No. 860,877. PATENTED JULY 23, 1907.

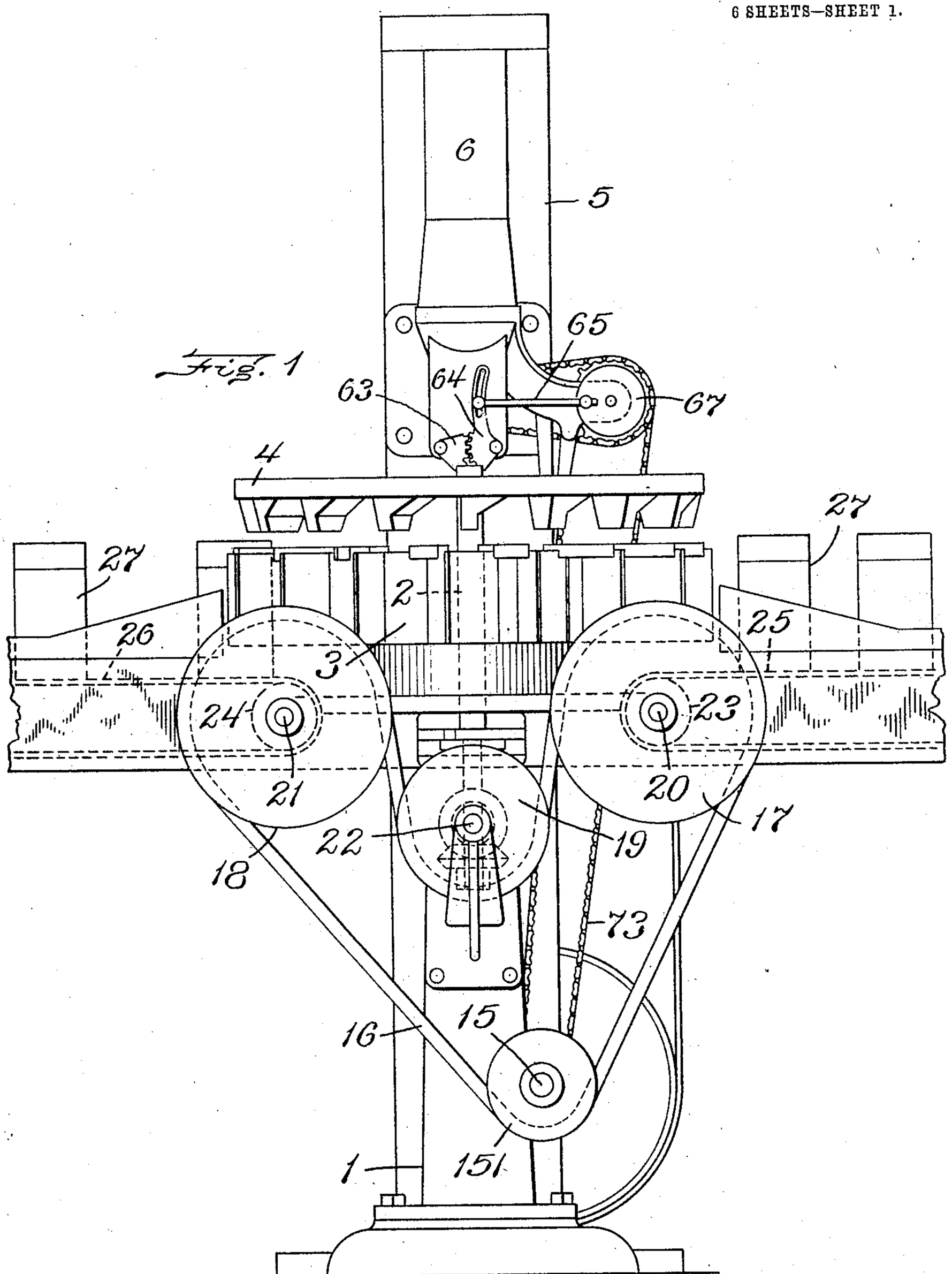
A. L. F. MITCHELL.

BOX FILLING MACHINE.

APPLICATION FILED AUG. 30, 1906.

6 SHEETS—SHEET 1.

Fig. 1



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6 SHEETS—SHEET 2.

Fig. 9

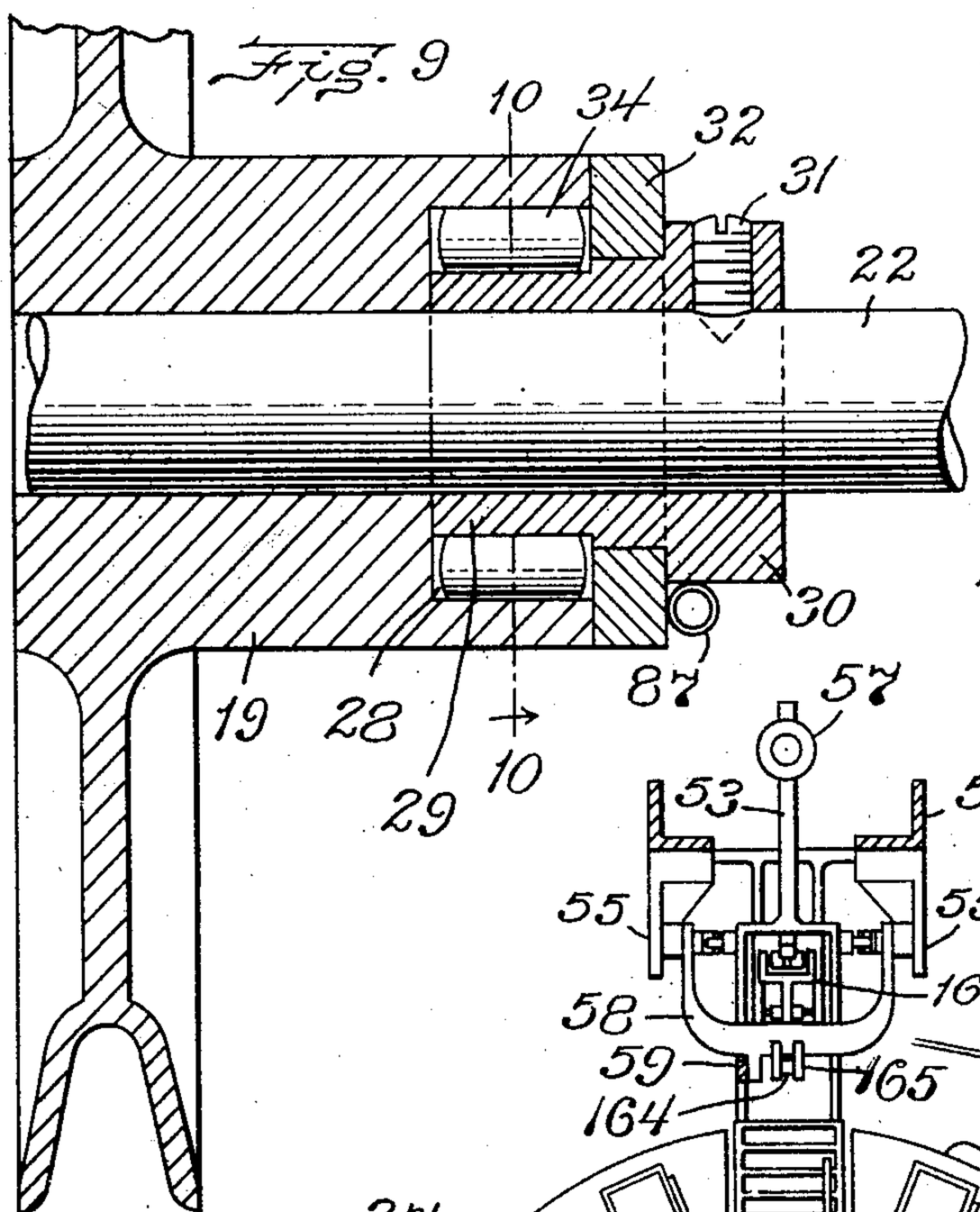
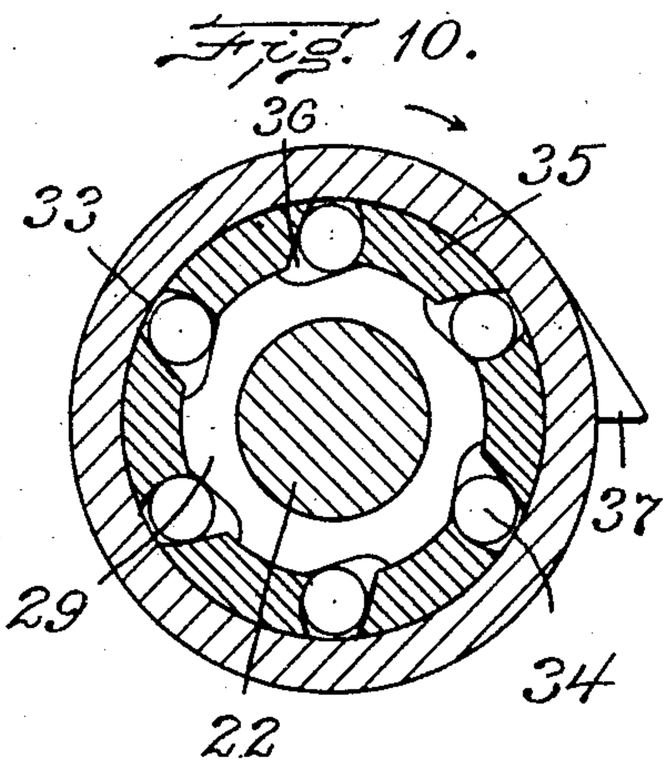


Fig. 10.



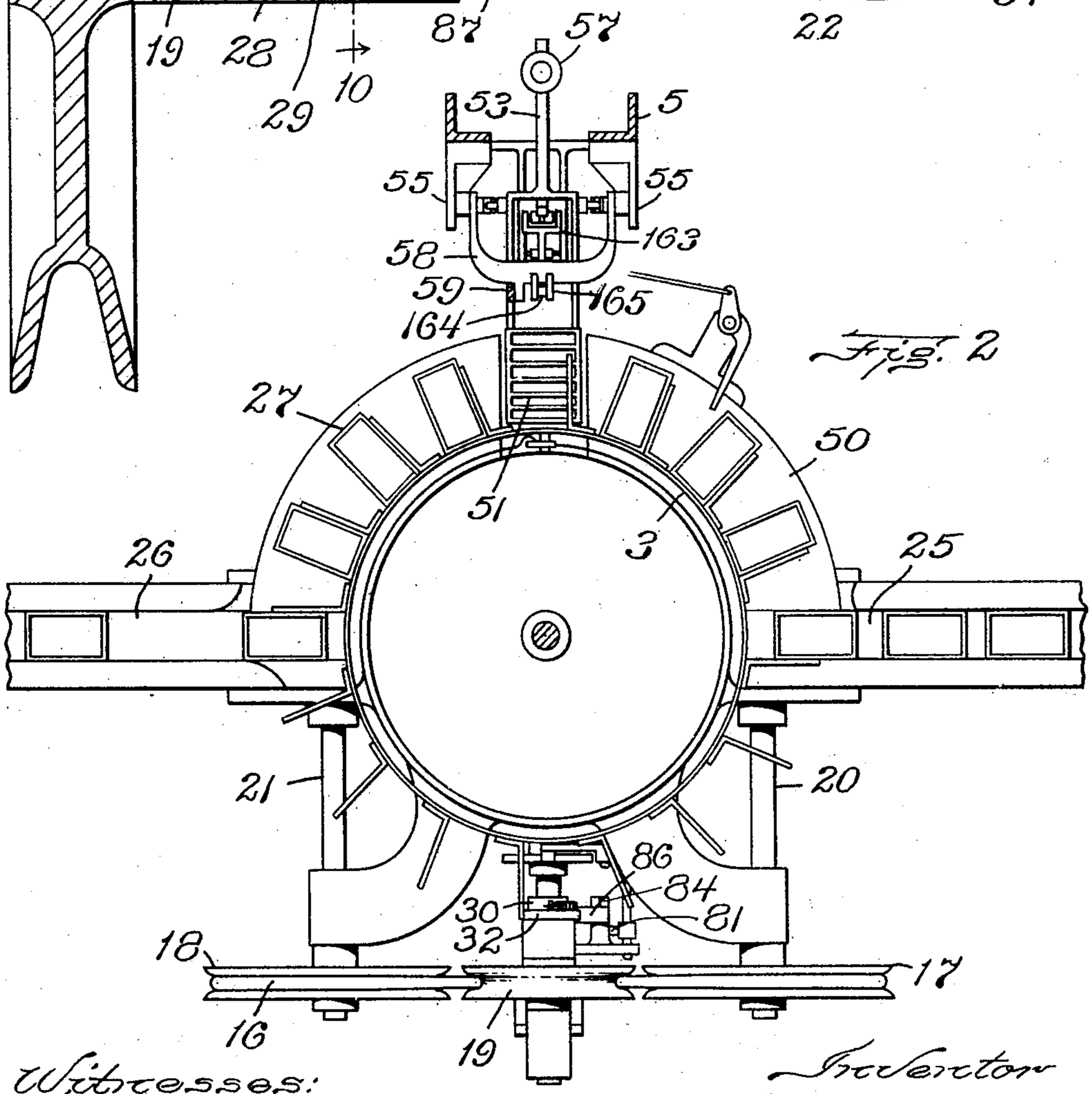


Fig. 2

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6 SHEETS—SHEET 3.

Fig. 3

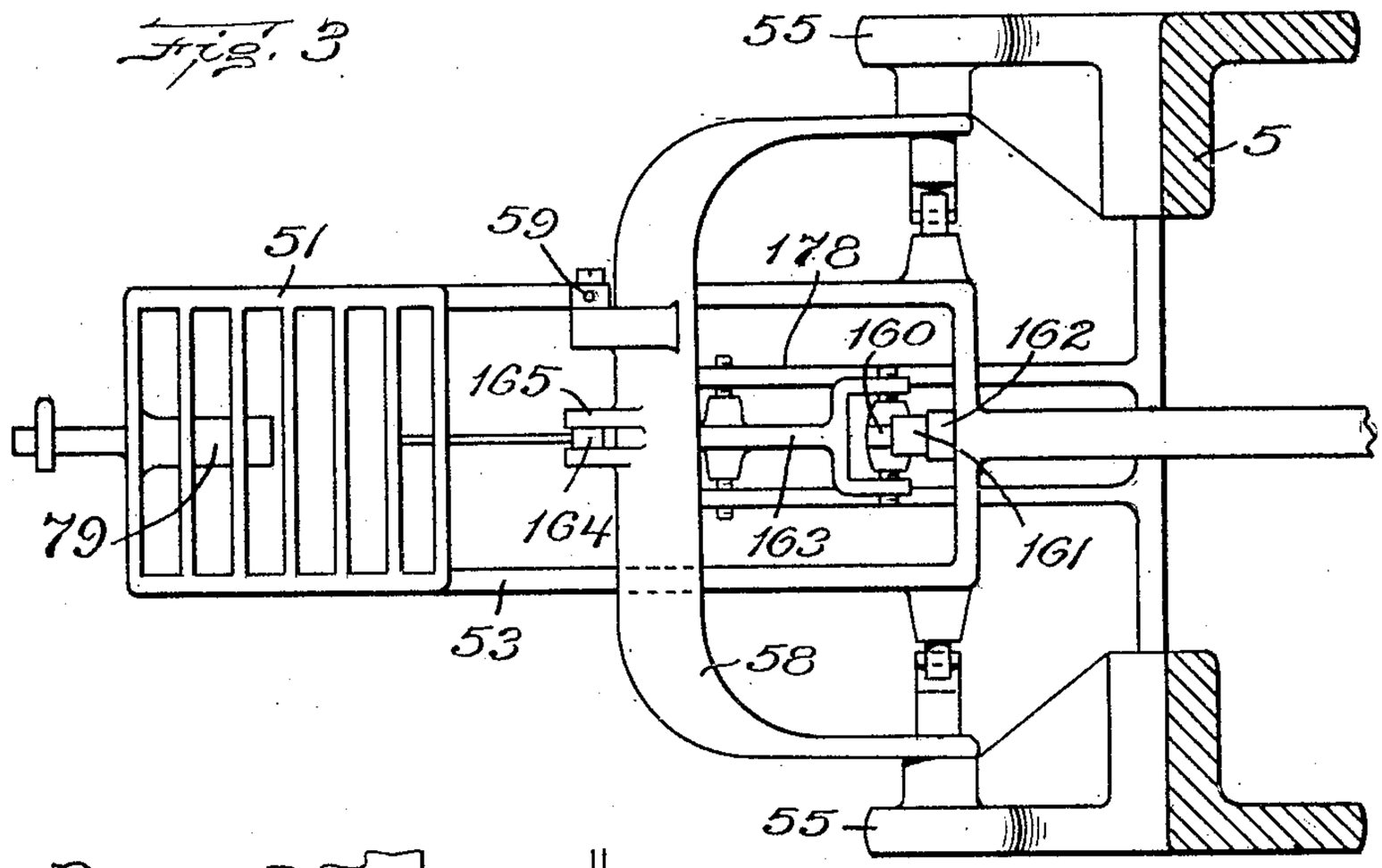
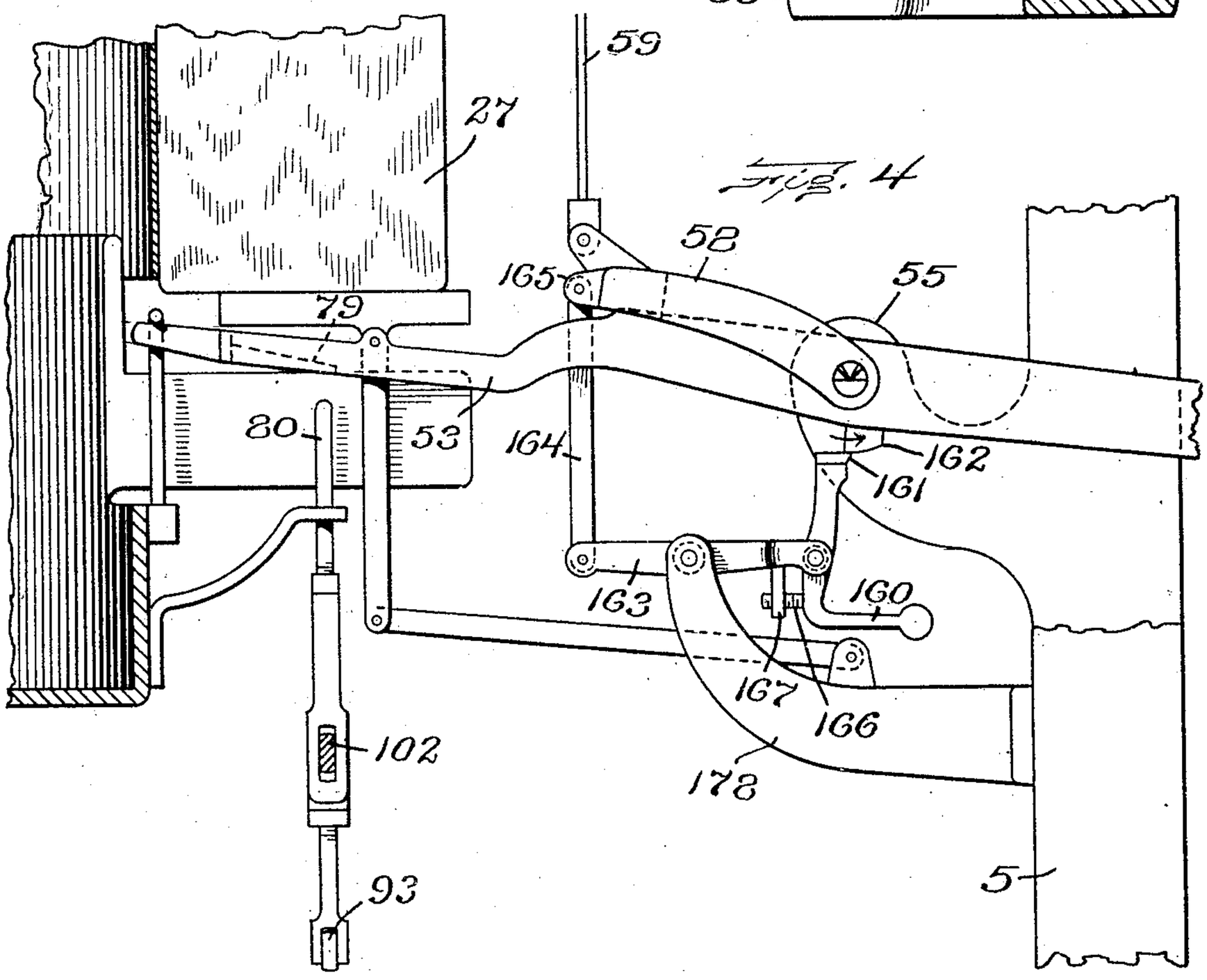


Fig. 4



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6 SHEETS—SHEET 4.

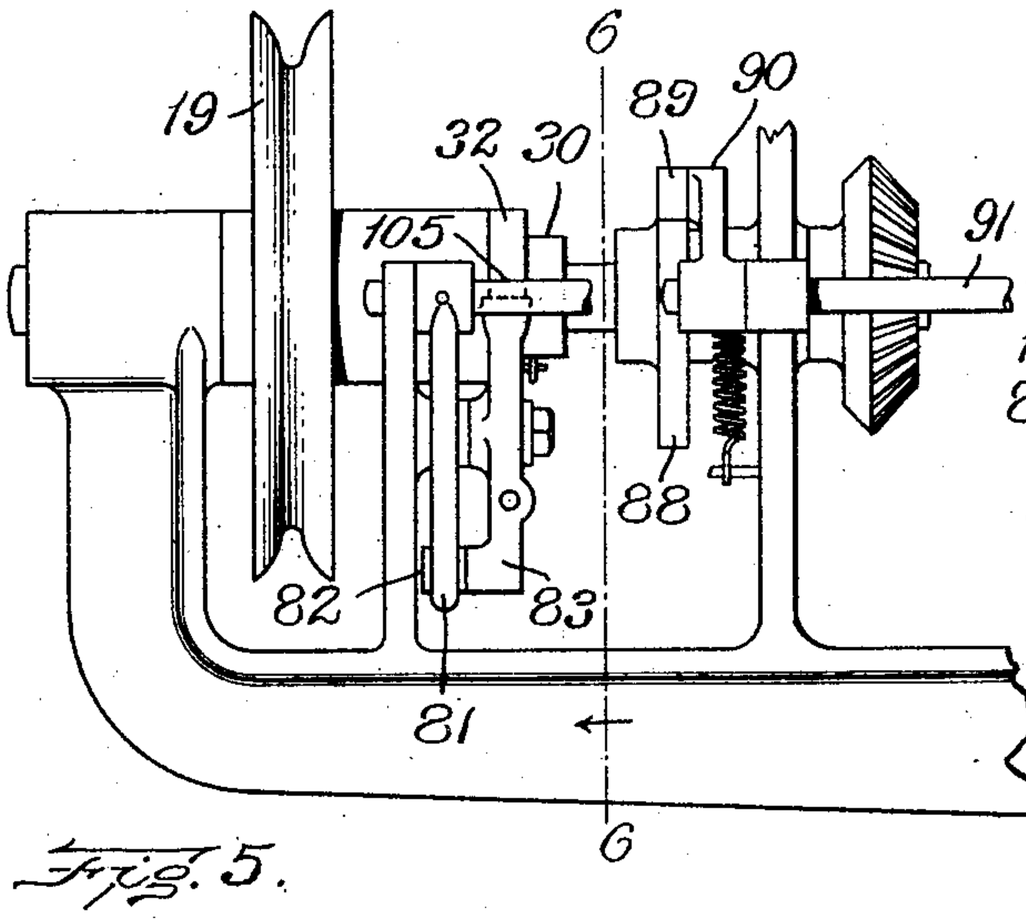

Fig. 5.

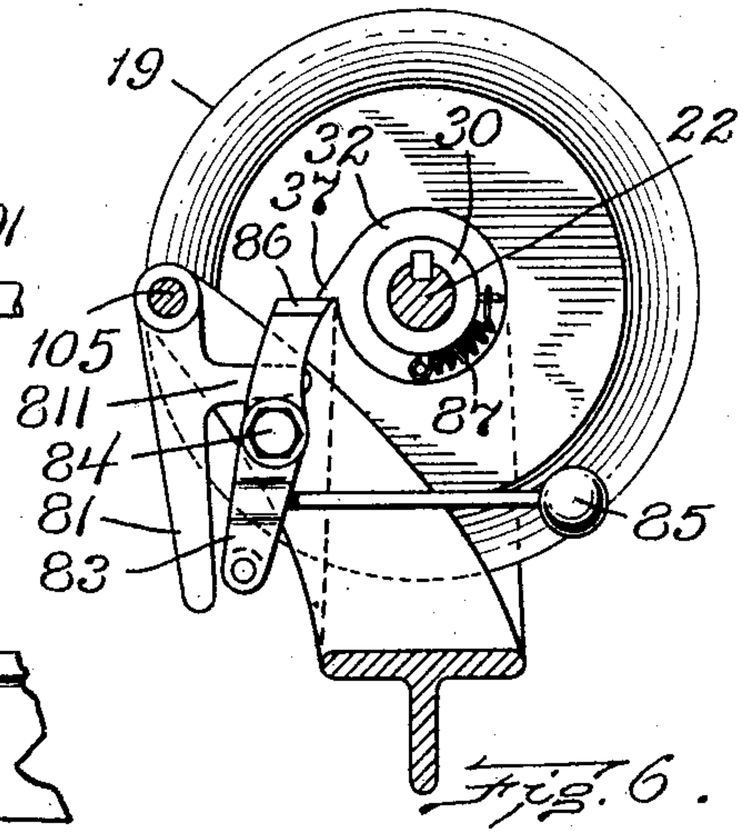

Fig. 6.

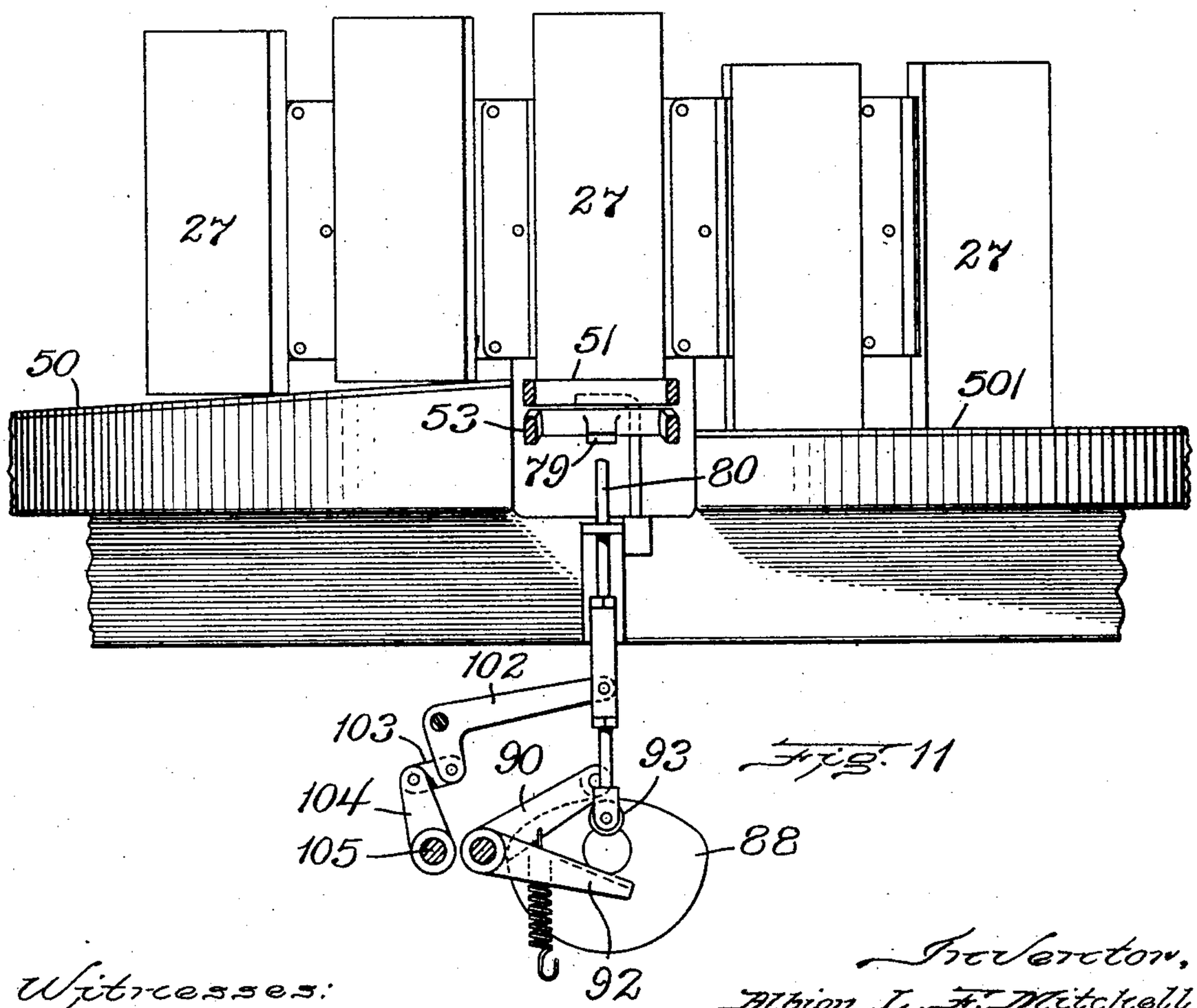

Fig. 11

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6 SHEETS—SHEET 5.

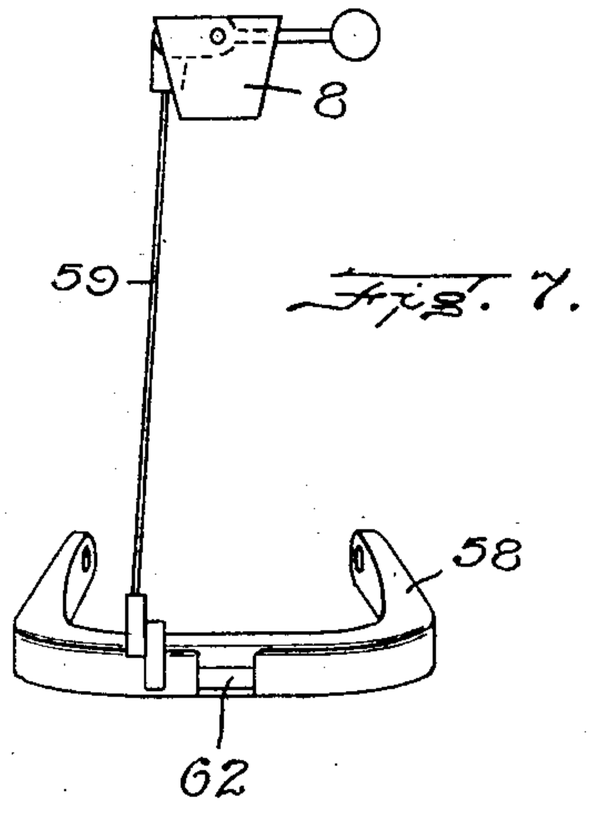

Fig. 7.

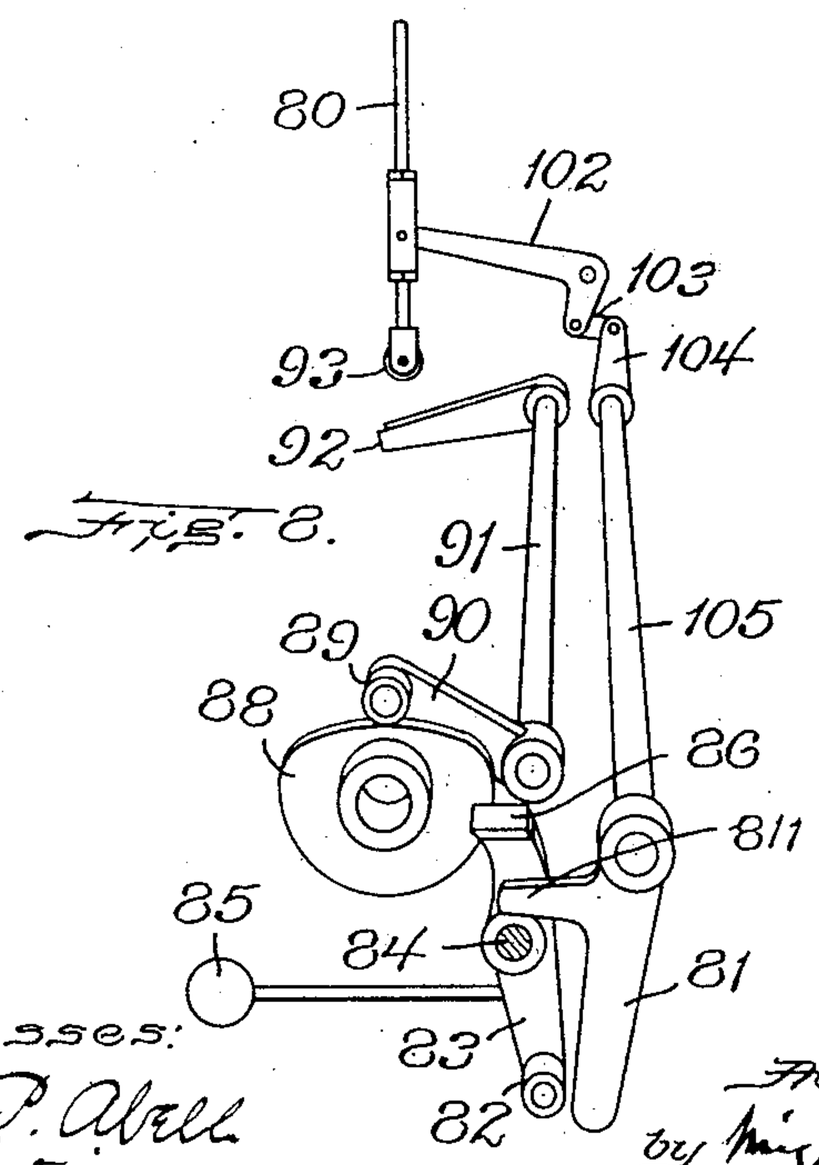

Fig. 8.

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BOX FILLING MACHINE.

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6 SHEETS—SHEET 6.

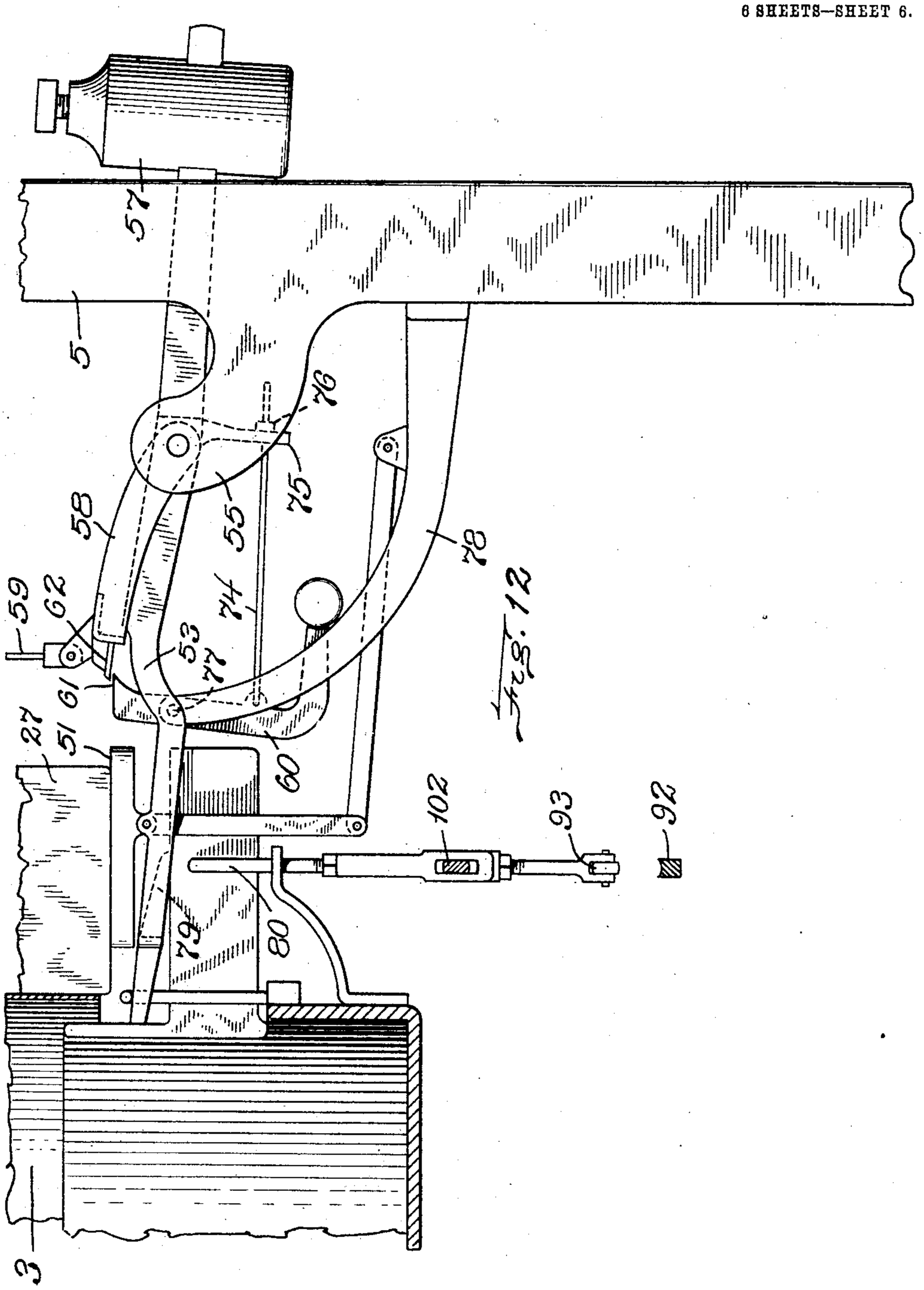

Fig. 12.

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UNITED STATES PATENT OFFICE.

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BOX-FILLING MACHINE.

No. 860,877. Specification of Letters Patent. Patented July 23, 1907.

Application filed August 30, 1906. Serial No. 332,634.

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 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. It has means for supplying finely-divided material to boxes, a conveyer for advancing boxes successively into position to receive material fed from the supplying means, and weighing mechanism for deflecting the supply when a box has received a certain predetermined amount, and for starting the conveyer to remove the filled box and advance an empty box into position.

The object of the invention is to provide an improved weighing device and a novel actuator for causing deflection of the supply of material in order to obtain the greatest possible accuracy of weighing, together with rapid movement of the boxes into and out of filling position.

Another object is to improve the driving connections so that the conveyer may be started immediately when a box has received its load.

To this end, therefore, the machine consists in an improvement on the apparatus described in my pending application for box-filling machine, filed March 12, 1906, Serial No. 305,721, and contains the novel features hereinafter described and claimed, reference being had to the accompanying drawings, in which,—

Figure 1 represents a front elevation of the improved machine. Fig. 2 represents a plan view with the means for supplying material omitted. Figs. 3 and 4 represent respectively, a plan view and a side elevation of the weighing devices. Fig. 5 represents a side elevation of the driving means and disconnectible clutch for the conveyer. Fig. 6 represents a sectional elevation of the same on line 6—6 of Fig. 5. Fig. 7 represents a perspective detail view of the guiding supply conduit for material and the actuating device therefor. Fig. 8 represents a perspective view of the clutch-controlling means operated by depression of the weighing platform and the device for elevating such platform. Fig. 9 represents a longitudinal section of the friction driving clutch. Fig. 10 represents a cross-section of the same on line 10—10 of Fig. 9. Fig. 11 represents a fragmentary elevation of a part of the box conveyer, the weighing means and the means for elevating the weighing platform after the filled box has been removed therefrom. Fig. 12 represents a side elevation of a modified form of weighing mechanism.

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

As in the application above referred to, the machine comprises a column 1 which supports a box conveyer or carrier 3, and a shield or chute carrier 4 above the box carrier. There is also a second column 5 supporting a chute 6 for supplying material, and a discharge conduit 8 pivoted below the chute 6. The box carrier is rotated by shaft 2 to which it is connected, and the latter is driven by a horizontal main drive shaft 15 having a pulley 151 over which passes a belt 16 which extends also over pulleys 17 18 and 19 on shafts 20 21 and 22, respectively. The shafts 20 and 21 carry rolls or pulleys 23 and 24 over which pass flexible endless conveyers 25 and 26 for feeding boxes or cartons 27 respectively to the carrier before filling, and away from the carrier after they have been filled. The pulley 19 is loose on the shaft and has a recess 28 in its hub into which extends a sleeve 29 which has a flange 30 and is secured to the shaft 22 by a set-screw 31. Between the flange 30 and hub of the pulley, and mounted on sleeve 29, is a disk 32 having a hub 35 entering the recess 28 with longitudinal grooves 33 containing rolls 34. These rolls are greater in diameter than the thickness of the hub or sleeve 35 of the disk, and extend into depressions 36 in sleeve 29. A projecting tooth 37 is formed on the disk 32. When the radial end of this tooth is engaged by a latch, the disk 32 and sleeve 35 are held stationary with the rollers in the deepest parts of grooves 36, so that they do not engage the pulley, and the latter is free to revolve in the direction of the arrow, shown in Fig. 10, that is, in right-hand rotation. When the tooth is released, the friction of the pulley (which may be assisted by a spring 87, hereinafter described) causes sleeve 35 to turn and roll the rollers 34 up the inclined sides of the notches until they are crowded against the pulley hub, whereupon the pulley and sleeve 29 are locked and the shaft is caused to turn.

The delivering mechanism is the same as described in my application aforesaid, having gates in the bottom of the chute 6 which are opened and partially closed by gear segments 63 64, arms 65, crank disk 67, and chain 73 from the shaft 15. The gates allow a thin stream of material to flow continuously and increase the amount every time they are opened by connection of a clutch, as described in said application.

The means for weighing the charge of material put into a box consists of a platform 51 located under the delivery and supported by a scale beam 53 to which it is pivotally connected and which is itself supported on knife edges between arms 55 extending from the rear column 5. An adjustable weight 57 counterbalances the platform 51 and box 27 when anything less than a full charge is contained therein.

The pivoted shiftable conduit 8 is normally located with its outlet above the weighing platform 51, and is

displaceable to deflect the stream flowing therethrough into another box, by means of an actuator 58 pivoted to the arms 55 independently of the scale beam and connected by a link 59 with the shiftable conduit. The free end of the swinging actuator is normally upheld in the position shown in Fig. 4 by a weighted trip lever 160 having a hardened wear plate 161 whose edge underlies one edge of a projection 162 depending from the scale beam directly under the axis thereof. The lever 160 is pivotally mounted in the forked end of a rock lever 163 which is fulcrumed midway between its ends in the end of a forked bracket 178 attached to the column 5. The other end of the lever 163 is connected by a pivoted link 164 to an ear 165 formed on the actuator. By reason of the connections just described, it is apparent that downward pressure of the actuator upon the link 164 causes upward pressure of the trip lever 160 against the projection 162 near the center of gravity of the scale-beam. The weight of the actuator may, therefore, be nearly, if not quite, as great as that of the scale-beam without lifting the knife edges from their supports. The weight of the actuator is preferably as great as is consistent with the weight of the scale-beam, so that when it is tripped as hereinafter explained, it may actuate the conduit 8 abruptly. The weighting of the trip lever 160 causes it to bear against an adjustable stop-screw 166 mounted in an ear 167 formed on the lever 163 for the purpose of fixing the position of the trip lever with relation to the projection 162.

When the platform 51 is depressed by the weight of the load in a box, the scale-beam is tilted and the projection 162 is swung backwardly, as indicated by the arrow in Fig. 4. The forward part of the scale-beam during the first part of its descent leaves the actuator supported in a fixed position, but when the projection 162 swings so far as to disengage itself from the plate 161, the actuator is released and, by reason of its weight, swings downwardly until arrested by contact with the scale-beam. In so doing, the actuator moves the conduit 8 so as to deflect the stream of material issuing therefrom into an unfilled box following the one on the platform. After the platform has moved the scale-beam enough to trip the conduit shifter, a finger 79 on the scale-beam engages a vertically moving rod 80, and further downward movement of the platform and box, depresses this rod, which is fastened to a bell-crank lever 102 connected by a link 103 with an arm 104 on a rock-shaft 105. The latter rock-shaft extends from rear to front of the machine, and has on the front end a lever 81 which lies beside a projection 82 on a latch lever 83 pivoted to a stud 84. The latch lever carries a weight 85 which tends to hold the upper end 86 of the lever, which is formed as a tooth, into engagement with the disk 32 and tooth 37 thereof. This tooth 86 therefore constitutes the latch which normally holds the friction clutch out of connection, and prevents the carrier being rotated. When, however, the weighing platform is depressed, arm 81 throws out the latch from engagement with tooth 37 and permits the clutch to be connected and the carrier actuated so as to remove the loaded box from the scale platform and substitute therefor an unfilled box. The clutch connects automatically, but in order to facilitate and hasten the connection, I may employ a spring 87 connected to the collar 30 and disk 32, respectively, tending to move the latter in the direction to crowd the rollers 33 against the pulley hub and sleeve 29.

As soon as the loaded box has been removed from the platform the latter is elevated by means of a cam 88 on the shaft 22 which bears upon a stud 89 on an arm 90 carried by the rock-shaft 91 which has a second arm 92 beneath a roller 93 on the lower end of the bar or rod 80. This cam rotates once during the movement of the carrier, which shifts the boxes and in thus rotating it raises the arm 92 so as to elevate the platform quicker than this can be done by the action of weight 57 alone, and is then lowered as shown in Fig. 8, so as to permit another depression of the platform. This motion of the rod 80 also acts to release the latch lever 83 from the restraint of lever 81 and allow it to disconnect the clutch. An arm 811 is formed on lever 81 so as to strike the hub of lever 83 and arrest the rock-shaft 105 before the loaded box has descended below the level of the receiving surface 501, hereinafter described.

The conduit actuator 58 is formed as a horse-shoe-shaped yoke of which the middle portion extends over the scale-beam, and is engaged thereby when the latter rises. This movement of the scale-beam raises the actuator and consequently lowers the trip lever 160 and swings the projection 162 forward again to initial position. The projection, in swinging forward, engages the plate 161 and thereby swings the lever 160 on its pivot so as to disengage the lower end from the stop-screw 166. Continued downward movement of the lever 160 carries the plate 161 below the edge of the projection 162, whereupon the gravity of the lever causes it to assume its actuator-supporting position as it is in Fig. 4.

The boxes are pushed by the carrier over an annular surface 50 which rises from the delivery point of the conveyer belt 25 to the level of the raised position of the scale platform, while the boxes are received by a second annular surface 501 at the level of the depressed position of the platform.

Fig. 12 illustrates the weighing and conduit-actuating mechanisms as provided with a modified form of tripping mechanism. This form of actuator-tripping mechanism, while simpler and cheaper of construction, is not as rapid in operation as that shown in Figs. 2, 3 and 4, because the contacting faces of the two coöperative tripping members are so close to the weighing platform that they may become fouled by stray material from the filling apparatus and stick so as to retard the descent of the platform. In this form the free end of the swinging actuator is normally upheld in the position shown, by a pivoted trip lever 60 having a projection 61 underlying the edge of a central projection 62 of the swinging actuator. The trip lever 60 is weighted so as to hold its projection 61 in actuator-supporting position, and is connected with the scale-beam by a tension rod 74 pivoted to it and passing through a hole in an arm 75 extending downwardly from the scale-beam. A movable stop 76 bears against the rear side of the arm 75 and restrains the tendency of the trip lever to swing beyond the position in Fig. 3, while permitting it to move independently of the scale-beam in the opposite direction. The trip lever is pivotally mounted at 77 on an arm 78 extending forward from the column 5, and is independent of the scale beam except for the linked connection described.

When the platform 51 is depressed by the weight of the load in a box, the forward end of the scale-beam 53 is lowered, and the arm 75 is swung backward so as to remove the projection 61 from under the projection 62 of actuator 58. Thereupon the free end of the latter is left unsupported and drops immediately, thereby swinging the pivoted conduit 8 the same as by the mechanism illustrated in Figs. 2, 3 and 4. There is enough overlap of the projections 61 and 62 and also of the corresponding projections 161 162 to permit a slight amount of depression of the weighing means without releasing the conduit actuator, and thereby the slight momentary depression caused when the greatest supply of material is falling into the box, will not be sufficient to shift the conduit, but the latter will remain in the normal position until the supply has diminished to a thin stream and the box is filled.

In my prior device, the scale-beam directly actuates the deflecting conduit, and so the latter is not shifted until the inertia of all the parts has been overcome and the scale-beam has been swung throughout a large part of its travel. With the present improvement, a quicker actuation of the conduit is accomplished, because the beam needs only to be moved a slight distance before the supply to the filled box ceases. Thus there is an instantaneous cut-off of material and no chance is given for more than the desired weight to be supplied during the appreciable time required for the box and scale platform to lower a sufficient amount for throwing in the carrier-actuating clutch. Thereby an increased accuracy of weighing is attained. Furthermore, a greater rapidity of operation is possible on account of the employment of a frictional, instead of a positive, clutch. A friction clutch acts almost instantaneously, while with the positive clutch, there is a wait of the amount of time required to bring the teeth into engagement.

I claim:—

1. In a box-filling machine, in combination with a deflecting conduit for guiding material, a weighing platform, a counterweighted beam supporting the same, and a device normally held stationary having a connection with said conduit adapted to be released by a slight movement of the platform for shifting the conduit to deflect the flow of material from a box on the platform to a neighboring box.

2. In a box-filling machine, in combination with a deflecting conduit for guiding material, a weighing platform, a counterweighted beam supporting the same, a device having a connection with said conduit for shifting the same, and a trip member supporting said device and operable by a slight movement of the platform and beam to release said device, whereby the latter is enabled to shift the conduit and deflect a stream of material from a box on the platform to a neighboring one.

3. In a box-filling machine, in combination with a deflecting guide for conducting material, a weighing platform, a weighted beam supporting the same, a device having a connection with said guide, and a trip supporting said device, the trip and beam being so engaged that a slight lowering of the platform will disengage the trip and release said device, to shift the guide and deflect a stream from one to another box.

4. In a box-filling machine, in combination with a pivoted material-guiding conduit, a weighted scale beam, a weighing platform supported by the beam, a member connected to the conduit for moving the latter, and a trip normally retaining said member and thereby the conduit in position to guide material into a box on the platform, so engaged with the beam that the weight of a loaded box will disengage the trip and permit movement of said member to shift the conduit away from such box.

5. In a box-filling machine, in combination with a pivoted material-guiding conduit, a weighted scale beam, a weighing platform supported by the beam, a member connected to the conduit for moving the latter, and a rest adapted to hold said member and maintain the conduit in position to direct material into a box on the platform during a slight movement of the beam, said rest being engaged with the beam and free after a predetermined movement of the beam to permit movement of the member to shift the conduit and direct material away from the box.

6. In a box-filling machine, in combination with a pivoted material-guiding conduit, a weighted scale beam, a weighing platform supported by the beam, a member connected to the conduit for moving the latter, connections adapted to hold said member and maintain the conduit in position to direct material into a box on the platform during a slight movement of the beam, and a trip between the beam and said connections arranged after a predetermined movement of the beam to be disengaged and permit movement of the member to shift the conduit and direct material away from the box.

7. In a box-filling machine, in combination with a pivoted material-guiding conduit, a weighted scale beam, a weighing platform supported by the beam, a member connected to the conduit for moving the latter, and a trip normally retaining said member and thereby the conduit in position to guide material into a box on the platform, and engaged with the beam in such a manner that the weight of a loaded box will release the trip and permit movement of said member to shift the conduit away from such box, said member having a portion adapted to be engaged by the beam and operated by return thereof to normal position to reset the member and the trip.

8. In a box-filling machine, in combination with a shiftable conduit, weighing means adapted to support a box being filled beneath the outlet of said conduit, an actuating member for the conduit mounted independently of the weighing means, and tripping means controlled by said weighing means and adapted to be tripped by the weight of a loaded box to permit said actuating member to shift the conduit outlet away from the box opening.

9. In a box-filling machine, in combination with a shiftable conduit, weighing means adapted to support a box being filled beneath the outlet of said conduit, an actuating member for the conduit mounted independently of the weighing means, and tripping means controlled by said weighing means and arranged to be tripped by the weight of a loaded box after the same has been depressed a certain amount to permit said actuating member to shift the conduit outlet away from the box opening, the tripping means being arranged to permit some depression of the box prior to being tripped.

10. In a box-filling machine, in combination with a shiftable conduit, weighing means adapted to support a box being filled beneath the outlet of said conduit, intermittent means for advancing boxes successively to said weighing means, an independent actuator for the conduit caused through the action of the weighing means by a preliminary downward movement of a filled box, to shift the conduit outlet away from a filled box, and connections operated by a further downward movement of the box for setting the box-advancing means in motion to substitute an unfilled for a filled box on the weighing means.

11. In a box-filling machine, in combination with a shiftable conduit, weighing means adapted to support a box being filled beneath the outlet of said conduit, an intermittently-movable conveyer for placing a series of boxes in succession on said weighing means to be filled, a continuously-moving disconnectible driver for said conveyer, an independently mounted actuator for the conduit normally holding the same with its outlet over the box opening, means adapted to become operative upon a preliminary downward movement of a filled box for permitting the actuator to shift the conduit outlet from the filled box to discharge into a following unfilled box, and connections operated upon a further movement of the filled box for connecting the conveyer with its driver.

12. In a box-filling machine, weighing means for boxes being filled, including a movable supporting platform adapted to be depressed by the weight of a filled box, an

intermittently moving carrier for the boxes for placing them successively on the platform, a continuously-movable driver for the carrier, disconnectible therefrom, connections operated by depression of said platform for throwing in the driver to start the carrier, and a single cam operated by said driver for raising the platform after each depression thereof.

13. In a box-filling machine, weighing means for boxes being filled, including a movable supporting platform adapted to be depressed by the weight of a filled box, an intermittently moving carrier for the boxes for placing them successively on the platform, a continuously-movable driver for the carrier disconnectible therefrom, a bar or rod operated by depression of the platform arranged to cause connection of the driver to start the carrier, an arm adjacent said bar, and a cam rotated at each movement of the carrier for acting on said arm to raise the bar and restore the platform after each depression thereof.

14. In a box-filling machine, weighing means for boxes being filled, including a movable supporting platform adapted to be depressed by the weight of a filled box, an intermittently moving carrier for the boxes for placing them successively on the platform, a continuously-movable driver for the carrier, disconnectible therefrom, a friction clutch between the driver and carrier automatically connectible when unrestrained, a latch adapted to engage a portion of said clutch and hold it disconnected, connections operated by depression of the platform for disengaging said latch to permit connection of the clutch and driving of the carrier, and a cam operative with the carrier for raising the platform after each depression and at the same time permitting the latch to move into locking position.

15. In a box-filling machine, in combination with a deflecting conduit for guiding material, a weighing platform, a weighted oscillatory beam supporting the same, an actuator adapted to actuate by gravity the conduit, and actuator-supporting means adapted to be held in actuator-supporting position by a portion of said oscillatory beam, and to be released thereby upon descent of said platform.

16. In a box-filling machine, in combination with a deflecting conduit for guiding material, a weighing platform, a weighted oscillatory beam supporting the same, a gravity-actuated conduit-deflecting actuator, and actuator-supporting means adapted to engage an edge of said beam beneath the axis thereof and to be released from actuator-supporting position by movement of said edge when the platform descends.

17. In a box-filling machine, in combination with a deflecting conduit for guiding material, a weighing platform, a weighted oscillatory beam supporting the same, a conduit-deflecting actuator, a projection on the beam, and a trip normally engaged with said projection to hold said actuator, and thereby the conduit, in one position, said projection being displaceable by the movement of the beam upon depression of the platform, to release the trip and allow the actuator to shift the conduit.

18. In a box-filling machine, in combination with a deflecting conduit for guiding material, a weighing platform, a weighted oscillatory beam supporting the same, a conduit-deflecting actuator, a projection on the beam, a lever having a connection with said actuator whereby to control the movements thereof, and an adjustable trip carried by said lever adapted to bear upwardly against said beam-projection when the platform is raised and retain the actuator in raised position, the beam-projection being displaceable upon the motion thereof produced by depression of the platform so as to release the trip and allow the actuator to drop.

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

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