow marginal side portions of the adjacent bag so as to prevent the same from falling out of the delivery end of the magazine. The bags are withdrawn from the delivery end of the magazine by vacuum gripping means which will presently be described, the bags being flexed and distorted slightly incident to their being pulled past such inwardly extending screw ends or tips. The screws 44a may be adjusted inwardly or outwardly as required to obtain the desired holding effect.

At the upper portion of the magazine, there is provided an inside wall or bag guide plate 42b (Fig. 12) of arcuate form and substantially concentrically related to the outer or bottom wall strap members 42. The member 42b may be supported by attachment at its opposite edges to the respectively adjacent arms or bars 41.

Bags in collapsed flat condition are delivered in horizontal position to the receiving end of the magazine with bottom ends out and their unsealed ends in (that is, towards the center of the machine) and, as the bags are withdrawn one by one from the delivery end of the magazine, the topmost blanks gradually move to a vertical position at the delivery end of the magazine. This form of magazine is advantageous in that the bags are prevented from becoming matted together but are instead more or less separated from each other so that withdrawal of the bags one by one from the delivery end of the magazine

is facilitated. Also, as will presently appear, the arrangement facilitates delivery of additional bag supplies to the magazine without interrupting operation of the machine.

The bags are withdrawn one by one from the delivery end of the magazine by means of a vacuum picker which comprises a vacuum head 46 secured to the outer end of a bar 47 which is mounted for radial sliding movement in an arm 48. The horizontal arm 48 is formed integrally with a vertical end portion 49 which is suitably recessed and slidably mounted on a vertical guide rod or bar 50. The bar 50 has its upper and lower ends bolted or otherwise fixedly secured to the upper rotating hub member 16 and to a lower hub member 51 which is rotatably mounted on the post 4. An anti-friction bushing 52 is provided in the bearing hub of said lower member 51. The guide bars 50 together with the parts vertically slidably mounted thereon rotate in unison with the cage structure comprising the plates 6 and 15 and the interconnecting rod posts 14.

Radial movement of the vacuum head 46 is effected by means of a horizontal cam embodying inner and outer tracks 53 and 54 which embrace a roller 55 carried by a stud 56 which depends from the radially slidable bar 47. The arm 48 in which the bar 47 is slidable has its lower side formed by a plate 57 which is screwed or otherwise attached to the arm 48 and said plate is slotted as indicated at 58 to permit the stud 56 to pass therethrough and to move radially under the control of the cam tracks 53 and 54.

The cam tracks 53 and 54 are stationary, the same being carried by a hollow cylinder or drum-like structure 59. The hollow cylinder 59 is fixedly supported by means of a flange or disc 60 which is rigidly mounted on the stationary post 4 by means of a hub 61 formed integrally with said disc. As shown in Figs. 2 and 4, a key 62 is provided for locking the hub 61 to the post 4, a set screw being provided as indicated to further lock the parts in fixed position. Vertical support is provided by a flange 63 which, in this instance, is welded in fixed position on the post 4.

The cam tracks 53 and 54 are shown in plan view in Fig. 7 from which it will be seen that the cam tracks are so formed as to produce in and out movement of the vacuum head 46 according to a predetermined plan of operation. For the purpose of explanation, we may assume a starting point of operation as represented by the radial line 64. Rotation of the structure being clockwise when viewed from above, the initial part of the rotary movement may be considered an idle period during which the vacuum head remains at a fixed distance from the center of rotation. The second step in the operation is an outward movement of the vacuum head to cause its outer end to engage the bag in the delivery end of the bag magazine 40, and the third step is one in which the vacuum head remains stationary while vacuum is being applied to cause the vacuum head to grab the bag in the delivery end of the magazine.

Then follows an operation during which the cams 53 and 54 act to move the vacuum head with a bag attached thereto inwardly to align it with a filling spout which will presently be described. Such inward movement of the bag is followed by a period of rest during which material is delivered into the bag through the spout just mentioned. After the bag is filled, the vacuum head together with the bag still attached

thereto is moved outwardly to a position in which the filled bag is released and discharged to a conveyor which will also presently be described. Upon discharge of the filled bag to such a conveyor, the vacuum head has returned to its starting position ready for another cycle of operation.

During the in and out movement of the vacuum head, it is also subjected to up and down movement which is effected by a rising and falling cam provided by the top edge 65 of the drum 59. The cam edge 65 acts against a roller 66 carried by the lower end portion of the vertical arm portion 49.

In Fig. 2, the vacuum head 46 at the left hand side of the view is represented in its lowermost position. It is lowered only slightly more during the course of which a filled bag is discharged to a conveyor 68 provided for receiving and carrying away the filled bag.

The starting point 64 in the cycle of operation, used above in reference to the horizontal motion of the gripper, occurs immediately following the discharge of a filled bag and is again referred to in the following explanation of the vertical movements of the vacuum head.

For an initial portion of the movement, the cam 65 has a rest period during which the vacuum head remains vertically stationary. Then follows a period during which the cam effects upward movement of the vacuum head to align it horizontally with the discharge end of its bag magazine 40. Then follows another vertical movement rest period during which the vacuum head is moved outwardly by the cam tracks 53 and 54 into engagement with a bag in its magazine and returned inwardly to align the grabbed bag with the filling spout. After the bag is in vertical alignment with the filling spout, the cam 65 rises again to elevate the bag relative to the spout so as to, in effect, insert the spout into the bag, this position being illustrated at the right hand side of Fig. 2. During the bag filling period, the vacuum head remains vertically stationary and after the filling operation is completed, the cam track turns downwardly to lower the filled bag and to discharge it on the conveyor 68. To insure the lowering movement of the vacuum head with its attached filled bag, the descending portion 65a of the cam 65 is equipped with an overlying track 65b which is spaced from the track portion 65a, a distance which is equal to the diameter of the roller 66. The cam track portion 65b is thus positively operative to effect lowering of the vacuum head with its attached filled bag.

Release of the filled bag from the vacuum head is effected by cutting off and relieving the vacuum as will presently be explained.

The vacuum heads 46 are provided with a pair of openings 69 which are interconnected by means of a bore 70 (Fig. 3). The openings 69 are on the outer or front face of the head which engages the bag which is to be withdrawn from the magazine. The openings and bore 70 are connected to a source of vacuum through a nipple 71 threaded into the inner face or the back of the vacuum head and a flexible hose 72, one end of which is connected to said nipple 71 and the other end as shown at 73 to one side of a filter device 74 (Fig. 2). A pipe or suitable conduit 75 connects the other side of the filter 74 to the lower portion of a pneumatically actuated locking device 76, the purpose of which will presently be explained.

Another suitable conduit 77 connects another

portion of the locking device 76 to the rotating shell 78 of the valve structure of which the elements 19 and 22 previously referred to, constitute parts. Through suitable openings provided in the valve parts 78 and 22, communication may be established between the conduit 77 and the space indicated at 79 which is provided between the inside of the tubular post 4 and a normally stationary shaft 80 which extends upwardly through said post. The space 79 is connected to a vacuum pump or other suitable source of vacuum by means of a conduit 81 which is threaded into the boss 3 of the supporting frame member 1. Suitable holes indicated at 82 bored through the boss 3 and the lower end portion of the post 4 serve to establish communication between said conduit 81 and said space 79.

It will be seen that when the air is exhausted from the conduits 81, the space 79, and the conduits 77, 75 and 72, a suction will be established at the vacuum head openings 69 whereby the vacuum head will be operative to grab a bag and withdraw it from the magazine when the vacuum head is moved readily inwardly.

The vacuum connection to the vacuum head 45 is controlled by the valve comprising the parts 78 and 22 incident to the rotation of the part 78 around the stationary part 22. The valve part 78 is caused to rotate in unison with the rotating cage structure by means of one or more pins, such as represented at 83 which have their upper and lower ends entering suitable sockets provided in the upper hub member 16 and in the valve member 78, at least one of said ends being slidably disposed in its socket so as to permit relative vertical movement between the parts connected by such pins. A coil spring 84 around each pin 83 and compressed between the parts 16 and 78 serves to hold the valve member 78 in engagement with the flange portion 22a of the valve member 22.

The stationary valve member 22 has the outer surface of its upstanding collar portion provided with a groove 85 which extends part way around its circumference and terminates in radial openings 86, 86, which communicate with a groove 87 in its inner surface. The post 4 has one or more openings such as represented at 88 establishing communication between said groove 87 and the space 79.

The outer valve member 78 is provided with a series of suitably tapped openings 89 (Fig. 9) which respectively receive the connections of the conduits 77 from the locking devices 76 as already stated.

The groove 85 is of such length that vacuum will be constantly maintained in the vacuum heads 46 for the entire period during which the bag is required to be held by each vacuum head.

For releasing the vacuum in a gripper when a filled bag carried thereby is to be discharged, the valve body 22 is provided with a vent duct 22b (Figs. 2 and 9) which, at the proper time, establishes communication between the vacuum line to each gripper and the atmosphere.

The filters 74, one of which is incorporated in the vacuum line to each vacuum head, is for the purpose of preventing the passage of any powdered material or the like which the machine may be packaging through the vacuum line and into the vacuum pump. Details of the filter are not a part of the present invention and hence are not illustrated or described. The filter may be of any type which is suitable for pre-

venting the passage of the material being packaged into the vacuum line.

The locking device 76 is employed for the purpose of preventing the dumping of material in the event that there is no bag presented to receive the material. The locking device comprises a pin 90 which is vertically slidably mounted in the housing of the device. The lower end of the pin 90 is enlarged to provide a piston 91 which is vertically slidable in a cylinder 92 which forms the body of the locking device. The piston 91 in its normal, lowered position partially covers the inner end of a bore 92a through the cylinder wall and a nipple extending from the cylinder for receiving the end portion of the flexible conduit 77. A boss 93 projecting upwardly from the bottom of the chamber in the locking device serves to properly position the piston 91 with reference to said bore 92.

Under normal operating conditions, i. e., when a bag is engaged by the vacuum head, the amount of air which will flow through the system will readily be handled by the uncovered portion of the bore 92. However, in the event that a supply of bags is missing or for some other reason the vacuum head 46 fails to engage a bag, a much larger volume of air will be caused to flow through the vacuum head and through the various vacuum conduits, the result being that the normally uncovered portion of the bore 92 will not permit the flow of air at a sufficiently high rate so that air pressure will be developed in the cylinder portion below the piston head 91 thereby raising the piston head and uncovering more of the bore 92 to permit the required air flow. Incident to the upward displacement of the piston 91, its pin 90 is projected upwardly above the top surface of the top member 15. The upwardly projecting portion of the pin 90 is employed as will hereinafter appear, for preventing the dumping of a charge of material when there is no bag present to receive it.

Material to be packaged is delivered into a hopper 94 which is rotatable in unison with the cage structure about the hollow post 4. As shown in the drawings, the pan or hopper 94 has a central upwardly projecting hub 95 suitably bushed as indicated at 86, rotatably mounted on the post 4. The pan is rotated in unison with the cage structure through the agency of one or more pins, such as indicated at 97, the ends of which are slidably mounted in suitable sockets, attached to or formed integrally with the pan and the top plate 15 of the cage. The pan or hopper 94 is supported by means of a collar 98 which is vertically slidable about the hollow post 4 and pinned to the shaft 80 by means of a cross pin 99. An anti-friction washer or bearing 100 may be interposed between the collar 98 and the adjacent surface of the hub 94 so as to permit free rotation of the hopper relative to said collar 98. The shaft 80 is normally held stationary but it is capable of being adjusted vertically as will presently be explained.

Near its periphery, the hopper 94 is provided with a series of dispensing openings 101, there being one such opening for each bag handling unit of mechanism. In this instance, as already explained, there are eight filling stations spaced equally distant about the periphery of the rotating structure.

Nozzles 102 extend downwardly from each of the dispensing openings 101, the inner diameter of the nozzles being preferably slightly expanded downwardly as best shown in Fig. 3. The outer

surface of each nozzle is preferably cylindrical and has slidably fitted on it a sleeve 103.

In alignment with each nozzle, the top plate 15 is provided with an opening 104 and filling spouts 105 extend downwardly from the bottom of the plate 15 in registry with each of its openings 104.

Valve mechanism is provided for controlling the passage of material from the nozzle 102 into the spout 105 and said valve mechanism comprises a member 106 which is pivotally mounted at its inner end as indicated at 107 on a suitable stud carried by the top plate 15. The outer end of the valve member 106 is provided with an enlarged and elongated eye 108 into which the nozzle 102 and its sleeve 103 extend as shown. The bottom of the eye 108 is partially closed by a plate 109 secured to the member 106. Said plate 109 has an opening 110 at one end of the eye so that when the member 106 is rocked on its pivot 107 to bring the opening 110 into registry with the nozzle and spout, material may flow downwardly into and through the spout. However, when the member 106 is rocked to its other position, the solid area of the plate 109 will serve to close the lower end of the nozzle to thereby prevent the passage of material downwardly therefrom (see Figs. 3 and 6).

The pivoted valve arm 106 has rigidly secured to it an inner arm extension 111, the arm extension 111 being also pivoted on the stud 107 and being secured to the member 106 by suitable bolts as represented at 112. The inner extremity of the arm 111 carries a roller 113 which engages the periphery of a normally stationary cam 114 which is keyed in fixed position on a portion of the stationary tubular post 4. The nut 115 threadedly engaging a portion of said tubular post is provided for holding the cam 114 in engagement with a supporting shoulder 116 on said post 4.

The valve arm 106 is normally urged to its nozzle closing position and the cam follower is normally held in engagement with the cam 114 by means of a tension spring 117 which is stretched between a pin 118 depending from the arm 106 and a pin 119 depending from the bottom of the plate 15. The pin 118 passes through an arcuate slot 120 in the plate 15 so that the pin is free to move about the axis of the pivot stud 107 with the valve member 106. The spring 117 is preferably enclosed in a suitable casing or jacket represented at 121, the same being suitably secured to the bottom of the plate 15.

It will be seen that as an incident to the rotation of the plate 15 with its valve members 106 (one for each of the nozzles), the cam follower 113 of each valve arm 106 will travel around the cam 114 and that once in each rotation of the structure, the cam follower will drop into a recessed portion 114a of the cam periphery to thereby permit the spring 117 to move its valve arm 106 to a position in which the valve plate opening 110 registers with the outlet end of the nozzle 102.

Each valve arm 106 is provided with an aperture 122 which, in the normally closed position of the valve arm, is aligned with the pin 90 of the above described pneumatic locking device. In the event that there is no bag on the vacuum head 46 so that sufficient air is drawn through the vacuum passages and through the locking device 76, the pin 90 will be caused to move up-

wardly into the opening 122 of the overlying valve arm 106. When the valve arm 106 is thus locked against rocking movement about its pivot 107, the spring 117 is, of course, unable to rock the valve arm so that the cam follower 113 of that particular valve arm will not enter the recessed portion 114a of the cam 114. Hence, there will be no discharging of material through a spout 105 which does not have under it a bag for receiving such material.

The hopper 94 is supported through the anti-friction washer 109 on the collar 98 which is in turn supported by the pin 99 on the shaft 80. Vertical adjustment of the hopper 94 relative to the top plate 15 of the rotary cage structure is effected by adjusting the shaft 80 up or down. Such adjustment of the hopper relative to the plate 15 serves to vary the length of the chamber in the nozzle 102. The sleeve 103 normally rests at its lower end on the valve plate 109 and the nozzle element 102 slides up or down in said sleeve when the hopper 94 is adjusted up or down. Such adjustment, by varying the length of the nozzle chamber serves to effect adjustment of the volume of material which will be delivered through the spout 105 into an underlying bag.

The shaft 80 may be adjusted up or down by means of a hand wheel, such as represented at 123 (Fig. 5), which is carried by the outer end of a shaft 124 which is suitably journaled in a supporting member 125 carried by the lower frame structure of the machine. The lower end of the shaft 124 is connected by means of a bevel gear universal joint 126 to a spindle element 127. The spindle element 127 has keyed or pinned to it a collar or thimble 128, the upper portion of which is provided with a screw threaded hole 129 which threadedly receives a screw threaded lower end portion 130 of the said shaft 80. The weight of the pan 94 and the shaft 80 is transmitted through the threaded end portion 130 to the thimble 128 and the latter is provided with an upper end flange 131 for cooperating with a suitable anti-friction bearing 132 to transmit the load to the lower end portion of a housing element 133, which is suitably secured to the bottom of the hub portion 3 of the lower frame element 1. By turning the hand wheel 123 and shaft 124, the shaft 80 will be adjusted up or down, rotation on the shaft being prevented by the passage of the pin 99 through slots in the stationary post 4 as clearly shown in Figs. 2 and 3.

The shaft 80 may be guided in suitable bushings indicated at 134, 135 and 136. The bushings 134 and 135 serve also to provide end seals for the space 79 between the shaft 80 and the post 4 which constitutes a part of the vacuum line or passageway as already explained. Additional end seals may be provided as indicated at 137 at the lower end of the shaft, if desired.

In the hopper 94 there are provided suitable material distributors and scrapers. They may be of various forms and in this instance there are shown a set of three such units respectively indicated at 138, 139 and 140. Material may be delivered to practically any portion of the hopper.

The scraper 140 has its lower edge normally spaced slightly above the bottom of the hopper as represented in Figs. 2 and 3 and it serves to level off the material in a peripheral zone overlying the entrances to the nozzles 102. The scraper 138 has its bottom edge lightly engaging the bottom of the hopper and it serves to move

inwardly from a peripheral zone of the hopper substantially all of the material therein so that the only material left in said peripheral zone is that which is contained within the chambers of the nozzles 102. Thus when the nozzle valves are opened an accurately measured quantity of material will be delivered from the nozzle chamber.

The scraper member 139 serves to return some of the material from the central portion of the hopper to the peripheral zone thereof so as to reveal the empty nozzle chambers. The scraper 139 may have its bottom edge disposed very close to the bottom of the hopper although not necessarily in engagement therewith. By the described scraper arrangement, there is no tendency to pack material into the nozzle chambers whereby delivery of free or loose powder into the packages is assured.

The scraper member 138 may be advantageously supported by a parallel bar supporting arrangement, comprising a flat bar 141 pivoted at its outer end between arms 142 of a bracket element which is secured directly to the outer face of the scraper 138 and pivoted at its inner end as indicated at 143 on a shaft carried by lugs 144 formed integrally with a hub member 145. A tie rod 146 of adjustable length construction is disposed in parallel relation to the bar 141 and has its outer end pivoted at the upper end of one of the legs or ears 142, which is extended upwardly for that purpose, the inner end of the said rod having pivoted as shown at 147 in a portion of one of the ears 144 which is extended upwardly for that purpose. It will be seen that this parallel bar arrangement serves to floatingly support the scraper 138 while maintaining it at all times in its normal vertical position so that the entire length of its bottom edge will maintain its proper relationship to the bottom of the hopper 94.

The scraper 139 which preferably has its bottom edge disposed closely adjacent to the bottom of the hopper may be advantageously supported by a similar parallel bar arrangement.

The scraper 140, which is supported with its bottom edge in spaced relation to the bottom of the hopper, may be supported by a plurality of hangers 148 and 149 and 150, which have downwardly extending outer end portions suitably secured to the outer face of the scraper and inner end portions turned downwardly and suitably anchored in a vertically adjustable block 151. The block 151 is vertically slidably mounted on a pair of pins 152 projecting upwardly from a portion 153 of the hub member 145. Adjustment of the block 151 vertically may be effected by means of a screw 154 which passes through a plate 155 and is provided at its upper end with a small hand wheel 156 for facilitating turning of said screw. The plate 155 is suitably bolted as indicated at 157 to the upper end of the hub member 145 and as indicated at 158, to the upper end of the shaft 80.

The hub 145 and its vertically adjustable block 151 are thereby vertically adjustably supported from the upper end of the shaft 80 so that these parts are adjustable vertically in unison with the hopper 94. Vertical adjustment of the scraper 140 relative to the bottom of the hopper 94 is not often required wherefor the above described provision for adjustment is adequate.

Again referring to the bag magazine, of which there is an independent bag magazine for delivering bags to each of the bag handling and

filling units, it is possible to fill each bag magazine manually notwithstanding the continual rotary movement thereof, but such manual filling is not desirable especially if the machine is operated at a fairly high rate of speed. For automatically filling the magazine and for maintaining the magazines filled to a minimum level with attendant benefits in the movement of the bags to position for withdrawal from the magazines by the vacuum grippers, there is provided the mechanism best shown in Figs. 10 to 13, inclusive.

At any suitable position around the circumference of the machine there is provided a stationary bag support comprising a plate or table 159, this plate or table being supported by means of brackets such as indicated at 160 and 161 near its opposite ends. The brackets 160 and 161 are adapted to be rigidly secured to stationary frame members such as represented at 162 which form supporting means for a jacket or casing which encloses the entire mechanism. Such jacket or casing is represented in part at 163 in Fig. 2.

The table 159 may be of sheet metal construction and is formed so that it has an elevated portion 159a, and a lowered delivery end portion 159b connected by an inclined portion 159c. On the elevated portion 159a there are provided brackets such as indicated at 164, 165 and 166 which are adapted to position a stack of bags as represented at 167 on the elevated portion of the table. The brackets 164, 165 and 166 may, of course, be adjustably mounted on the table as indicated. The table plate is provided with longitudinally extending arcuate slots 168 which communicate with the delivery end of the table plate and extend into the elevated portion thereof well beyond the bag positioning brackets 165 and 166.

At the outer or convex side of the table plate and at its delivery end, it is provided with an upstanding guide plate 169 which may be formed as a part of a bale-like bracket as best shown in Fig. 12 for cooperating with the supporting bracket 161 to mount the delivery end of the table plate. The purpose of the table plate 159 is to support the stack of bags 167 manually placed thereon in position for automatic delivery to a bag magazine as an incident to the travel of the bag magazine under the plate.

Each bag magazine is equipped with a mechanism for automatically moving a stack of bags such as 167 from the table into the magazine as an incident to the movement of the magazine under said table. Such mechanism comprises a pair of arms or fingers 170 and 171 which are pinned or otherwise secured to a shaft 172 which is rotatably mounted on the upper end of the trailing side of the bag magazine. The shaft 172 can be so mounted by means of a pair of brackets 173 and 174 which are bolted or otherwise secured to the trailing side bar 41 of the magazine. (See Figs. 3, 11 and 12.)

The finger 171 is provided with an enlargement 175 at its hub to form a shoulder 176 adapted to cooperate with a pivoted latch or dog 177 for locking the finger in a down or inoperative position as shown in Fig. 11. Said locking member 177 is pivoted as indicated at 178 in a boss 179 formed in the mounting bracket 174 and it has a lower end portion or feeler 180 extending toward the bag magazine and adapted to engage the adjacent side of the stack of bags in the magazine. The dog 177 is so proportioned that its upper end over-balances its lower end

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and tends to rock the dog in a clockwise direction as viewed in Fig. 11 to cause the free end of its feeler arm 180 to enter the bag magazine when the supply of bags therein drops below the level of the feeler arm. When the bag level drops to the extent indicated, the free end of the arm 180 enters the bag magazine as represented in Fig. 13, the dog 177 rocking in such a direction as to disengage its locking end 181 from the shoulder 176 whereupon the arm 171 and shaft 172 is released for rotary movement which will be effected by spring means.

The spring means for rotating the shaft 172 and rocking the arms or fingers 170 and 171 comprises a torsion spring 182 which is coiled around a sleeve 183 (see Fig. 3) freely rotatable around the shaft 172. One end 184 of the spring is anchored as shown at 185 (see Figs. 3 and 12) to the supporting bracket 173, and the other end of the spring is anchored as indicated at 186 in one end of an arm hub 187 which is journaled on the shaft 172.

When the fingers 170 and 171 are in the down position as illustrated in Fig. 11, the spring 182 is wound up or under tension so that it tends to rock the shaft 172 to elevate the fingers 170 and 171 to the position illustrated in Fig. 13. Such spring effected movement of the shaft and arms is, of course, normally prevented by the locking action of the dog 177 on the portion 175 of the arm 171 as already explained.

The force of the spring is transmitted through said arm hub 187 to the finger 170 and shaft 172 by means of a pin 189 which is slidably mounted in a suitable bore in said arm hub 187 for movement in a direction substantially parallel with the axis of the hub. A suitable coil spring 190 is placed under compression between the inner end of the pin 189 and a set screw or plug 191 which closes one end of the pin receiving bore in said hub.

The free or outer end of the pin 189 is adapted to engage in a detent 192 formed in a hardened metal plate 193 secured to the adjacent face of the finger arm 170. Said hardened plate 193 is rotatably adjustable about the shaft 172 and it is adapted to be locked in fixed relation to the hub portion of the finger 170 by means of a locking screw 194 which is threaded into the finger 170 and passes through an arcuate slot in a portion of plate 193 as indicated in Fig. 11. By rotatably adjusting the plate about the shaft 172, the location of the detent 192 may be adjusted to the extent permitted by the arcuate slot through which the screw 194 passes.

It is desirable that the shaft 172 and the parts carried thereby be freely rotatable in the bearing brackets 173 and 174. To prevent resistance to such free rotation incident to the endwise thrust produced by the spring 182, a suitable anti-friction thrust bearing 194a is disposed between the bracket 173 and the adjacent end of the spring 182 and a similar anti-friction thrust bearing 195 is disposed between the bracket 174 and a collar 196 fixed to the shaft 172.

The normal or inactive position of the arms 170 and 171 is illustrated in Fig. 10 and 11. As there shown the arms are disposed in a more or less horizontal position overlying the top of the stack of bags in the magazine. The locking dog 177 is in locking position with its end 181 in engagement with the locking shoulder 176, this position being maintained as an incident to the presence of bags in the magazine which pre-

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vent the feeler arm 180 from moving into the magazine.

As each magazine travels under the table 159, a roller 197, carried by an arm 188 which projects from the hub 187, engages a cam 198 which depends from the bottom of the table 159. Said cam 198 extends for substantially the entire length of said table and has a downwardly inclined lower edge portion 198a at its receiving end and a substantially horizontal bottom edge portion 198b constituting the remainder of the operating edge of the cam. The cam bar 198 is mounted for limited longitudinal adjustment by means of screws such as indicated at 199 which pass through suitably elongated slots 200 in the cam bar and are threaded into a fixed reinforcing bar 201 which forms a part of the table structure. It will be evident that by adjusting the cam bar 198 lengthwise, the timing of the operations effected by the operating edge of the cam can be suitably adjusted.

When the bag magazine contains sufficient supply of bags to prevent the locking dog feeler 180 from entering the bag magazine, the finger arms 170 and 171 and the shaft 172 will be held against rotation. Nevertheless, when the roller 197 engages the cam edge 198a, it will be rocked in a clockwise direction from a normal position vertically above the shaft 172 to a position approximately in horizontal alignment with said shaft 172 as illustrated in Fig. 11. Such movement of the roller 197 and its arm 188 will result in a winding of the spring 182 and will be permitted without effecting corresponding movement of the finger 170 and parts rigid therewith because the spring pressed pin 189 will be cammed or forced out of the detent 192 and caused to ride on the surface of the wearplate 193. As soon as the roller 197 leaves the end of the cam 198, the spring 182 will restore the arm 188 and roller 197 to the said normal position vertically above the shaft 172. The said normal position appears in Figs. 1 and 3 of the drawings.

When the supply of bags in the magazine is reduced to such an extent that the feeler arm 180 may enter the magazine, the locking dog 177 will rock, because of its weight and arrangement, in a clockwise direction as viewed in Fig. 11 to disengage the locking end 181 thereof from the locking shoulder 176 of the arm 171. Then when the roller 197 next engages the cam 198, the arms 170 and 171 and the shaft 172 will be rocked in a clockwise direction incident to the cam effected rocking of the lever 188 and its hub 187 through the agency of said spring pressed pin 189 and the detent 192. The finger arms 170 and 171 will thereby be caused to project upwardly as shown in Fig. 13.

The cam 198 is so disposed as to cause the arms 170 and 171 to be rocked to their upwardly extending position before they reach the stack of bags 167 on the table. The arms then project upwardly through the slots 168 and come into engagement with the back face of the stack of bags 167 whereby the bags are advanced along the table plate 159.

The guide plate 169 prevents the bags from being displaced outwardly incident to the centrifugal force developed during the travel of the bags, and they follow the downwardly inclined portion 159c of the table plate to the horizontal portion 159b thereof and into engagement with the upper end portions 43a of the magazine side rods 43.

The purpose of the inclined portion of the table

159c and of the lowered delivery portion 159b is to permit the upwardly projecting rod portions 43a to travel under the stack of bags on the table portion 159a so as to be positioned in advance of the same when the stack is wiped from the lowered delivery end of the table into the receiving end of the magazine. The said portions 43a are, therefore, operative to prevent the bags from being thrown across the top of the magazine to an extent which might interfere with their proper dropping into the magazine as the bags leave the end of the table portion 159b.

As soon as the roller 197 leaves the cam 198, the spring 182 will rock the finger arms 170 and 171 in a counterclockwise direction from the position illustrated in Fig. 13 to the position illustrated in Fig. 11 thereby causing the arms to follow the downward movement of the stack of bags delivered to the magazine and to more or less tamp the same downwardly therein to insure their proper positioning on top of the bags previously remaining in the magazine. To insure movement of the finger arms 170 and 171 to their inoperative horizontal position, the plate 193 on the arm 170 is provided with a shoulder 202 which will be engaged by the pin 189 when it is seated in the detent 192 with the arm 170 in upwardly extending position. The pin 189 is thereby prevented from riding out of the detent 192 when it is called upon to effect rocking movement of the arms 170 and 171 and the shaft 172 as explained. When the arms 170 and 171 are rocked to their inactive positions, the locking dog will re-engage the shoulder 176 to again lock the arms in said positions.

The normal tendency of the spring 182 to effect clockwise rocking of the arms 170 and 171 and the shaft 172 will not interfere with the disengagement of the locking dog 177 from the shoulder 176 when the feeler arm 180 is permitted to enter the magazine because each time the roller 197 engages the cam 198, the pin 189 is disengaged from the detent or groove 192, thereby permitting the weight of the arms 170 and 171 to cause the same to rock slightly in a counter-clockwise direction to effect reduction of the engagement pressure between the locking shoulder 176 and the end 181 of the locking dog (if not actual separation thereof) so that the latter is free to rock by gravity to an inoperative position when permitted by the absence of bags in the magazine. To make this action more certain the plate 193 may be provided with an auxiliary detent 203 which will receive the pin 189 when the arm 188 is moved to the position illustrated in Fig. 13 while the arms 170 and 171 remain in the position illustrated in Fig. 11. Then when the roller 197 leaves the cam 198, the initial returning movement of the arm 188 will be transmitted to the arm 170 and 171 to thereby effect release of the dog 177 to permit the same to rock to an inoperative position if the bag supply is sufficiently low in the magazine. The auxiliary detent 203 will offer only slight resistance to disengagement of the pin 189 from said detent thereby only very slight movement of the arms 170 and 171 will be effected by this means. The resistance supplied by the bags in the magazine to downward rocking of the arms 170 and 171 is sufficient to cause the pin 189 to leave said auxiliary detent 203. Clockwise rocking movement of the arms 170 and 171 and the shaft 172 may advantageously be limited by engagement of the shoulder 176 of the arm 170 with the adjacent side bar 41 as shown in Fig.

13. Rocking movement of the arms 170 and 171 in the counter-clockwise direction will be limited either by engagement of the arms with the top of the bag supply in the magazine or by engagement of the arms with adjacent portions of the underlying bar 41.

The form of container or bag which the machine is designed to fill is illustrated in Fig. 2a from which it can be seen that there are front and back walls 205 and 206, respectively, said walls being suitably interconnected around their opposite side and bottom edges but unconnected at their upper edges. The front wall terminates in an upper edge indicated at 207, and the back wall extends upwardly beyond the edge 207 of the front wall to form the lip 208.

When the bag is drawn inwardly from the magazine into alignment with the spout 105, the horizontal position of the bag is such that the lip portion 208 thereof will engage the lower end or lip-like portion 209 of the spout. Such engagement of the bag lip 208 with the spout lip 209 serves to initiate opening of the bag as an incident to continued inwardly movement of the vacuum gripper 46. Upward movement of the vacuum head and bag which may occur in fact simultaneously with inward movement and in part after such inward movement, effects telescoping of the bag over the spout and further opening or distension of the bag as indicated in Figs. 2 and 3 of the drawings.

When powdered material being filled is delivered into a bag, some dust may rise from the discharged powdered material. To prevent such dust from settling in the mechanism, there is provided a hood 210 which surrounds the spout just shortly above the upper edge of the bag in its highest position on the spout. The hood is connected by means of a conduit 211 to the upper plate 15 of the rotary cage and establishes communication between said hood 210 and a vacuum manifold 212 overlying said plate 15. The manifold 212 (see Fig. 6) is of arcuate form overlying the peripheral portion of the plate 15, and it is of such length that it is capable of straddling a pair of adjacent conduits 211. The manifold is connected by suitable means such as a flexible hose 213 to a source of vacuum so that any dust rising from the bag 205 will be drawn upwardly through the hood and conduit into the manifold 212 and thence to a suitable collecting means (not shown). By causing the manifold 212 to communicate with adjacent conduits 211, the manifold is caused to at all times be in communication with at least one such conduit so that the flow of air through the manifold and to the vacuum pump will be substantially constant. This avoids an objectionable intermittent loading of the vacuum system and avoids any pulsating effect which would normally result from intermittent action. Smoothness of operation is thereby attained.

The operation of the described machine may be summarized as follows:

Empty bags, batch-fed automatically to bag magazines 40, are withdrawn one by one from the delivery end of each magazine by a vacuum gripper 46. There are, of course, a plurality of such grippers disposed in circumferentially spaced relation around the rotary turret or cage which is journaled on the central supporting post 4, and there is a bag magazine for each of the grippers. In other words, each gripper draws a bag from its own magazine.

Air suction in each gripper 46 is controlled by

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a rotary multiple valve structure mounted on the central post 4 and comprising the parts 19, 22, and 78. Connections from the valve structure to the grippers 46, comprise, for each gripper, a flexible hose 77, a valve locking device 76, a hose 75, a filter 74, and a hose 72.

Each vacuum gripper 46 is mounted for horizontal and vertical movement, horizontal movement being effected by the cams 53 and 54, and vertical movement by the cam 65. The cams which control the horizontal and vertical movements of the gripper are so arranged that a bag is first moved horizontally inwardly from the delivery end of a bag magazine, the bag lip 208 being brought into engagement with the lip 209 of spout 105 so as to effect opening of the bag incident to continued inward movement of the gripper and gripped wall of the bag. When the bag has been sufficiently opened, the gripper is caused to move upwardly to telescope the bag over the lower end portion of the spout in preparation for the delivery of material through the spout into the bag.

The material to be filled is delivered to a rotating hopper 94 in which spreader plates 138, 139, and 140 are arranged to effect filling of circumferentially spaced outlet nozzles 102 which constitute measuring chambers for determining the amount of material which will be delivered into the bags. There is a nozzle 102 in communication with each spout 105, and communication between the nozzles and the respective spouts is controlled by a valve plate 109 and a stationary cam 114.

Incident to rotation of the rotary cage structure which carries the grippers, spouts, hopper and nozzles, and nozzle valves, the stationary cam 114, acting through the arm 111 and the valve member 106 which carries the valve plate 109, controls the opening and closing of the valve. The valve member 106 is pivoted at 107 on the rotating plate 15.

The valve plate 109 is opened after a bag is in proper position on the spout, a measured quantity of material being thereby discharged into the bag. Any dust which rises from the material delivered into the bag is drawn away through the vacuum hood 210 and stationary vacuum manifold 212 which is of such length that it communicates with adjacent hoods to insure a continuous air flow through the manifold.

After the bag is filled, the gripper with its filled bag is lowered and moved outwardly to dispose the filled bag over a conveyor 68 to which the bag is discharged by cutting off of the vacuum to the gripper. The vacuum is, of course, cut off by appropriate porting of the rotary valve structure comprising the parts 19, 22 and 78, and provision is made to relieve the vacuum through such valve structure. The discharge of the filled bag from the gripper 46 is preferably effected just as the gripper reaches its lowermost point so that the downward and edgewise momentum of the bag will aid in its separation from the gripper when the vacuum is cut off.

The conveyor 68 which receives the filled bag will have associated with it, suitable side guides or supports for holding the filled bag upright and the bag will be carried by the conveyor 68 to any desired mechanism for effecting further operations on the filled bag such as, for example, shaping the filled bag, closing and sealing its open end, and inserting it into an outer container if desired.

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After discharge of a filled bag, the vacuum gripper 46 is moved vertically upwardly into horizontal alignment with the discharge end of its bag magazine preparatory to the next cycle of operation. Then the gripper is moved horizontally outwardly to engage and withdraw the next bag and the filling operation is repeated.

It will be apparent that various changes in the details of construction may be made while retaining the principles of the described machine, wherefore the described details are intended to be a disclosure of typical rather than essential details.

I claim:

1. In a filling machine of the class described, a plurality of interconnected, travelling container handling devices movable successively through a predetermined path of travel, and a plurality of separate container magazines respectively associated in fixed relation with said handling devices and movable in unison therewith for delivering containers respectively to said container handling devices.

2. In a container filling machine of the class described, a plurality of portably supported container handling devices, means for effecting simultaneous travel of such devices through a predetermined path of travel common to all of said devices, a plurality of separate container magazines for supplying containers respectively to said handling devices, and a plurality of separate means respectively associated with said handling devices and movable in unison therewith for delivering material to containers held by the respective handling devices.

3. In a container filling machine of the class described, a plurality of portable container supply magazines, means associated with said magazines for withdrawing containers therefrom, means for effecting unitary travel of said magazines and said container withdrawing means, a normally stationary container support, and means for automatically delivering stacks of containers from said support to said magazines as an incident to relative movement between said magazines and support after withdrawal from the magazines of a predetermined portion of the container capacity thereof.

4. In a machine of the class described, a plurality of container magazines movable in unison, a normally stationary container support, means carried by each of said magazines and controlled by the supply of containers therein to automatically deliver containers from said support into the respective magazines as an incident to relative movement between said magazines and said support, said means comprises for each magazine a shaft rotatably mounted on the magazine, a pair of finger arms fixedly mounted on said shaft in spaced relation longitudinally thereof, spring means normally urging said finger arms and shaft to rotate to position the finger arms in inoperative position overlying the receiving end of the magazine, an arm having a hub portion rotatably mounted on said shaft intermediate said spring and one of said finger arms, means yieldably interconnecting said hub and the adjacent finger arms for unitary rotary movement about the axis of said shaft, said hubbed arm having cam engaging means at its free end and the container support being provided with a cam adapted to engage said cam engaging means to effect rocking movement of said hub and said finger arms to position the latter in operative,

container delivering position, and a locking dog pivotally mounted on a portion of said magazine and having at one end a feeler arm for engaging the supply of containers in said magazine and, at its other end, locking engagement with one of said finger arms to hold the same in inoperative position when said feeler arm is in engagement with containers in the magazine.

5. In container filling mechanism of the class described, the combination of a rotary turret provided with a plurality of container gripping and filling devices; means for rotating said turret, a separate container magazine for each of said container gripping and filling devices, said magazines being movable about the axis of said turret with the respective gripping and filling devices and being of arcuate form and arranged to receive containers in a generally horizontal plane and conduct the same downwardly and inwardly through an arcuate path of travel to a generally vertical position, means for actuating said container gripping devices as an incident to the rotation of said turret so as to cause the gripping devices to engage the vertically disposed containers in the respective magazines and successively withdraw the containers inwardly of the turret from said respective magazines to position the containers for filling purposes.

6. In container filling mechanism of the class described, the combination of a rotary turret provided with a plurality of container gripping and filling devices, means for rotating said turret, a separate container magazine for each of said container gripping and filling devices, said magazines being movable in unison with the respective gripping devices about the axis of said rotary turret, means for actuating said container gripping devices during rotation of said turret to cause the gripping devices to successively grip the containers in the respective magazines and to withdraw said containers therefrom and position said containers beneath the filling devices.

7. In apparatus of the class described, normally travelling container handling and filling means; a magazine for delivering containers to said handling and filling means, said magazine being associated with said handling and filling means for travelling in unison therewith and having approximately horizontal receiving and vertical discharge ends, said magazine comprising opposite, substantially parallel, side guides and an arcuate bottom intermediate said side guides, said side guides and bottom extending from the container receiving end of the magazine to the container discharge end thereof and constituting a chute for guiding containers from horizontal position to vertical position for delivery to said container handling means, and guide means spaced from and substantially paralleling the receiving end portion of said bottom and extending for at least a portion of the distance from said receiving end to said discharge end to cooperate with the receiving end portions of said side guides and bottom to position the containers in said horizontal receiving end portion of the magazine, and means for automatically delivering a stack of horizontally disposed containers to said magazine through said horizontal receiving end thereof during the travel of said magazine and said container handling and filling means.

8. In a machine of the class described, a plurality of spaced apart container magazines movable along a predetermined path, a normally stationary container support, means carried by each

of said magazines which are movable into engagement with containers positioned on said support for moving said containers into the respective magazines as an incident to relative movement between said magazines and said support, and additional means on said magazines operable in response to a change in the supply of containers in the magazine to effect said movement of said first mentioned means into engagement with the containers on said support.

9. In a machine of the class described, a plurality of container magazines movable along a predetermined path, a normally stationary container support, means operable to effect delivery of containers from said support into the respective magazines as an incident to relative movement between said magazines and said support, said means comprising an element rotatably mounted on each of said magazines in position for movement into engagement with the containers on said container support, and a cam carried by said container support in position for engagement with said element on each of said magazines to cause said element to move to said container engaging position.

10. In a container filling machine of the class described, a plurality of portably supported container handling devices, means for effecting simultaneous continuous travel of such devices through a predetermined path of travel common to all of said devices, a plurality of separate container magazines for supplying containers respectively to said handling devices, said magazines being respectively associated with said container handling devices and movable in unison therewith, a normally stationary support adjacent to said path of travel for supporting a stack of containers, and means automatically delivering stacks of containers from said support into the respective magazines when the supply of containers in the respective magazines approaches a predetermined state of depletion.

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