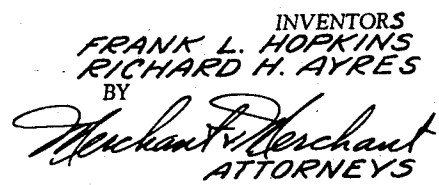


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June 2, 1959

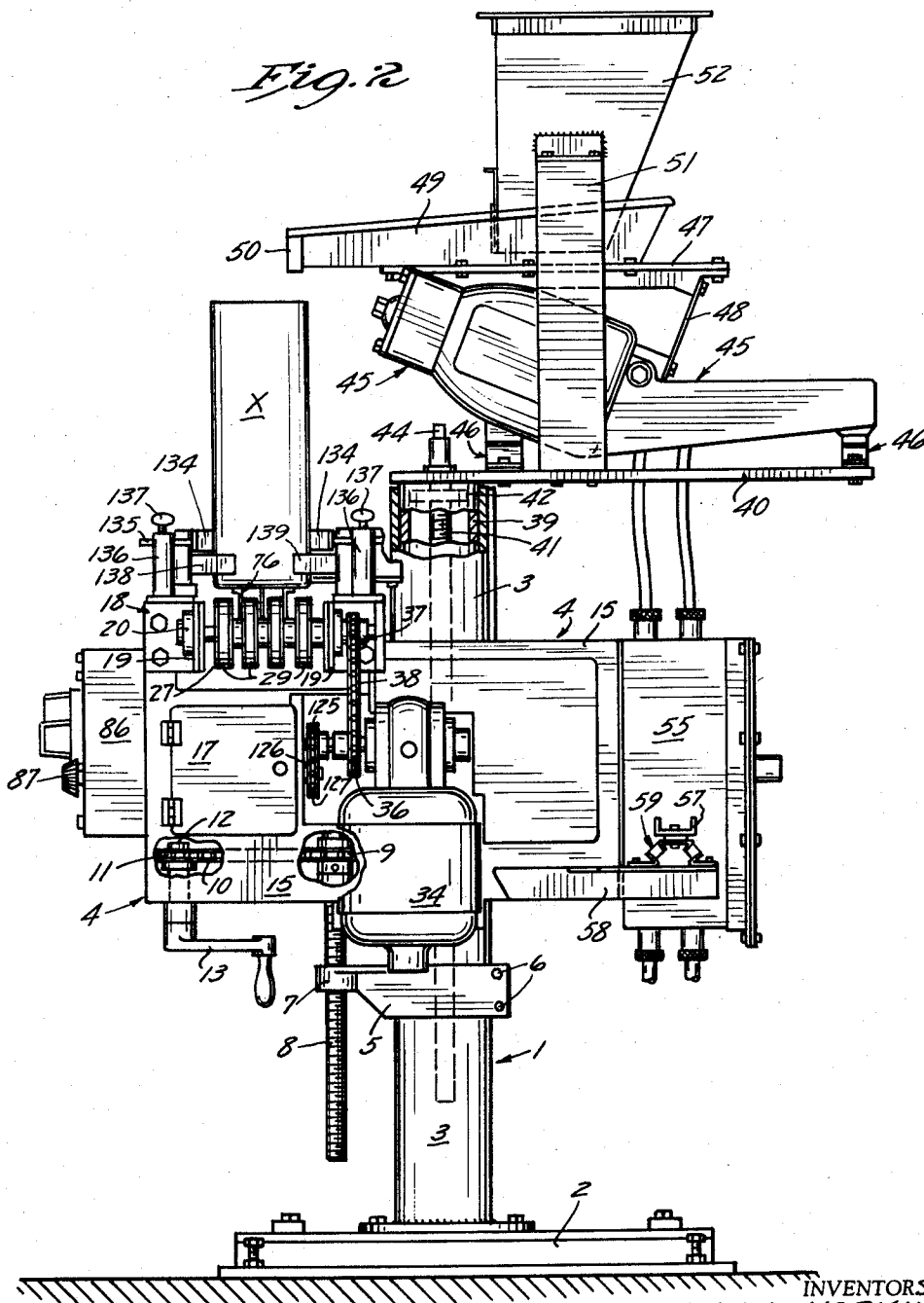
F. L. HOPKINS ET AL

2,889,031

CONTAINER FILLING AND WEIGHING MACHINE

Filed April 24, 1957

8 Sheets-Sheet 2



INVENTORS
FRANK L. HOPKINS
RICHARD H. AYRES
BY

Merchant & Merchant
ATTORNEYS

June 2, 1959

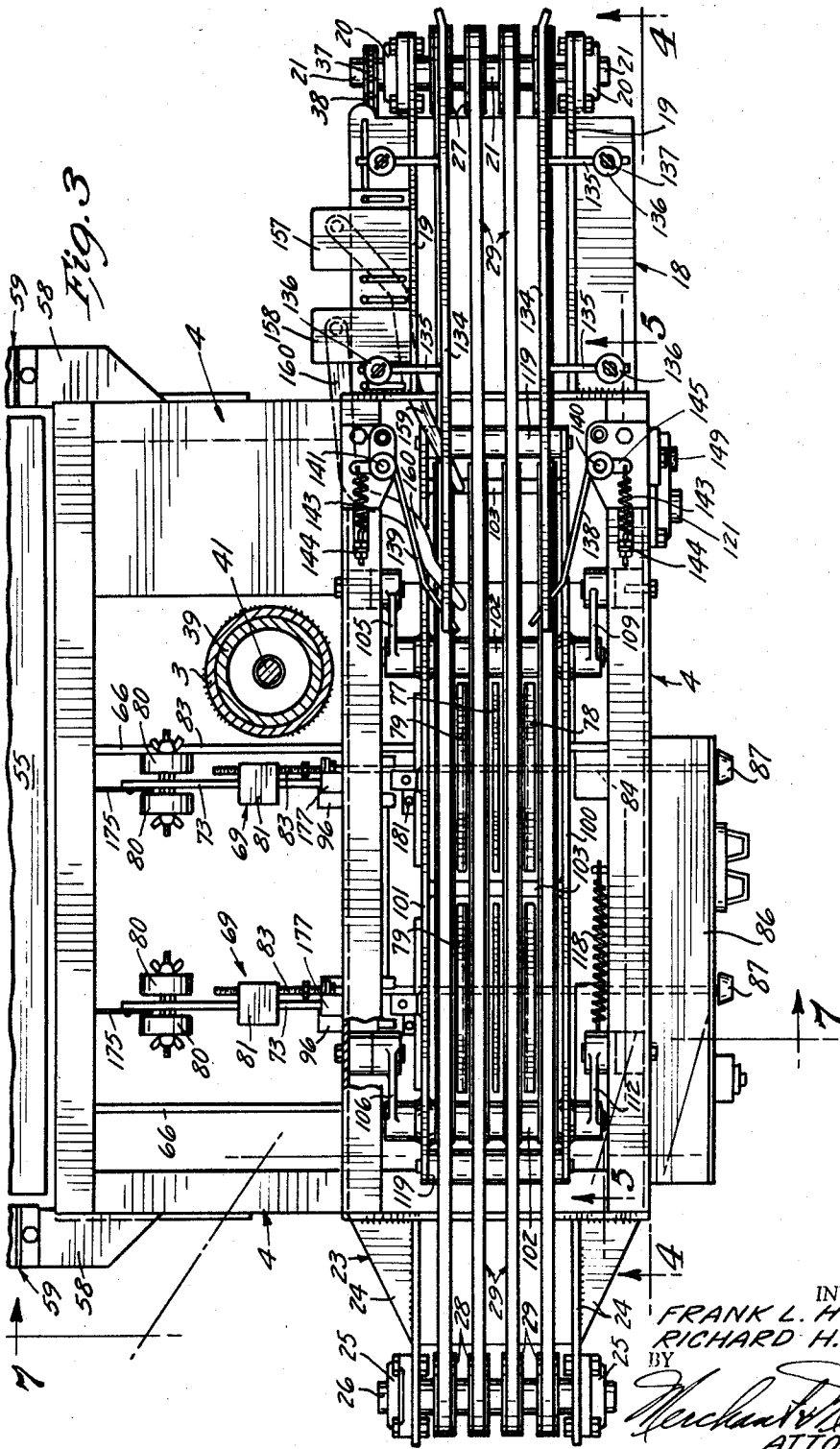
F. L. HOPKINS ET AL

2,889,031

CONTAINER FILLING AND WEIGHING MACHINE

Filed April 24, 1957

8 Sheets-Sheet 3



INVENTORS
FRANK L. HOPKINS
RICHARD H. AYRES

BY *Herbert A. Herkner*
ATTORNEYS

June 2, 1959

F. L. HOPKINS ET AL

2,889,031

CONTAINER FILLING AND WEIGHING MACHINE

Filed April 24, 1957

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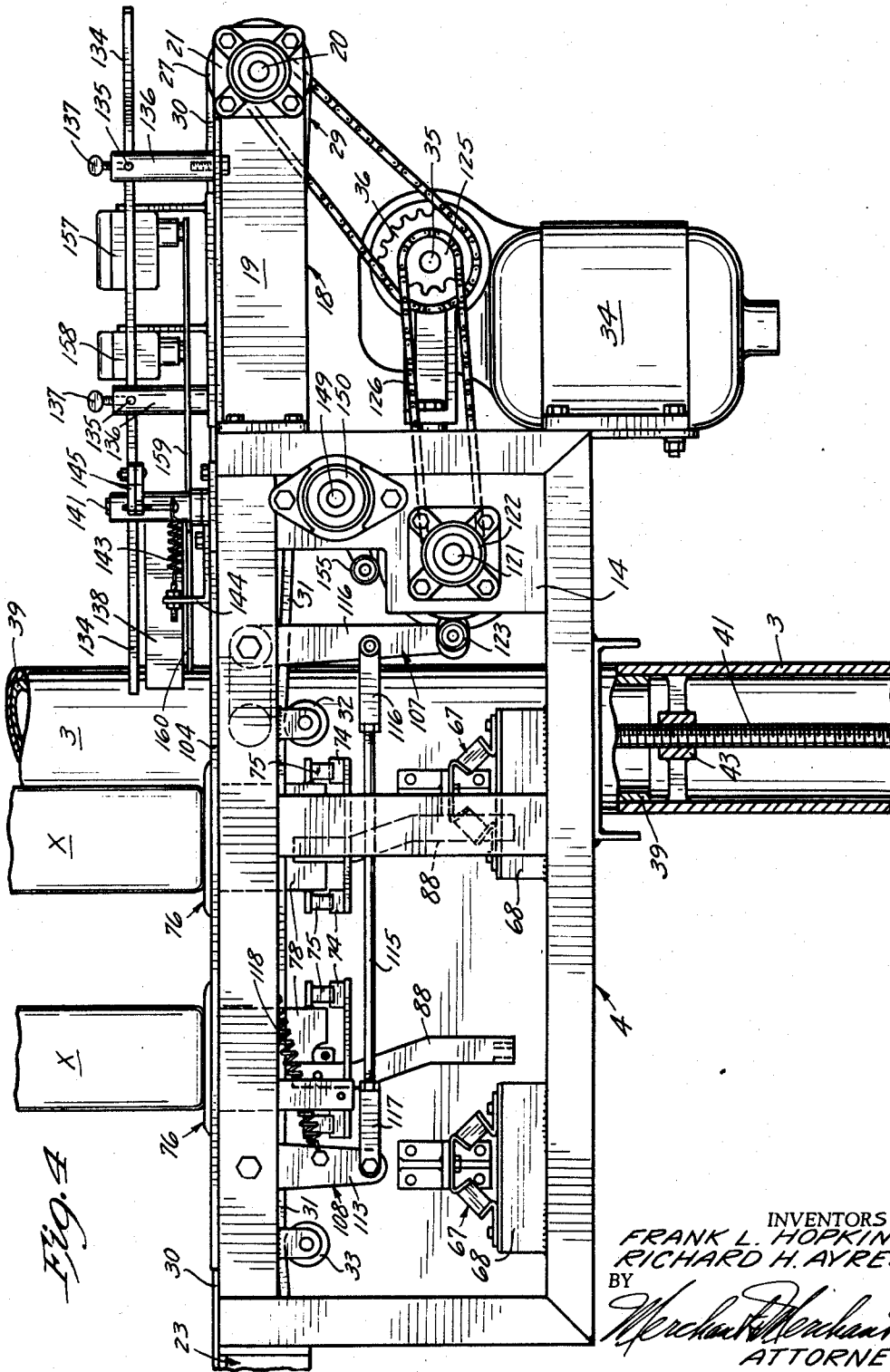


Fig. 4

INVENTORS
FRANK L. HOPKINS
RICHARD H. AYRES
BY
Merck & Co.
ATTORNEYS

June 2, 1959

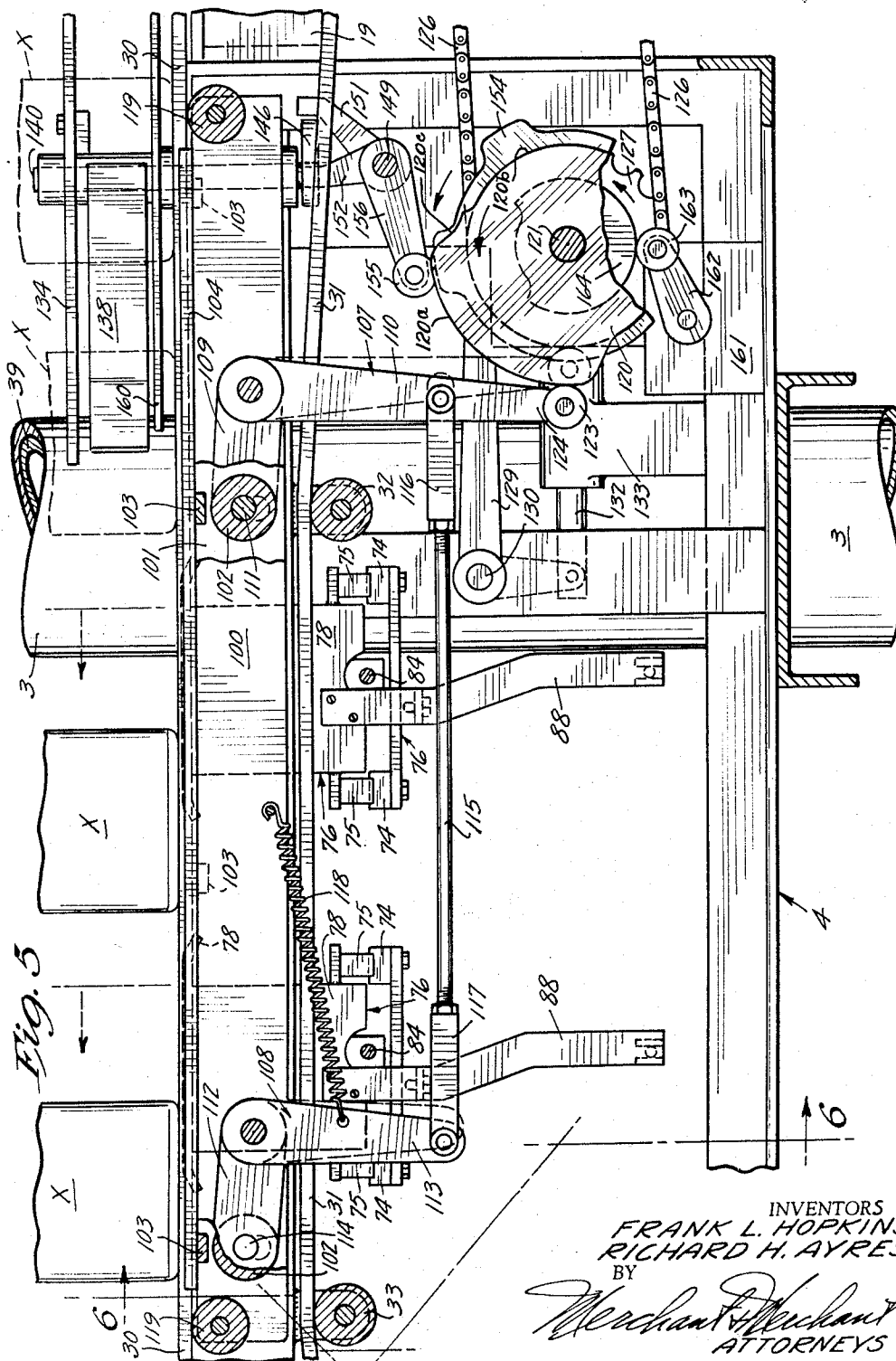
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CONTAINER FILLING AND WEIGHING MACHINE

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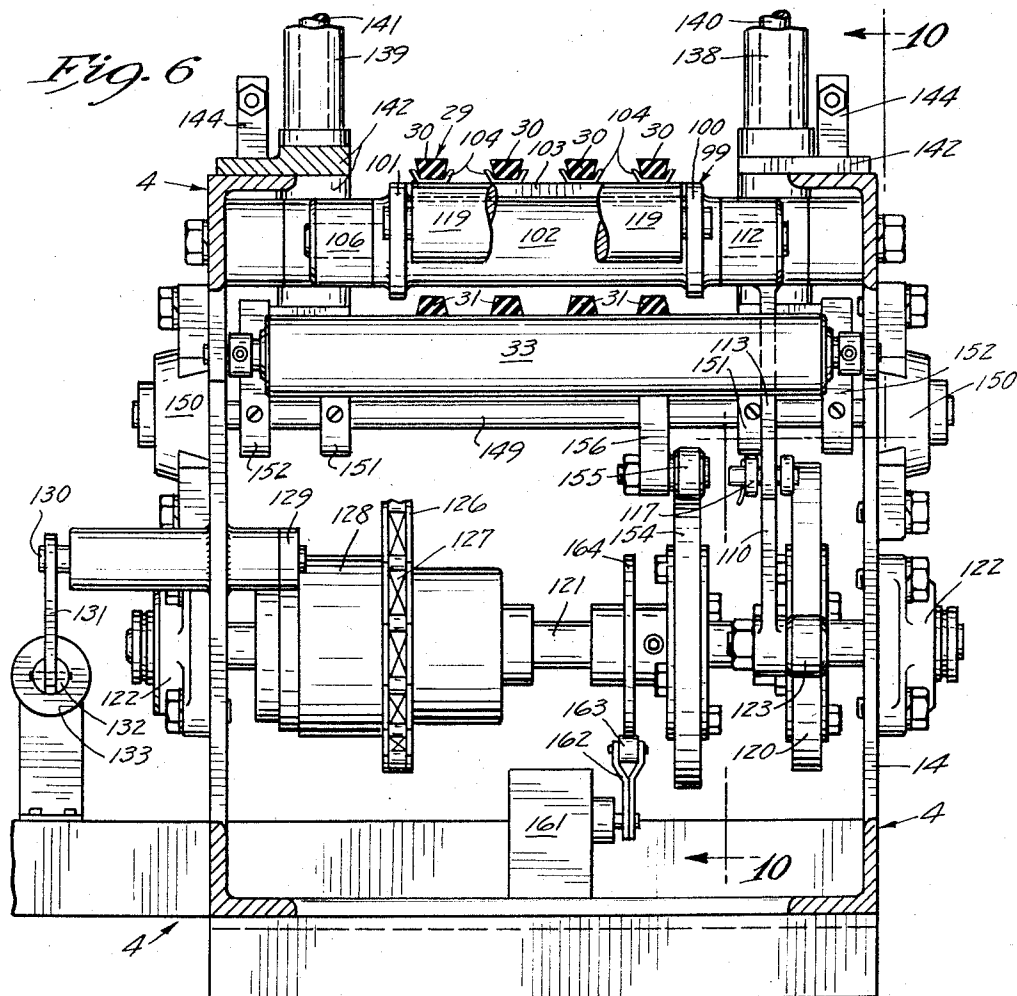
F. L. HOPKINS ET AL

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CONTAINER FILLING AND WEIGHING MACHINE

Filed April 24, 1957

8 Sheets-Sheet 6



INVENTORS
FRANK L. HOPKINS
RICHARD H. AYRES
BY

Merchant & Merchant
ATTORNEYS

June 2, 1959

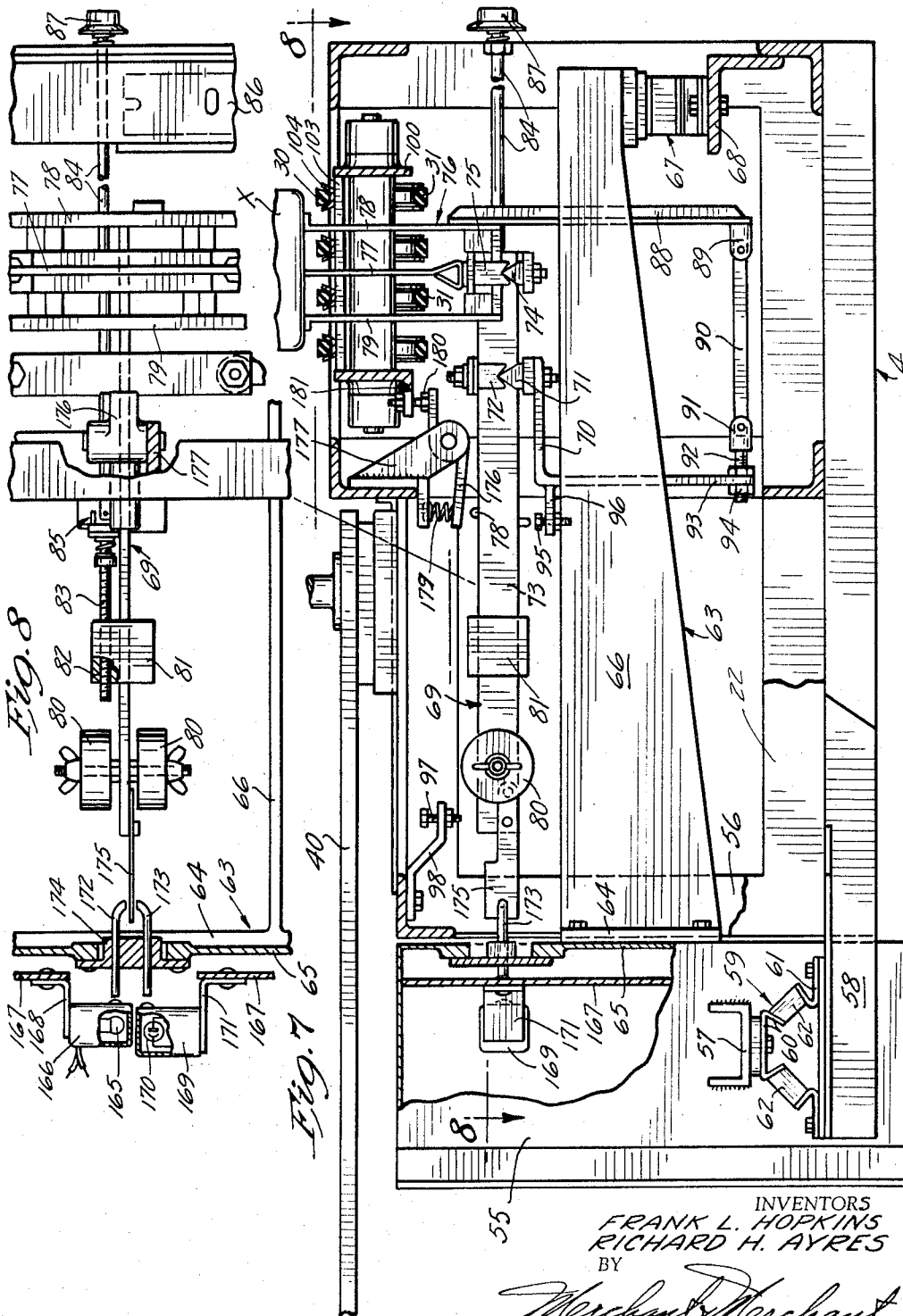
F. L. HOPKINS ET AL

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CONTAINER FILLING AND WEIGHING MACHINE

Filed April 24, 1957

8 Sheets-Sheet 7



INVENTORS
FRANK L. HOPKINS
RICHARD H. AYRES

BY

Merchant & Merchant
ATTORNEYS

June 2, 1959

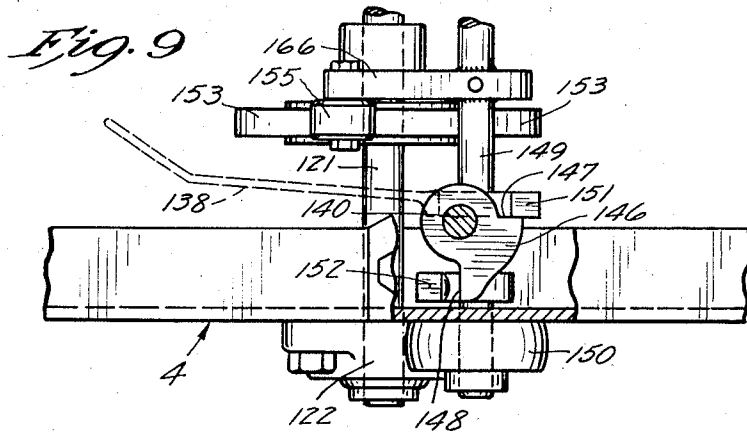
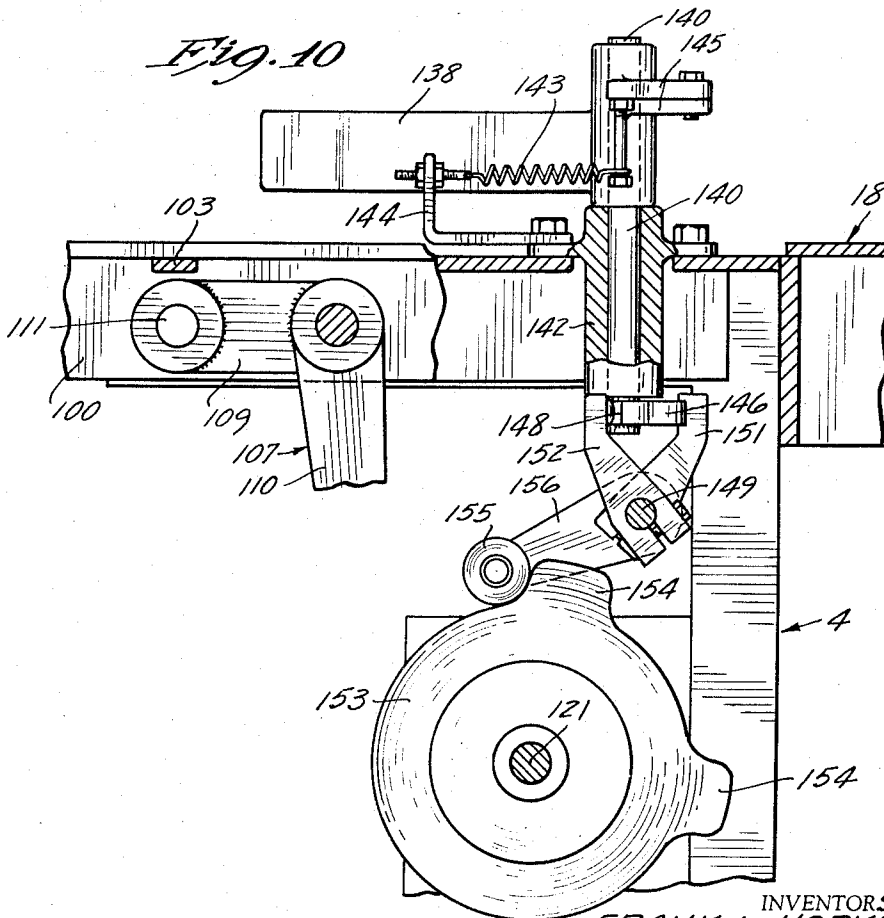
F. L. HOPKINS ET AL

2,889,031

CONTAINER FILLING AND WEIGHING MACHINE

Filed April 24, 1957

8 Sheets-Sheet 8



INVENTORS
FRANK L. HOPKINS
RICHARD H. AYRES
BY
Merchant & Merchant
ATTORNEYS

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2,889,031

CONTAINER FILLING AND WEIGHING MACHINE 5

Frank L. Hopkins and Richard H. Ayres, Minneapolis, Minn., assignors to Bemis Bros. Bag Co., St. Louis, Mo., a corporation of Missouri

Application April 24, 1957, Serial No. 654,934

6 Claims. (Cl. 198—39)

Our present invention relates generally to machines for filling containers with granular or powdered bulk material, and more specifically to such machines utilized to add small quantities of material to partially filled containers to bring the same to a predetermined weight, such machines being sometimes referred to as "trim weighing machines."

In the filling of bags, cartons and the like with bulk material, the containers are usually filled with a bulk charge of the material at relatively high speed, to an extent less than the total amount required in each container. The quantity of the material comprising the bulk charge may be measured either by weight or by volume. When the material is thus dispensed through a container at a relatively high rate of feed, it is difficult to maintain a predetermined uniform accurate measurement, and material must be thereafter fed to the containers or removed therefrom to bring the same to a given weight. Heretofore, weighing and container-filling machines have been used incorporating mechanism for delivering material to a container at relatively high speed for the bulk portion of the charge less than the desired total charge, and thereafter feeding at a relatively slow rate to bring the container up to weight. Obviously, machines of this general type involve considerable mechanism for accomplishing the dual function of rapidly dispensing a bulk charge and thereafter slowly dribble the amount of feed necessary to bring the container up to the predetermined weight. An important object of our invention, is therefore, the provision of a machine which will receive partially filled containers and automatically fill said containers to the desired predetermined weight, and in a rapid accurate manner.

Another object of our invention is the provision of a machine as set forth which can be used with various types of bulk type dispensing apparatus without structural change, either in itself, or in such bulk charge dispensing machines.

Still another object of our invention is the provision of a machine as set forth having plurality of spaced weighing devices and a like plurality of material feeding devices whereby partially filled containers placed on each of the weighing devices will be independently brought to their desired weight by material added thereto from the feeding devices, and of novel means whereby said containers are automatically spaced for placement each on a different one of said weighing devices.

Another object of our invention is the provision of a machine of the type herein described which is quickly and easily adjustable to accommodate containers of various sizes and to add material to said containers, to bring the contents thereof to various desired quantities by weight.

Another object of our invention is the provision of a machine as set forth having a continuously operating conveyor for transporting the containers toward and away from said weighing devices; and of novel means for moving the conveyor out of operative engagement

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with the containers when the containers are positioned to become engaged by the weighing devices, and for automatically moving the conveyor into operative engagement with said containers to remove the same from the weighing devices when the container filling operation has been completed.

Still another object of our invention is the provision of novel means for mounting the weighing devices of our invention and for cushioning the same against vibrations set up in the machine, to the end that highly accurate weighing is achieved.

Another object of our invention is the provision of a machine of the above type which is relatively simple and inexpensive to manufacture, which is highly efficient in operation and which is rugged in construction and durable in use.

The above, and still further highly important objects and advantages of our invention, will become apparent from the following detailed specification, appended claims, and attached drawings.

Referring to the drawings, which illustrate the invention, and in which like reference characters indicate like parts throughout the several views:

Fig. 1 is a view in front elevation of a machine for dispensing bulk material to partially filled containers, built in accordance with our invention;

Fig. 2, is an enlarged view in end elevation as seen from the right to the left with respect to Fig. 1;

Fig. 3 is a still further enlarged fragmentary view partly in plan and partly in section taken substantially on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged fragmentary view in front elevation as seen from the line 4—4 of Fig. 3, some parts being removed;

Fig. 5 is an enlarged fragmentary view partly in front elevation and partly in section, taken on the line 5—5 of Fig. 3, some parts being broken away;

Fig. 6 is a transverse section taken substantially on the irregular line 6—6 of Fig. 5;

Fig. 7 is an enlarged fragmentary transverse section taken substantially on the irregular line 7—7 of Fig. 3;

Fig. 8 is a fragmentary detail partly in plan and partly in section, taken substantially on the line 8—8 of Fig. 7, some parts being removed;

Fig. 9 is an enlarged fragmentary detail, partly in plan and partly in horizontal section taken substantially on the line 9—9 of Fig. 1; and

Fig. 10 is an enlarged detail taken substantially on the line 10—10 of Fig. 6.

In the preferred embodiment of the invention illustrated, a supporting structure, indicated in its entirety by the numeral 1, comprises a supporting base 2 having a tubular pedestal element 3 bolted or otherwise rigidly secured at its lower end to the base 2, and a generally rectangular housing 4 mounted for vertical movements on the pedestal element 3. A clamping ring 5 is releasably anchored to the pedestal element 3 by clamping bolts or the like 6 and is provided with a threaded boss 7 through which extends an adjustment screw 8 that is journaled in the housing 4 and held against axial movement with respect to the housing 4. Adjacent its upper end, the adjustment screw 8 is provided with a sprocket 9 over which is entrained an endless link chain 10 that is also entrained over a second sprocket 11 mounted on a short shaft 12 journaled in the housing 4 in laterally spaced parallel relation to the adjustment screw 8. A crank 13 is fixed to the lower end of the shaft 12 exterior of the housing 4 and is operative to rotate the adjustment screw 8 through the sprockets 9 and 11 and chain 10 to raise and lower the housing 4 with respect to the base 2. Obviously, with the clamping ring 5 secured against movement on the pedestal 3, rotation of the crank acting handle 13 in one di-

rection will cause the housing 4 and all parts carried thereby to move upwardly, while rotation of the handle 13 in another direction will cause said housing 4 to be lowered, for a purpose which will hereinafter become apparent. The front wall 14 of the housing 4 and one end wall 15 thereof are provided with inspection openings, not shown, but which are normally closed by doors 16 and 17 hingedly mounted on the front and end walls 14 and 15 respectively.

Bolted or otherwise rigidly secured to the upper end portion of the end wall 15 of the housing 4 is an elongated bifurcated bracket 18 comprising laterally spaced parallel arms 19 to the outer end of which are secured aligned bearings 20 which journal a transverse shaft 21, see Figs. 1-3. Likewise rigidly secured to the upper end portion of the opposite end wall 22 of the housing 4 is a bifurcated bearing bracket 23 comprising laterally spaced arms 24, to the outer ends of which are secured aligned bearings 25 which journal opposite end portions of a horizontally disposed shaft 26 parallel to the shaft 21. A plurality of pulleys 27 are rigidly secured to the shaft 21 in axially spaced relationship between the arms 19 of the bracket 18 and a like plurality of cooperating pulleys are rigidly secured on the shaft 26 between the arms 24 of the bracket 23. The shafts 21 and 26 together with their respective pulleys 27 and 28 form part of conveyor means which further includes a plurality of laterally spaced parallel endless conveyor belts 29, each of which is entrained over a cooperating pair of the pulleys 27 and 28. The conveyor belts 29 are of the type commonly known as V-belts, each of said belts defining horizontally extending upper delivery flights 30 and lower return flights 31 downwardly spaced from the delivery flights 30. The return flights 31 of the conveyor belts 29 are supported intermediate the pulleys 27 and 28 by longitudinally spaced transversely extending supporting rollers 32 and 33 suitably journaled within the housing 4, see Figs. 5 and 6.

Means for imparting continuous and uninterrupted conveying movement to the several conveyor belts 29 to cause travel of the delivery flights 30 thereof in a direction from the right to the left with respect to Figs. 1, 3 and 5, comprises, a drive shaft motor 34 of the geared head type and having an output shaft 35, a sprocket 36 rigidly mounted on the shaft 35, a second sprocket 37 on the pulley shaft 21, and an endless drive chain 38 entrained over the sprockets 36 and 37.

The supporting structure 1 includes a tubular leg 39 that is telescopically received in the pedestal element 3 and which has welded or otherwise rigidly secured to its upper end a plate-like element 40. An elevating screw 41 is journaled in the closed upper end 42 of the tubular leg 39 and the front end of the plate-like element 40, and is provided with suitable means for preventing axial movement with respect to the tubular leg 39. The lower end portion of the elevating screw 41 is threadedly received in a nut element 43 rigidly mounted in the lower portion of the pedestal element 3, see Fig. 4. The upper end of the elevating screw 41, above the plate-like element 40 is formed to provide a cross sectionally polygonal head 44 that is adapted to be engaged by a crank or wrench, not shown, for imparting rotary movement to the screw 41. By rotating the elevating screw 41, the tubular leg 39, element 40 and parts carried thereby, may be raised or lowered as desired, for a purpose which will hereinafter appear. Mounted on the plate-like element 40, in side by side relationship is a pair of electromagnetically operated vibratory motors 45 that are separated from the element 40 by means of cushioning devices 46. A pair of vibratory bracket elements 47 are mounted each on a different one of the motors 45 by means including resilient fingers 48, each of said brackets 47 supporting a different one of a pair of vibratory feeding trays 49 having forwardly opening discharge end portions 50 overlying the delivery flight portions 30 of the conveyor belts 29 in

spaced relation longitudinally of said delivery flights. A pair of supporting arms 51 extend upwardly from opposite side edges of the platform element 40 and support a delivery chute 52 the open upper end of which is adapted to underlie and receive granular or powdered material to be dispensed from a suitable source of material, such as a hopper, indicated at 53. The chute 52 is formed to provide a pair of gate equipped delivery legs 54 that are adapted to discharge the granular or powdered material, one each into each of the vibratory feeding trays 49 adjacent the rear ends thereof, see particularly Figs. 1 and 2. The motors 45, cushioning elements 46, brackets 47 and mounting means 48 and the trays 49 are of the type disclosed in the pending Frank L. Hopkins' application for U.S. Letters Patent, Serial No. 466,984, filed November 5, 1954, and entitled "Vibrator Motor Construction," now Patent No. 2,790,097 and further detailed description thereof is believed unnecessary. Hence, for the sake of brevity, such further detailed description is omitted.

A secondary housing 55, containing various electrical control elements for the machine, is disposed in rearwardly spaced relation to the open rear portion 56 of the housing 4, and is provided at its opposite ends with outwardly projecting ears 57 which overlie cooperating mounting flanges 58 that extend rearwardly from the opposite ends 15 and 22 of the housing 4, see particularly Figs. 2, 3 and 7. Interposed between the ears 57 and their cooperating mounting flanges 58 are cushioning devices 59 similar to the cushioning elements 46, each of said cushioning devices 59 comprising a top member 60 bolted or otherwise secured to its respective ear 57, a pair of laterally spaced bottom members 61 secured to their respective mounting flange 58, and rubber-like cushion elements 62 interposed between opposite ends of the top member 60 and adjacent bottom members 61, see Fig. 7.

A scale supporting bracket 63 comprises an elongated back plate 64 bolted or otherwise rigidly secured to the front wall 65 of the secondary housing 55 and a pair of spaced arms 66 which extend forwardly of the back plate 64 to a point adjacent the front of the housing 4, and which are spaced apart in a direction longitudinally of the conveyor belts 29. The front ends of the arms 66 are supported by cushioning devices 67 identical to the cushioning devices 59 above described. The cushioning devices 67 are mounted on angle brackets 68 that are welded or otherwise rigidly secured to the interior of the housing 4.

The arms 66 of the bracket 63 support a pair of identical weighing scale mechanisms, each indicated in its entirety by the numeral 69, through the medium of an angle or cross member 70 connected at its opposite ends to the arms 66. Mounted on the upper portion of the cross member 70 are fulcrum or knife edge elements 71 which are received in cooperating knife edge blocks 72 that are rigidly mounted on scale beams 73 in rearwardly spaced relation to the front ends thereof. Other knife edge elements 74 are rigidly secured to the extreme front ends of the scale beams 73, the knife edge elements 74 being received in downwardly opening notches in knife-edge block elements 75 at the lower end of container engaging platform structures each indicated in its entirety by the numeral 76. Each of the platform structures comprises an intermediate platform element 77 and front and rear platform elements 78 and 79 respectively, said platform elements being spaced apart and extending upwardly, each between a different pair of adjacent conveyor belts 29, see particularly Figs. 3 and 7. It will be noted, that in all positions of weighing movement of the scale mechanisms including the platform structures 76, the upper container engaging ends of the platform elements 77-79 are disposed above the plane of the top surfaces of the delivery flights 30 of the conveyor belt 29 when said delivery flights 30 are in an inoperative lower position as will hereinafter be described. At their rear end portions, the scale beams 73

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are provided with relatively fixed counterweights 80 and relatively movable counterweights 81, the counterweights 81 having threaded apertures 82 therethrough for the reception of adjustment screws 83 that extend generally parallel to the longitudinal dimensions of the scale beams 73. The adjustment screws 83 are operatively connected to rotary adjustment shafts or rods 84 by means of pin-type couplings 85, see particularly Fig. 8. The adjustment shafts 84 extend forwardly through a box-like control panel 86 and terminate in control knobs 87.

For the purpose of supporting the platform structures 76 in an upright position, we provide depending legs 88 that are rigidly secured at their upper ends to their respective platform structures 76, and which are pivotally connected at their lower ends, as indicated at 89, to the front ends of rigid stabilizer links 90. The rear ends of the stabilizer links 90 are pivotally connected to anchoring elements 91 that are provided with screw-threaded stems 92 which extend through suitable apertures in the lower portion 93 of the cross member 70, see Fig. 7. Lock nuts 94, screw threaded on the stems 92 hold the anchoring elements 91 in desired adjusted relationship with respect to the cross member 70. The above described arrangement supports the platform structure 76 in proper upright positions, and permits free movement of the scale beams 73 and platform structures 76 during the weighing operation. For limiting upward movement of the platform structures 76, we provide stop screws 95 that are screw threaded into brackets 96 welded or otherwise rigidly secured to the upper end portions of the angle members 70. The stop screws 95 underlie the intermediate portions of their respective scale beams 73 for engagement therewith. For limiting downward movements of the front ends of the scale beams 73 and their respective platform structures 76, we provide lock nut equipped stop screws 97 that are screw-threaded through bracket elements 98 rigidly secured to the rear portion of the housing 4. The stop screws 97 overlie the rear ends of their respective scale beams 73 for engagement therewith during downward movement of their respective platform structures 76 and consequent upward movement of the rear ends of their respective scale beams 73.

As above indicated, partially filled containers such as bags, indicated at X, are delivered from conventional bag filling machines, not shown, through the input end of the delivery flight 30 of the conveyor 29, said input end being at the right with respect to Figures 1 and 3. We provide means, now to be described, for raising the intermediate portions of the delivery flights 30 to cause said delivery flights to carry the partially filled bags into overlying relationship to the upper ends of the weighing platform structures 76 and, when the bags X are properly positioned, to lower said portions of the delivery flights 30 to cause said bags X to be deposited on the platform structure 76 for weighing without stopping conveying movement of the belts 29. A horizontally disposed, generally rectangular carriage 99 extends longitudinally of the conveyor belts 29 between the delivery and return flights 30 and 31 thereof, and comprises, a pair of laterally spaced side rails 100 and 101, a pair of longitudinally spaced transverse members 102 welded at their opposite ends to the side rails 100 and 101, and a plurality of longitudinally spaced parallel cross bars 103 welded or otherwise rigidly secured to the top edge portions of the side rails 100 and 101. A plurality of upwardly opening guide channels 104 extend longitudinally of the carriage 99 and are welded or otherwise rigidly secured to the cross bars 103, one each in underlying parallel relationship to a different one of the delivery flights 30 of the conveyor belts 29. The guide channels 104 are spaced apart to permit free passage therebetween of the platform elements 77-79, and retain the delivery flights against lateral movement into engagement with said platform elements.

The carriage 99 is supported at one side in the housing

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4 by a pair of rock arms 105 and 106 each pivotally secured at one end to the housing 4 on a horizontal axis extending transversely of the carriage 99 in spaced relationship longitudinally of the conveyor, and each pivotally secured to the side rail 101 in axial alignment with a different one of the transverse members 102. A pair of bellcrank levers 107 and 108 are pivotally mounted at their intermediate portions in the housing 4 adjacent the front wall 14 thereof on axes in alignment with the axes of the pivotal connections between the rock arms 105 and 106 respectively and the housing 4. The bellcrank lever 107 comprises a relatively short arm 109 and relatively long arm 110, the outer end of the relatively short arms 109 being pivotally connected to the side rail 100 of the carriage 99 in axial alignment with the pivotal connection between the rock arm 105 and the transverse member 102 of the carriage 99. Preferably, the outer end of the lever arm 109 and the respective end of the rock arm 105 are journaled on a common shaft 111 which extends axially through the transverse member 102 and the side rails 100 and 101, see Fig. 5. The bell crank lever 108 comprises a generally horizontally disposed lever arm 112 and a generally vertically disposed lever arm 113, the outer end portion of the lever arm 112 being pivotally secured to a pin 114 that extends axially through the adjacent transverse member 102, said pin or shaft 114 also journaled the outer end of the rock arm 106. The carriage 99, the rock arms 105 and 106 together with the bellcrank levers 107 and 108, and their pivotal connections to the carriage 99 and housing 4, provide a parallelogram arrangement wherein swinging movement of the rock arms and levers in a clockwise direction with respect to Figs. 1 and 5 will cause the carriage 99 to raise and carry the guide channel engaged portions of the delivery flights 30 above the upper limit of movement of the bag engaging portion of the weighing scale platform structures 76. Thus, containers or bags on the delivery flight 30 are held out of engagement with the bag engaging top portions of the platform structures 76. When the rock arms 105 and 106 and their cooperating bellcrank levers 107 and 108 respectively are swung in a counter-clockwise direction with respect to Figs. 1 to 5, the carriage 99 is lowered to a point wherein the top bag engaging surfaces of the delivery flights 30 are disposed below the lower limit of weighing movement of the bag engaging portions of the platform structures 76 so that, bags carried by the delivery flights 30 and overlying the platform structures 76 when the carriage is lowered will be deposited on the platform structures 76 for weighing. The lever arms 110 and 113 of the bellcrank levers 107 and 108 respectively are connected by a rigid link 115 having longitudinally adjustable end members 116 and 117 that are pivotally secured to the lever arms 110 and 113 respectively, whereby swinging movement of one of the bellcrank levers will cause equal swinging movement to be imparted to the other thereof. Although the carriage 99 is yieldingly urged toward its lower position by action of gravity, the carriage is further yieldingly biased toward its lower position by a coil tension spring 118 secured at one end to the housing 4 and at its other end to the lever arm 113 of the bellcrank lever 108. To relieve excess friction between the opposite ends of the guide channels 104 and their respective conveyor belts when the carriage 99 is in its raised position, we provide transverse guide rollers 119 journaled between the side rails 100 and 101 longitudinally outwardly of the opposite ends of the guide channels 104.

Carriage lifting movement is imparted to the bellcrank lever 107 by a cam 120 that is rigidly mounted on a rotary shaft 121 journaled in bearings 122 in the front and rear walls of the housing 4. The cam 120 operatively engages a cam follower roller 123 that is journaled on the lower end 124 of the lever arm 110. The shaft 121 is driven from the drive motor 34 through

a sprocket wheel 125 rigidly mounted on the output shaft 35 of the motor 34, and an endless link chain 126 running over the sprocket wheel 125 and a second sprocket wheel 127 mounted on a conventional single-revolution clutch 128. The clutch 128 is shown in Figure 6 as being mounted on the rotary shaft 121, and is of the well-known type which, when actuated, is automatically disengaged when the driven shaft, in this case, the shaft 121, has completed a single revolution. For actuating the clutch 128 we provide an operating arm 129 mounted on one end of a rockshaft 130 that is journaled in the housing 4, the opposite end of the arm 129 operatively engaging the clutch 128. A crank arm 131 is connected to the opposite end of the shaft 130 and to the armature 132 of a clutch operating solenoid 133 suitably mounted on the supporting structure 1, see Figs. 5 and 6.

As partially filled bags are fed to the input end of the machine, the same are received between a laterally spaced pair of longitudinally extending guide rails 134 that are provided with laterally outwardly projecting stems 135 slidably received in mounting posts 136 that extend upwardly from the arms 19 of the bracket 18, see particularly Figs. 1-3. The guide rails 134 are shiftable laterally to accommodate bags or containers X of various widths and are releasably locked against lateral shifting movement by thumb screws 137 screw threaded into the upper ends of the posts 136. As the bags X approach the weighing scale platform element on the continuously moving delivery flight 30 of the conveyor belts 29, the bags must be held temporarily against common movement with the conveyor belts 29 and released in definite timed relationship so that the spacing between the bags X will be equivalent to the spacing between the weighing scale platform structures 76. For alternately holding and releasing the bags X, we provide a pair of opposed gate elements 138 and 139 that are carried at one of their ends by vertically disposed shafts 140 and 141 respectively journaled in bearings 142 mounted in the housing 4 at opposite sides of the path of movement of the bags. The free ends of the gate elements 138 and 139 are yieldingly biased toward each other to engage and hold a bag X against movement toward the weighing scale platform structures 76, by coil tension springs 143 connected at one of their ends to anchoring brackets 144 rigidly mounted on the housing 4 and at their other ends to the outer ends of rigid lugs or the like 145 projecting radially outwardly from the inner pivoted ends of the gate elements 138 and 139. Rigidly mounted on the lower ends of the shafts 140 and 141 below the bearings 142 are enlarged heads 146 each defining angularly disposed radial abutment faces 147 and 148. A rockshaft 149 is journaled in bearings 150 in the front and rear wall portions of the housing 4 on an axis parallel to the axis of the rotary shaft 121, and has mounted thereon an axially spaced pair of radially outwardly extending latch dogs 151 that are positioned to move into and out of the paths of rotary movements of the faces 147 of the heads 146 to releasably lock the gate elements 138 and 139 against bag releasing movement. Also mounted on the shaft 149 for common rocking movements therewith is a pair of axially spaced gate element operating dogs 152 that engage their respective abutment faces 148 of the head 146 to cause bag releasing movements to be imparted to the gate elements 138 and 139 when the latch dogs 151 are moved out of latching engagement with the abutment faces 147 and against the yielding bias of said springs 143. Rocking movements are imparted to the rock shaft 149 by a second cam 153 having circumferentially spaced radially outwardly projecting lugs or lobes 154 that successively engage a cam follower roller 155 that is journaled on the outer end of a crank arm 156 anchored to, and projecting radially outwardly from, the rockshaft 149. The cam 153 is rigidly mounted on the rotary shaft 121 for common rotation therewith and the cam 120. The lugs or lobes 154

of the cam 153 are so spaced that, during a single revolution of the cam 153, a pair of partially filled bags X will be released by the gate elements 138 and 139 in spaced relation longitudinally of the conveyor belts 29 to be deposited properly one each on each of the weighing scale platform structures 76. In other words, engagement of the cam follower roller 155 by the lobes 154 in succession, will cause bag releasing movements to be imparted to the gate elements 138 and 139 to permit release of one bag X after which the gate element will close to hold a succeeding bag X and release the same only after a proper spacing has been obtained therebetween and the preceding bag.

Operation of the solenoid to actuate the single revolution clutch 128 to initiate a cycle of operation of the machine is controlled by a pair of control switches, not shown, but which may be assumed to be contained in a pair of switch housings 157 and 158 mounted on the bracket 18 and operated by a pair of sensing fingers 159 and 160, and conventional circuit means not shown. With reference to Fig. 3 it will be seen that the free ends of the sensing fingers 159 and 160 extend laterally into the path of travel of the bags X on the conveyor belts 29, said inner ends of the fingers 159 and 160 being spaced apart longitudinally of the path of travel of the bags X a distance greater than the width of a single bag. The switches contained in the housings 157 and 158 may be assumed to be of the momentary contact type and to be arranged in series, simultaneous closing of both said switches being required to energize the solenoid 133. Thus, when a single partially filled bag X approaches the gate elements 138 and 139, it first engages the sensing fingers 159 to close the switch in its respective housing 157 and thereafter moves out of engagement with the sensing finger 159 before engaging the finger 160 to close the switch in its respective housing 158. Hence, the solenoid 133 will not become energized to start a cycle of operation until a second partially filled bag X is brought into engagement with the sensing finger 159 while the first bag is in engagement with the second sensing finger 160. During opening of the gate elements to release the bags X, the carriage 99 is moved to its raised position wherein the top bag engaging surfaces of the delivery flights 30 are disposed above the tops of the weighing scale platform structures 76 so that, when the bags are released by the gate element 138 and 139 in properly spaced relationship, the same will be delivered to points overlying respective platform structures 76 and underlying respective delivery ends 50 of the feeding trays 49. At this point, the carriage 99 is lowered and the bags are deposited on their respective platform structures 76 for weighing and filling. It will here be noted that with the above arrangement, a pair of bags X brought to the proper weight in the preceding cycle of operation will not be moved by the conveyor from their positions on the weighing platforms until the gate elements release the next succeeding pair of bags X to be weighed.

The electro-magnetic vibratory feeding motors 45 are independently controlled by a mechanically operated switch, not shown, but contained in a switch housing 161 underlying the rotary shaft 121; suitable cut-off switches, not shown, but which may be assumed to be contained in the secondary housing 55 and controlled by respective scale beams 73; and conventional circuit means not shown. The switch within the housing 161 is operated by a rock arm 162 to the outer end of which is journaled a cam follower roller 163 that is engaged by a third cam 164 mounted on the rotary shaft 121 for common rotation therewith. The third cam 164 is so shaped and so disposed with respect to the first and second cams 120 and 153 respectively, that the switch within the housing 161 is closed to energize the feeding motors 45 after the bags X are deposited on their respective weighing scale platform structures 76. The above-mentioned cut-off switches, not shown, for de-energizing the

feeding motors 45 when their respective bags X have been brought to a predetermined weight, are preferably of the type which is operated by electronic means involving the use of a beam of light and a photo-electric cell. With reference to Figs. 7 and 8, it will be seen that said source of light comprises an incandescent lamp 165 that is mounted in a suitable casing 166 which in turn is carried by a mounting panel 167 by means of a suitable bracket 168, the panel 167 being disposed within the secondary housing 55 adjacent the front wall 65 thereof. Closely adjacent the casing 166 is a similar casing 169 containing a photo-electric cell 170. The casing 169 is also supported from the panel 167 by a bracket 171. A pair of light transmitting elements 172 and 173 are carried by a mounting plate 174 in spaced parallel relationship and project forwardly through an opening in the front wall 65 of the secondary housing 55 to the interior of the housing 4 rearwardly of one of the scale beams 73. The light transmitting elements 172 and 173 are preferably solid rods of transparent synthetic plastic resin having light transmitting characteristics which cause a beam of light introduced at one end thereof to follow any given bend which the rod may take and be emitted from the opposite end thereof. At their forward ends, the rods 172 and 173 are bent toward each other with their front ends in opposed spaced relationship. With this arrangement, light from the incandescent bulb 165 passes forwardly through the rod 172, from the front end thereof to the opposed front end of the rod 173, and from thence, rearwardly to the photo-electric cell 170. It will be noted that both the casings 166 and 169 are provided with the usual lenses for transmitting light between the rods 172 and 173 and their respective components 165 and 170. While the above light-producing, transmitting and receiving apparatus has been described in the singular, it will be appreciated that each scale beam 73 is associated with an individual apparatus as above described. Extending rearwardly from each scale beam 73 is a generally vertically disposed relatively thin vane 175 that is adapted to move vertically between the front ends of the rods 172 and 173 of its respective control apparatus. The vanes 175 are made from opaque material whereby, when the rear ends of the scale beams 73 are moved upwardly, by reason of the bags X supported thereby being brought up to weight, the vanes 175 will, in passing upwardly from normal positions between the front ends of their respective light transmitting rods 172 and 173, permit transmission of the beam of light to the photoelectric cell 170 and cause the feeding motors 45 to become deenergized. Inasmuch as the control circuits in themselves do not comprise the instant invention, and whereas such control circuits may be varied without affecting operation of the instant machine, detailed showing and description thereof is believed unnecessary, and as such, is omitted in the interests of brevity.

The entire dispensing and weighing operation consumes a minimum of time, and the cam 120 is shaped to cause the carriage 99 to be lowered for a length of time sufficient to permit such dispensing and weighing. As the cam 120 rotates, the carriage 99 is again raised and the filled and weighed bags are carried to the discharge end of the machine, and from thence to other points by suitable means not shown with reference to Fig. 5, it will be seen that the cam 120 is formed to provide high and low dwell surface portions 120a and 120b respectively, and an intermediate dwell surface portion 120c. Movements of the cam follower roller 123 from the low dwell surface portion 120b to the high dwell surface portion 120a is rapid to cause fast raising of the delivery conveyor flight 30. Movement of the roller 123 from the surface portion 120a to the intermediate dwell surface portion 120c is also quite rapid, but decelerates quickly, said dwell surface portion 120c causing the carriage 99 and delivery flight 30 to set the containers X gently on their respective platform struc-

tures 76, and partially support the containers X thereon. As the roller 23 moves from the dwell surface portion 120c to the lower surface portion 120b, the carriage 99 and delivery flight 30 are lowered completely to cause the entire weight of the containers X to be supported by their respective platform structures 76.

For preventing bouncing of the delicately balanced scale beams 73, we provide levers 176 pivotally mounted intermediate their ends to brackets 177 mounted within the housing 4. The levers 176 are yieldingly urged toward engagement of one of the ends of each thereof with an abutment member 178 on each of the scale beams 73 by means of coil compression springs 179. The opposite ends of the levers 176 are engaged by abutment elements 180 in the nature of headed lock-nut equipped bolts threadedly received in flanges or ears 181 on the side rail 101 of the carriage 99 when the carriage 99 is moved to its lower position, to swing the levers 176 in a direction to release the scale beams 73 for the weighing operation. Obviously, when the carriage 99 is again raised, the levers 176 will be pivotally moved in the opposite direction by their respective springs 179 to move their respective scale beams 73 into engagement with the stop screws 95.

It will be appreciated that, although the counterweights 80 have been described as being fixed, the same may be easily removed from their respective scale beams 73 and replaced with lighter or heavier counterweights to enable the machine to accommodate variously weighing groups or runs of materials for container sizes. The movable counterweight elements 81 are preferably used for relatively fine weighing adjustment. It will further be appreciated that vertical adjustment of the housing 4 and the conveyor carried thereby permits the instant machine to be operatively coupled to the delivery ends of conveyors or other bag filling machines of the bulk charge dispensing variety, when there is a difference in level between such different conveyors or machines. Moreover, the adjustment of the guide rail 134 and of the material dispensing mechanism supported by the plate-like element 40 readily adapt our machine to a relatively wide variety of shapes and sizes of containers to be filled.

While we have shown and described a commercial embodiment of our novel container filling and weighing machine, it will be understood that the same is capable of modification without departure from the spirit and scope of the invention, as defined in the claims.

What we claim is:

1. Container conveying and controlling apparatus for material dispensing and weighing devices comprising material delivery mechanism and a weighing scale including a container supporting platform mounted for limited vertical weighing movements; said apparatus comprising, a supporting structure, an endless flexible conveyor element having a generally horizontally disposed delivery flight with a vertically varying bag-engaging top surface adjacent said platform and a return flight spaced from the delivery flight, means on said supporting structure mounting and guiding said conveyor element at the opposite ends of said flights, means for imparting continuous and uninterrupted delivery movement to said conveyor element, carriage means for guiding the delivery flight of said conveyor element intermediate the end portions of said delivery flight, mechanism for moving said carriage means between vertically spaced limits wherein the container engaging top surface of said delivery flight is disposed above and below the plane of said platform respectively at the upper and lower limits of movement of said platform, a gate element movable relative to said conveyor element toward and away from the path of travel of a container on said conveyor element to stop movement of said container during movement of said conveyor and to release the container for common movement with said conveyor, and means for moving

said gate element in a direction to release a container held thereby responsive to operation of said carriage means moving mechanism to raise said carriage means.

2. Container conveying and controlling apparatus for material dispensing and weighing devices comprising material delivery mechanism and a weighing scale including a plurality of container supporting platform sections mounted for common limited vertical weighing movements; said apparatus comprising, a supporting structure, conveyor means including a plurality of laterally spaced endless conveyor elements having cooperating generally horizontally disposed delivery flights with vertically varying container engaging top surfaces adjacent different ones of said platform sections and return flights spaced from said delivery flights, means on said supporting structure mounting and guiding said conveyor elements at the opposite end portions of said flights, means for imparting continuous and uninterrupted delivery movements to said conveyor elements, a carriage including a plurality of guide elements in spaced parallel relation, each of said guide elements receiving a delivery flight portion of a different one of said conveyor elements, means including a pair of spaced cooperating levers mounting said carriage to the supporting structure for movements between a lower position wherein said guide elements are substantially out of operative engagement with their respective delivery flight portions and a raised position wherein said guide elements support their respective delivery flight portions above the plane of said platform sections at their upper limit of weighing movement, said levers being pivotally mounted at corresponding portions to the supporting structure on parallel horizontal axes, said carriage being pivotally connected to other corresponding portions of said levers, a power driven rotary shaft, a cam on said shaft operatively engaging one of said levers to impart raising and lowering movements to said carriage, a gate element mounted on said supporting structure for movements relative to said conveyor element toward and away from the path of travel of a container on said conveyor elements to stop movement of said container during movement of said conveyor elements and to release the container for common movements with said conveyor elements, and means for moving said gate element in a direction to release a container held thereby responsive to rotation of said cam to raise said carriage.

3. The structure defined in claim 2 in which said levers are mounted in spaced relationship longitudinally of the direction of movement of the delivery flight of said conveyor elements, the pivot axes of said levers extending transversely of said direction of movement, and in further combination with extensible and retractable tie rod means connecting said levers together independently of said carriage, adjustment of the length of said tie rod means causing one end of the carriage to be raised or lowered with respect to the other end thereof.

4. Container conveying and controlling apparatus for material dispensing and weighing devices comprising material delivery mechanism and weighing scale mechanism including spaced container supporting weighing platforms mounted for limited vertical weighing movements; said apparatus comprising, a supporting structure, conveyor means including a plurality of laterally spaced endless conveyor elements having cooperating generally horizontally disposed delivery flights with vertically varying container engaging top surfaces adjacent said platforms and return flights spaced from said delivery flights, means on said supporting structure mounting and guiding said conveyor elements at the opposite end portions of said flights, means for imparting continuous and uninterrupted delivery movements to said conveyor elements, a carriage including a plurality of guide elements in spaced parallel relation, each of said guide elements receiving a delivery flight portion of a different one of said conveyor elements, means including a pair of spaced cooperating levers

mounting said carriage to the supporting structure for movements between a lower position wherein said guide elements are substantially out of operative engagement with their respective delivery flight portions and a raised position wherein said guide elements support their respective delivery flight portions above the plane of said platforms at their upper limit of weighing movement, mechanism operatively engaging said levers to impart raising and lowering movements to said carriage and including a power driven rotary shaft, a gate element movable relative to said conveyor element into and out of the path of travel of containers on said conveyor elements, means for releasably locking said gate element in its container holding position in said path of movement of the containers, and means including said shaft for moving said gate element in a direction to release said containers for common movements with said conveyor elements in predetermined spaced relationship longitudinally of said conveyor elements and upon movement of said carriage to its raised position, whereby, when said carriage is subsequently lowered, said containers will be deposited each on a different one of said spaced platforms.

5. Container conveying and controlling apparatus for material dispensing and weighing devices comprising material delivery mechanism and weighing scale mechanism including a pair of spaced container supporting platforms mounted for limited vertical weighing movements; said apparatus comprising, a supporting structure, an endless flexible conveyor element having a generally horizontally disposed delivery flight with a vertically varying container engaging top surface adjacent said platform and a return flight spaced from the delivery flight, means on said supporting structure mounting and guiding said conveyor element at the opposite end portions of said flights, means for imparting continuous and uninterrupted delivery movements to said conveyor element, a carriage including a guide element receiving the delivery flight portion of said conveyor element, mechanism for moving said carriage between vertically spaced limits wherein the top engaging surface of said delivery flight is disposed above and below the plane of said platform respectively at the upper and lower limits of movement of said platform, said mechanism comprising, a pair of spaced cooperating levers pivotally mounted on the supporting structure and operatively connected to said carriage, a rotary shaft, and a cam on said shaft operatively engaging one of said levers, a container engaging gate element mounted on said supporting structure for movements into and out of the path of travel of containers on said delivery flight to respectively stop and release said containers to space said containers apart a distance corresponding substantially to the spacing between said platforms, a second cam mounted on said rotary shaft for common rotation with said first mentioned cam, motion transfer mechanism engaged by said second cam and operatively connected to said container engaging gate element to move said gate element in a direction to release a container held thereby, yielding means urging said gate element in the opposite direction to intercept and hold a succeeding container, said second cam moving said gate element out of the path of movement of said containers against bias of said yielding means, and means operatively connected to said motor for imparting intermittent rotary movement to said rotary shaft.

6. Container conveying and controlling apparatus for material dispensing and weighing devices comprising material delivery mechanism and a weighing scale including a container supporting platform mounted for limited vertical weighing movements; said apparatus comprising, a supporting structure, an endless flexible conveyor element having a generally horizontally disposed delivery flight with a vertically varying bag-engaging top surface adjacent said platform and a return flight spaced from the delivery flight, means on said supporting structure mounting and guiding said conveyor element at the opposite ends

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of said flights, means for imparting continuous and uninterrupted delivery movement to said conveyor element, carriage means for guiding the delivery flight of said conveyor element intermediate the end portions of said delivery flight, mechanism for moving said carriage means between vertically spaced limits wherein the container engaging top surface of said delivery flight is disposed above and below the plane of said platform respectively at the upper and lower limits of movement of said platform, said mechanism including a cam element and a cooperating cam follower element, one of said last-mentioned elements being power driven, the other thereof being operatively connected to said carriage means, said cam element having relatively low and relatively high surface portions engaged by said follower element to move the carriage to its upper and lower limits of movement respectively, said cam element further defining an intermediate dwell surface portion engaged by said follower element during movement thereof from said high cam surface portion to said low cam surface portion, whereby a container on said delivery flight is lowered rapidly and gently to a position wherein said container is partially supported by the scale platform and thereafter lowered

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into weighing position fully supported by said platform, a gate element movable relative to said conveyor element toward and away from the path of travel of a container on said conveyor element to stop movement of said container during movement of said conveyor and to release the container for common movement with said conveyor, and means for moving said gate element in a direction to release a container held thereby responsive to operation of said carriage means moving mechanism to raise said carriage means.

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