Jan. 25, 1944. L. J. NOWAK, JR 2,340,225

WEIGHING, BAG OPENING, AND FILLING APPARATUS

Filed Dec. 12, 1938 5 Sheets-Sheet 1

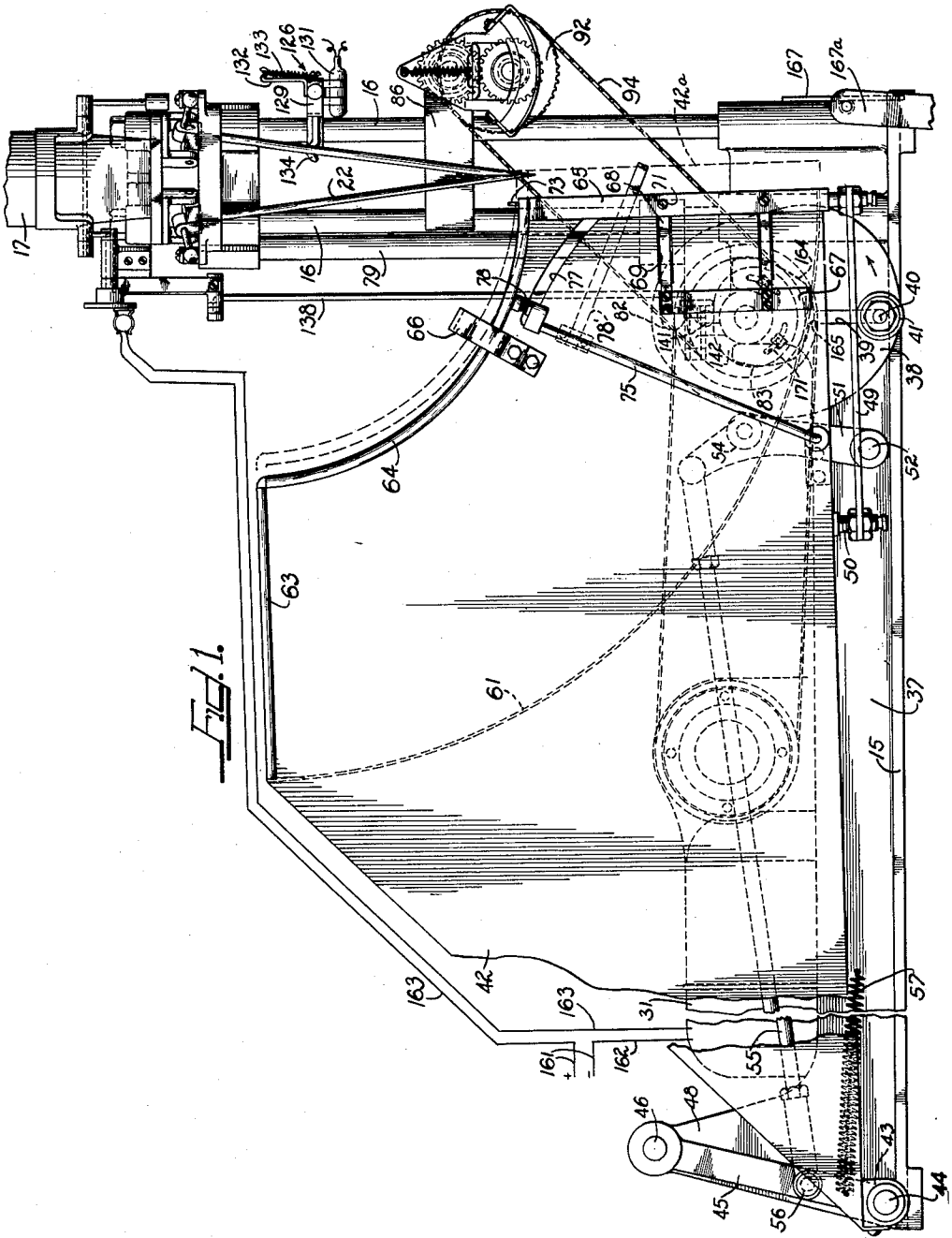


Fig. 1.

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WEIGHING, BAG OPENING, AND FILLING APPARATUS

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Fig. 2.

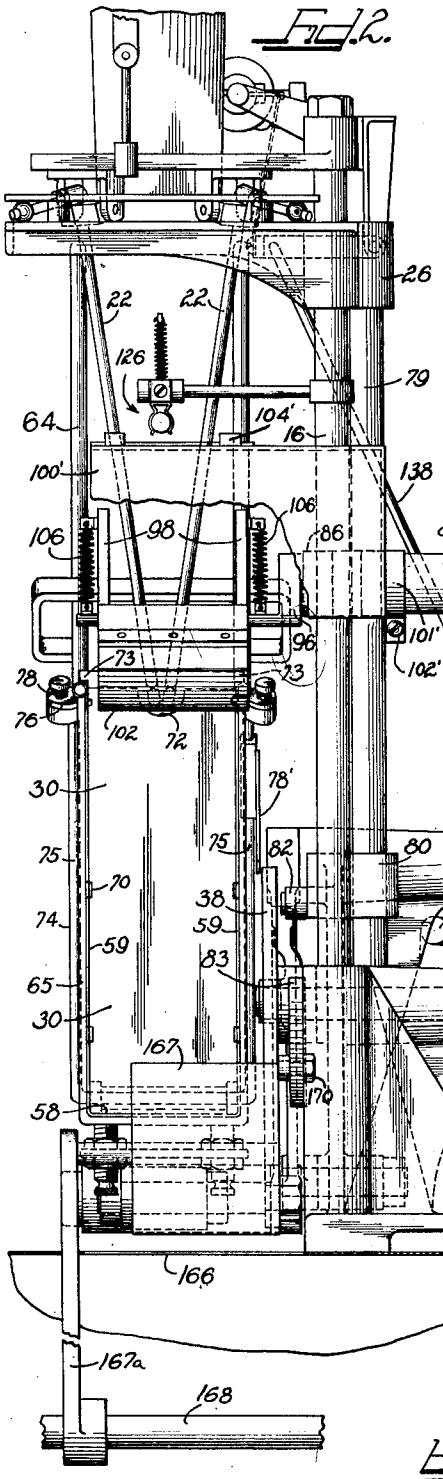
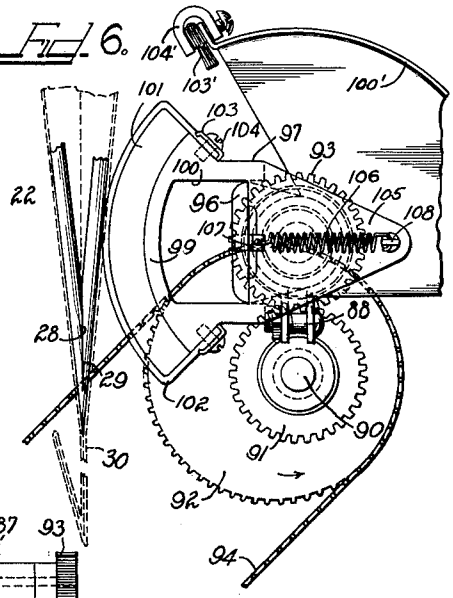


Fig. 6.



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WEIGHING, BAG OPENING, AND FILLING APPARATUS

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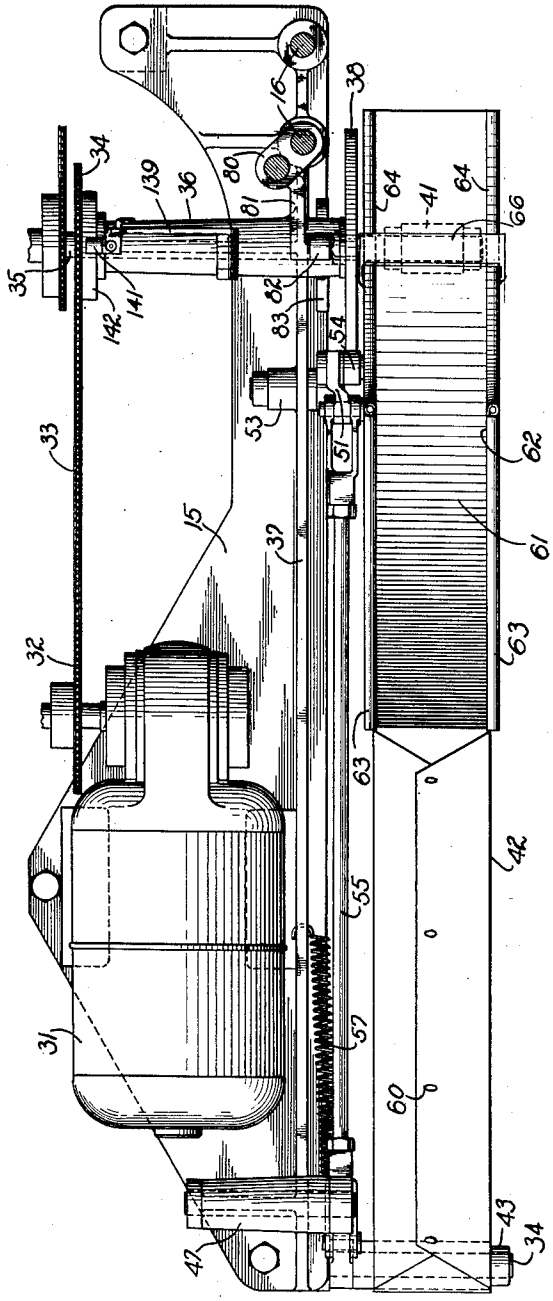


Fig. 3

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WEIGHING, BAG OPENING, AND FILLING APPARATUS

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Fig. 7.

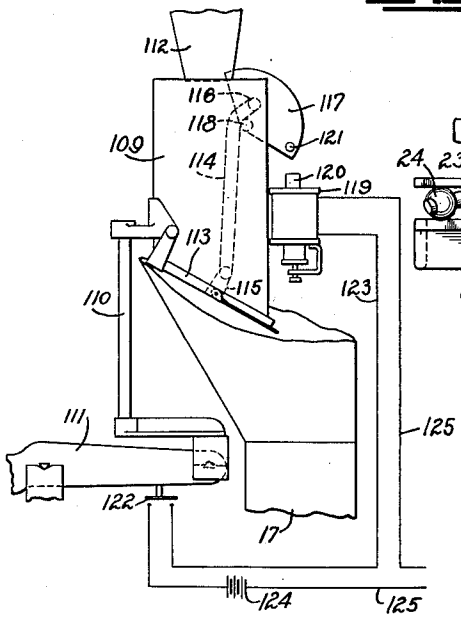


Fig. 4.

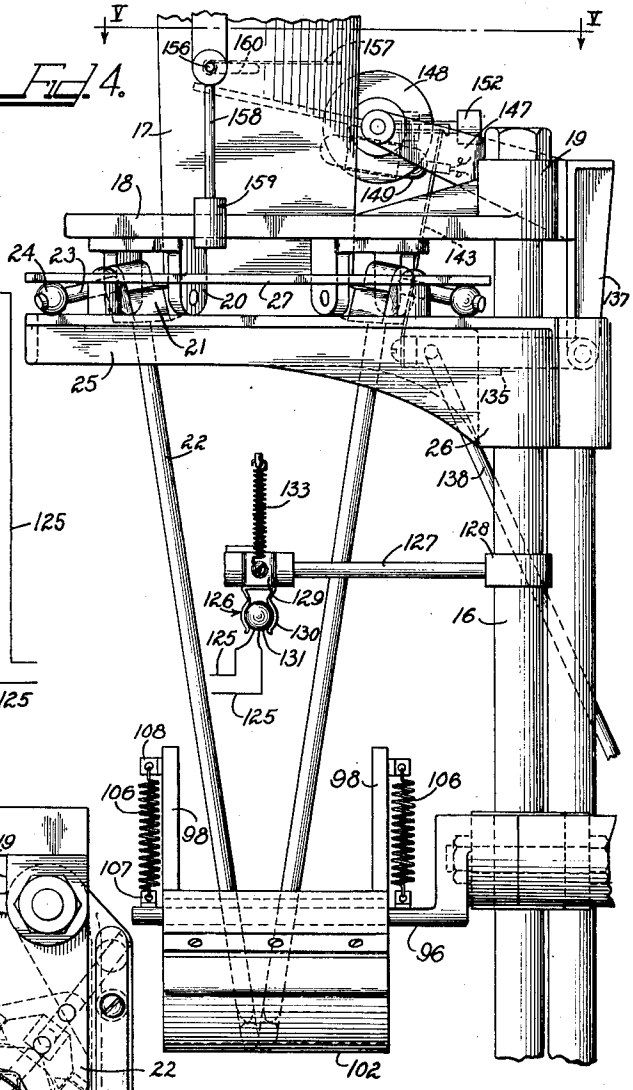
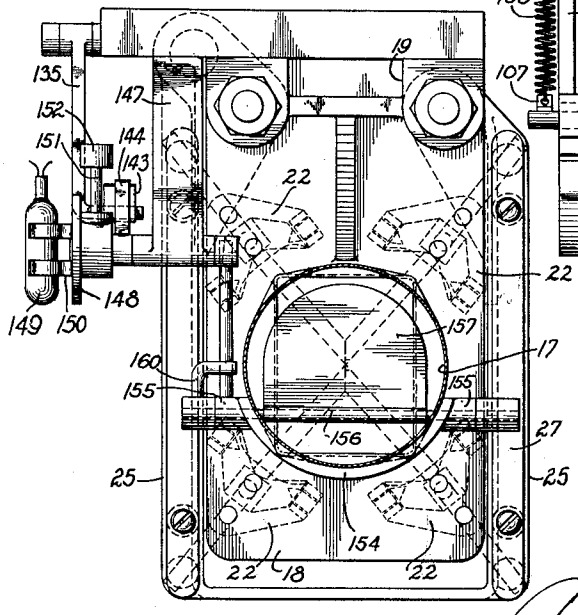


Fig. 5.



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WEIGHING, BAG OPENING, AND FILLING APPARATUS

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Fig. 8.

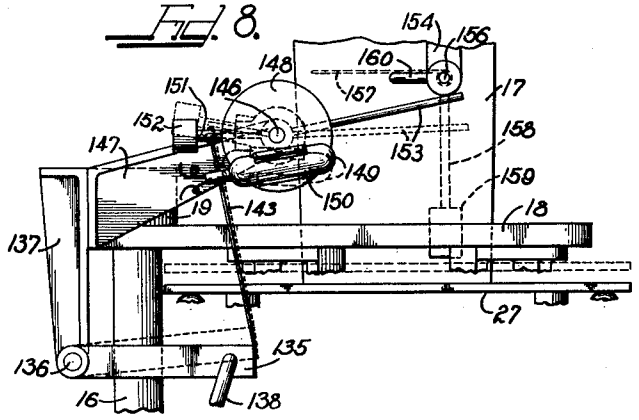


Fig. 9.

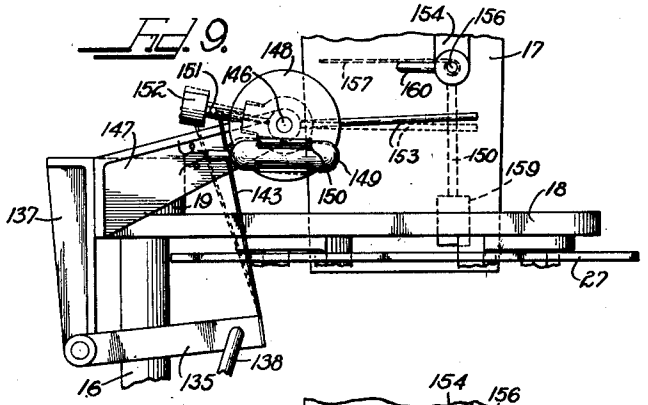
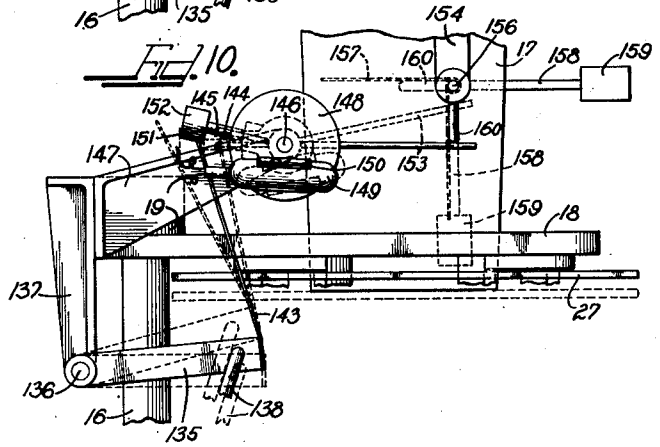


Fig. 10.



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UNITED STATES PATENT OFFICE

2,340,225

WEIGHING, BAG OPENING, AND FILLING APPARATUS

Leon J. Nowak, Jr., Chicago, Ill.

Application December 12, 1938, Serial No. 245,120

8 Claims. (Cl. 226—49)

The present invention relates in general to a weighing, bag or container opening and filling apparatus; and is primarily concerned with improvements in the means for carrying out the various stages of the operation of the apparatus in such manner as to effect a more efficient and reliable apparatus for such purpose.

The invention further contemplates an improved arrangement for telescoping a bag over bag opening fingers in such a way as to enable the use of bags constructed of relatively light materials. That is, an arrangement wherein the forces acting to telescope the bag and fingers are applied in such a manner as to obviate crumpling of the bag wall.

A further object of the invention is to provide improved means for coordinating the weighing mechanism and the discharge of material therefrom into a bag or container in such manner that the material will not be discharged unless the proper amount of material has first been weighed and the container is in proper filling position to receive the material.

Another object of the invention is to provide a bag magazine of improved construction; novel means for moving the magazine in a predetermined path during the operation of the apparatus; and improved mechanism for controlling the starting and stopping of the magazine movements in a predetermined relation to the operation of the other parts of the apparatus.

A still further object of the invention is to provide apparatus of the character described embodying bag opening fingers of improved construction.

With these and other objects in view, which will become more apparent as the description proceeds, this invention comprises the novel structure and combination of parts hereinafter described and more particularly pointed out in the appended claims.

In the accompanying drawings which illustrate a preferred form of this invention, and in which similar reference numerals refer to similar features in the different views:

Figure 1 is an elevational view of the bag supply and bag opening portions of apparatus embodying the features of the present invention;

Figure 2 is an end view of the same;

Figure 3 is a plan view of the base portion of the apparatus, showing the manner in which the bag magazine is mounted and mechanism for swinging and shifting the bag magazine;

Figure 4 is an enlarged fragmentary end view of the mechanism for telescoping a bag and bag opening fingers, and showing the supporting and actuating mechanism for the bag opening fingers;

Figure 5 is a transverse sectional view of the same, taken substantially on line V—V of Figure 4;

Figure 6 is an enlarged fragmentary view showing details of the mechanism for telescoping a bag over the bag opening fingers;

Figure 7 is a fragmentary elevational view of the weighing mechanism and means for controlling the discharge of material therefrom; and

Figures 8, 9, and 10 are enlarged fragmentary side views of the hopper and motor control mechanism, showing the various positions of the parts during the operation of the apparatus.

As shown on the drawings:

In referring to the drawings, which illustrate the chosen embodiment of the present invention, it will be noted that the apparatus comprises a supporting base structure 15 provided with a pair of upstanding standards 16—16. Adjacent the top portion of the standards there is secured thereon a feed hopper 17. This hopper is supported on a platform 18 at the lowermost end of the hopper, this platform having a laterally extending bearing 19 provided with suitable apertures for receiving the standards. The bearing 19 may be rigidly secured in any suitable manner to the standards.

Supported on the under side of the platform 18 adjacent the throat of the hopper are four bifurcated bearing brackets 20, each of these brackets serving as a pivotal support for a pivot block 21. A pendant finger 22 is secured to each pivot block. Each block also has a laterally extending arm 23 which carries a spherical member 24 at its outermost end. As shown by dotted lines in Figure 5, the machine includes two pairs of fingers 22.

Below the stationary platform 18, there is disposed a frame structure 25 which is supported for vertical movements on the standards 16—16 by means of a suitable bearing 26. This frame carries a pair of laterally disposed rails 27 suitably supported on its upper side in spaced relation thereto. The rails cooperate with the frame structure to pivotally anchor the spherical members 24 so that, when the frame 25 is raised and lowered, the arms 23 will be swung about their pivots and the pendant fingers 22 moved into converged and non-converged relationship. It will thus be evident that the frame structure 25, together with the rails 27, constitute an actuator for operating the fingers 22.

As shown in Figures 1 and 6, it will be noted that the fingers 22 are arranged to operate in pairs, and that in each pair of fingers, one of the fingers is of shorter length than the other. The long finger in each case is provided with a recessed portion 28 adjacent its lowermost end. The shorter finger of the pair has its end beveled as shown at 29, thus enabling the fingers to interfit at their lowermost ends and facilitate their insertion into the open end of a bag or container 30 and the telescoping of the bag thereon.

Mechanism has been provided for telescoping an empty bag over the fingers 22 and automatically actuating the fingers to expand the bag sufficiently so that it will be supported upon the fingers while it is being filled. This mechanism will now be described.

Referring to Figures 1, 2, and 3, it will be noted that a driving motor 31 is mounted upon the base 15, this motor having a driving connection with a sprocket wheel 32 that is connected by a suitable chain 33 with a sprocket wheel 34 and a shaft 35 which is journalled in a suitable bearing 36 projecting from a vertical wall 37 extending lengthwise of the base on one side of the motor. The shaft 35 extends beyond the wall 37 and has fixed upon its outermost end a cam 38. Adjustably mounted in a slot 39 in the cam 38 is a crankpin 40 upon which a roller 41 is journalled.

Extending longitudinally along the wall 37 is a bag magazine 42 having its left hand end, as shown in Figure 1, provided with a bearing 43 in which a crankpin 44 is journalled. This crankpin is connected to the lowermost end of a swingably mounted link 45 which is pivoted at its upper end on a pivot pin 46 mounted in a bearing 47 supported on an integrally formed pedestal portion 48 of the wall 37. Thus, the magazine is anchored at this end in such a way as to permit swinging movement of the magazine, as well as longitudinal shifting thereof. At its forward end, the magazine is provided with a plate member 49 supported on studs 50 in spaced parallel relation to the bottom of the magazine. This plate forms a bearing surface for coaction with the roller 41 for swinging the magazine about its pivoted end, when the cam 38 is rotated.

For controlling the longitudinal shifting movements of the magazine during its raising and lowering movements, there is provided a cam lever 51 that is pivoted at its lower end by a pivot pin 52 journalled in a bearing 53 mounted on the wall 37. This lever carries a roller 54 intermediate its ends for coaction with the cam surface of cam 38. The free end of the lever is connected by a link member 55 to a point intermediate the ends of link 45 by a suitable pivotal connection 56. A coiled spring 57, having one end connected to the wall 37 and its other end to the link 45, acts to shift the magazine to the right, as viewed in Figure 1, and maintains the roller 54 in engagement with the cam surface of the cam 38.

The magazine may be constructed of sheet metal by bending a metal plate to provide a bottom 58 and parallel side walls 59. These side walls, it will be noted, are bevelled towards the pivotally supported end of the magazine, and, if desired, may have their upper marginal edges folded over and secured in lapped relation in any suitable manner, as by riveting, welding, or the like, as shown at 60 in Figure 3. The free end portion of the magazine is provided with an arcuate false bottom 61 which cooperates with the side walls to form an arcuate chute 62, the normally disposed horizontal edges at the top of the chute being beaded, as shown at 63, and connected with the vertically disposed edges at the chute outlet by an arcuate beaded edge 64 conforming to the curvature of the false bottom. A U-shaped member 65 is secured, as by welding or other means, externally of the delivery end of the magazine so as to extend down the sides and across the bottom thereof.

The side walls of the magazine adjacent the arcuate beaded edges 64—64 are interconnected by a bridging member 66 which is secured at its ends to the respective side walls and is carried between the side walls in spaced relation to the beaded edges.

Spaced a short distance from the delivery end of the magazine are side braces 67 that are attached to the exterior surfaces of the side walls. Leaf springs 68 are attached to these braces and extend through long slots 69 cut in the side walls of the magazine. The leaf springs extend to the forward end of the magazine, where they are provided with inturned lips 70 for retaining bags at the delivery end of the chute. Adjustable screws 71 mounted in the sides of the U-shaped member 65 abut the leaf springs for adjusting the inward deflection thereof as is apparent.

Although bags of various types of construction may be utilized with the apparatus of the present invention, it is contemplated that each bag will be of the type having a notch or cut out portion 72 at its open end in the adjacent side wall edge, and that the opposite edge will have a tie member 73 secured thereto, this tie member projecting beyond walls of the bag when the bag is folded into collapsed form.

The empty bags are confined in the chute 62 between the side walls thereof with the cut out or notch 72 disposed forwardly. It will be noted that the bags adjacent the charging end of the chute will be disposed in substantially horizontal position, and the bags are placed in the chute with their respective tie members extending over the beaded edges 64. At the delivery end of the chute, the bags are disposed in vertical position with their tie members riding on the beaded edges 64—64. The bags in the chute will tend to feed down by gravity due to their inherent weight, and the foremost bag at the delivery end of the chute will have its edges engaged by the inturned lips 70.

For applying additional pressure against the bags adjacent the delivery end of the magazine, there is provided a U-shaped member 74 having its arms 75 extending exteriorly along the side walls of the magazine, and its arm connecting portion pivoted adjacent the bottom of the magazine. Each arm 75 carries at its outermost end a pivoted pawl 76 which extends through an associated arcuate slot 77 into the interior of the bag chute. This pawl is limited in its movement in one direction and is resiliently biased as by a spring 78 against movement in the opposite direction. With this construction, it will be evident that the member 74 may be swung counterclockwise, as viewed in Figure 1, to bring the pawl to the upper end of the slot 77, the spring enabling movement of the pawl in this direction over the edges of the bags within the magazine. When the member 74 is released, the pawls 76 engage behind the edges of an adjacent bag, and due to the inherent weight of the member 74, pressure is applied against the bags at the delivery end of the chute. Movement of the mem-

ber 74 in a counter-clockwise direction to automatically reset the same is accomplished by an arm member 78' carried by the member 74, this arm member being arranged for engagement by the crank pin 40 during each rotation of the cam 38.

As shown in Figures 1, 2, and 3, it will be noted that a rod 79 is secured at its upper end to one of the bearings 26 of the actuator 25, and that the lower end of this rod is secured to a bearing member 80 slidably mounted on the adjacent standard 16. The bearing member 80 carries an arm 81 having a roller 82 journalled upon its outer end for engagement by a cam 83 rotatable with the shaft 35.

For augmenting the operation of telescoping a bag onto the fingers 22, there is cooperatively associated with the fingers a bag moving and holding mechanism. As shown in Figures 1, 2, and 6, this mechanism comprises a shaft 84, which is journalled in a bearing 85 mounted on a bearing bracket 86 secured to the standards 16—16. The bearing 85 at one end is provided with a contracted portion 87, which forms a pivotal mounting for an idler bearing hanger 88. This hanger supports a bearing 89 in which there is journalled a shaft 90 having an idler gear 91 and sprocket wheel 92 secured thereto. Cooperating with the idler gear 91 is a gear 93 secured to the shaft 84. The sprocket wheel 92, as shown in Figure 6, is eccentrically mounted on the shaft 90 and is driven through a chain 94 from a sprocket wheel 95 on the shaft 35.

The other end of shaft 84 has connected thereto a crank arm 96 which serves as a support for a bag feeder frame 97 having spaced side walls 98 interconnected at one set of their ends by a segmental bridging portion 99. The side walls are provided with aligned apertures 100 for receiving the arm 96 therethrough. Mounted on the segmental portion 99 is a resilient covering which in this instance comprises a resilient backing member, such as sponge rubber 101. This backing member is retained in position by an outer covering 102 which may be of any suitable material, and in this case is of a harder rubber material. The outer covering may be secured along its ends by metallic anchor strips 103, which are clamped over the end margins of the covering and secured to the frame as by screws 104.

On the opposite side of the arm 96, from the segmental portion 99, the side walls of frame 97 project in triangularly shaped arms 105. These arms are connected by exteriorly disposed springs 106 to the arm 96, the arm 96 and arms 105 being respectively provided with anchor lugs 107 and 108 to which the ends of the spring are connected.

The springs 106 act to retain the bases of the arms 105 in abutting engagement with the arm 96, but enable resilient movement thereof away from the arm 96.

For shielding the bag feeding mechanism and preventing particles of the material being fed into the bags or containers from being deposited on its parts, an arcuate hood or shield 100' is arranged over the bag feeder frame. This hood is suitably supported and, as shown in the present instance in Figure 2, may be provided with a split clamping ring 101' which may be disposed around the bearing 85 and clamped in position by a securing screw 102'.

It has been found desirable to provide means for keeping the bag or container engaging surface 102 clean and free from material which might become deposited thereon during operation of the apparatus and prevent its efficient and proper function in feeding the bag onto the bag opening fingers.

The surface 102 is cleaned by means of a suitable brush 103' removably supported on the hood 100' as by one or more removable clamps 104'. It will be noted that the bristles of this brush extend into the path of rotation of the surface 102 and will wipe the surface each time it is rotated past the brush. Thus, the surface will be cleaned prior to its engagement with a bag and there will be no particles of material thereon to prevent or interfere with its proper operation.

The bag feeding mechanism just described is arranged, upon rotation, to engage the outer wall surface of a bag disposed on the fingers 22, and by virtue of the rotation of the feeder frame, the bag will be moved upwardly onto the fingers. It will be observed that in this arrangement the forces, which are applied against the bag wall, are in such direction that there will be no tendency to crumple the bag wall, even though the bag be constructed of very light material. The eccentric mounting of the sprocket 92, together with the swinging movement of the idler bearing bracket 88, will result in the feeder frame being moved at variable speeds during the time it is in contact with the bag for a purpose which will later be explained. The feeder mechanism also operates during the feeding of the bag to support the bag.

The apparatus embodies a weighing mechanism for furnishing a weighed quantity of material to the bag when it is in proper filling position on the fingers 22. The weighing mechanism, as shown ni Figure 7, comprises a weighing container 109, which is supported by means of a suitable bracket 110 in association with the weight receiving end of a scale beam 111 of a scale mechanism of conventional construction. The upper end of container 109 is disposed to receive material from a chute 112 forming a part of any suitable mechanism for controlling the supply of material to the container 109, such for example as shown in my Patent 2,077,152 and as shown in my copending application Serial No. 178,687, filed December 8, 1937.

The lowermost end of container 109 is arranged to discharge material into the hopper 17, the discharge of material from the container being controlled by a pivotally mounted door or gate 113. This door is normally latched in closed position by means of a link 114 which is pivotally connected at one end to a lug 115 on the door and at its other end is pivotally connected, as shown at 116, to a sector disk or plate 117 pivoted at 118 for swinging movement.

It will be noted that in the construction just described the pivotal connection 116 is arranged to move past a dead center position with reference to a center line connecting the pivot connection of the link with leg 115 and the pivot 118, when the sector plate is moved to a position wherein the door 113 will close the lower end of the weighing container.

The door 113 may be unlatched by moving the sector plate 117 in a counterclockwise direction through dead center. The weight of the plate 117 is so disposed relative to its pivot point 118 as normally to move the plate 117 to a door latching position in which the door 113 is latched or held in closed position.

For tripping the latching mechanism, a sole-

noid 119 is provided, this solenoid having an armature 120 that is adapted when the coil of the solenoid is energized, to engage a pin 121 on the sector disk or plate 117 and cause the disk or plate 117 to be rotated in counterclockwise direction, thus releasing the door 113 which will open due to the weight of material in the container.

It will be evident that material should not be discharged into the hopper 17 until a bag is in proper filling position, and the material should likewise not be discharged until the proper amount has been weighed.

Control of the dumping or discharge of material from the container 109 is therefore made dependent upon the two conditions noted above, by providing a switch 122 having its contacts disposed in a conductor 123 connecting one side of the solenoid coil with one side of a source of electrical energy such as a battery 124. The other side of the electrical source is connected through a conductor 125 to the other side of the solenoid coil, this conductor having a switch 126 therein.

The switch 122 is so associated with the scale beam 111 that, when the scale beam is in balanced position as the result of weighing a predetermined amount of material in the container 109, the switch contacts will be closed. If the contacts of switch 126 are at this time in closed position, the solenoid 119 will be energized and the latch for the door 113 tripped, thus enabling discharge of material from the container 109 into the hopper 17. It will be evident, however, that if the contacts of either the switch 122 or switch 126 are open, material will not be discharged.

The switch 126 is so arranged that its operation to contact closing position is dependent upon the positioning of a bag in proper filling position on the fingers 22 to receive the material. While this switch may be of any suitable construction, in the present instance it comprises a supporting bracket 127 connected at one end as by a collar 128 to one of the standards 16. The outer end of the bracket pivotally supports a member 129 having clips 130 adapted to removably support a mercury type of switch 131 of conventional construction. Secured to the outer end of the bracket is an upwardly extending extension 132 to which one end of a spring 133 is anchored, the other end of this spring being connected to the member 129.

The spring 133 acts to bias the switch to "off" position. Mounted on the member 129 is an outwardly extending finger 134 which is disposed in the path of movement of a bag being telescoped on the fingers 22, and so arranged that, when the bag has been completely telescoped on the fingers 22 and is in proper filling position, the finger 134 will be moved upwardly by virtue of its engagement by the upper end of the bag, whereupon the switch 131 will be moved to contact closing position.

For controlling the operation of the driving motor 31, control mechanism is provided which will now be described. Referring to Figures 8, 9, and 10, a lever 135 is pivoted at one end as shown at 136 for swinging movement on a supporting bracket 137 mounted on the supporting bearing 19 of platform 18. Swinging of the lever 135 about its pivot is accomplished by means of a connecting rod 138 having its upper end pivotally connected to the lever and its lowermost end connected to a lever 139 which is pivoted at 140 on the bearing 36. The outermost end of lever 139 carries a roller 141 which is arranged to ride on the cam surface of an actuating cam 142 mounted on the shaft 35.

Upon the outermost end of lever 135 is a leaf spring 143, this spring being anchored at its lowermost end to the lever and having its free end arranged to engage a trip lever 144 having a downwardly hooked end 145. The trip lever 144 is secured to a shaft 146 journalled in a bearing bracket support 147 mounted on the bearing 19 of platform 18. On the same end of shaft 146 upon which the trip lever is mounted, there is also secured a disk 148 upon which a mercury type switch 149 is mounted in suitable clip supports 150. Associated with the disk is an outwardly extending arm 151 provided with a counterweight 152 at its outermost end which acts to rotate the shaft 146 in a counterclockwise direction, as viewed in Figures 8, 9, and 10.

Disposed on the opposite side of the bearing bracket 147 and connected to the other end of shaft 146 is a right angularly disposed rod 153 extending on one side of the hopper 17.

Supported on the exterior of the hopper 17 is a bearing bracket 154 containing aligned bearings 155 disposed on opposite sides of the hopper, these bearings forming a support for a shaft 156 journalled therein and extending through the hopper. Interiorly of the hopper, the shaft 156 has a plate 157 forming a vane disposed in the path of material during its travel from container 109 to the bag being filled.

The plate 157 is normally held in a position extending across the hopper 17 by means of an arm 158 secured at one end to an end of shaft 156 and carrying at its other end a counterweight 159.

It will be noted that the rod 153 is of such length that when the shaft 146 is rotated in a counterclockwise direction by the weight 152, the outermost end margin of the rod 153 will engage the adjacent bearing to thus limit the rotative movement of shaft 146.

The associated end of shaft 156 has secured thereto a bent arm 160 which extends in a general direction substantially parallel to the plane of plate 157. This arm 160, it will be noted, will engage the rod 153 to move it downwardly away from the bearing 155, when the plate 157 is deflected downwardly by the passage of material through the hopper.

The contacts of the mercury switch 149 are connected in one side of a suitable electric supply circuit 161 connected to the motor by conductors 162 and 163.

With the parts positioned as shown in Figure 8, the mercury switch 149 will be closed and the motor 31 will be operating. Movement of the cam 142 will swing the lever 135 upwardly to the dotted position shown in Figure 8 and cause partial rotation of the shaft 146 and connected parts to dotted line position. As a result of this partial rotation, the switch will open its contacts to stop the motor. The spring 143 is slightly flexed, but is prevented from disengaging from the trip lever 144 by its hooked end.

The motor will remain inoperative during the filling operation. Movement of material in the hopper 17 will deflect the plate 157 to bring the arm 160 against the end of rod 153 which displaces it slightly to the position shown in dotted lines in Figure 9. This slight displacement of the rod 153 is sufficient to disengage the free end of spring 143 from the trip lever, whereupon the spring 143 snaps to a position shown in Figure 9 in dotted lines. The arm 160 latches the

rod 153 against movement in counterclockwise direction, as shown in Figure 10, and thus retains the switch 149 in "off" position so long as material continues to flow to the hopper. As soon as the flow of material in the hopper is discontinued, the weight 159 rotates the plate 157 to its normal position across the hopper and releases the rod 153 which may now move counterclockwise by virtue of the action of weight 152 until the rod abuts bearing 155 as shown in Figure 8. Thus the switch is restored to "on" position and the motor is again started.

As the motor continues to operate, the lever 135 continues in its upper swinging movement to an upward position determined by the throw of the cam 142. The face of this cam is so arranged that as the motor continues to operate the lever 135 will be swung to its lower limit before again starting upward movement. In moving to its lower limit, the free end of the spring 143 is again confined by the hook portion of trip lever 144, whereupon the above described sequence of operation will be repeated.

The operation of the apparatus will now be described. Assuming that the driving motor 31 is operating and that the magazine 42 is in the full line position shown in Figure 1, the motor control switch mechanism will be in the position shown in Figure 8. As the cam 38 is moved in a counterclockwise direction, as shown in Figure 1, the roller 41 acting on plate 49 will start elevating the magazine at a relatively slow rate. During this initial movement of the cam, the cam surface engaged by the roller 54 is withdrawn, whereupon the spring 57 acts on the lever 45 to shift the magazine to the right to substantially the dotted line position 42a.

During this movement of the magazine, the converged ends of fingers 22 will be moved into the open end of the foremost bag in the magazine through the notch 72 thereof.

This lateral shifting movement of the magazine, combined with the elevating movement thereof, acts to initially telescope the open end of the bag over the converged ends of the fingers 22, and as the elevating of the magazine continues, the bag feeding mechanism will have operated to carry the surface of the covering member 102 into engagement with the bag which is pressed thereby against the adjacent fingers 22. The surface of cam 38 acting on the roller 54 now gradually moves the lever 45 clockwise to move the discharge end of the magazine away from the fingers 22, and at the same time the roller 41 acting on the plate 49 continues to elevate the magazine. It will be noted that the elevating mechanism will elevate the magazine at a variable rate, and consequently the rotation of the bag feeding mechanism must act to move the bag upwardly on the fingers 22 at a corresponding rate. Synchronizing of the movement of the magazine and the bag feeding mechanism is accomplished by disposing the sprocket wheel 92 in eccentric relation to the shaft 90 as previously described.

As the magazine continues to be elevated, the foremost bag is withdrawn past the inturned lips 70 so that the bag is now entirely supported by virtue of the pressure of the bag feeding mechanism covering 102 against the adjacent fingers 22. As the apparatus continues to operate, the bag is moved upwardly on the fingers until its upper edge is adjacent the finger 134.

At this time the cam 83 has moved to a position wherein an inclined surface 164 thereon acts to increase the throw of the cam and moves the associated cam roller 82 upwardly. This upward movement of the cam roller operates to elevate the actuator for the fingers 22, these fingers being spread apart to open the bag and hold the bag while being filled. During the completion of the telescoping operation of the bag onto the fingers, and the spreading of the fingers to support the bag, the finger 134 is engaged by the upper edge of the bag and the switch 126 actuated to a position wherein its contacts are closed.

At this time it will be noted that the roller 41 has not quite reached its maximum elevating position for the magazine. Assuming that, during this portion of the operating cycle, the predetermined amount of material has been deposited in the weighing container 109 and that the scale beam 111 is in balanced position closing the contacts of switch 122, then, when the contacts of switch 126 are closed as the result of the bag now being in proper filling position, the solenoid 119 is energized and the sector disk 117 will be moved by the solenoid armature 120 to unlatching position, thus enabling the door 113 to open and discharge the weighed material from the weighing container into the hopper 17.

As this material flows through the hopper, it moves the plate 157 downwardly, whereupon the spring 143 is released from the trip lever and the switch 149 latched in "off" position. The motor now stops, during which time the bag is being filled. At the conclusion of the filling operation, the plate 157 is restored to normal position, the switch 149 automatically moves to "on" position to start the motor, and the resetting of the control mechanism takes place.

As the shaft 35 now continues to operate, the cam 83 reaches a position wherein a depressed portion 165 of the cam surface acts to lower the actuator for the fingers 22 by a slight amount, this being just enough to relieve the holding pressure of the fingers against the bag wall. The bag is then free to drop down to a delivery position adjacent the lower ends of standards 16—16 onto a delivery platform 166 in front of a pusher plate 167 which may be supported on the end of a rocker arm 167a having its lower end connected to a shaft 168 (Figure 2) which may be oscillated by a crank and link connection 169 with the shaft 35. Thus the movement of plate 167 may be synchronized with the operation of the other parts of the machine in such a way as to position the plate to the left of the delivery position of the bag while the bag is being filled. In this position of the plate, the magazine will not yet have been returned to its Figure 1 full line position. However, as the apparatus operates to return the magazine, the plate 167 will be moved to the right, as shown in Figure 1, and move the filled bag out of the way.

As the motor continues to operate, the magazine will be returned to the full line position shown in Figure 1, and the cycle will be repeated.

It should be noted that the cam 83 is of segmental shape and is adjustably secured to the back side of cam 38 by means of bolts 170 (Figure 2) in suitable slots 171 which permit the cam to be advanced or retarded in its operation of the actuator for expanding and converging the fingers 22.

From the foregoing description, it will be appreciated that the present invention provides improved apparatus for weighing the material, opening a bag or container, and filling the container with the weighed material, wherein the

various stages of operation are effected in an improved and more efficient manner; which embodies an improved arrangement for telescoping a bag over bag opening fingers in such a way as to enable the use of bags constructed of relatively light materials; which coordinates the weighing mechanism and the discharge of material therefrom into a bag or container in such a manner that the material will not be discharged unless the proper amount of material has first been weighed and the container is in proper filling position to receive the material; which utilizes an improved magazine for the bags and includes novel control for starting and stopping of the magazine movements in timed and predetermined relation to the operation of the other parts of the apparatus; and which also has bag opening fingers of improved construction.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the scope and spirit of the appended claims.

I claim as my invention:

1. In an apparatus of the character described, a plurality of pendant bag opening fingers, a magazine containing bags, means for shifting and elevating the magazine for initially entering the fingers in the open end of a bag, mechanism laterally disposed of said fingers for pressing the bag toward the fingers for supporting the same and continuing to move the bag further onto the fingers as the magazine is further elevated, and means for spreading the fingers for opening the bag and supporting it while the bag is being filled.

2. In apparatus of the class described, a plurality of converged bag opening fingers, means for initially telescoping a bag and said fingers, rotatable means engageable with the bag for completing the telescoping of said bag and fingers, and means for spreading said fingers to open the bag and hold it while being filled.

3. In apparatus of the class described, a plurality of converged bag opening fingers, means for initially telescoping a bag and said fingers, rotatable means engageable with the bag for completing the telescoping of said bag and fingers, means for spreading said fingers to open the bag and hold it while being filled, and means operative when the bag is substantially filled for slightly moving said fingers toward converging position to release said filled bag.

4. In apparatus of the class described, a plurality of converged bag opening fingers, a bag magazine for delivering empty bags, means for moving said magazine to initially telescope a bag and said fingers, mechanism actuated in timed relation to the movement of said magazine for completing the telescoping of said bag and fingers and cooperating with said fingers to support the bag, and means for spreading the fingers to open the bag and hold it, while being filled, independently of said mechanism.

5. In an apparatus of the class described for opening a collapsed bag, a plurality of grouped fingers having free adjacent ends adapted to enter the top end of a collapsed bag, means for relatively moving the bag and fingers so as to dispose said free ends of the fingers inside said top end of the bag, means disposed laterally of said fingers for pressing the bag toward the fingers and for moving the bag onto said fingers, and means for respectively moving the fingers from grouped to spread apart relation in engagement with the bag wall, the movement of said fingers being such as to open the bag in at least two directions disposed at an angle to each other.

6. In an apparatus of the character described, a plurality of pendant bag opening fingers, a magazine containing bags, means for shifting and elevating the magazine for initially entering the fingers in the open end of a bag, mechanism laterally disposed of said fingers for pressing the bag toward the fingers for supporting the same and continuing to move the bag further onto the fingers as the magazine is further elevated, means for spreading the fingers for opening the bag and supporting it while the bag is being filled, means for filling the opened bag, and control means operable by the opening and movement of said bag to a supported and opened position to effect operation of said filling means.

7. In an apparatus of the class described for opening a collapsed bag, a plurality of grouped fingers having free adjacent ends adapted to enter the top end of a collapsed bag, means for relatively moving the bag and fingers so as to dispose said free ends of the fingers inside said top end of the bag, swingably mounted means disposed laterally of said fingers for pressing the bag toward the fingers and for moving the bag onto said fingers, means for respectively moving the fingers from grouped to spread apart relation in engagement with the bag wall, the movement of said fingers being such as to open the bag in at least two directions disposed at an angle to each other, said laterally disposed pressing means being swingable to engage an outer side surface of the bag, and wiping means for engaging said pressing means as it is swung about its axis to remove from its pressing surface any particles of foreign matter accumulating thereon.

8. In apparatus of the class described, a plurality of converged bag opening fingers, a bag magazine for delivering empty bags, means for moving said magazine to initially telescope a bag and said fingers, mechanism actuated in timed relation to the movement of said magazine for completing the telescoping of said bag and fingers and cooperating with said fingers to support the bag, means for spreading the fingers to open the bag and hold it, while being filled, independently of said mechanism, and means operable by the discharge of material in said bag to arrest further movement of said magazine during the filling operation.

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