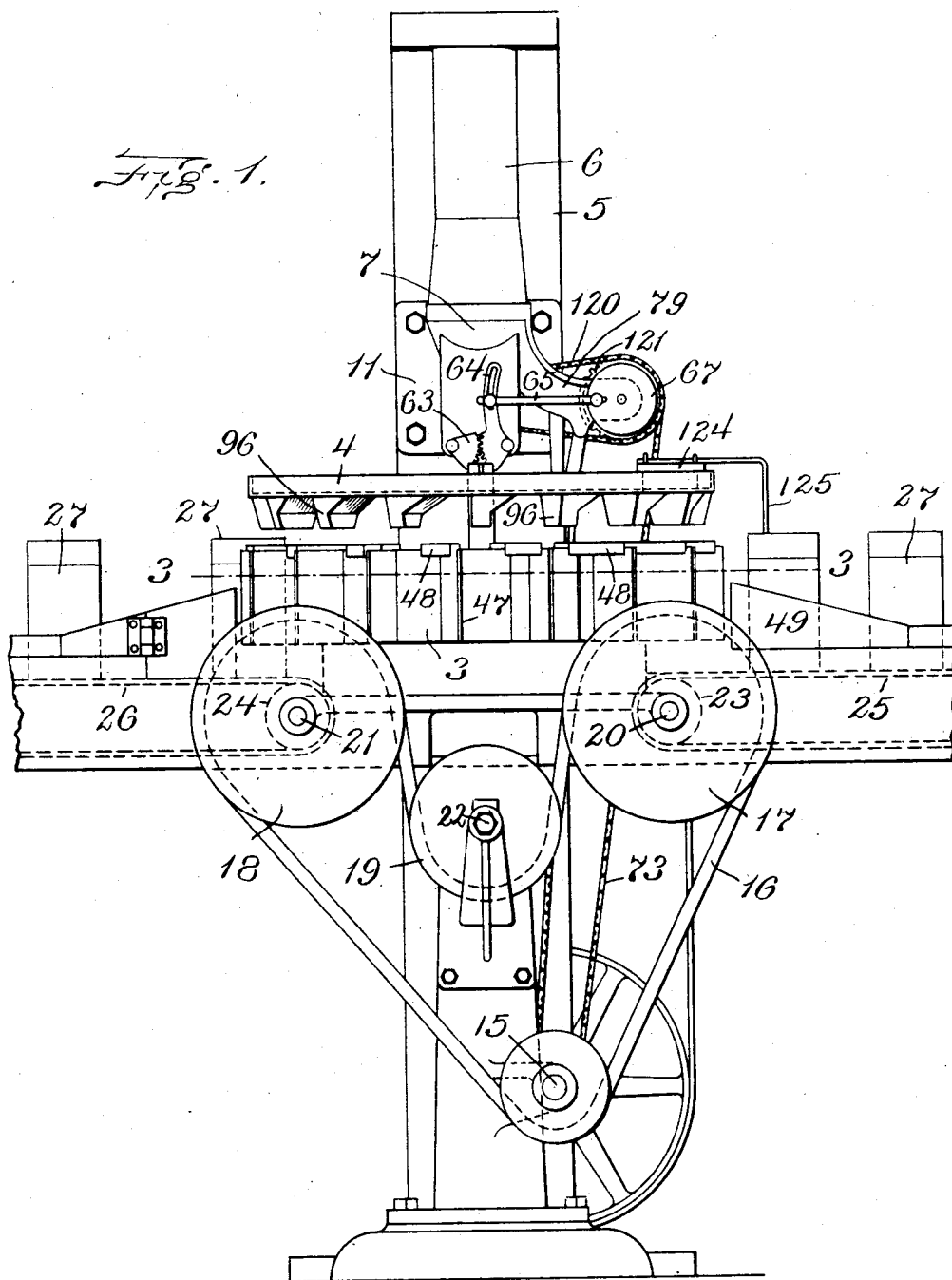


No. 870,895.

PATENTED NOV. 12, 1907.

A. L. F. MITCHELL.
BOX FILLING MACHINE.
APPLICATION FILED MAR. 12, 1906.

7 SHEETS—SHEET 1.



Witnesses:
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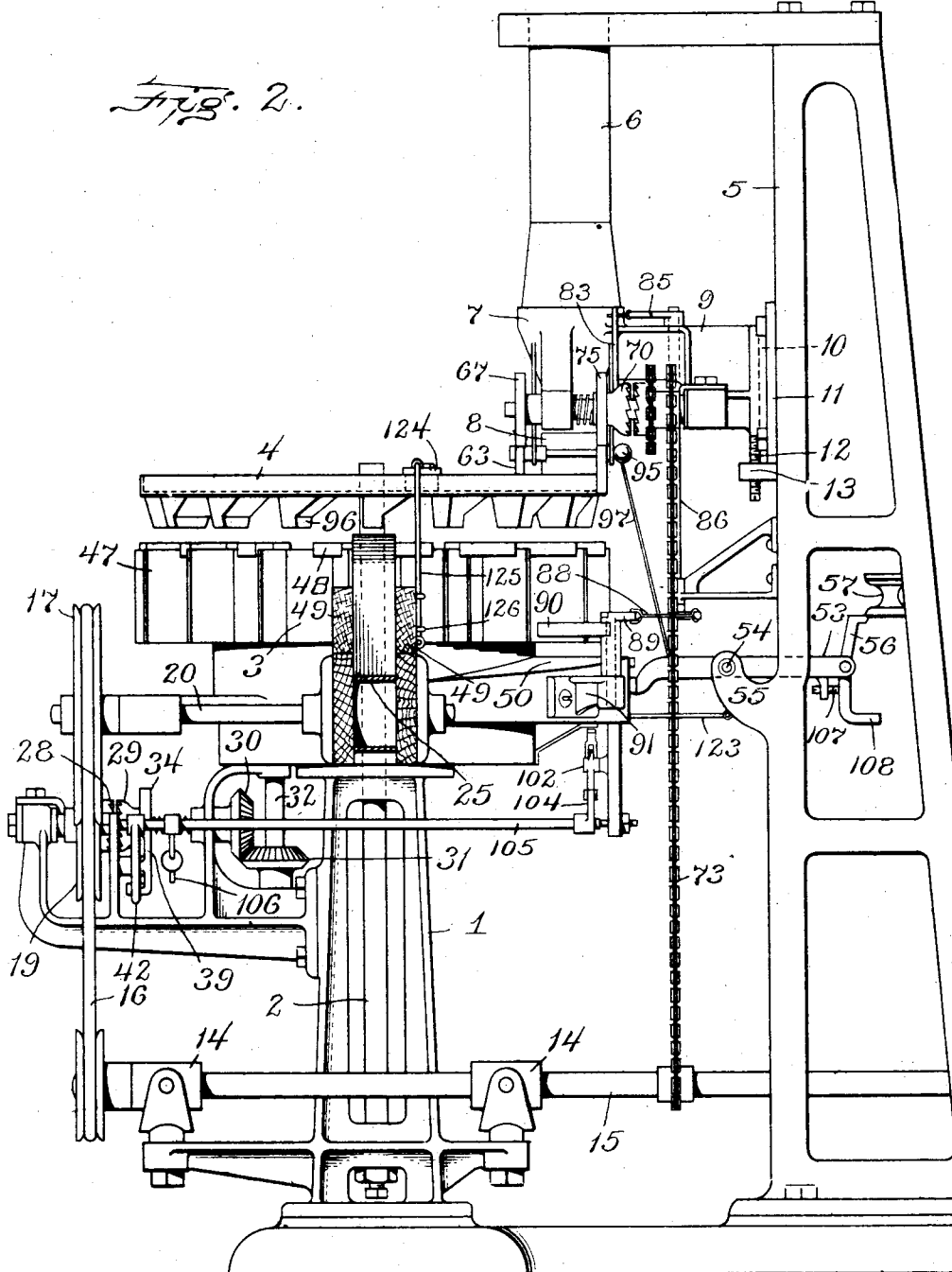
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7 SHEETS—SHEET 2.



Witnesses:
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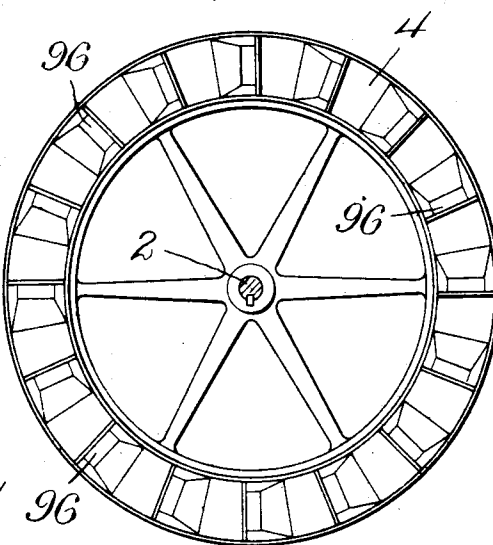
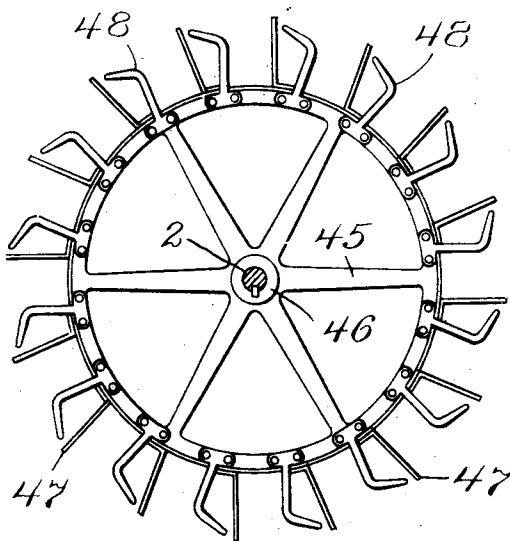
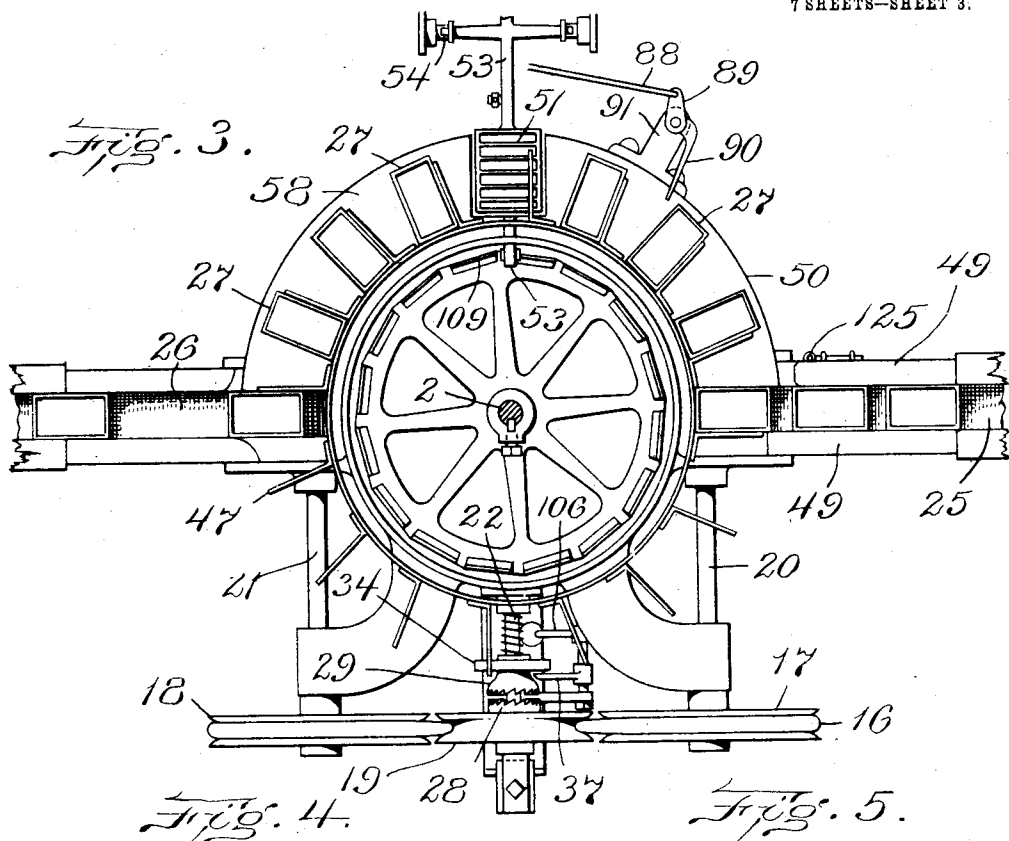
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APPLICATION FILED MAR. 12, 1908.

7 SHEETS—SHEET 3.



Witnesses:
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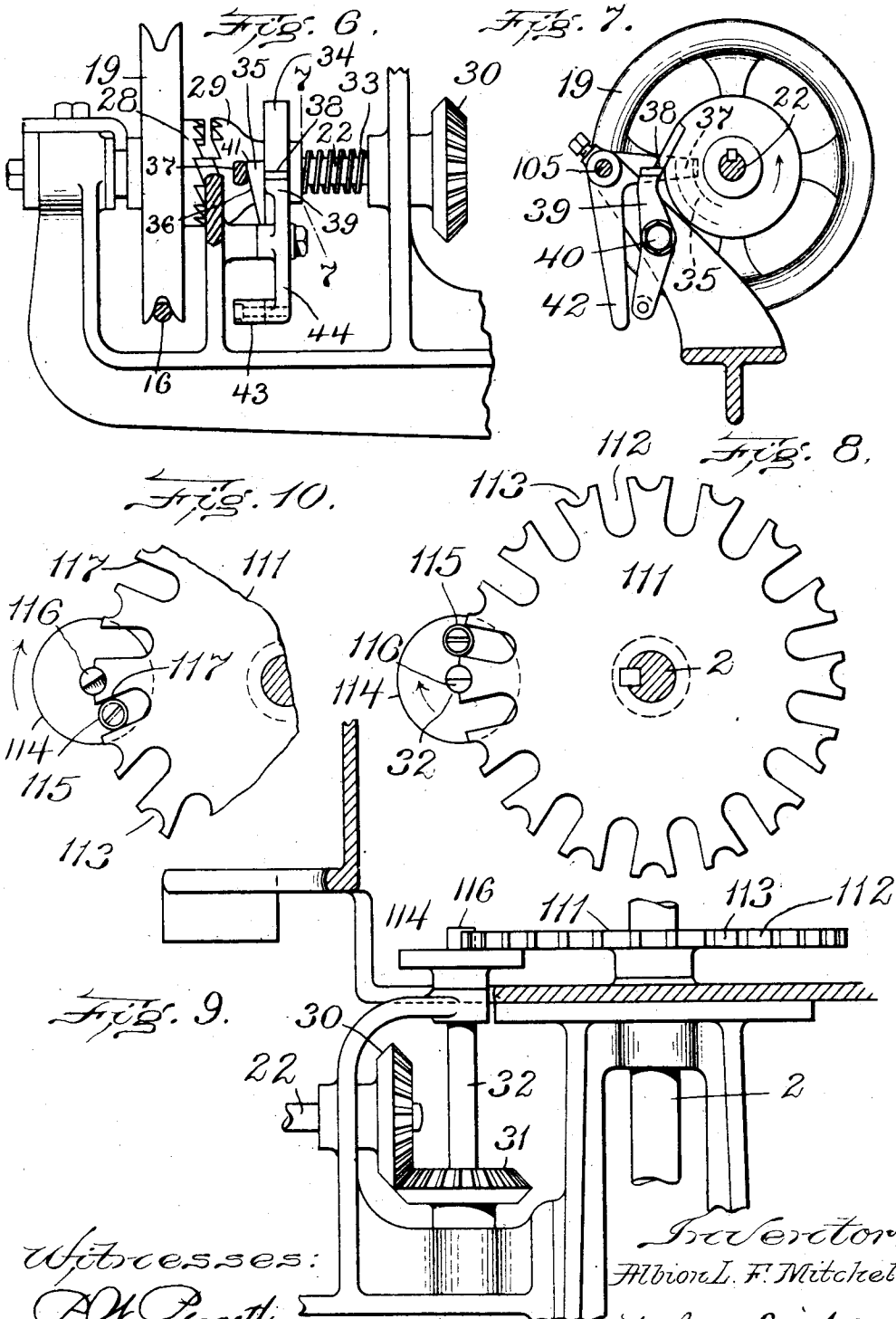
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BOX FILLING MACHINE.
APPLICATION FILED MAR. 12, 1906.

7 SHEETS—SHEET 4.



Witnesses:
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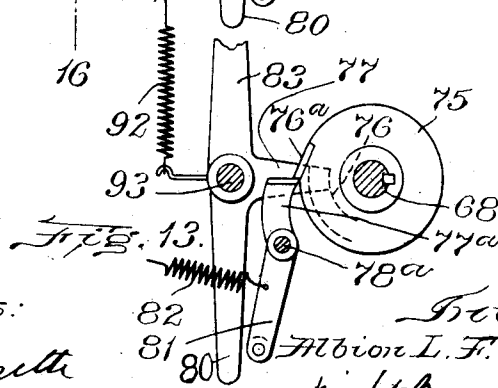
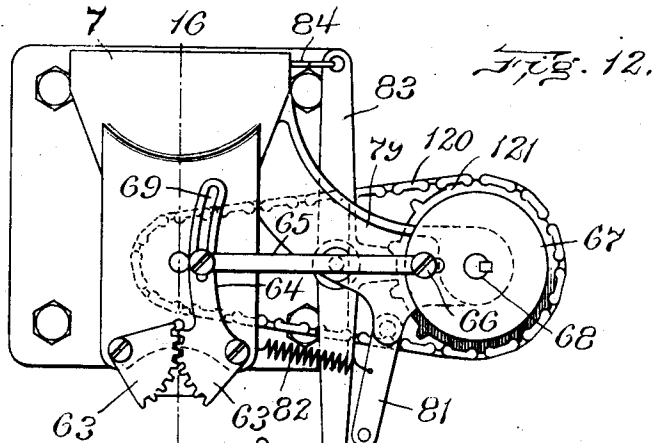
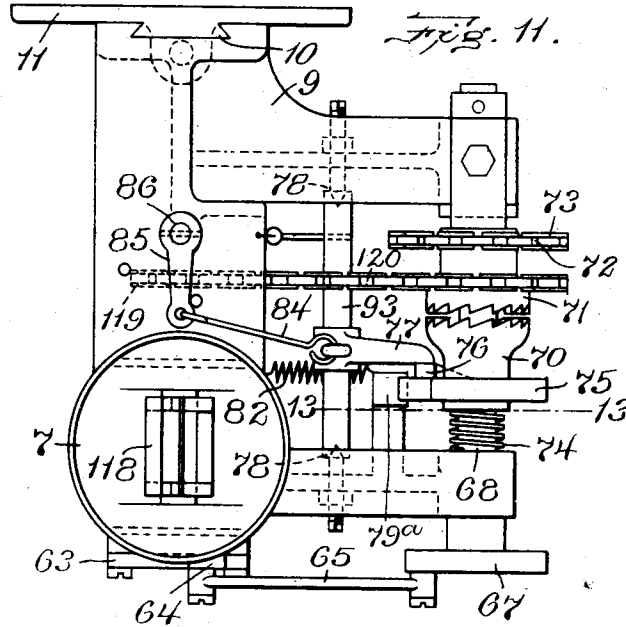
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No. 870,895.

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BOX FILLING MACHINE.
APPLICATION FILED MAR. 12, 1906.

7 SHEETS—SHEET 5.



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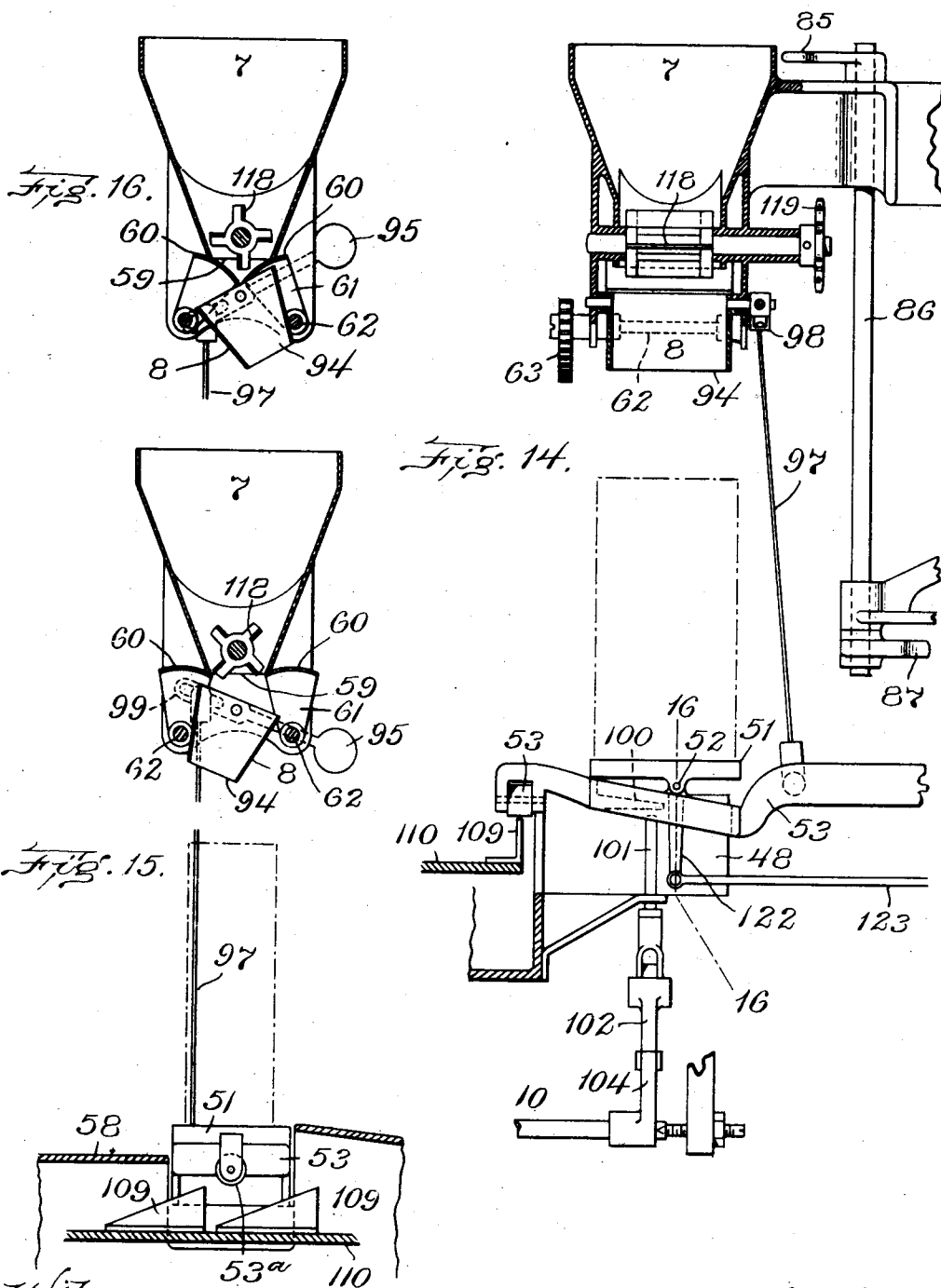
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No. 870,895.

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APPLICATION FILED MAR. 12, 1906.

7 SHEETS—SHEET 6.



Witnesses:
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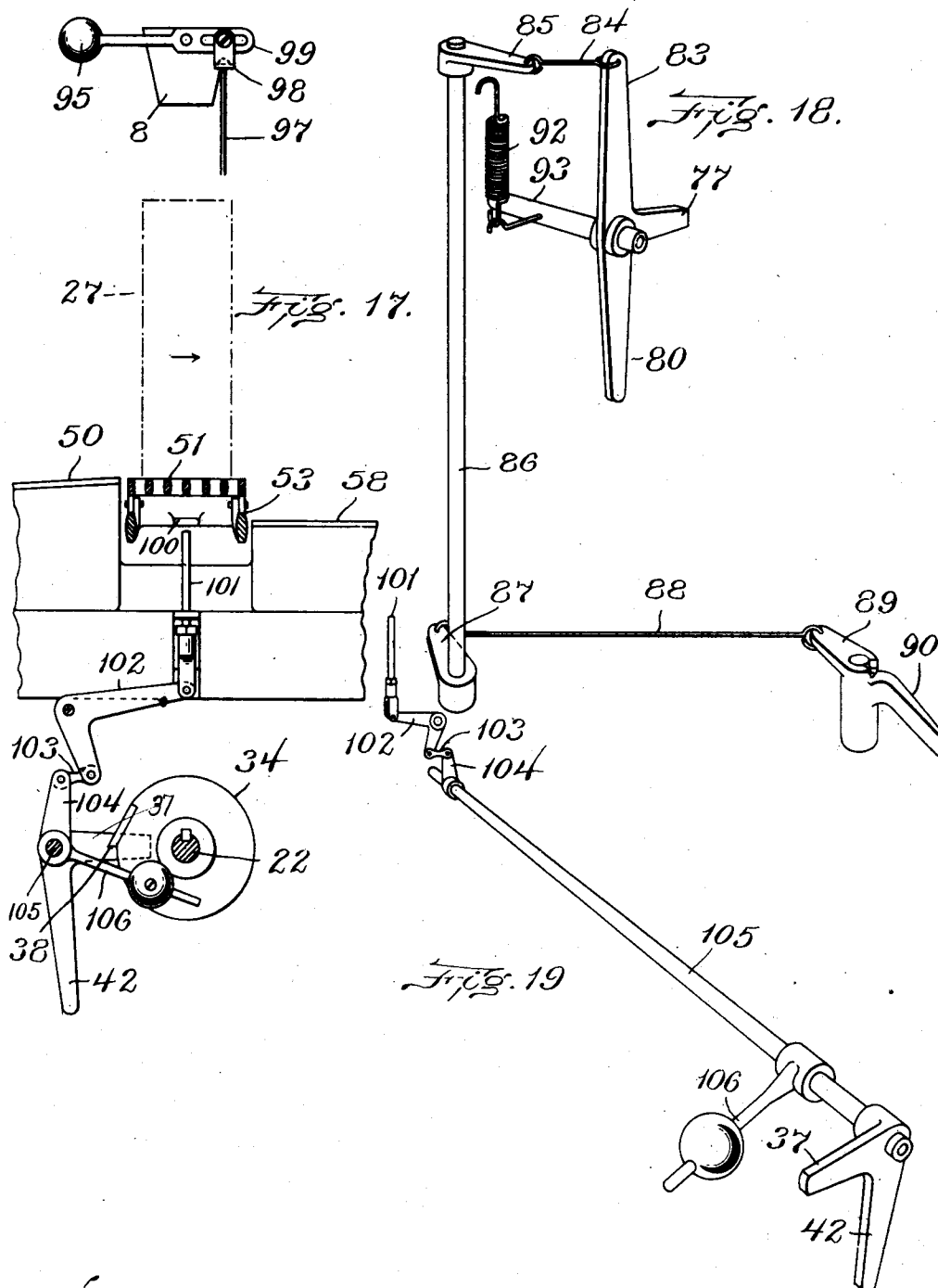
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PATENTED NOV. 12, 1907.

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APPLICATION FILED MAR. 12, 1906.

7 SHEETS—SHEET 7.



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UNITED STATES PATENT OFFICE.

ALBION L. F. MITCHELL, OF HYDE PARK, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO CHARLES W. AIKEN, OF HACKENSACK, NEW JERSEY.

BOX-FILLING MACHINE.

No. 870,895.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed March 12, 1906. Serial No. 305,721.

To all whom it may concern:

Be it known that I, ALBION L. F. MITCHELL, of Hyde Park, in the county of Norfolk and State of Massachusetts, have invented certain new and useful

5 Improvements in Box-Filling Machines, of which the following is a specification.

This invention relates to machines for automatically filling boxes or cartons which are closed at one end and open at the other.

10 It has for its object to provide a machine adapted to automatically advance an empty box to filling position, arrest the box while being filled, and cause it to be again advanced out of filling position, by mechanism actuated by its weight when filled.

15 Further objects are to provide a means for supplying material to the boxes, adapted to furnish a constant supply of varying amount, the amount being automatically governed by the boxes; to cause the weight of a filled box to deflect therefrom the issuing
20 material when the charge in the box has reached a predetermined amount; and to provide a weighing mechanism which will first weigh the material in the box, holding the latter stationary, and then when the weight has reached the required amount, allow the
25 latter to shut off the supply of material and remove the box.

A machine embodying elements by which the above objects are attained is illustrated in the accompanying drawings, forming a part of this specification, in
30 which,—

Figure 1 represents a front elevation of the machine. Fig. 2 represents a side elevation thereof, as seen from the right of Fig. 1. Fig. 3 represents a plan view, the supplying means and upper, or finger-carrying, ring being omitted. Fig. 4 represents a detail plan view of the box-carrier. Fig. 5 represents a similar view of a shield or spout-carrier having guideways adapted to lead material into the several boxes engaged with the carrier. Figs. 6 and 7 represent two
40 elevations of clutch mechanism for driving the carrier. Figs. 8 and 9 represent a detail plan and elevation of the gear for rotating the box-carrier step-by-step. Fig. 10 represents a view similar to Fig. 8, of a slightly different form of gearing. Figs. 11 and 12 represent a
45 plan and a front elevation of the supplying means and mechanism for governing the amount of material supplied thereby. Fig. 13 represents a detail of the mechanism which governs the clutch of the supply governor. Figs. 14 and 15 represent sectional elevations on planes at right angles to each other, of the
50 supplying means and the connections adapted to be operated by a box for deflecting the supply. Fig. 16 represents a section of the supplying means similar to Fig. 14, but showing the gate and deflecting spout

thereof in a different position. Fig. 17 represents in
55 elevation, the connections operated by a filled box, for starting the carrier. Figs. 18 and 19 represent perspective views respectively, of the connections for connecting the supply governor clutch and the carrier-driving clutch.

60 The same reference characters indicate the same parts in all the figures.

Referring to the drawings, 1 represents a standard or column which supports in bearings a vertical shaft 2 carrying on its upper end the box-carrier 3 and shield
65 or chute-carrier 4.

5 represents a second column which supports a chute 6 for supplying material, which discharges into a chamber 7, and the latter having an outlet above a tube or spout 8, the parts 6 7 and 8 together constituting a supply conduit for the material, which opens
70 above and adjacent the shield or guard member 4. The conduit parts 7 and 8 are supported by an arm 9 which is held on and projects from a vertical guideway 10 on a plate 11 secured to the standard 5. The
75 arm is movable vertically on the guideway and is supported by a screw 12 in a lug 13 of the plate 11. By adjusting the screw, the discharge outlet of the member 8 may be moved as near or as far from the shield 4 as desired.

80 Rotating in bearings 14 supported by the base of column 1 is a main drive shaft 15 from which a belt 16 extends over pulleys 17 18 19 on shafts 20 21 22, respectively. The shafts 20 and 21 carry respectively pulleys or rolls 23 and 24 over which pass flexible
85 endless conveyers 25 26, of which the former is adapted to carry boxes or cartons 27 to be fed into engagement with the carrier 3, while the other conveyer is in position to receive cartons or boxes which have been filled, and to remove them from the carrier.

90 The pulley 19 is loose upon shaft 22 and carries a clutch member 28 with which there coöperates a complementary clutch member 29 splined to shaft 22 and movable longitudinally thereof toward and from the first clutch member so as to be connected with or dis-
95 connected from the same. When the clutch members are disconnected, the pulley rotates idly, but when they are in engagement, shaft 22 is rotated and thereby a bevel gear 30 affixed to the shaft also turns and rotates an intermeshing gear 31 on shaft 32, from which
100 a step-by-step movement is communicated to the carrier 3 by means to be described. It is sufficient for the present to understand that while shaft 22 makes one complete revolution, the carrier is rotated a distance equal to that between successive boxes engaged
105 with it, so that at each step a fresh empty box is received from the conveyer 25, a loaded box is transferred to conveyer 26, an unfilled box is moved into position

adjacent the supplying means to receive material therefrom, and a filled box is removed from such position.

Between the endwise movable clutch member 29 and a fixed abutment is a spring 33, the normal tendency of which is to hold the clutch members in engagement. The movable clutch member, however, carries a disk 34 on the side of which is a cam projection 35 having an inclined face 36. An abutment 37 normally lies in the path of rotation of the cam surface 36 so that it is engaged by the latter at the end of each revolution of the clutch and shaft, and the cam surface being offset in a direction parallel with the axis, it causes the follower clutch member to be shifted out of engagement with the driver. When complete disengagement of the clutch has been effected, a shoulder 38 on the periphery of disk 34 comes into contact with a stop dog 39 pivoted on a stud 40 and arrests further movement of shaft 22. The cam projection terminates in an abrupt shoulder 41 whereby when the abutment 37 is moved past the end of said projection, the latter is released and the clutch 29 is free to be moved by spring 33 into connection with the other clutch member. At the same time that the abutment is moved an arm 42 connected thereto comes into contact with a roll 43 on an arm 44 of the dog 39 and moves the latter out of engagement with shoulder 38 so that the shaft 22 is free to begin another rotation.

In the preferred embodiment of the invention, the carrier 3 is preferably a rotary one and consists of an annular head connected by arms 45 with a hub 46 keyed to shaft 2. From the periphery of the carrier extend blades 47 which are adapted to bear against the rear side of a box delivered by the conveyer 25 and push it forward. Also projecting from the upper part of the carrier are fingers 48, each one of which is adapted to cooperate with a blade 47 in positioning a box, extending along the opposite side of the box from that engaged by the blade. The spaces between the blades 47 and fingers 48 are approximately radial, or perpendicular to the periphery of the carrier, and preferably somewhat greater than the thickness of the boxes, so that the latter will not be compressed and gripped between the fingers and blades.

The driving roll 23 of conveyer 25 is nearly vertically below the periphery of the carrier 3, and the conveyer travels radially of the carrier. Thereby boxes are advanced between guides 49 into the spaces between plates 47 and 48. When the carrier is stationary, it is held so that one of such spaces is always in line with the guideway. When the carrier is started a box is engaged by one of the blades 47 and transferred from the conveyer to an inclined platform 50 which rises gradually from its beginning near the conveyer to its end adjacent a weighing table or support 51. This table 51 is pivoted at 52 to an arm 53 which is in turn pivoted at 54 to brackets 55 on the column 5. The rear end of the arm or lever 53 carries a pivoted projection 56 upon which rests a weighted member 57 which may be any suitable weight, such as a scale beam upon which an adjustable weight may be mounted. This weighted member holds the forward end of lever 53 and the table 51 in an elevated position at substantially the height of the upper end of table 51. When a charge of sufficient weight to overcome the

weight of the member 57 has been delivered to the box, the latter lowers the table 51 to about the level of a curved platform 58 which extends around the carrier from the weighing table to the conveyer 26.

Material is delivered from the chamber 7 through the outlet 59 of the latter, which is closed to a more or less complete extent by a gate consisting of plates 60 which are mounted upon arms 61 connected to rock-shafts 62 so as to swing about the axes of these shafts. Outside of the chamber the shafts have fixed to them intermeshing gear segments 63, so that when one is moved, the other turns simultaneously in the opposite direction. The movement is such as to cause the gate members to advance toward and away from each other across the outlet of the supply chamber. These members are operated through an arm 64 extending from one of the gear segments, by a connecting rod 65, one end of which is connected to a crank-pin 66 on a disk 67 keyed to a shaft 68, while its other end is adjustably fixed in a slot 69 of the arm 64. Shaft 68 is rotated by means of a clutch member 70 splined thereto, which is adapted to be connected with a driving clutch member 71 which is connected to a sprocket wheel 72 driven by a chain 73 from another sprocket on the main drive shaft 15. The endwise movable clutch member is adapted to be held in engagement with the other member by a spring 74 and carries a disk 75 having a cam projection 76 cooperating with an abutment 77 mounted to turn about bearings 78. The disk 75 also has on its periphery a locking shoulder 76^a cooperating with an arresting dog 77^a pivoted to a stud 78^a on the bracket 79 which supports one end of shaft 68. Connected to the abutment 77 is an arm 80 adjacent an arm 81 of dog 77^a, said arm 81 being acted on by a spring 82 which tends to hold the dog in engagement with the periphery of disk 75. The construction and operation of the parts just described are substantially the same as of the clutch members 28 and 29, and the separating and stopping means therefor previously described.

At each rotation of the shaft 68, the gate members 60 are oscillated, being moved apart and then toward each other, being stopped in the last position by the shoulder 76^a coming into contact with dog 77^a after the clutch is uncoupled by means of the cam projection 76 engaging abutment 77. In this position the pitman 65, crank-pin 66 and shaft 68 are all in line. Preferably the gate members 60 are so arranged that when closest together they do not quite close the outlet of chamber 7, so that a small stream of material may always flow therefrom. The amount by which the gate is opened may be varied by the adjustment between pitman 65 and arm 64, consisting of the slot 69, which preferably is curved on the arc of a circle about pin 66 when the latter is in the position shown in Fig. 12.

In order to cause the clutch members to be connected and the gate operated to enlarge and then diminish the outlet of chamber 7, I provide an arm 83 connected to the abutment 77 and also connected by a link 84 with an arm 85 on a vertical rock-shaft 86, the lower end of which has a second arm 87 connected by a link 88 with an arm 89 having a trigger extension 90. The trigger extension is supported on a bracket 91 and extends into the path of movement of the boxes, being preferably so located that it is engaged by one of the boxes before the preceding box has been moved onto the weighing table.

During the time in which one of the moving boxes is in engagement with the trigger, the latter is turned, causing the vertical rock-shaft 86 also to be turned and to swing the arm 83 about its pivot in a direction to raise the abutment 77 above the abrupt shoulder on the end of cam 76, and simultaneously through arm 80 to release dog 77^a from contact with the locking shoulder 76^a. Thereby the movable clutch member 70 is released and enabled to engage the driving clutch 71 so that the supply outlet gate may be opened to its fullest extent and then partially closed, after which the clutch is uncoupled and the driven parts brought to rest. A spring 92 is connected with the spindle 93 of abutment 77 and restores it to normal position after trigger 90 has been released by the box.

As previously stated, beneath the outlet of the chamber 7 is a spout 8 which is pivoted so that its lower or outlet end 94 may be deflected. Connected to this spout 8 is a weight 95 held off at one side in such a way as to cause the spout normally to occupy the position shown in Fig. 15. When in this position it causes material delivered from the conduit to fall through one of the chutes 96 of the shield 4 into the box 27 which is upon the weighing support 51. When the box has received its allotted charge, it depresses the support and weighing arm 53, and thereby draws down a link 97 pivoted thereto and having a lost-motion connection at 98 with a slotted arm 99 connected to the chute 8. Downward movement of the link causes the outlet 94 of spout 85 to be deflected so that it is no longer over the chute 96 which leads into the box on the weighing support. Instead it is so placed as to deliver the material which still continues to issue upon the shield 4, and into the adjacent chute 96, through which it runs into the box immediately following that on the weighing support. Material deposited upon the upper side of the shield between the chutes 96 is brushed therefrom as the shield rotates, by a brush 124 held in contact with the upper side of the shield by a rod 125 attached by fastenings 126 to one of the guide members 49.

As soon as the weight of a loaded box lowers support 51, a projection 100 on the latter strikes a rod 101 and depresses the latter, which is guided so as to be movable endwise. It is connected to a bell-crank lever 102 of which one arm is connected through a link 103 with an arm 104 on a rock-shaft 105 to which is rigidly connected the abutment 37 and arm 42 before described. The depression of rod 101 rotates the rock-shaft in such a direction as to elevate the abutment 37 and move it past the end of cam 35, at the same time disengaging dog 39 from shoulder 38, allowing the clutch members 28 and 29 to be coupled and the carrier moved a further step. A weighted arm 106 fixed to rock-shaft 105 normally depresses abutment 37 so that it will be in engagement with cam 36 when shoulder 38 is engaged by dog 39.

The weighted member 57 which balances the box being filled and supports it until a certain charge has been delivered thereto, rests upon the projection 56 over a very limited area near the end of the latter. Thereby a small amount of movement of lever 53 disengages the same from the member 57. By means of a set-screw 107 bearing against a downward extension 108 of finger 56, the extent of the bearing area may be varied and consequently the sensitiveness of the ap-

paratus made greater or less. As soon as the lever 53 is free of the weighted member 57, the whole weight of support 51 and the charge in the box is released and becomes operative to shift the spout 8 and operate the clutch controllers 37 39, and thus the machine may be controlled by the weight of a very small charge of material, a result which is entirely novel. The weight necessary for operating the mechanism may be given to the table 51 and arm 53, which may be counterbalanced by added weight on the member 57, but as soon as the excess of the latter, which may be extremely slight, is over balanced by the charge in the box, the lever 53 is released. In order to raise the forward end of this lever and the weighing platform to their normal height, I provide cams 109 carried by a head 110 fixed to the shaft 2 and movable simultaneously with the box carrier. One of these cams is arranged adjacent each of the box-receiving spaces so as to become operative as soon as a loaded box is removed from the weighing table, to raise the table and release the same while an unfilled box is being advanced thereto. This positive actuation of the weighing table is necessary as there is no constantly-acting means to counter-balance the same when the box is removed.

The amount of widest opening of the conduit 7, and the time thereof, are adjusted so that nearly the whole charge is delivered rapidly to the box, but the opening is reduced to its minimum before the box is quite loaded. Thereafter a small quantity continues to be delivered until the required weight is reached, whereupon the weighing platform is immediately depressed and the spout 8 deflected by the means before described. The material is kept in a finely-divided condition by a stirrer 118 in the mouth 59 of chamber 71, constantly rotated by a sprocket wheel 119 over which a chain 120 passes, which chain is engaged by a sprocket wheel 121 fixed to the hub of the constantly-rotating clutch member 71. The stirrer is immediately above the opening between the gate members 60 and prevents any lumps of material lodging and stopping up said opening. It will be seen from the foregoing that the material in the box is automatically weighed and itself causes stopping of the supply and starting of the carrier, and that the weight of the charge causes the machine to be operated again. In this machine, necessity for separate weighing mechanism is avoided, since the same devices determine the amount of each charge in such a way that all the charges are exactly uniform by weight, and permit the same to cause operation of the motive mechanism.

The weighing table has a single pivotal connection at 52 with the supporting arm 53 and is retained upright in a horizontal position by means of a depending arm 122 to which is connected a link 123 that is also pivoted to the standard 2 and extends beside and approximately parallel with arm 53. Thereby the arm 122 is always kept vertical, and it is impossible for the supporting surface of table 51 to occupy any other than a substantially horizontal position. By reason of the single connection, the weight of a box is applied to the arm 53 at the same distance from the fulcrum thereof, regardless of the position the box may occupy on the table 51. Therefore it is not necessary to take care to locate the box in any particular position upon said table.

The carrier is rotated step-by-step by a novel mechanism illustrated in Figs. 8, 9 and 10. Upon the shaft 2 to which the carrier is connected, is keyed a disk 111 having slots 112 extending inward from its periphery, intermediate which are notches 113. The shaft 32 to which bevel gear 31 is attached has its axis preferably in line with the circumference of the disk 11, and carries a disk or plate 114 on which is mounted a pin 115 separated from shaft 32 by the distance between a slot 112 and adjacent notch 113. The upper end of shaft 32 is partially cut away, leaving a projection 116 of an extent substantially equal to half the cross-sectional area of the shaft. The cut-away portion extends to the lower side of disk 111 so that when it is adjacent the same, the disk is free to rotate, but when the projection 116 is turned into one of the notches, the disk is locked. Pin 115 is located on the same side of shaft 32 as the cut-away portion of the latter, and as the shaft is rotated in the direction of the arrow shown in Fig. 8, pin 115 is moved first into one of the slots 112, causing the disk to turn and is then moved out of the slot and back to where it can enter a subsequent slot. When the stud is crossing the line of centers of shafts 2 and 32, the cut-away portion of the latter is adjacent the disk so that the projecting portions of the disk may pass by it, and the part 116 does not enter a notch until the stud is about to leave one of the slots. By this construction the disk and carrier are held locked at all times so as to be incapable of movement except that given by the stud, and an absolutely certain and invariable amount of movement is given at each actuation.

In Fig. 8, the slots 112 are shown as radial, but in Fig. 10, which is the preferred construction, they are inclined somewhat rearwardly with respect to the path of movement of the disk and the radii. The rear side and corner 117 of each slot thus acts as a cam surface against which stud 115 bears when leaving the slot and causes a slight backward movement of the disk. This occurs after a box has been deposited on the weighing table and causes the blade 47 which previously was in engagement with the box to be freed therefrom so that it will interpose no frictional resistance to the free downward movement thereof under the influence of the weight of the charge.

The drawings illustrate the machine in a condition of rest with all of the parts disconnected and a number of boxes engaged with the several propelling blades 47 of the carrier, there being no box, however, on the weighing platform. In order to start the machine, the weighing platform may either be depressed by hand or the lever arm 42 manually operated to connect the driving clutch members 28 29. The carrier is then actuated and the box at the right of the weighing platform as seen in Fig. 3, is deposited on said platform, the second box meanwhile tripping the latch 90 and causing the axially movable clutch member 70 to be released from the holding dog 77. Thereupon the spring 74 causes the gate driving clutch to be opened. Meanwhile, however, the cam 35 has engaged the stop 41 and disconnected the carrier-driving clutch so that the carrier has come to rest with the box squarely on the weighing platform, it having been stopped in the correct position by the stop shoulders 38 and 39. The clutch member 71 drives shaft 68 through one complete revolution, opening the gates 60 and again nearly closing them so

that only a thin stream issues from the chute. This clutch is automatically disconnected then by cam 76 and dog 77, and the material continues to run out through the narrow space between the stationary gates until the charge in the box is sufficiently heavy to depress the weighing platform. A slight depression of the latter is enough to free the end of finger 56 from the scale-beam 57, and thereafter the platform drops suddenly, sharply deflecting the chute 94 and cutting off the supply of material flowing to the box on the platform. The quick dropping of the platform prevents more than a very slight amount of material to flow into the box after a sufficient weight to depress the platform has been received. In falling, the platform 51 strikes the pin 101 and rotates rock-shaft 105 so as to free the cam 35 of the abutment 37 and also the shoulder 38 of the latch 39, whereupon the clutch is connected and the carrier set in motion again. This motion of the carrier removes the filled box from the scale platform to the runway 58, and transfers another unfilled box to the platform, one of the cams 109 acting in the meantime to elevate the platform and engage the trigger 56 with the scale beam 57. It will be observed that the cams 109 are positive means which swiftly raise the platform during the limited time in which one box is moving from and the other moving upon the platform. Further movements are simply repetitions of those just described.

I claim:—

1. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, means adapted to be rendered operative by a box engaged with the carrier for causing material to be fed into another box, and means operated by such other box when filled for deflecting therefrom the material being fed. 95
2. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, and means adapted to be rendered operative wholly by a single box engaged with the carrier for causing material to be fed into a preceding box. 100
3. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, means adapted to be rendered operative by a box engaged with the carrier for causing material to be fed into a preceding box, and means operated by a filled box for deflecting to a following one the material being fed. 105
4. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, a supply conduit, means for opening and partially closing the outlet to said conduit, and connections adapted to be actuated by a single one of the boxes for setting said means in operation while another box is coming into position to receive the material discharged from said conduit. 110
5. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, a supply conduit, means for opening and partially closing the outlet to said conduit, connections adapted to be actuated by one of the boxes for setting said means in operation while another box is coming into position to receive the material discharged from said conduit, and a deflector operated by a filled box for directing into the succeeding box the material being discharged. 115
6. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, a supply conduit, intermittent mechanism, automatically rendered inoperative after each cycle, for opening and partially closing the outlet of said conduit, leaving the outlet partly open at all times for the constant escape of the contents of the conduit, and means 120

adapted to be actuated by a box engaged with the carrier for setting said mechanism in operation.

7. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, a supply conduit, means for increasing and diminishing the quantity supplied by said conduit while permitting a continuous supply, driving mechanism for said means including automatically-disconnectible clutch members, and means adapted for operation by a box engaged with the carrier for causing connection of the clutch members.

8. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, a conduit for supplying charges of material to the boxes, a gate for the conduit outlet, an actuator for the gate constructed to open the same and reduce the opening to its minimum in one cycle, driving means for said actuator including disconnectible clutch members, one of which is continuously movable, said clutch members being automatically separated at the end of each cycle of the gate-actuator, and means operated by the boxes for causing connection of the clutch members.

9. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, a conduit for supplying charges of material to the boxes, a gate for the conduit outlet, a crank connected to the gate for opening the same and reducing the opening thereof to its minimum in one revolution, a rotary driver for the crank including disconnectible clutch members one of which is continuously driven, said members being automatically uncoupled at each revolution of the gate-actuating crank, and devices operated by the boxes for causing connection of the clutch members.

10. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, means for supplying charges of material to the boxes, driving means for the carrier automatically rendered inoperative for moving the boxes one at a time into juxtaposition with said supplying means, connections operated by one unfilled box for causing discharge of material into another unfilled box from the supplying means, and connections operated by the latter box when filled for causing the carrier to be connected with said driving means and thereby moved.

11. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, means for supplying charges of material to the boxes, driving means for the carrier automatically rendered inoperative for moving the boxes one at a time into juxtaposition with said supplying means, connections operated by an unfilled box for causing discharge of material from the supplying means, and connections operated by a filled box for causing the carrier to be connected with said driving means and thereby moved, and for deflecting from said box the material issuing from said supplying means.

12. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, means for supplying charges of material to the boxes, driving means for the carrier automatically rendered inoperative for moving the boxes one at a time into juxtaposition with said supplying means, connections operated by an unfilled box for causing discharge of material from the supplying means, and connections operated by a filled box for causing the carrier to be connected with said driving means and thereby moved, and for deflecting to the following unfilled box the material issuing from said supplying means.

13. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, means for supplying charges of material to the boxes, a driver, separable connections between the driver and carrier for moving the latter step-by-step, and automatically rendered inoperative upon each movement of the carrier bringing an unfilled box into juxtaposition with the supplying means, means governing the rate of discharge of material from the supplying means, an actuator adapted for operation by one unfilled box to

put said discharge-governing means in operation to increase and then diminish, without wholly stopping, the supply of material, and connections operated by another box when filled for connecting the driver with the carrier to advance the latter.

14. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, means for supplying charges of material to the boxes, a driver, separable connections between the driver and carrier for moving the latter step-by-step, and automatically rendered inoperative upon each movement of the carrier bringing an unfilled box into juxtaposition with the supplying means, means governing the rate of discharge of material from the supplying means, an actuator adapted for operation by an unfilled box to put said discharge-governing means in operation to increase and then diminish the supply of material, connections operated by a filled box for connecting the driver with the carrier to advance the latter, and other connections simultaneously operable by the filled box for deflecting from the opening thereof the flowing material.

15. A box-filling machine comprising a carrier having box-engaging means adapted to impart a progressive movement to a plurality of boxes, means for supplying charges of material to the boxes, a driver, connections including a separable clutch between the driver and carrier for advancing the latter and moving the boxes successively up to said supplying means, automatic means for disconnecting the clutch as each box is so moved, discharge-governing means for said supplying means, an actuator for said discharge-governing means, a separable clutch adapted to connect said actuator with the driver for operation thereby, the said actuator being constructed to increase and then diminish the discharge and finally disconnect its clutch at each operation, instrumentalities operated by an unfilled box to cause connection of the latter clutch, and instrumentalities operated by a filled box for causing connection of the carrier-operating clutch.

16. In a box-filling machine, the combination of a box carrier, a driving shaft, a supply conduit, mechanism for advancing the carrier, a gate for the discharge outlet of said conduit, an actuator for operating said gate to vary the area of the conduit outlet, clutches between the driving shaft and the carrier mechanism and gate actuator respectively, each automatically disconnectible upon operation of the carrier and gate-actuator, and independent means operated by an unfilled and a filled box respectively, for causing connection of the respective clutches.

17. A box-filling machine comprising a supply conduit, a carrier having box-engaging means, actuating means for advancing the carrier intermittently to bring the boxes successively adjacent said conduit to receive material discharged therefrom, mechanism for enlarging and diminishing the discharge opening of the conduit including driving and driven clutch members, means movable with the driven clutch member for disconnecting the same from the other member after each actuation of said mechanism, and means operated by a box for causing connection of the clutch members.

18. A box-filling machine comprising a supply conduit, a carrier having box-engaging means, actuating means for advancing the carrier intermittently to bring the boxes successively adjacent said conduit to receive material discharged therefrom, mechanism for enlarging and diminishing the discharge opening of the conduit including driving and driven clutch members, a cam movable with the driven clutch member, an abutment in the path of said cam engaged thereby after each actuation of said mechanism to separate the clutch members, and connections operated by a box for disengaging the cam and abutment.

19. A box-filling machine comprising a supply conduit, a carrier having box-engaging means, actuating means for advancing the carrier intermittently to bring the boxes successively adjacent said conduit to receive material discharged therefrom, mechanism for enlarging and diminishing the discharge opening of the conduit including driving and driven clutch members, a cam movable with the driven clutch member, an abutment in the path of said cam engaged thereby after each actuation of said mechanism to

separate the clutch members, and a trigger located for engagement by a box moved by the carrier and connected with the abutment for disengaging the same from the cam.

20. A box-filling machine comprising a supply conduit, a carrier having box-engaging means, actuating means for advancing the carrier intermittently to bring the boxes successively adjacent said conduit to receive material discharged therefrom, mechanism for enlarging and diminishing the discharge opening of the conduit including driving and driven clutch members, a cam and a locking projection movable with the driven clutch member, abutments in the path of said cam and locking projection respectively, adapted to be engaged thereby after each actuation of said mechanism to separate the clutch members, and devices arranged for actuation by a box engaged with the carrier and connected to disengage said abutments from the cam and locking projection.

21. A box-filling machine comprising a supply conduit, a carrier having box-engaging means, actuating means for advancing the carrier intermittently to bring the boxes successively adjacent said conduit to receive material discharged therefrom, mechanism for enlarging and diminishing the discharge opening of the conduit including driving and driven clutch members, a cam and a locking shoulder movable with the driven clutch member, an abutment in the path of the cam for engagement thereby to separate the clutch members, a stop in the path of said locking shoulder for engagement thereby after separation of the clutch members, means tending to connect said members, and connections adapted for actuation by a box to disengage said abutment and stop and permit connection of the clutch.

22. A box-filling machine comprising a supply conduit, a carrier having box-engaging means, actuating means for advancing the carrier intermittently to bring the boxes successively adjacent said conduit to receive material discharged therefrom, mechanism for enlarging and diminishing the discharge opening of the conduit including driving and driven clutch members, a cam and a locking shoulder movable with the driven clutch member, an abutment in the path of the cam for engagement thereby to separate the clutch members, a stop in the path of said locking shoulder for engagement thereby after separation of the clutch members, a trigger mounted for actuation by a box and connected to disengage said abutment from the cam, and an arm moved thereby to separate the stop from the locking shoulder, whereby the clutch members may be connected and the said mechanism set in operation.

23. In combination with supplying means arranged to deliver charges of material into boxes and a box carrier adapted to engage and advance a series of boxes successively thereto, a conduit or spout intermediate the supplying means and a box receiving material therefrom, a weighing platform on which each box is supported while receiving material, and connections between said platform and spout for shifting the latter when a box is filled to deflect the material into a succeeding box, whereby the latter receives a preliminary charge before reaching the weighing platform.

24. In combination with supplying means arranged to deliver charges of material into boxes and a box carrier adapted to engage and advance boxes successively thereto, a conduit intermediate the supplying means and a box receiving material therefrom, connections operated by the box when sufficiently filled for shifting said conduit to deflect the issuing material from the filled box into a following unfilled box, whereby the latter is partially charged before reaching the weighing platform, and means tending to restore said conduit to normal position.

25. In a box-filling machine, a carrier adapted to engage and advance boxes, a support on which the boxes are successively moved and yieldingly held so as to be depressed by a loaded box, and positive means movable simultaneously with the carrier for raising said support after removal therefrom of a box and before a succeeding box is placed thereon.

26. In a box-filling machine, a carrier adapted to engage and advance boxes, a support on which the boxes are successively moved and yieldingly held so as to be depressed by a loaded box, and a cam movable with the carrier for

positively and rapidly elevating the support upon removal therefrom of a box.

27. In a box-filling machine, a carrier having a plurality of engaging means adapted to engage and advance boxes, a support on which the boxes are successively moved and yieldingly held so as to be depressed by a loaded box, and a plurality of cams arranged adjacent the respective box-engaging means for positively and quickly elevating the support as each box is removed therefrom.

28. In a box-filling machine, means for supplying charges of material to boxes, a carrier for advancing boxes thereto and stopping, weighing means supporting the box and charge of material therein constructed and arranged to weigh the same, and connections directly engaged with and actuated by said weighing means, when a predetermined weight of charge is delivered to the box, to cut off the supply of material and cause the carrier to be started.

29. In a box-filling machine, a support adapted to hold boxes while being loaded, a lever carrying the support, weighted means engaging the lever to hold the support elevated and disconnectible therefrom by the weight of a loaded box, and provisions for adjusting the extent of said bearing whereby the sensitiveness of the apparatus may be varied.

30. In a box-filling machine, a support adapted to hold boxes while being loaded, a lever carrying the support, an extension on an arm of the lever, and weighted means bearing on a limited portion of said extension, the latter being movable under the influence of a loaded box for disengagement from said weighing means, and a stop on the lever for said extension adjustable to vary the amount of movement necessary to effect such disengagement.

31. The combination of a box-carrier, supplying means including a shiftable spout, driving mechanism for moving the carrier intermittently to bring a succession of boxes to receive material delivered from the spout, a weighted beam located to support boxes when receiving material and arranged to be depressed by the weight of a loaded box, and a link connected with the beam and spout for shifting the latter to deflect material when the beam is depressed.

32. The combination of a box-carrier, supplying means including a shiftable spout, driving mechanism for moving the carrier intermittently to bring a succession of boxes to receive material delivered from the spout, a weighted beam located to support boxes when receiving material and arranged to be depressed by the weight of a loaded box, a link connected with the beam and spout for shifting the latter to deflect material when the beam is depressed, and mechanism actuated by depression of the beam for setting the carrier in motion to replace a loaded by an unloaded box.

33. In a machine of the character described, a supply conduit, a gate for governing the discharge outlet thereof comprising cooperating members pivotally mounted below the outlet to swing toward and from each other, gearing connecting them to move together, and means for moving said members, constructed to leave always an opening between them.

34. In a machine of the character described, a supply conduit, a gate for governing the discharge outlet thereof comprising cooperating members pivotally mounted to swing toward and from each other, intermeshing segment gears connected to said members, one of them having a slot curved on an arc of which the radius is equal to the length of the pitman, and a crank and pitman adjustably connected with one of said gears in said slot for actuating them.

35. In a box-filling machine, a carrier, means for supplying material, mechanism for moving the carrier intermittently to bring boxes successively into receiving position adjacent said supplying means and stopping, weighing means comprising a support for the boxes beneath the supplying means, weight-controlled to hold the support and box elevated until the weight of material in the box reaches a predetermined amount, and connections adapted to be engaged and operated directly and positively by the support when depressed for causing the carrier to be set in motion.

36. In a box-filling machine, a carrier, a supply con-

duit, means including a clutch for driving the carrier intermittently to bring boxes successively into receiving position adjacent said conduit, provisions for automatically disconnecting said clutch after each advance of the carrier, a yielding weighing support for the boxes while in receiving position, and means operated directly by depression of said support for displacing into inoperative position said clutch-disconnecting provisions.

37. In a box-filling machine, a carrier, a supply conduit, means including clutch members for driving the carrier intermittently to bring boxes successively into receiving position adjacent said conduit, a spring tending to retain the clutch members connected, means movable into and out of position to be engaged by a cam portion of one of the members to overcome said spring and separate the clutch members after each actuation of the carrier, a yieldable weighing support for the boxes while in receiving position, and connections operated by depression of said support for removing said clutch-disconnecting means and permitting the spring to connect the clutch.

38. In a box-filling machine, a carrier, means for supplying material, mechanism for moving the carrier intermittently to bring boxes successively into receiving position adjacent said supplying means and stopping, weighing means comprising a support for the boxes beneath the supplying means, weight-controlled to hold the support and box elevated until the weight of material in the box reaches a predetermined amount, an endwise-movable rod beneath said support adapted to be engaged and moved by the latter when depressed by the weight of a loaded box, and connections between said rod and the carrier-driving mechanism for setting the latter in operation upon movement of the rod.

39. In a machine of the character described, a head or carrier having a plurality of box-engaging portions, means for supplying charges of material to boxes, a shield above the carrier having a guiding funnel or chute over each of the box-engaging portions, and a brush cooperating with the shield to remove therefrom material deposited thereon.

40. In a machine of the character described, a head or carrier having a plurality of box-engaging portions, means for supplying charges of material to boxes, a shield above the carrier having a guiding funnel or chute over each of the box-engaging portions, the carrier and shield being movable to advance chutes and boxes successively to the supplying means, and a stationary brush engaging the shield to brush off material deposited thereon between the chutes.

41. In a machine of the character described, in combination with the filling mechanism and a box-supporting platform, a movable carrier having outwardly-extending blades or plates secured thereto and adapted to engage boxes brought to the platform in proximity to the carrier and push them forward.

42. In a machine of the character described, in combination with the filling mechanism and a box-supporting

platform, a movable carrier having outwardly-extending blades or plates secured thereto and adapted to engage boxes brought to the platform in proximity to the carrier and push them forward, and fingers projecting from the carrier each adapted to extend on the opposite side of a box from a blade and to embrace the box.

43. In a machine of the character described, in combination with the filling mechanism and a box-supporting platform, a movable carrier, plates extending out from the periphery of the carrier and being of substantially the same height, and fingers extending from the upper part of the carrier, each parallel with one of the plates.

44. In a machine of the character described, means for supplying material, weighing means, a carrier for advancing boxes to said weighing means in position to receive material from said supplying means, and driving means for advancing the carrier and box, constructed with provisions for backing off the carrier sufficiently to free the box after the box has been brought to the weighing means.

45. In a machine of the character described, means for supplying material, weighing means, a carrier for advancing boxes to said weighing means in position to receive material from said supplying means, and driving means for the carrier constructed to advance the box and then retract the carrier sufficiently to free the box, comprising a revoluble stud and a follower connected to the carrier and having slots inclined to the path of movement thereof.

46. In a machine of the character described, means for supplying material, weighing means, a carrier for advancing boxes to said weighing means in position to receive material from said supplying means, and driving means for the carrier constructed to advance the box and then retract the carrier sufficiently to free the box, comprising a revoluble stud and a follower connected to the carrier and having slots inclined inwardly and rearwardly from the periphery thereof, into which the stud is adapted to enter.

47. In a machine of the character described, means for supplying material, weighing means, a rotary carrier for advancing boxes to said weighing means in position to receive material from said supplying means, and driving means for the carrier constructed to advance the box and then retract the carrier sufficiently to free the box, comprising a revoluble stud and a disk connected to the carrier and having slots inclined with respect to its radii and direction of motion, into which the stud is adapted to enter.

In testimony whereof I have affixed my signature, in presence of two witnesses.

ALBION L. F. MITCHELL.

Witnesses:

A. C. RATIGAN,
C. F. BROWN.