

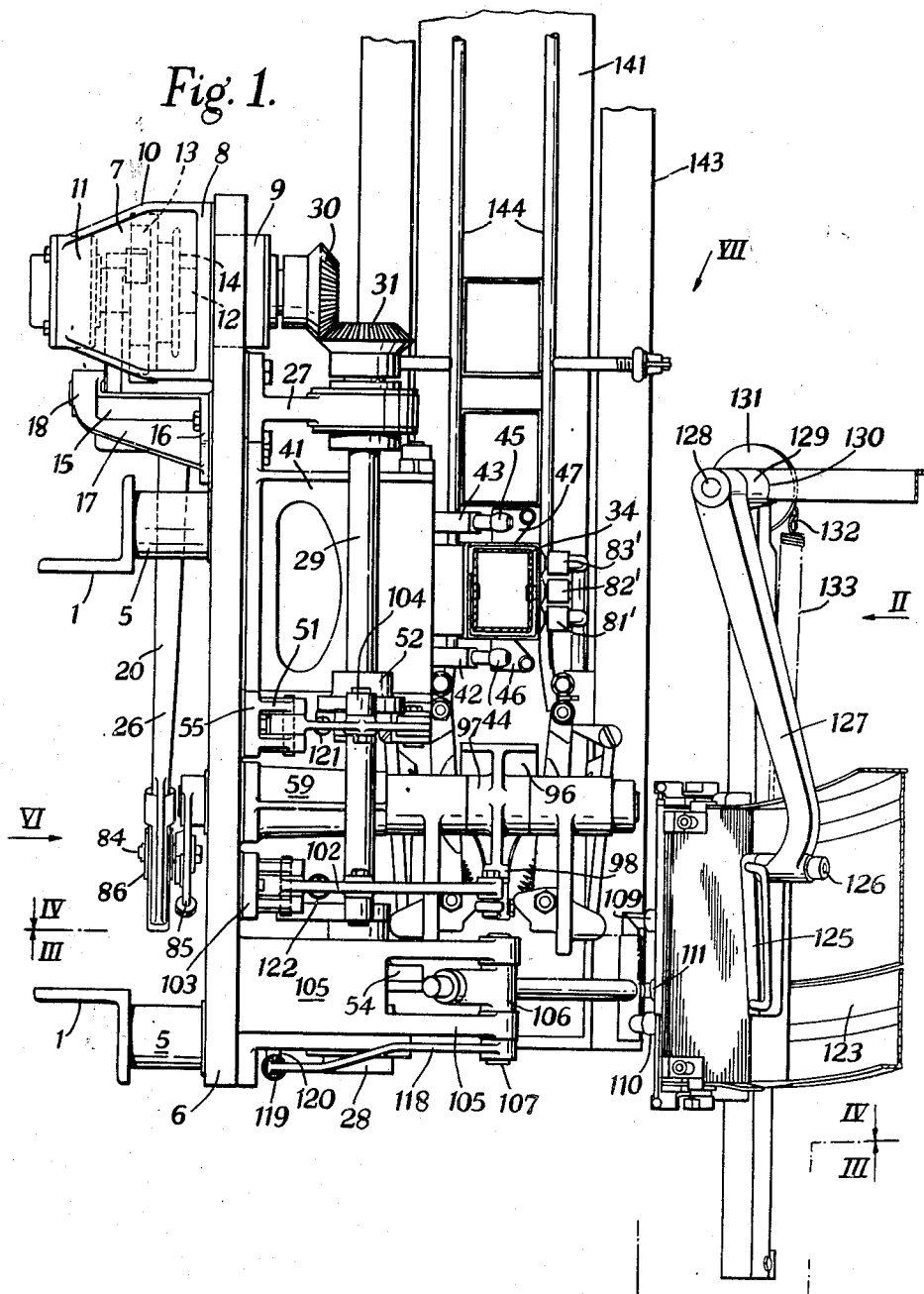
July 20, 1954

H. J. DOLMAN
TRANSFER MECHANISM FOR FEEDING OPENED
BAGS TO A BAG FILLING APPARATUS

2,684,191

Filed Jan. 29, 1951

8 Sheets-Sheet 1



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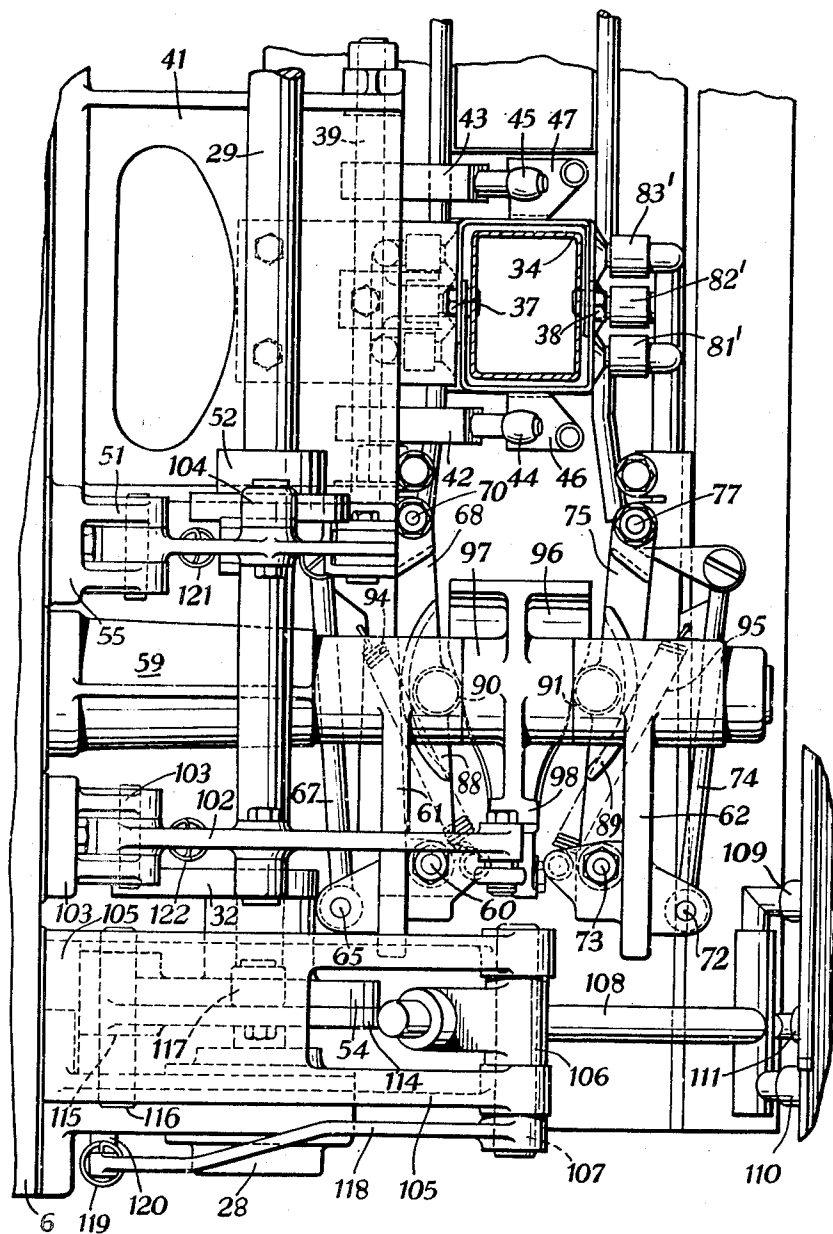
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8 Sheets-Sheet 2

Fig. 1A.



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8 Sheets-Sheet 3

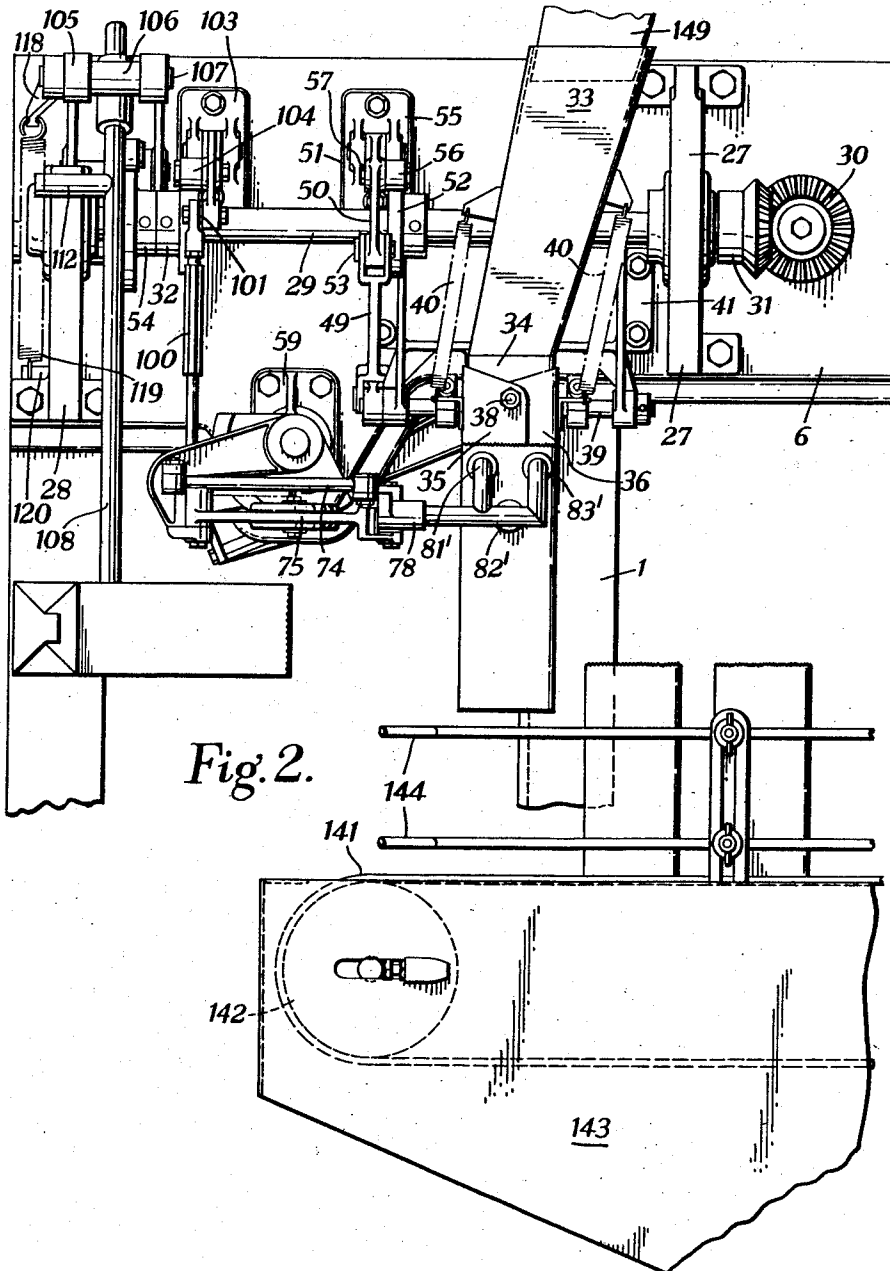


Fig. 2.

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8 Sheets-Sheet 4

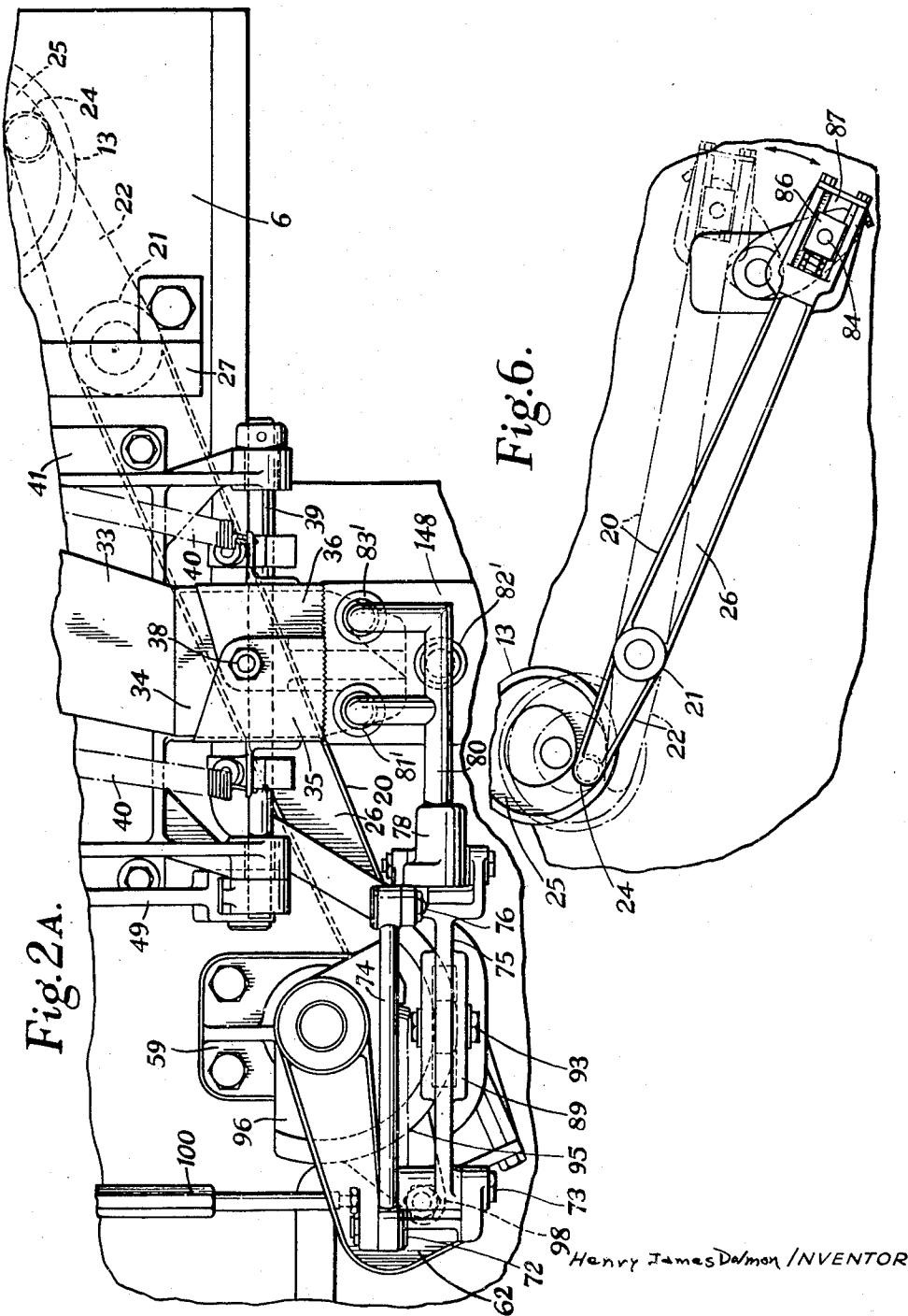


Fig. 2A.

Fig. 6.

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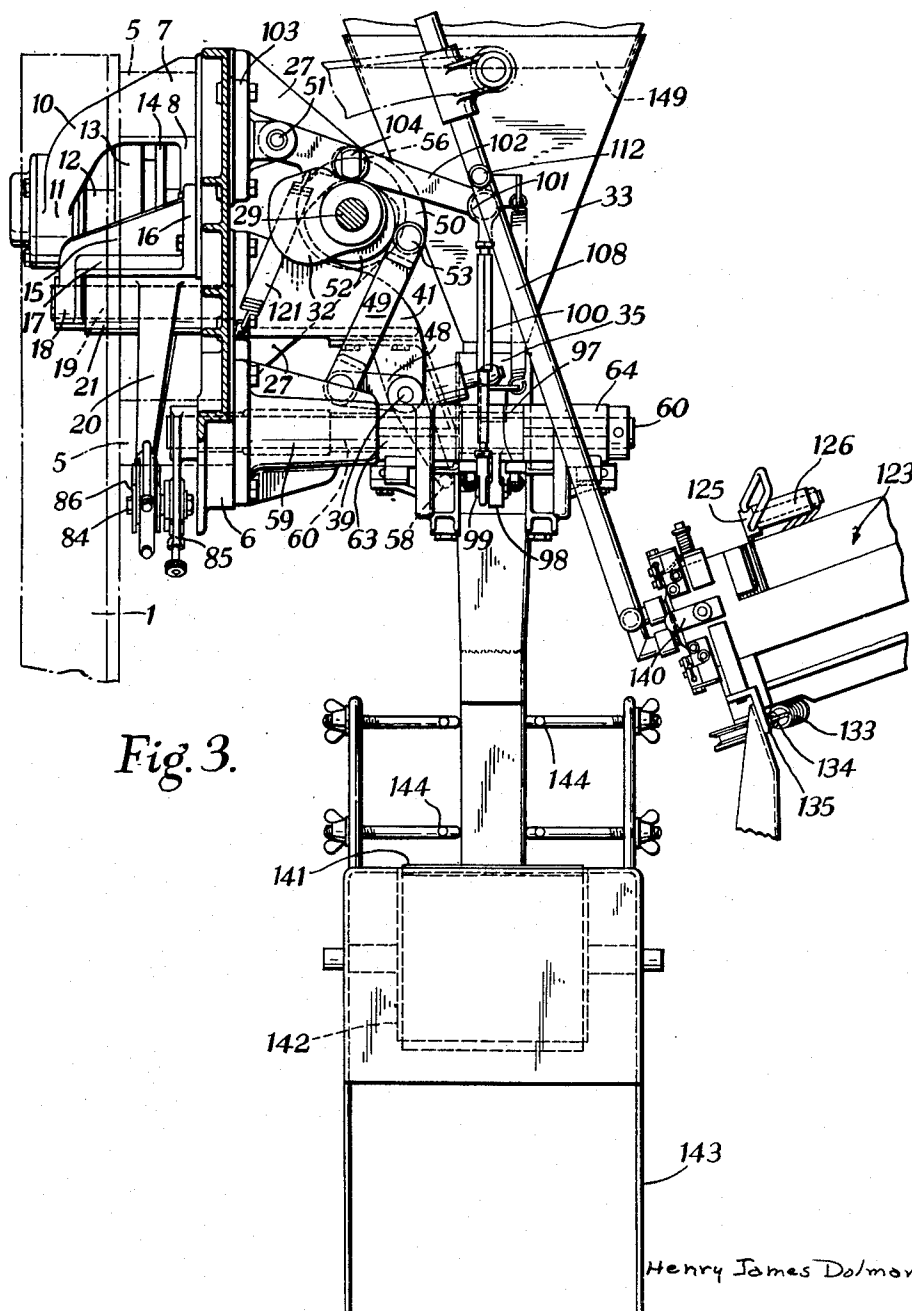
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8 Sheets-Sheet 5



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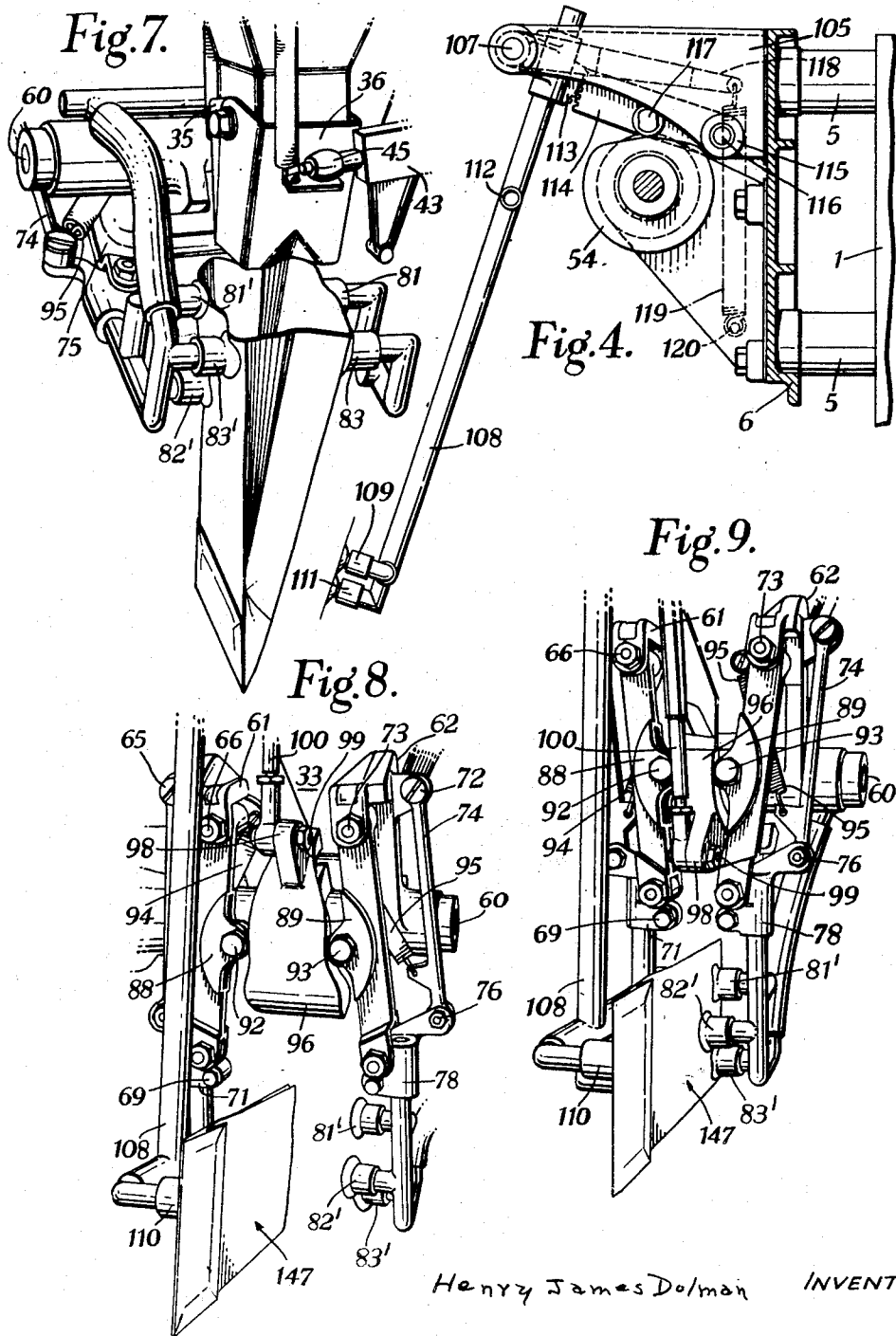
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8 Sheets-Sheet 6



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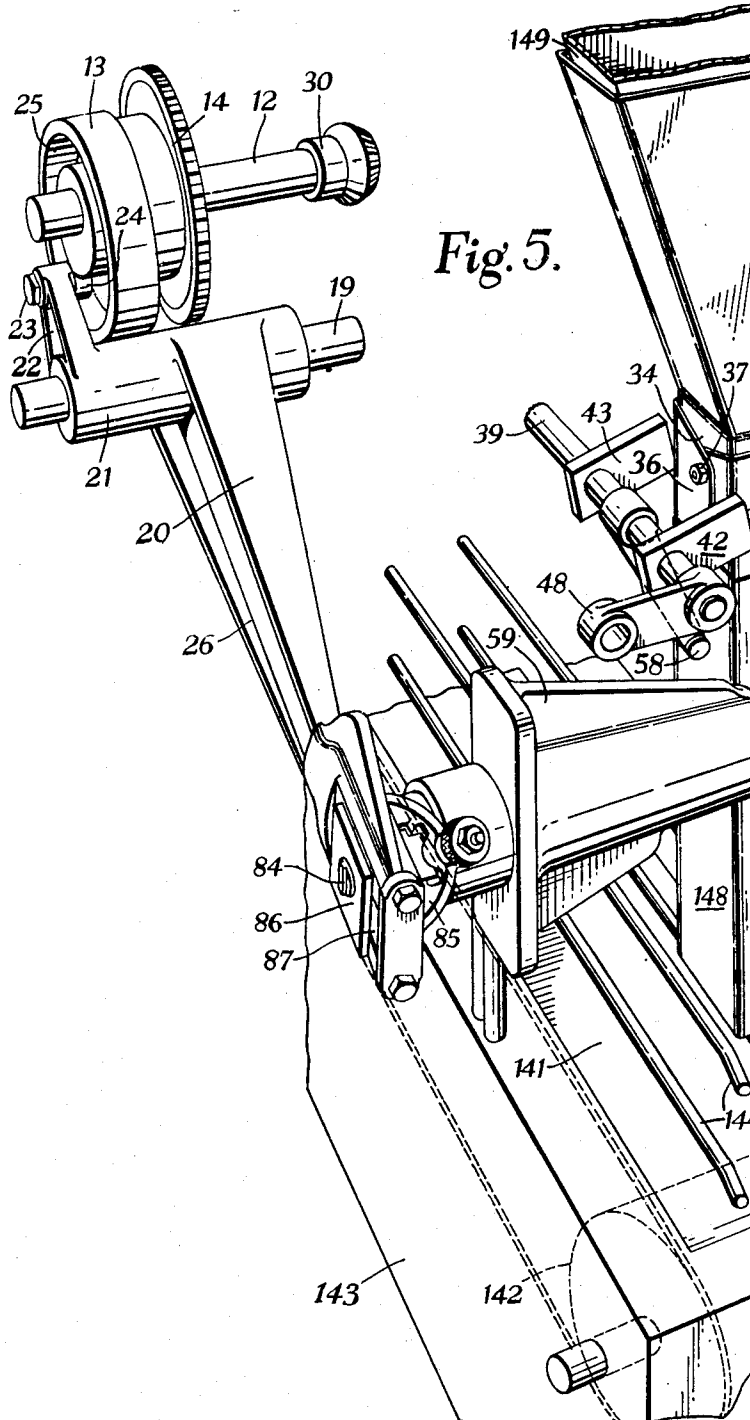
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8 Sheets-Sheet 7



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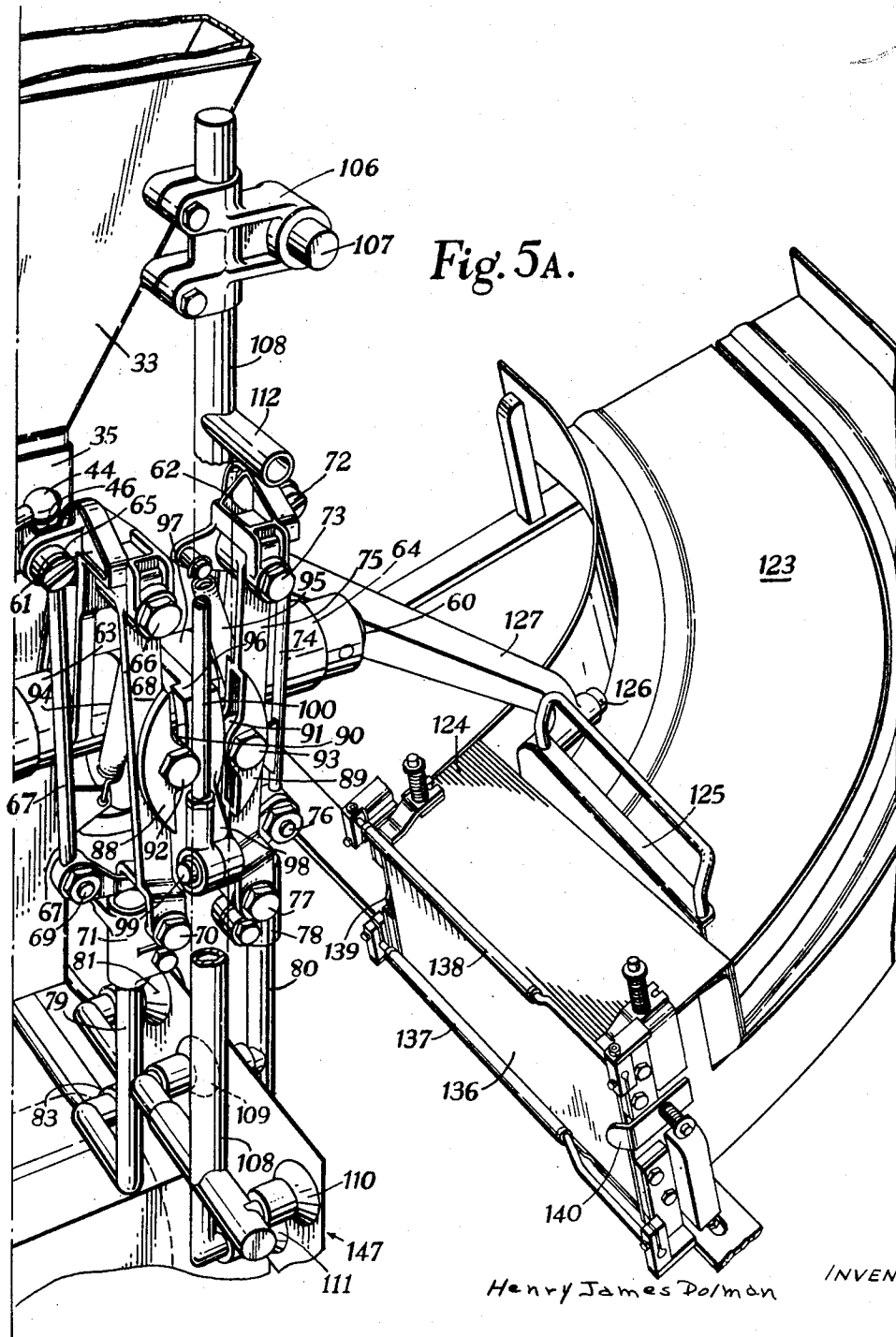
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2,684,191

TRANSFER MECHANISM FOR FEEDING
OPENED BAGS TO A BAG FILLING AP-
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Application January 29, 1951, Serial No. 208,394

4 Claims. (Cl. 226—49)

1

This invention relates to mechanism for feeding paper or like bags to bag filling apparatus. The main object of the invention is to provide a simple and efficient form of bag feeding mechanism.

Another object of the invention is to provide improved mechanism for feeding paper or like bags to a filling nozzle of a bag filling apparatus, which employs a pneumatic separator that successively separates the bags one by one from a stack thereof in a magazine in which they are arranged in collapsed condition, and that retains each collapsed bag so separated until both sides of the bag are engaged by a pneumatic transfer and opening device, which then removes the bag from the pneumatic separator, opens out the bag, and transfers it to the filling nozzle so that the opened mouth of the bag is moved over said filling nozzle to surround it ready for the filling operation.

The above mentioned and other objects of the invention are achieved in the particular embodiment illustrated, by way of example, in the accompanying drawings in which—

Fig. 1 is a plan of the whole mechanism but with the top of the filler funnel removed and with the rear end of the magazine for the stacked collapsed bags broken away.

Fig. 1A is an enlarged view of part of Fig. 1.

Fig. 2 is a view looking in the direction of the arrow II in Fig. 1, but with the magazine and its associated drive parts omitted, except that the position of the front bag in the magazine is indicated.

Fig. 2A is an enlarged view of part of Fig. 2.

Fig. 3 is a section on the section line III—III of Fig. 1 the rear end of the magazine being broken away.

Fig. 4 is a section on the section line IV—IV of Fig. 1, this line IV—IV being identical with the section line III—III, except that the view is taken in the opposite direction.

Figs. 5 and 5A together constitute a perspective view indicating the general operation of the main moving mechanism but omitting certain fixed and moving parts required for supporting and driving such moving mechanism, the mechanism shown being in a different position to that indicated in Figs. 1—4.

Fig. 6 is a fragmentary elevation looking in the direction of arrow VI, Fig. 1.

Fig. 7 is a perspective view looking in the direction of arrow VII, Fig. 1, and

Figs. 8 and 9 are perspective views showing

2

the pneumatic bag transfer and opening device in two different positions.

Referring to the drawings, all the mechanism except the magazine 123 is carried on two up-
rights 1 (see Figs. 1—4), this magazine being inde-
pendently supported by the floor.

Secured to these uprights 1 through the me-
dium of distance pieces 5 is the main frame 6,
which is essentially a flat plate with strengthen-
ing webs thereon. This main frame 6 carries on
one side two bearing brackets 7 and 15 (see Figs.
1 and 3), and on the other side seven bearing
brackets 27, 41, 55, 59, 103, 105 and 28 (see Figs.
1 and 2) to be hereinafter more fully described.

The bracket 7 (see Figs. 1 and 3) is formed with
a plate like portion 8 (through which it is at-
tached to the main frame 6) said portion 8 be-
ing connected to a bearing element 9 that fits
within a cut away part of the frame 6. The
bracket 7 also has a curved channelled arm 10
ending in an outer bearing element 11 which, in
conjunction with said bearing element 9, supports
a short main shaft 12. This shaft 12 (best shown
in Figs. 1 and 5) is adapted to be driven from a
chain (not shown) by means of a sprocket wheel
14, includes a box cam 13 in the form of a pulley
with a groove 25 as indicated in Fig. 5, and ex-
tends through the bearing element 9 to carry a
bevel wheel 30.

The bracket 15 (see Figs. 1 and 3) includes a
base part 16 by which it is secured to the main
frame 6, and a laterally extending webbed arm
17 ending in an outer bearing 18 which supports
one end of a fixed pivot pin 19 (see Figs. 1 and 5)
whose other end is secured to the main frame 6.

Upon the pin 19 is pivotally mounted a rocker
lever 20 (see Figs. 1, 3 and 5). This rocker lever
20 is shown in the drawings as including a boss
21 (to fit over the pin 19) and short and long
arms 22 and 26 respectively. The short arm 22
ends in a short stub axle 23 carrying a cam roller
24 that engages within the groove 25 of the box
cam 13 above referred to. The long arm 26 has
a slotted end 27 within which is slidably mounted
a slide block 28 which is relatively rotatable
about a pin 24 eccentrically mounted on an arm
25 of an axle 30 to be hereinafter described,
whereby said axle 30 is oscillated.

The bearing brackets 27, 28 (see Figs. 1 and 2)
support a cam shaft 29 carrying a bevel gear
wheel 31 which engages with the bevel gear wheel
30 and through which it is driven. This cam
shaft is provided with three cams 52, 32 and 54.

The bracket 27 is extended to support a funnel
33 (best seen in Fig. 5) through which the loading

3

material (e. g. flour, sugar, grain) is to be fed to the bags, this extension not being shown in the drawings for clearness.

The bottom of the funnel 33 ends in a nozzle member 34 of rectangular form, said nozzle member 34 being constituted by two halves 35, 36 each pivoted to the main part of the funnel 33 by screws 37, 38. Biasing springs 40 (see Fig. 2) tend to open out the two halves 35, 36 so as to expand the filling nozzle 34. The bearing bracket 41 (see Figs. 1 and 3) carries a shaft 39 (see also Fig. 5) controlling the expansion of said filling nozzle 34.

This shaft 39 is formed with a pair of arms 42, 43 carrying rollers 44, 45 adapted to bear downwards against angle pieces 46, 47 secured to the two nozzle halves 35, 36. The rocking of this shaft 39 is effected by another arm 48 thereof being pivoted to a link 49 (see Figs. 2 and 3) which is itself pivoted at 53 to one end of a lever 50 whose other end is pivoted at 51 to the bracket 55, said lever 50 carrying a cam roller 56 that bears against the cam 52, whereby the shaft 39 will be rocked and the nozzle 34 thereby expanded or contracted at appropriate times (a spring 121 (Fig. 3) connecting the lever 50 to a fixed part of the frame acts to keep the cam roller 56 pressed against the cam 52).

The bearing bracket 59 carries an oscillatory axle 60 (above referred to as oscillated through the rocking imparted to the long arm 23 of the rocker lever 26).

Secured to the axle 60 through bush portions 63, 64 are radially extending stumps 61, 62 which respectively serve to support movable carriers 71, 78 (see Fig. 5A). The carrier 71 is pivoted at 69, 70 to ends of parallel links 67, 68 whose opposite ends are pivoted at 65, 66 to the stump 61.

It will be seen that the link 68 is forked at the end where it is pivoted at 70 to the carrier 71.

The links 67, 68 are of equal length. Also the distance between the pivot points 69, 70 is equal to the distance between the pivot points 65, 66 so this mechanism operates in the manner of a parallel ruler, so that if the stump 61 is considered as fixed, then the carrier 71 moves parallel to itself and more or less in a direction parallel to the longitudinal axis of the axle 60.

The carrier 78 is linked to its stump 62 in the same way as has just been described for the linkage between the carrier 71 and its stump 61. That is to say, the carrier 78 is pivoted at 75, 77 to ends of parallel links 74, 75 whose opposite ends are pivoted at 72, 73 to the stump 62. The link 75 is forked at the end where it is pivoted at 77 to the carrier 78. The links 74, 75 are of equal length. Also the distance between the pivot points 75, 77 is equal to the distance between the pivot points 72, 73 so this mechanism operates in the manner of a parallel ruler, so that if the stump 62 is considered as fixed, then the carrier 78 moves parallel to itself and more or less in a direction parallel to the longitudinal axis of the axle 60. (This linkage for the carrier 78 is also shown in Fig. 2.)

The carriers 71, 78 respectively carry arms 79, 80 formed by pneumatic tubes ending in sets of suckers 81, 82, 83 and 81', 82', 83', the relative positions of which are best indicated in Fig. 2.

The pneumatic tubes 79, 80 are connected at their upper ends through flexible tubing (not shown) to a controlled source of suction, whereby suction is intermittently applied at the right times.

4

The forked links 68, 75 carry protuberances 88, 89 (see Fig. 5A) which are milled out or cut away to provide spaces in which are housed rollers 90, 91 pivotally mounted within said forked links at 92, 93.

Springs 94, 95 act to bias the rollers 90, 91 together so that they bear against a face cam 96 which is formed as a sleeve member 97 (see also Fig. 1) rotatable about the axle 60.

An arm 98 on said sleeve 97 has pivotally secured thereto at 99 an upwardly extending rod 100 (only the lower half of said rod 100 being shown in Fig. 5). This rod 100 is also shown in Figs. 2 and 3 and its upper end is pivoted at 101 to a lever 102 whose other end is pivoted to the bearing bracket 103 carried by the main frame 6.

The said lever 102 carries a roller 104 that bears against the cam 32 of the cam shaft 29, being forced thereon by a spring 122 (see Fig. 3) whose upper end is attached to said lever 102 and whose lower end is attached to the main frame 6. Thus the arms or pneumatic tubes 79, 80 and their respective suckers are oscillated (through about 90°) and their distance apart varied by means of the box cam 13 and the cam 32. The bracket 105 secured to the main frame 6 (see Figs. 1 and 4) is forked at its end to accommodate a carrier 106, secured to a short axle 107 pivotally mounted within said bracket 105.

The carrier 106 carries a downwardly extending pneumatic tube 108 ending in three suckers 109, 110, 111 shown also in Fig. 5A (in which the middle part of the tube 108 has been broken away to show other parts). The pneumatic tube 108 has a short branch 112 by which it is connected through flexible tubing (not shown) to a controlled source of suction, whereby suction is intermittently applied at the right times.

The carrier 106 and its pneumatic tube 108 are intermittently oscillated by means of a gear quadrant 113 on said carrier 106 (see Fig. 4) meshing with a gear quadrant 114 on a rocker 115 pivoted to the main frame 6 at 116 and carrying a roller 117 which engages the cam 54 of the cam shaft 29. The said roller 117 is pressed on to the cam 54 by means of a spring 119 connected at its lower end to the bracket 23 and its upper end to the end of a lever 118 secured to the short axle 107 of the carrier 106. Thus the pneumatic tube 108 and its suckers is oscillated from the cam 54.

The magazine 123 serves for holding a stack of bags in collapsed condition ready for filling.

As shown in the drawings (particularly Fig. 5A) the bags are arranged in a more or less horizontal stack, and the magazine is of arcuate shape to accommodate bags which in their collapsed condition are thicker at one end than the other due to the closed end having to be folded to more thickness.

The magazine is more or less open at its delivery end 136 but contains marginal projections 137, 138, 139, 140 at that end against which bear the marginal portions of the foremost collapsed bag, but when said foremost collapsed bag is acted upon by the suckers 109, 110, 111 of the pneumatic tube 108 and said tube moved, the foremost bag bends so as to get clear of said marginal projections 137, 138, 139, 140, which then act to retain the next collapsed bag in position.

The collapsed bags are forced against said 75 projections 137, 138, 139, 140 by a spring pressed

pusher plate 125 which is clamped by a screw 126 to an arm 127 secured to an axle 128 (see Fig. 1) which is rotatable within a bearing 129 secured to framing diagrammatically represented by 130.

Secured to a point on the periphery of a pulley 131 secured to the axle 128 is a wire rope 132 that passes round part of the pulley and is connected at its other end to one end of a spring 133 whose other end 134 is secured to framing diagrammatically indicated by 135 in Fig. 3.

The operation of the mechanism is as follows:

The sprocket wheel 14 drives the main shaft 12 which through the connections shown causes the pneumatic tube 108 and its suckers to oscillate, and also oscillates the arms 79, 80 and their suckers simultaneously varying their distance apart, while the nozzle member 34 is intermittently expanded and contracted.

Simultaneously, valves (not shown) are operated in the piping of the suction system, in order to apply suction at the appropriate times to the three sets of suckers 109, 110, 111—81, 82, 83—and 81¹, 82¹, 83¹.

The pneumatic tube 108 and its suckers constitute a pneumatic separator and the arms 79, 80 and their suckers constitute a pneumatic transfer and opening device. The various parts move in such phase relations that the pneumatic separator 108 rocks to the position indicated in Fig. 4 so that its suckers make contact with the front collapsed bag in the magazine indicated by 136 (see Fig. 5A) and then its suction is applied to hold said bag. The pneumatic separator 108 then rocks back, thus separating the bag from the stack of bags in the magazine 123 and moving it to the position 147 in Fig. 5A where it is retained temporarily. While the collapsed bag is retained by the pneumatic separator in this position 147, the pneumatic transfer and opening device is moved so that its two sets of suckers 81, 82, 83—81¹, 82¹, 83¹ moving in a direction more or less parallel with the plane of the bag are located on either side of the bag and then approach each other so as to make contact with opposite sides of the bag. Suction is then applied to these sets of suckers 81, 82, 83—81¹, 82¹, 83¹, while the suction is cut off from the suckers 109, 110, 111 of the pneumatic separator 108.

The pneumatic transfer and opening device 79, 80 is then moved so as to turn said device bodily and also to open out its arms 79, 80.

This has the effect of removing the bag from the pneumatic separator 108 and carrying it bodily through an arcuate path to transfer it to the filling nozzle 34 while opening out the mouth of the bag, finally moving the opened mouth of the bag over the filling nozzle 34 to surround it ready for the filling operation as indicated in Fig. 2. This position of the bag is indicated in Figs. 2 and 5 by 148. The filling nozzle 34 is then expanded to engage the mouth of the bag to secure it, and the required charge (of flour or sugar for instance) is fed to the bag through a spout 149.

The suction to the pneumatic transfer and opening device 79, 80 is shut off when the bag is engaged by the expanded filling nozzle 34, and the arms 79, 80 return on an idle stroke preparatory to engaging a succeeding collapsed bag at 147.

The arms 79, 80 of the pneumatic transfer and opening device do not on the idle return stroke simply retrace the positions they successively took on the operative or transfer stroke. This permits of the arms 79, 80 making an initial spac-

ing movement and thus opening out more at the start of the idle stroke in order to bring them completely clear of the opened bag.

These movements are caused by the correct rocking of the sleeve cam 96, 97 surrounding the axle 60.

After the bag has been filled the filling nozzle 34 is contracted and the filled bag falls from the position 148 a short distance on to a moving endless conveyor belt 141 of which only the rear part is shown in Fig. 5, together with a rear pulley 142 over which it passes.

Guide rails 144 act to maintain the filled bags correctly on the conveyor belt 141.

The motions performed by the various working parts of the mechanism during one cycle of operations will be readily understood by a comparative study of the various figures of the drawings; Figs. 7, 8 and 9 are mainly concerned with the bag transfer and opening device.

It is to be understood that while disclosure has been made of a preferred form of feeding mechanism, other equivalent forms of mechanism and sub-assemblies therefor may be used within the scope of the invention defined in the claims.

What I claim is:

1. An automatic bag feeder comprising a main frame, an oscillatory arm pivotally carried at its upper end by said main frame and provided at its lower end with a plurality of pneumatic suckers, a bag magazine, means for oscillating said arm in one direction to bring said suckers into engagement with the leading collapsed bag of a stack thereof carried on edge by said magazine and in the opposite direction to remove said bag from the magazine and place it in position to be engaged by bag transfer means, bag transfer means including a carrier member oscillatable about an axis disposed at right angles to that of said oscillatory arm, a pair of arms pivotally connected at their upper ends to said carrier member and swingable in a direction parallel to the axis thereof, each of said arms being provided at its lower end with a plurality of pneumatic suckers, a stationary filling nozzle operatively aligned with said carrier member, means for oscillating said carrier member in one direction to bring the suckers of said pair of arms on opposite sides of the bag held by the suckers on said first mentioned oscillatory arm and in the opposite direction to bodily move said opposed sets of suckers and the bag held therebetween through an arcuate path terminating at said nozzle whereby to apply the bag thereto, and means for imparting a movement of separation to the lower ends of said pair of arms prior to the end of said arcuate movement whereby to open the mouth of said bag prior to its engagement with said nozzle.

2. An automatic bag feeder comprising a main frame, an oscillatory arm pivotally carried at its upper end by said main frame and provided at its lower end with a plurality of pneumatic suckers, a bag magazine, means for oscillating said arm in one direction to bring said suckers into engagement with the leading collapsed bag of a stack thereof carried on edge by said magazine and in the opposite direction to remove said bag from the magazine and place it in position to be engaged by bag transfer means, bag transfer means including a carrier member oscillatable about an axis disposed at right angles to that of said oscillatory arm, a pair of arms pivotally

connected at their upper ends to said carrier member and swingable in a direction parallel to the axis thereof, each of said arms being provided at its lower end with a plurality of pneumatic suckers, a normally contracted filling nozzle operatively aligned with said carrier member, means for oscillating said carrier member in one direction to bring the suckers of said pair of arms on opposite sides of the bag held by the suckers on said first-mentioned oscillatory arm and in the opposite direction to bodily move said opposed sets of suckers and the bag held therebetween through an arcuate path terminating at said nozzle whereby to apply the bag thereto, means for imparting a movement of separation to the lower ends of said pair of arms prior to the end of said arcuate movement whereby to open the mouth of said bag prior to its engagement with said nozzle, and means effective after a bag has been applied to said nozzle for expanding the same to fully open position and retain the bag thereon and for again contracting said nozzle after the bag has been filled.

3. An automatic bag feeder comprising a main frame, an oscillatory arm pivotally carried at its upper end by said main frame and provided at its lower end with a plurality of pneumatic suckers, a bag magazine, means for oscillating said arm in one direction to bring said suckers into engagement with the leading collapsed bag of a stack thereof carried on edge by said magazine and in the opposite direction to remove said bag from the magazine and place it in position to be engaged by bag transfer means, bag transfer means including a carrier member oscillatable about an axis disposed at right angles to that of said oscillatory arm, a pair of arms pivotally connected at their upper ends to said carrier member and swingable in a direction parallel to the axis thereof, each of said arms being provided at its lower end with a plurality of pneumatic suckers, a stationary filling nozzle operatively aligned with said carrier member, means for oscillating said carrier member in one direction to bring the suckers of said pair of arms on opposite sides of the bag held by the suckers on said first-mentioned oscillatory arm and in the opposite direction to bodily move said opposed sets of suckers and the bag held therebetween through an arcuate path terminating at said nozzle whereby to apply the bag thereto, and means effective prior to the commencement of said bodily arcuate movement for imparting a movement towards each other of the lower ends

of said pairs of arms whereby to cause the suckers carried thereby to engage opposite faces of said bag and thereafter effective during said bodily arcuate movement for imparting a movement of separation of the lower ends of said arms whereby to open the mouth of said bag prior to its engagement with said nozzle.

4. An automatic bag feeder comprising a main frame, an oscillatory arm pivotally carried at its upper end by said main frame and provided at its lower end with a plurality of pneumatic suckers, a bag magazine, means for oscillating said arm in one direction to bring said suckers into engagement with the leading collapsed bag of a stack thereof carried on edge by said magazine and in the opposite direction to remove said bag from the magazine and place it in position to be engaged by bag transfer means, bag transfer means including a carrier member oscillatable about an axis disposed at right angles to that of said oscillatory arm, a pair of arms pivotally connected at their upper ends to said carrier member and swingable in a direction parallel to the axis thereof, each of said arms being provided at its lower end with a plurality of pneumatic suckers, a normally contracted filling nozzle operatively aligned with said carrier member, means for oscillating said carrier member in one direction to bring the suckers of said pair of arms on opposite sides of the bag held by the suckers on said first-mentioned oscillatory arm and in the opposite direction to bodily move said opposed sets of suckers and the bag held therebetween through an arcuate path terminating at said nozzle whereby to apply the bag thereto, means for imparting a movement of separation to the lower ends of said pair of arms prior to the end of said arcuate movement whereby to open the mouth of said bag prior to its engagement with said nozzle, and means effective after a bag has been applied to said nozzle for expanding the same to fully open position and retain the bag thereon and for again contracting said nozzle after the bag has been filled.

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