No. 607,470. Patented July 19, 1898.

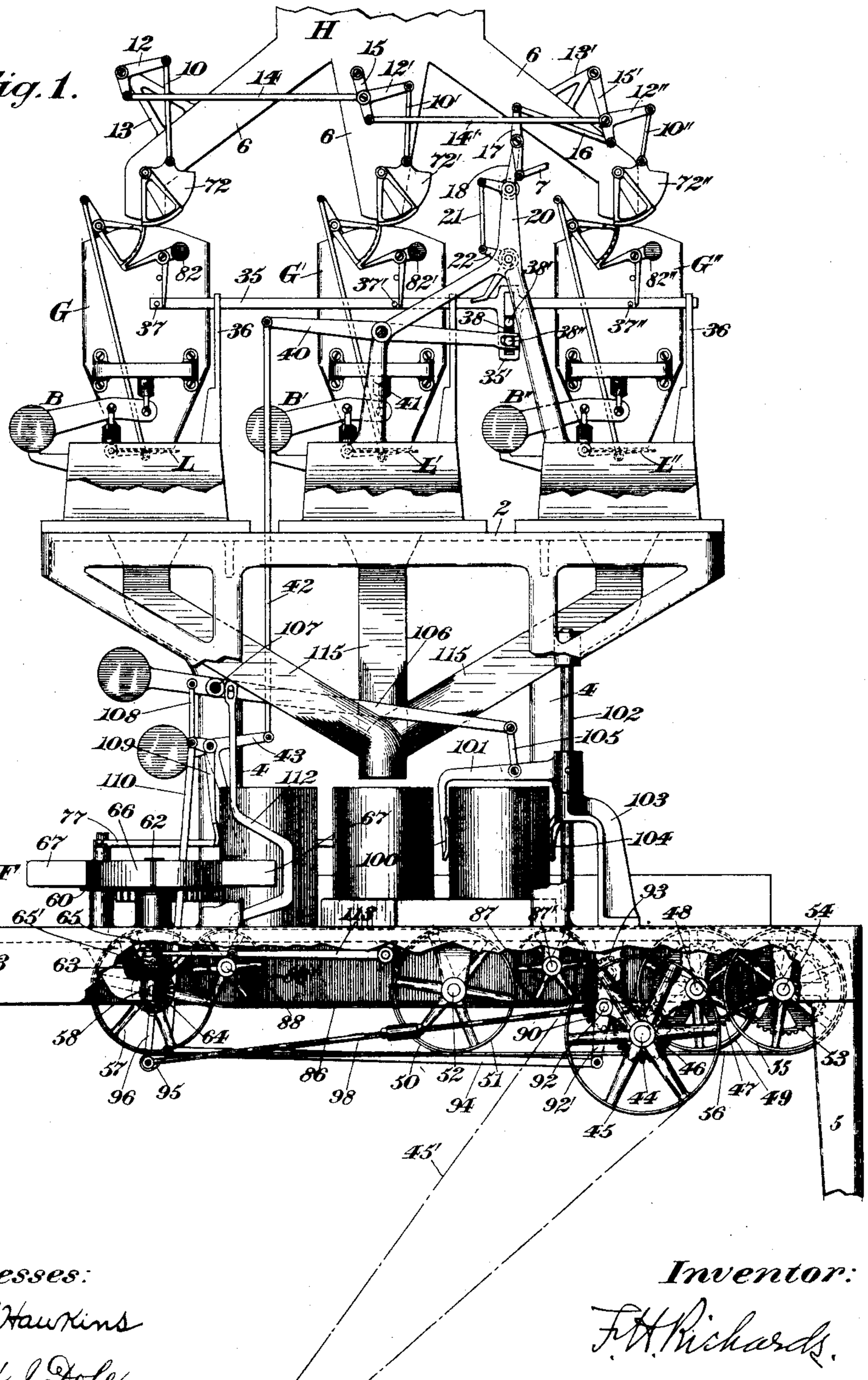
F. H. RICHARDS.

BOX FILLING AND TRANSFERRING MACHINE.

(Application filed Nov. 26, 1897.)

(No Model.) 6 Sheets—Sheet 1.

Fig. 1.



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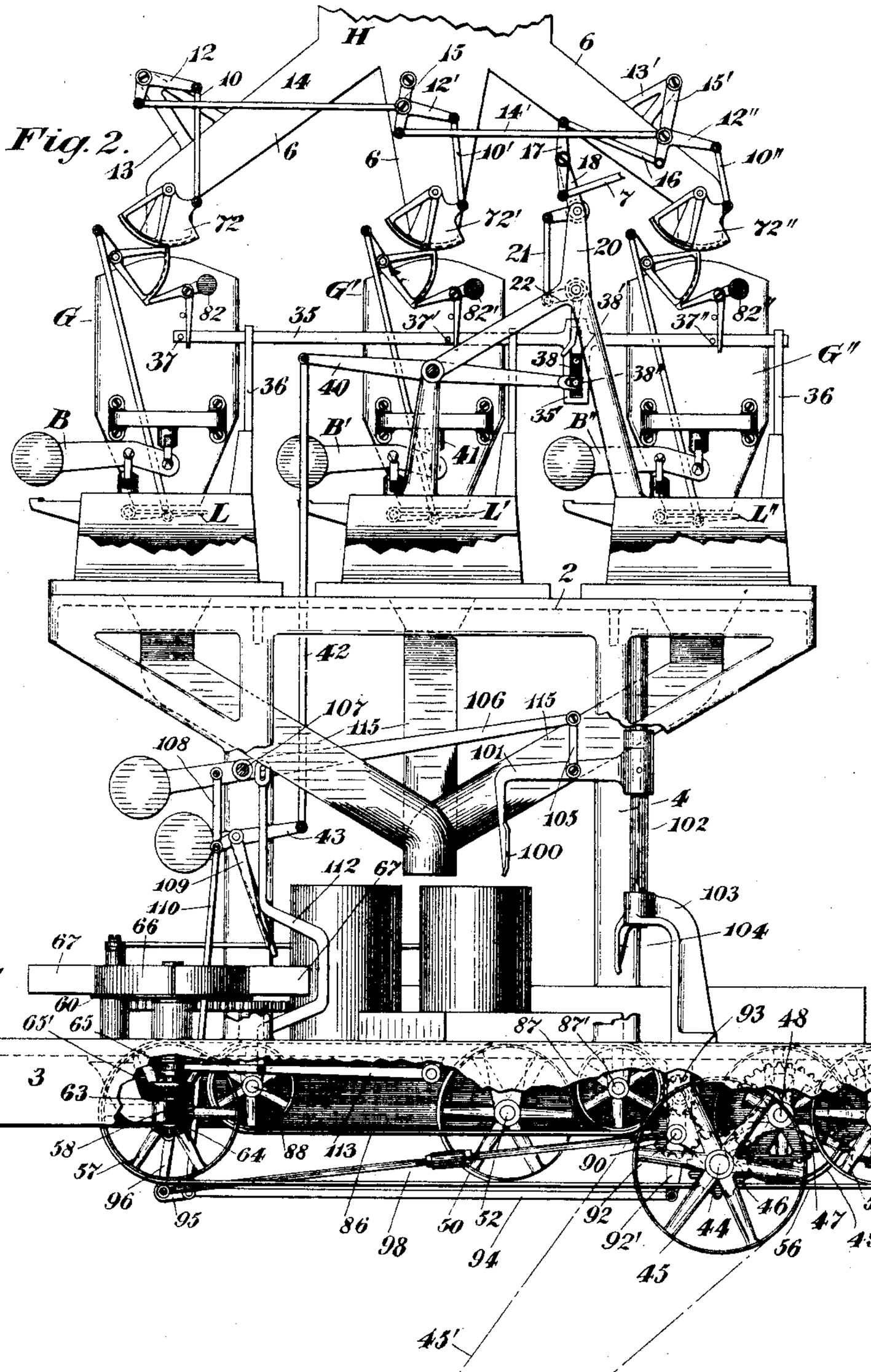
(No Model.) 6 Sheets—Sheet 2.

Fig. 2.



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(No Model.) 6 Sheets--Sheet 3.

Fig. 3.

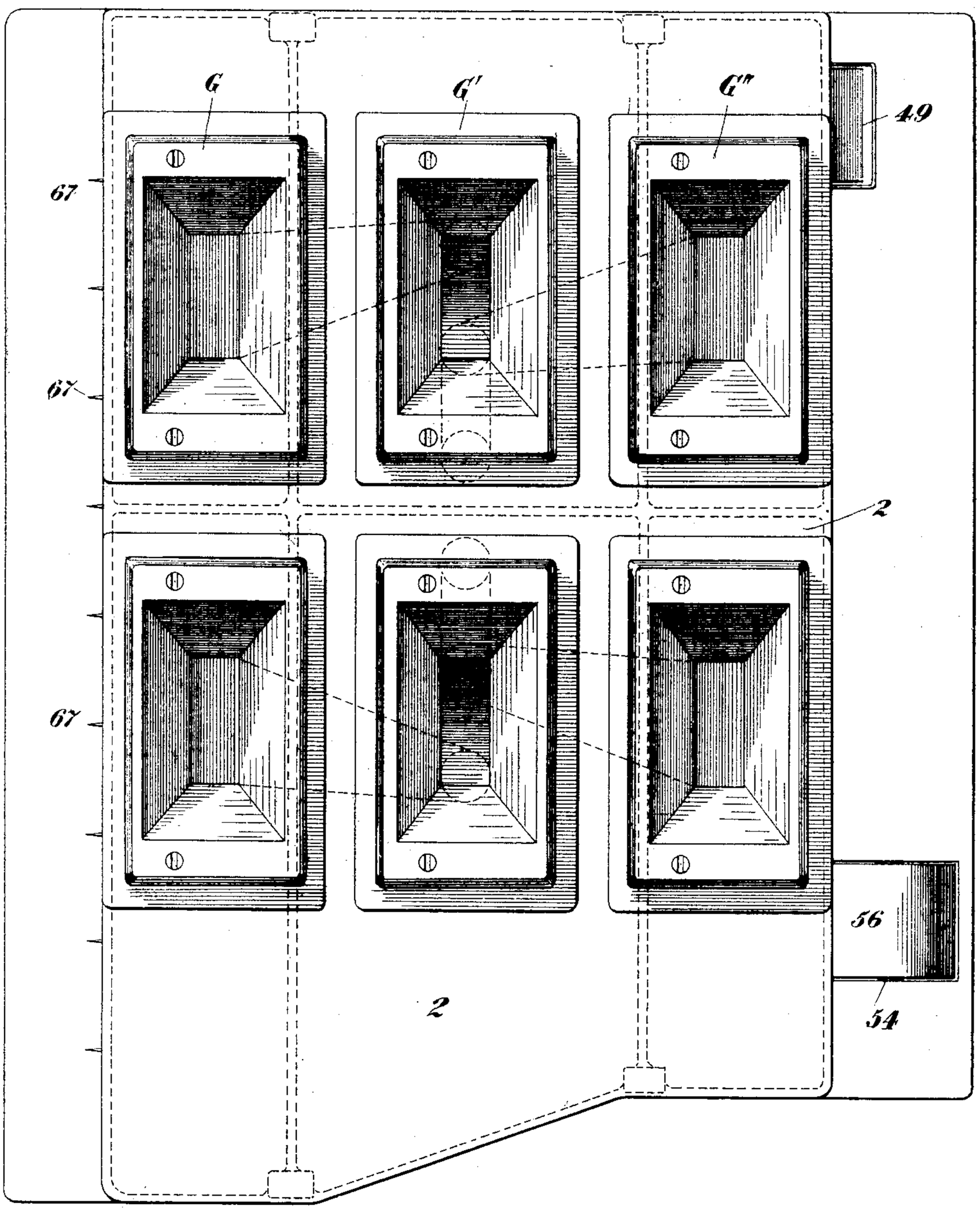

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Fig. 4.

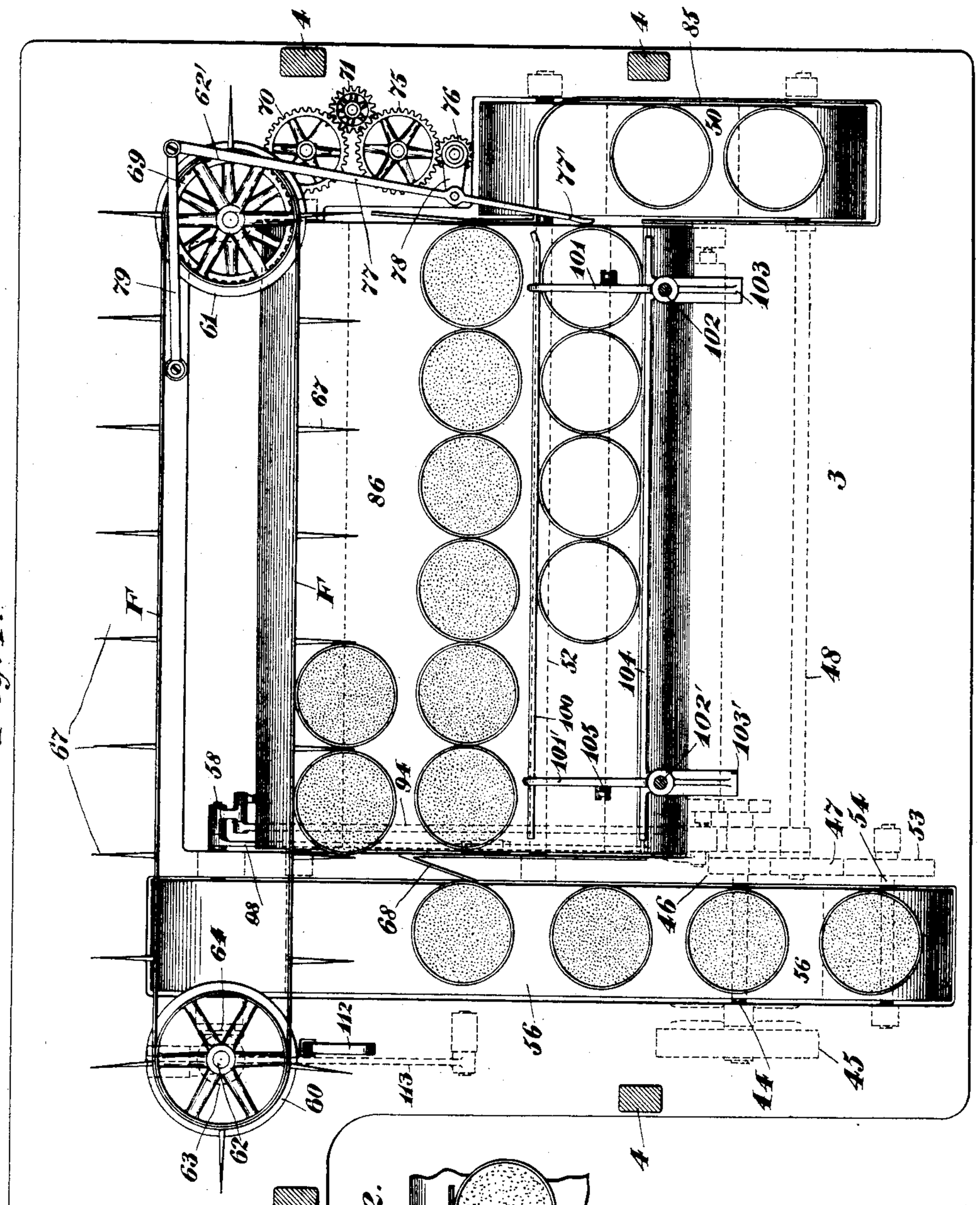

Fig. 12.

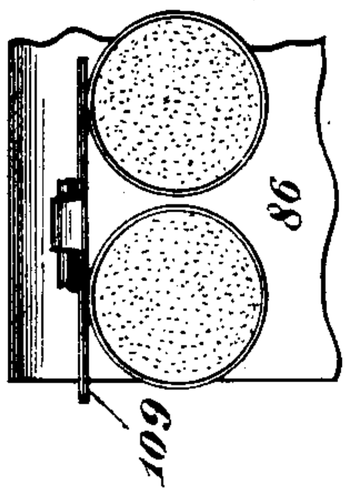

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Fig. 5.

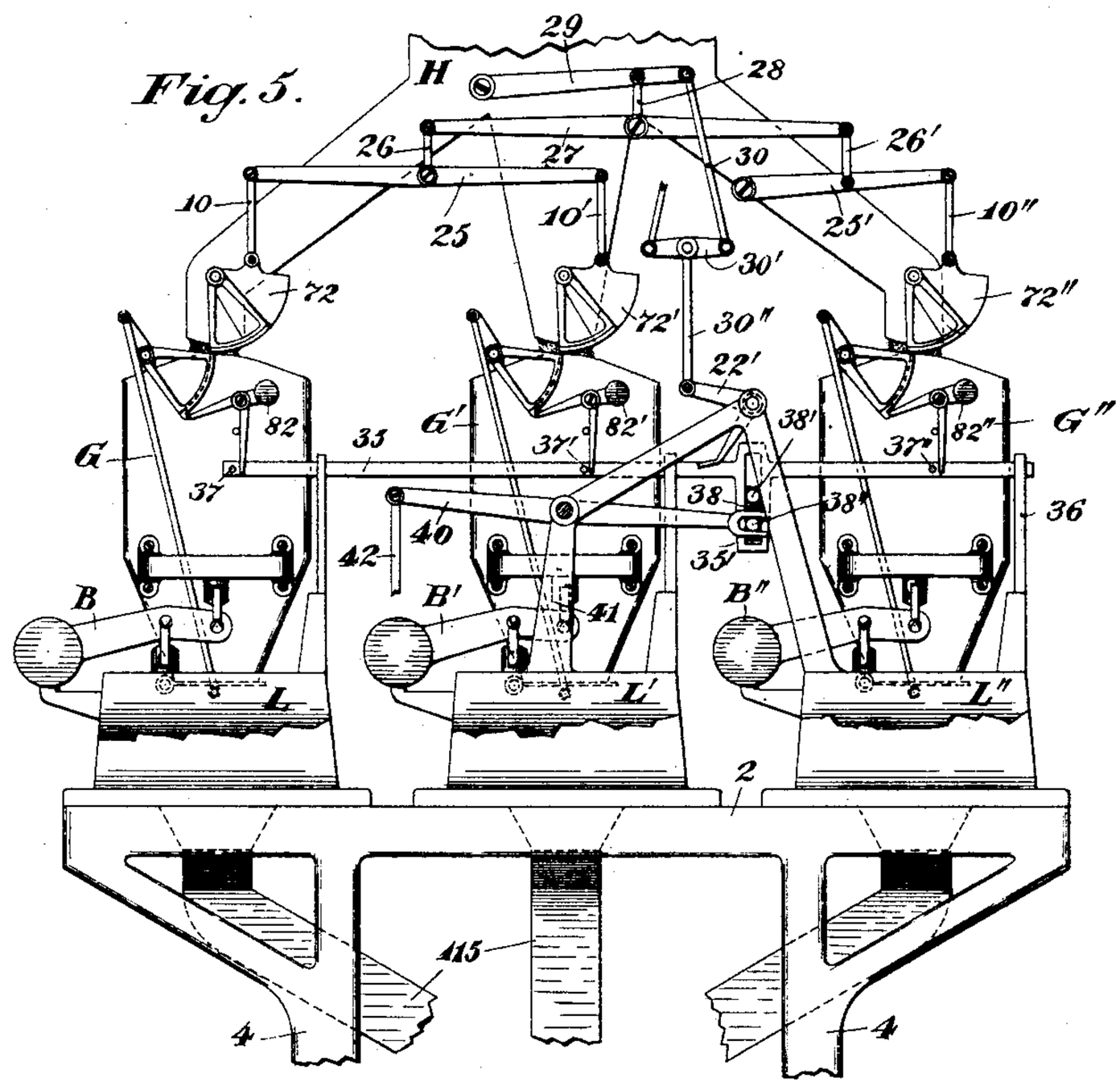
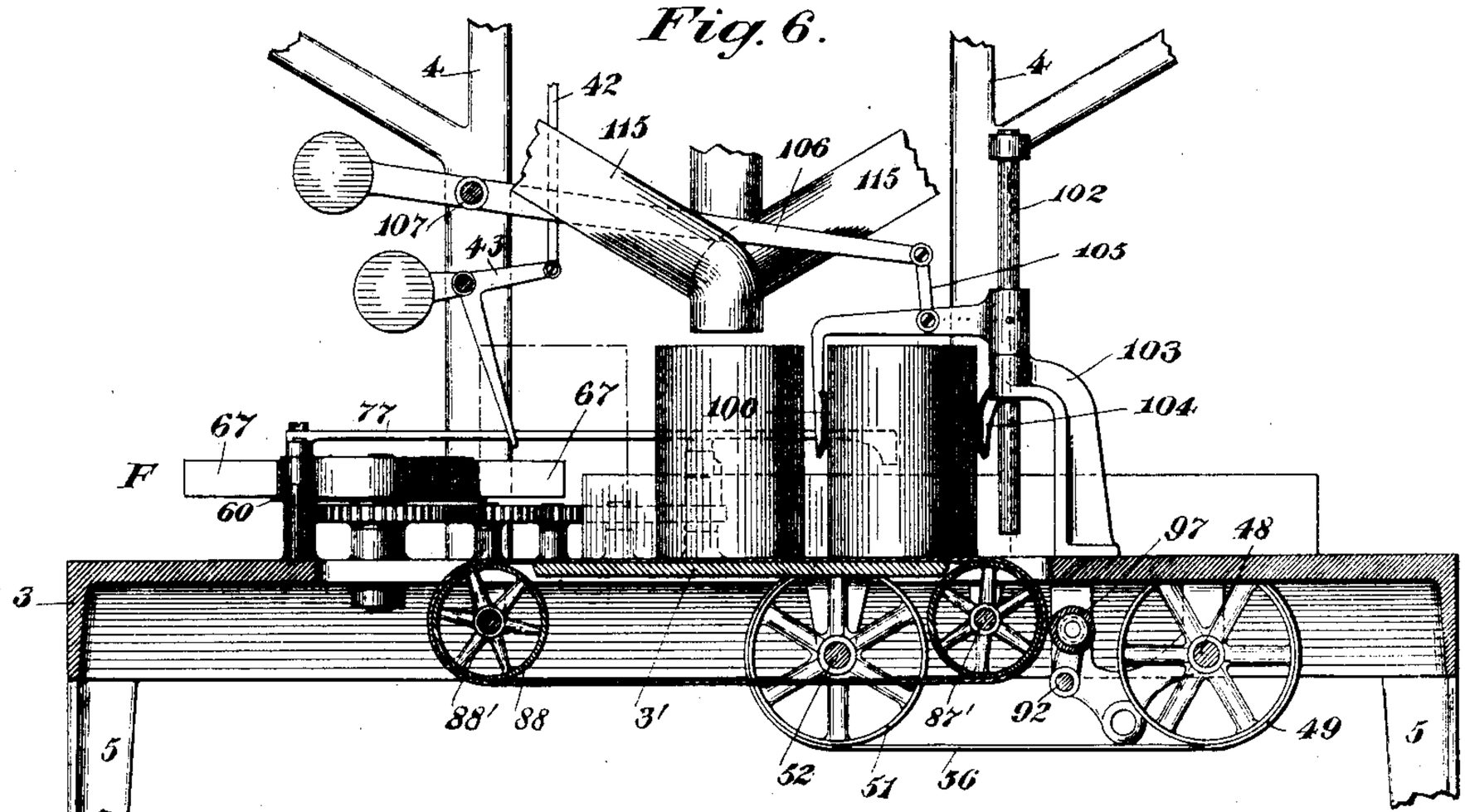


Fig. 6.



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(No Model.) 6 Sheets—Sheet 6.

Fig. 7.

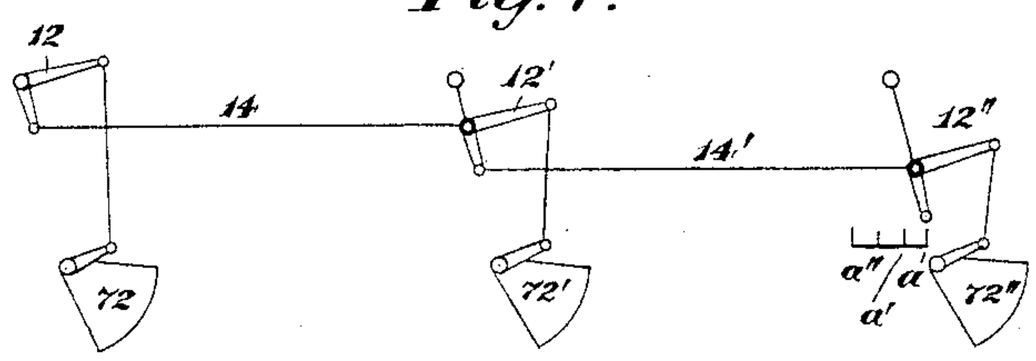


Fig. 8.

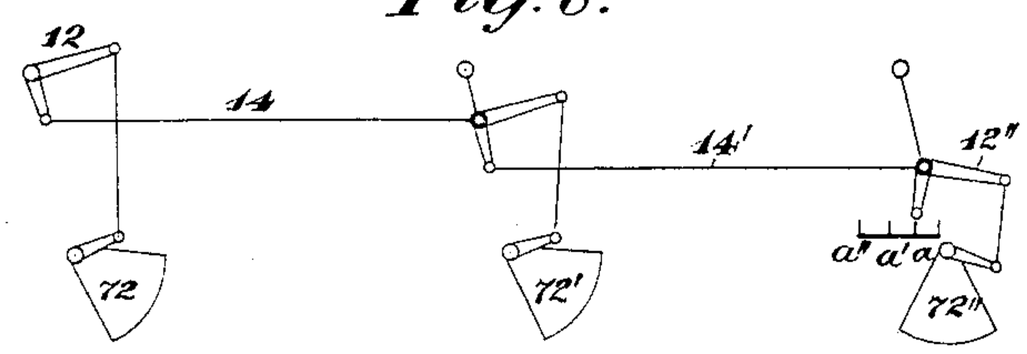


Fig. 9.

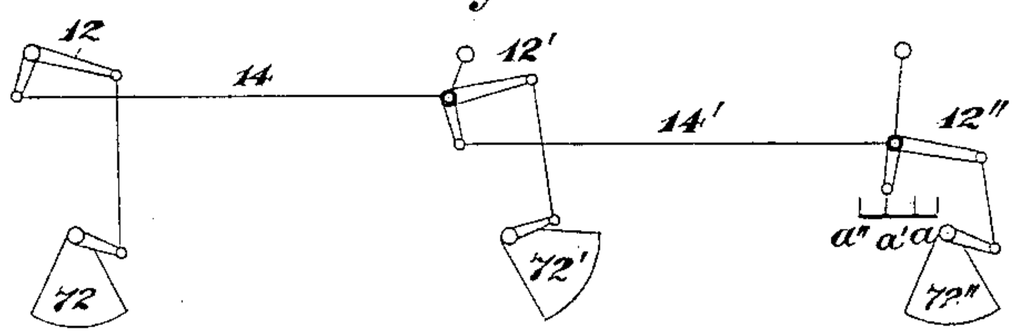


Fig. 10.

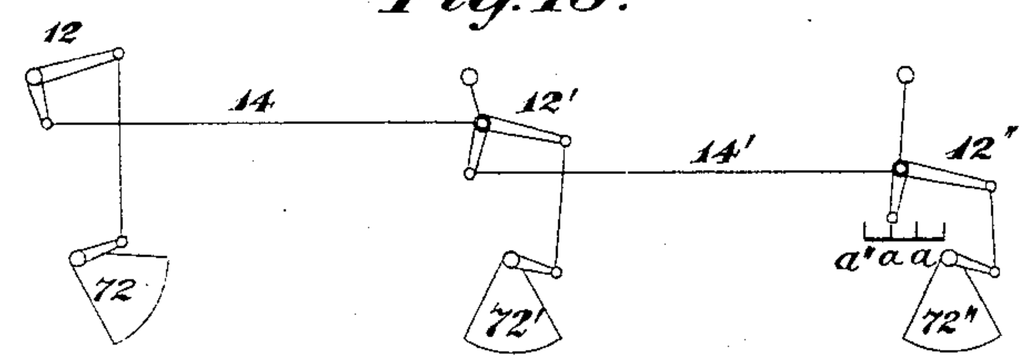
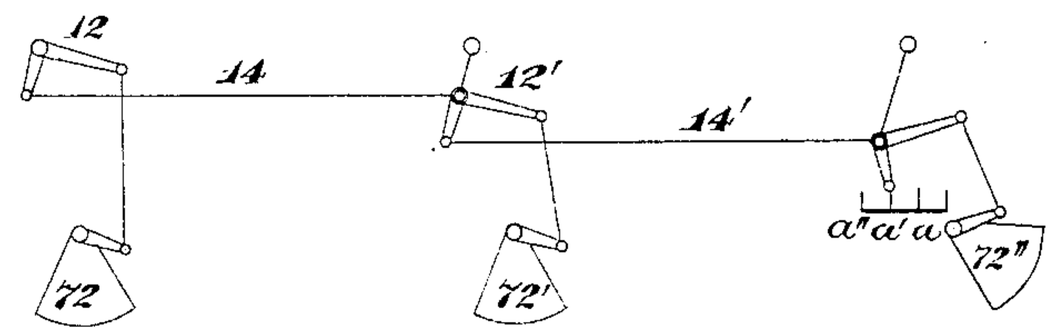


Fig. 11.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

BOX FILLING AND TRANSFERRING MACHINE.

SPECIFICATION forming part of Letters Patent No. 607,470, dated July 19, 1898.

Application filed November 26, 1897. Serial No. 659,839. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Box Filling and Transferring Machines, of which the following is a specification.

This invention relates to improvements in box filling and transferring machines; and it has for its main object the provision of an improved machine by means of which boxes may be filled with predetermined quantities of material by a continuous operation and removed from the apparatus as fast as they receive their contents.

My present invention is in the nature of an improvement upon that embodied in the box filling and transferring machine shown, described, and claimed in my application filed October 19, 1897, Serial No. 655,736, and as to many of the essential features thereof the machine illustrated herein and that shown in said other application are similar in construction and operation. In both of them the boxes to be filled are brought, preferably in rows, under corresponding delivery spouts or conduits controlled by weighing mechanisms each of which is operative for weighing the same amount of material; and in the preferred construction I employ a plurality of automatic weighing-machines, one for each delivery-spout, each capable of making up its load independently of the others. Moreover, all of the machines embody devices for preventing the discharge of a completed load from any weighing mechanism unless a box is in proper position under the delivery-spout leading therefrom, and in this case all of these machines will be so connected with suitable controlling devices that none of the machines will be discharged until the loads in all of them are fully made up and the stream-controlling means or valve mechanisms thereof are in their several closed positions for shutting off the supply of material to the load-receivers of the different weighing mechanisms.

For the purpose of controlling the release of the shiftable members of the load-receivers, by means of which the boxes of the transferring mechanism are filled, I employ means controlled by the box-feeding devices of the transferring mechanism for preventing the discharge of the loads in the receivers until a predetermined point is reached in the cycle of operations of the several movable parts of the apparatus.

One of the main features of the invention is the provision, in connection with a plurality of operating members, of an operated member controlled in its movements by suitable power-transmitting means between the operated and the operating members, this operated member having a total movement made up of several partial movements, each of which is controlled by one of the operating members, the connection between the operating members and the operated member being a connector-train connected with the operating members at different points at one end of the train and with the operated member at a single point at the other end of the train to permit the train to accumulate the movements of the operating members and transmit them singly and with cumulative effect to the operated member, so that the latter will move in accordance with and proportionally to the movements of the operating members of this mechanism. Preferably the operating members will be independently operative and will be in the nature of stream-controllers or valves, one of which may be employed for each weighing-machine used, although the number of such operating members or valves is not essential. The total movement of the operated member may be made up of a plurality of equal partial movements, and the connector-train may be a lever-train embodying a plurality of levers, some of which will have shiftable pivots and all of which will be connected with one another and with other operating connections of this mechanism for interdependent movements. Obviously the final movement of such an operated member as that just described may be employed for the purpose of controlling the release of the shiftable members or load-dischargers of all of a large number of separate and independently-operative weighing mechanisms, and in the present case this operated member is utilized for the purpose of effecting the release of the several holding devices or latches for the shiftable members or load-dischargers of the different mechanisms when the loads

shall have been made up in all of the load-receivers of such mechanisms and the stream-controllers or valves corresponding thereto shall have been operated to cut off entirely the flow-stream to each load-receiver. Hence this operated member may constitute one member of releasing or tripping means for tripping all of the latches of a series of load-receivers or buckets; but as the discharge of the several completed loads is intended to be controlled also in an apparatus of the type shown and described in this application by means of the box-feeding mechanism or transferring devices I prefer that the releasing or tripping means shall embody at least two members, one of which will be shiftable into and out of operative relation with the other to prevent such release of the bucket-latches until the proper point in the operation of the box-feeding means. In the preferred construction the operated member of the power-transmitting mechanism hereinbefore described will constitute an intermediate adapted to coact with a tripping member shiftable into and out of operative relation with said intermediate by means of suitable connections controlled by the box-feeding means and preferably by the boxes shifted thereby.

It will be apparent, therefore, that another feature of this invention, and one which I deem of importance, is the employment of a releasing device common to all of a plurality of weighing mechanisms having members shiftable for discharging their respective loads, which releasing device will be controlled by the box-feeding means of the box-transferring portion of the apparatus, the preferred construction being that in which this common releasing device is controlled directly by the engagement of a box or boxes with a movable part of the device. By employing such a releasing device or tripping means as this it will be clear that I provide two means for positively controlling the release of the load-dischargers of the several weighing mechanisms—viz., a means governed directly by and only operative in accordance with the closing of the several controlling means or valve mechanisms of the different weighing-machines which I employ for filling the boxes of this box filling and transferring machine and a means controlled by the transferring or box-feeding mechanism of the apparatus—and, moreover, not only is the release of the load-dischargers dependent upon the proper closing of the stream-controlling valves and upon the proper coaction of the transferring or box-feeding mechanism with the several weighing-machines, but the tripping device, by means of which the release of the several holding devices or latches of the load-dischargers is effected directly, has such a range of movement that until it shall have been operated from one extreme to the other of its path it will not be effective for releasing such latches, even though it may have been moved through one or more steps of its total range of action.

As in the preferred construction I make use of a plurality of box-filling means or weighing-machines and as the release of each load-discharger is controlled by the final partial movement of the operated member or intermediate of the train of mechanism hereinbefore referred to, it will be seen that an important feature of these improvements is the utilization of this final step in the total range of movement of such operated member or intermediate for effecting the simultaneous movement of a plurality of members or latches shiftable for discharging the completed loads of the several weighing mechanisms.

The operation of the tripping means may be governed by a blocking device governed by box-feeding means and preferably controlled in its movements by a box or boxes. The construction and mode of operation of this blocking device will be described more particularly hereinafter in detail.

Another feature of this invention which I deem of importance is the employment of a shiftable box-guide coöperative with one of the box-feeders and preferably disposed over the box-shifting feeder of the transferring mechanism and movable toward and from the same, so as to engage an empty box or row of boxes when such box or boxes are being fed onto the box-shifting feeder, and suitably operated so that it will be withdrawn from the path of movement of the box or boxes when the box-shifting feeder is started to shift the boxes beneath the discharge ends of the spouts leading from the box-filling means, hereinbefore described. This box-guide may lie normally at that side of an entering empty box or row of boxes which is adjacent to the discharge end of the box-shifting feeder, and another guide at the opposite side of the row of boxes and adjacent to the receiving end of the box-shifting feeder may coöperate with the shiftable box-guide to hold the boxes in position between it and the shiftable guide. It should be understood, of course, that this box-shifting feeder will coöperate with a suitable box-advancing or box-receiving feeder by means of which the boxes are delivered to the apparatus and that the box-shifting feeder will preferably be intermittently operative to shift the boxes successively under the mouths of the spouts by which they are to be filled and away from such spouts and into the path of operation of a suitable box-discharging device or belt. It will be clear, therefore, that the shiftable box-guide should be in position to engage the row of empty boxes only when the box-shifting feeder is at rest and that such guide should be shifted out of the path of the boxes as soon as this feeder begins to move. This shifting movement of the movable guide will be controlled by a suitable actuator, preferably counterweighted and having an arm projecting into the path of and controlled by the movements of a filled box or boxes on the box-shifting feeder.

In connection with the devices described before I prefer to employ box-controlled coupling means for governing the operation of one or more box-feeders from suitable driving means, and this, as well as other novel features of the invention illustrated in the drawings of this application and not hereinbefore particularly referred to, will be described in detail hereinafter.

In the drawings accompanying and forming part of this specification, Figure 1 is a side elevation of a box filling and transferring machine embodying my present improvements and illustrates the positions of the parts at the beginning of the operation of loading the buckets of the weighing-machines and feeding a row of empty cans into position. Fig. 2 is a similar view showing the positions of the parts on the making up of the loads in the several receivers of the weighing-machines and illustrates the corresponding position of the transferring mechanism. Fig. 3 is a plan of the apparatus with the weighing-machines removed. Fig. 4 is a substantially central horizontal section of the apparatus. Fig. 5 is a side elevation of the upper part of a box feeding or transferring machine embodying a modified form of connecting mechanism between the valves and the latch-tripping means, which mechanism will be described hereinafter in detail. Fig. 6 is a sectional side elevation of the transferring mechanism of the apparatus. Figs. 7 to 11, inclusive, are diagrammatic views illustrating the operation of the connector-train controlled by the movements of the valves; and Fig. 12 is a detail of a box-controlled blocking device, which will be hereinafter described.

Similar characters designate like parts in all the figures of the drawings.

The machine illustrated herein comprises two main mechanisms suitably connected with each other and preferably located one above the other, these two mechanisms being the box-filling means and the box feeding or transferring means. Said mechanisms may be mounted on any suitable framework—such, for example, as that shown herein, in which two flat supporting beds or tables (indicated, respectively, by 2 and 3) are connected by suitable supports or columns, such as 4 4, the lower table or bed being in turn carried by suitable uprights or legs 5.

On the upper bed or table 2 the major portion of the box-filling means is supported, and in the present case this box-filling means embodies six weighing-machines substantially similar in construction to those shown in prior patents granted to me, these weighing-machines being connected in this instance in such a manner that while they will be operative independently for making up their respective loads no one of the machines will be capable of discharging its load until all of the others shall be in condition for discharging.

In the construction illustrated the stream-controlling means or valve mechanisms and suitable connections therebetween, such as those hereinbefore alluded to, are supported on a stream-supplying device of any suitable construction, such as the hopper shown at H, and embodying a plurality of supply-spouts, such as 6, one for each of the several machines. The several stream-controlling means or valve mechanisms of the weighing-machines are connected, as before stated, in such a manner that they will control the operation of a member connected with one end of the connector-train, while at the other end of said train different points in the latter will be connected with the operating members or valves by means of which the discharging movements of the shiftable members of the load-receivers are governed. In this case each supply-spout 6 is controlled by a valve preferably oscillatory about an axis passing through the supply-stream, three of these valves being shown at 72, 72′, and 72″, while the other three, being at the opposite side of the machine, (not illustrated herein,) do not show. It will be obvious, of course, that the other three valves will be connected in a manner substantially similar to that illustrated with respect to the valves 72, 72′, and 72″, and for this reason I have illustrated at 7 a connecting member in the form of a link or rod, which, it should be understood, will be connected to a similar train of mechanism at the opposite side of the machine. In the preferred form of this connector-train, which is illustrated in Figs. 1 and 2, the valve 72 is connected by means of a rod or link, such as 10, to one arm of an angle-lever 12, pivoted on a bracket or support 13, projecting from one of the supply-spouts 6, the opposite end of this lever, which is in this case of the "angle-lever" type, being pivoted to a connecting-rod, such as 14, which in turn is pivoted to a link, such as 15, also carried by the hopper H. On this link 15 may be pivoted a second angle-lever, such as 12′, one arm of which is in turn connected by a rod, such as 10′, with the second stream-controller or valve 72′, while the other arm of the angle-lever 12′ is pivoted to a rod, such as 14′, which in turn is connected in a manner similar to that just described to a link, such as 15′, pivoted on an arm or bracket, such as 13′, and having thereon an angle-lever, such as 12″, one arm of which is pivoted to a link or rod, such as 10″, connected in turn to the valve 72″, while the other arm of said angle-lever 12″ is connected in some suitable manner, as by a connecting-rod 16 and a lever 17, to the connecting-rod 7, passing to a corresponding connector-train (not shown) at the opposite side of the box-filling mechanism. The lever 17 may have pivoted thereto another lever, such as the angle-lever 18, which may be mounted on a suitable support 20 and connected by means of a rod 21 with a lever 22, the free end of which constitutes in this case the operated member or intermediate by means of which the discharging movements of the shiftable members or load-dischargers

of the weighing-machines are controlled, although, of course, it will be obvious that the connections just described need not necessarily be employed so long as the connector-train and the operated member operate in the manner hereinbefore described. It will be noticed that this connector-train or lever-train embodies a plurality of interdependent valve-controlled elements, all of which are connected in such a manner that the movement of any one of them in any order causes the operated member or intermediate 22 to be actuated a certain distance, which distance will of course be one step or part of the total range of movement thereof. If two of these valve-controlled elements are operated, of course the operated member or intermediate will be advanced through two steps of its total movement, and so on until all of the actuating members or valves shall have been shifted from one extreme position to the opposite one. It will be noticed that in this connector-train or lever-train one of the principal valve-controlled elements—in this case the angle-lever 12—has a fixed pivot, while the corresponding members controlled by the other valves have shiftable pivots, and hence may be shifted bodily from one position to another, or other positions, without turning about such pivots or fulcra. Hence any one of the several levers 12, 12′, and 12″ (and of course the corresponding levers of the other part of the transmitting mechanism at the other side of the box-filling mechanism) may be oscillated about its pivot entirely independently of the others and whether it is or is not shifted bodily by the connecting-rods 14 and 14′, joining the several valve-operated elements of the connector-train. In Fig. 5 I have illustrated a modification of this feature of my invention in which the valves 72, 72′, and 72″ are connected by a different type of mechanism, but one operating on substantially the same principle. Hence the connecting-rods 10, 10′, and 10″ are connected to the several elements of an equalizing-lever system, the two connecting-rods 10 and 10′ being connected to opposite ends of a lever 25, which near its center is suspended by means of a link 26 from one end of a lever, such as 27, from the opposite end of which is suspended in a similar manner by means of a link 26′ a lever, such as 25′, pivoted at one end on a fixed portion of the framework and at its other end connected to the rod 10″. The lever 27 is in turn suspended near its center by means of a link, such as 28, from a lever, such as 29, also pivoted at one end of the framework and joined at its opposite end by means of a connecting-rod, such as 30, to a lever 30′ and a connecting-rod 30″, pivoted to the operated member or intermediate 22′. In this connector-train it will be clear that the lever-and-linkage system will be controlled by the valves 72, 72′, and 72″ in substantially the same manner as in the connector-train illustrated in Figs. 1 and 2 and hereinbefore described.

In Figs. 7 to 11, inclusive, I have illustrated diagrammatically the manner in which the operated member or intermediate is actuated from the operating members or valves through the medium of the interposed connector-train.

In Fig. 7 the positions of the parts are illustrated with all the valves wide open and with the operated member in its normal idle position at one extreme of its range of movement.

In Fig. 8 I have shown the positions which the parts assume when the operating member at the right—that is, the valve 72″—is actuated and the valve closed. Here the lever 12″ has been oscillated to carry the operated member to the end of its first partial movement, (indicated by *a*,) the connections from the lever 12″ to the valves 72′ and 72 being undisturbed.

In Fig. 9 I have illustrated the positions of the several parts of the train when the operating member or valve 72 is actuated after the valve 72″ has closed. Here the movement of the lever 12 has been transmitted, through the connecting-rods 14 and 14′, to the lever 12′ and also to the previously-operated lever 12″, causing the lever 12′ to be shifted bodily to the left without turning about its fulcrum, the lever 12″ also moving in the same direction to carry the operated member to the end of the range of its second partial movement.

In Fig. 10 I have illustrated how the connections operate when the two valves 72′ and 72″ are closed either simultaneously or successively while the valve 72 is open, and in Fig. 11 I have shown how the lever 12″ will be actuated to carry the operated member to the end of the range of its second partial movement when the valves 72 and 72′ are closed and the valve 72″ remains open.

As before stated, the weighing-machines which I employ as the several box-filling media may be of any suitable type. Each will preferably embody as its essential features a load-receiver, three of which are indicated at G, G′, and G″, these receivers being pivotally supported in the usual manner on beam mechanisms, such as B, B′, and B″, which in turn are pivotally mounted in substantially the same way on the framework. Each load-receiver has a member shiftable for discharging its contents, this shiftable member being of the usual type of load-discharger or closer—such, for example, as is illustrated at L, L′, and L″. The holding means by which these closers will be secured in their shut positions may also be of the ordinary type, coöperating, preferably, with the usual interlocks between the valve and the closer, the construction and the functions of which interlocks are well understood and need not be described in detail. These holding devices or latches are indicated by 82, 82′, and 82″ and are preferably counterweighted, they being in operative relation with suitable releasing means or tripping means controlled by the movements of the operated member or intermediate 22 or 22′ of the connector-train.

This releasing or tripping means constitutes an important feature of my present improvements and embodies as its essential elements two tripping members, one of which is the intermediate or operated member 22 or 22′ and the other of which may be of any suitable construction and may, indeed, be made up of several parts. In this case one of the two main parts of the tripping means will of course be shiftable, as before stated, into and out of operative relation with the other, and the member which is so shiftable is preferably controlled in its operation by the box-filling means, which will be hereinafter described. The releasing means should be so disposed that it may be brought into operative relation with all of the several latches controlling the discharging movements of the different weighing-machines, and hence that part of the tripping means which coöperates with the member 22 or 22′ should embody suitable means for engaging the several latches 82, 82′, and 82″ and releasing the latter at the proper time. It may also embody a member shiftable by the action of some suitable part of the box-feeding mechanism and coöperating directly with the operated member or intermediate of the connector-train. These connections, which form part of the releasing means or tripping means, may be formed in many different ways, as will be obvious; but in the construction illustrated here I have shown a tripping-slide, such as that illustrated at 35, which slide may be supported by guides 36 and 36′ on the framework and is mounted to reciprocate horizontally. This tripping-slide has thereon a plurality of tripping-pins, such as 37, 37′, and 37″, which coöperate, respectively, with the respective latches 82, 82′, and 82″ to release the latter at the proper point in the operation of the apparatus. This tripping-slide 35 also carries the shiftable member, which is movable into and out of operative relation with the intermediate of the connector-train, and said shiftable member may also be in the form of a slide, such as 38, mounted in a guide, such as 35′, disposed transversely of the slide rod or bar 35, the slide 38 having projecting therefrom in this case a pair of pins, such as 38′ and 38″, the upper of which constitutes a tripping member coöperative with the intermediate or tripping member of the connector-train, while the lower constitutes a means by which the slide 38 may be shifted back and forth to bring its pin 38′ into operative relation with the intermediate to carry it away from the latter.

It will be clear that if the intermediate or operated member of the connector-train and the coöperative shiftable slide of the tripping means, of which the intermediate of course forms an element, are properly positioned with respect to each other and the movements of the two parts are suitably proportioned the intermediate will not shift the slide-rod unless the slide on said rod is in its proper position, and also if said slide is in such position the intermediate will not reciprocate the slide-rod unless the intermediate has been shifted from one end to the other of its total range of movement. If said intermediate is not shifted throughout all of its successive partial movements, which partial movements will preferably be equal, the slide-rod will not be actuated, and the movement of the latter will not take place until the final partial movement of the intermediate shall have been effected by the closing of the last valve of the several weighing-machines. Hence it will be seen that it is this last partial movement of the intermediate or operated member of the connector-train which, in conjunction with a coöperative member of the releasing means or latch-tripping devices, controls the discharge of the completed loads from the receivers of the several weighing mechanisms.

Any suitable connections between the pin 38″ of the slide 38 and the box-feeding means may be employed. In this case I have illustrated a lever 40, pivoted on a support or base, such as 41, forming part of the framework, and forked at one end to engage the pin 38″. At the opposite end thereof the lever 40 may be connected, as by means of the rod 42, to a controller or actuator governed by the box-feeding means, preferably in the form of a counterweighted angle-lever, such as 43, on the framework, one arm of this lever being so positioned as to project into the path of a box operated by a box-feeder and be controlled in its movements by such box. Hence the releasing means is not only controlled by the connector-train or lever-train of the weighing apparatus, but is also governed by the proper positioning of a box or boxes operated by the box-feeding means.

The box-feeding means is mounted, as before stated, on the bed or table 3 of the apparatus and embodies a plurality of box-feeders, preferably in the form of endless traveling feed-belts, at least one of which is operative to advance a box or row of boxes into position to be shifted under the discharge ends of the spouts controlling the filling of such box or boxes, one or more box-discharging devices or belts being employed also for discharging the filled boxes from the machine. This type of feeding means is substantially similar in many respects to that illustrated and described in my application hereinbefore referred to. Suitable controlling means will of course be employed for regulating the movements of these feeders or belts, so that they will operate properly to advance, shift, and discharge the boxes, and, moreover, one or more of these feed-belts will control, preferably by means of the boxes carried thereby, the release of the shiftable members for discharging the loads made up in the latter.

The feeding mechanism or feed-belts may be driven in any suitable manner, and in this

instance I have shown at 44 a main driving-shaft carrying a driving-wheel 45, which may be rotated from a source of power continuously in any suitable manner. The shaft 44 is journaled in suitable bearings preferably formed in hangers projecting below the upper side of the table 3, and in this case said shaft is a relatively short one and carries thereon near its inner end a power-transmitting member or gear, such as 46, which may in turn mesh with a corresponding gear, such as 47, secured to a shaft 48, having at its opposite end a band-wheel 49, supporting one of the feeders or feed-belts—in this case the belt which is operative for receiving and advancing into the machine empty boxes—this feed-belt being indicated herein at 50 and passing around another band-wheel, such as 51, carried by a shaft 52, extending substantially from end to end of the machine and supported in suitable bearings carried by the table 3. As the driving-shaft 48 for the belt 50 is geared directly to the main driving-shaft 44, the belt 50 will of course be operated continuously, as the band-wheel 45 is intended to be rotated continuously by a belt, such as 45′.

Another box-feeder or feed-belt, which is intended to be operated continuously in the same manner as the belt 50, is the box-discharging belt, by means of which the filled boxes will be carried away from the machine. This feed-belt is intended in this case to be driven from the gear 47, which may mesh with a corresponding gear, such as 53, secured to a short shaft, such as 54, having a band-wheel, such as 55, carrying a box-feeder or feed-belt, such as 56, which constitutes the box-discharging belt for delivering the filled boxes from the machine. At the opposite side of the table 3 this feed-belt 56 may be passed around the band-wheel 57, coöperating with and having its axis in parallelism with that of the band-wheel 55, said band-wheel 57 being carried by another short shaft, such as that indicated by 58, which may be mounted in proper bearings in the ordinary manner. The belt 58, as well as that shown at 50, will of course operate continuously in the construction illustrated, but obviously said belts will move in opposite directions.

For the purpose of moving the filled boxes away from a suitable box-shifting feeder, which will be described hereinafter, I may make use of another box-discharging belt, which may be of a type such as that indicated by F and substantially similar to the corresponding feeder shown in my application to which I have hereinbefore referred. This box-discharging belt coöperates with that shown at 56 and is intended to deliver the filled boxes onto the latter; but the feed-belt F is not intended in this case to be operated continuously. Instead, it is so connected with the other members of the feeding mechanism or other suitable driving means as to be operative intermittently. In this instance it is intended to be driven from the shaft 58 of the band-wheel 57 by means of a suitable coupling device. In the construction shown the belt F extends from the box-receiving belt 50 to the box-discharging belt 56 and is supported by a pair of pulleys, such as those shown herein at 60 and 61. The former of these two pulleys constitutes the driving member and is supported on a short vertical shaft, such as 62, carried in a proper bearing and having loosely mounted thereon a bevel-pinion, such as 63, which may mesh with a corresponding bevel-pinion 64, fast on the shaft 58. The loose pinion 63 may be made fast to the shaft 62 intermittently by means of a coupling device or clutch member, such as that shown at 65, which is splined on the shaft 62 and is shiftable vertically thereon into and out of engagement with a corresponding clutch member, such as 65′, formed integral with the pinion 63. The manner in which the shiftable coupling member or clutch 65 is controlled will be set forth in detail hereinafter. The belt F will in this instance have projecting from the belt or band portion 66 thereon a circuit of box-separating and actuating members or blades, such as those shown at 67, these blades being preferably equidistant from one another and disposed at intervals just sufficient to receive the boxes. These feeders do not support the boxes; but the box-shifting feeder preferably constitutes a box-support, and hence the actuating members 67, traveling with the belt 66, are intended to shift the boxes along and slide them transversely of the box-shifting belt onto the continuously-operative box-discharging belt 56. At the point where the boxes get off from the box-shifting feeder and onto the belt 56 I may provide a guide, preferably located obliquely to these two belts, so positioned as to facilitate the discharge of the boxes from the feeder F. This guide is indicated herein at 68.

The band-wheel 61, which, like that shown at 60, is preferably flanged to constitute a support for the belt 66, is mounted on a shaft 62′, properly supported in suitable bearings, and this shaft has secured thereto a spur-gear 69, which, through a suitable gear-train, the several members of which are supported and indicated herein by 70, 71, 75, and 76, is intended to operate a box-feeder, coöperative with the box-receiving feed-belt 50 for shifting the entering boxes onto the box-shifting feed-belt. This feeder operated by the gear-train is in the form of a swinging arm, such as that shown at 77, pivoted to a crank-arm 78, movable in unison with the pinion 76, and this feeder 77 may be pivoted to a fixed portion of the frame by means of a guide-link, such as 79, so as to be properly controlled in its movements. The operating end of the feeder 77 is indicated by 77′ and is in the form of a finger adapted to swing in an orbit and engage the entering boxes successively as they arrive at the discharge end of the feeder 50. It will be obvious that when a box is so

engaged by the finger 77′ coming in contact with the outer side thereof said box will be drawn forward substantially in the direction of movement of the feed-belt 50 and at the same time forced sidewise by a movement which will carry it onto the box-shifting feeder.

For the purpose of assuring the delivery of the boxes onto the box-shifting feeder I prefer to employ box-guiding means such as that indicated by 85.

The box-shifting feeder may be of any suitable construction; but I prefer to make use of an endless traveling feed-belt, such as shown at 86, this belt preferably being a short but relatively wide one, so that the row of boxes may be shifted thereby into position to permit the boxes to be filled by the weighing-machines hereinbefore described. This feed-belt is mounted in the present instance on rollers or cylinders, such as 87 and 88, carried by suitable shafts 87′ and 88′, disposed in parallelism with each other and suitably journaled in bearings carried by the table 3. In the construction illustrated the cylinder or roller 87 is intended to be driven by a friction-roller preferably operated directly from the main driving-shaft 44 by means of a suitable gear-train. One member of this gear-train is the pinion 46, with which meshes a pinion 90, (see Fig. 6,) the hub of this pinion being secured to the rock-shaft 92 of a rock-frame embodying a rock-lever 92′, the upper end of which has a rod on which is journaled a pinion 93, while the lower end of said lever is pivotally connected, by means of a rod, such as 94, with a short link, such as 95, pivoted to a fixed arm 96, projecting from the framework, the two members 94 and 95 constituting a toggle which when straightened out serves to carry a friction-roller 97, secured to the pinion 93, into engagement with the belt 86 to drive the latter. It will be obvious that when the toggle is struck the friction-roller 97 will be shifted out of engagement with the periphery of the cylinder 87 and the box-shifting feed-belt will stop moving.

The upper run of the box-shifting feeder 86 preferably passes over and in contact with the central portion 3′ of the upper or flat part of the table 3, it being understood, of course, that suitable openings are provided, as shown clearly in Fig. 6, to receive the box-shifting feed-belt and permit the latter to operate freely. As the box-shifting feeder moves of course the boxes supported thereon will be correspondingly shifted; but as they are supported by the table they will be maintained at all times in the same vertical position.

It will be noticed that the rock-shaft 92 and the outer end of the fixed arm 96 are maintained at a fixed distance apart, as by means of a suitable connecting-rod 98, which may be made of two members connected by a turnbuckle for the purpose of gaging accurately the position of the friction-roller 97 and assuring the proper movement of the box-shifting feeder.

As before stated, one of the important features of this box-feeding mechanism is the employment, in connection with the box-receiving feeding means and the box-shifting feeder, of a shiftable guide coöperative with the empty boxes and with the box-shifting feed-belt to engage the boxes at that side thereof which is adjacent to the discharge end of said box-shifting feeder while the latter is still, and I have illustrated a guide in the form of a vertically-movable part, such as 100, which may be secured to a pair of carrier-arms, such as 101 and 101′, mounted for vertical sliding movement on a pair of guide-rods, such as 102 and 102′, which may be supported at their lower ends by brackets 103 and 103′ rising from the table 3, and at their upper ends by the table 2 in any suitable manner, as by the walls of guide-sockets in such table. The two brackets 103 and 103′ also support in the construction shown a guide preferably fixed, (indicated by 104,) this last-mentioned guide coöperating with the shiftable guide-bar 100 and the two guide-bars being disposed at an interval substantially equal to the diameter of the cans.

In order to shift the movable guide-bar 100 out of the path of movement of the boxes when the feed-belt 86 is to be operated, I may make use of a suitable box-guide actuator, which in the construction illustrated comprises links, such as 105, connected to the arms 101 and 101′ and also connected to a counterweighted rock-frame embodying, preferably, a pair of counterweighted levers 106, supported on a rock-shaft 107, journaled in the framework between the tables 2 and 3. This box-guide actuator is intended to be controlled by the box-feeding means, preferably directly by the filled boxes, and in this case a link 108 is connected to the counterweighted end of the box-guide actuator and to the short arm of an angle-lever, such as 109, mounted on the framework and having a long arm or finger adapted to project into the path of the filled boxes and constituting a controller or blocking device governing the movements of the box-guide actuator. The short arm of the angle-lever 109 may be connected by means of a rod 110 with the pivot of the toggle formed by the connecting-rod 94 and the link 95, and this connecting-rod 110 is intended to control the coupling member or friction-roller 97, and hence the box-shifting feeder. The box-guide actuator is also intended to form the means for operating the coupling member or clutch 65, by which the operation of the box-discharging belt F is controlled. The connections illustrated herein comprise a link 112, pivoted to the lever 106 at the opposite side of the rock-shaft 107 from that at which the link 108 is pivoted, said link 112 being in turn pivoted at its lower end to a shifting lever or shipper, such as 113, pivoted at one of its ends on the table 3 and

at its other end having the usual fingers working in a peripheral groove in the clutch member 65. It will be apparent from the construction illustrated that the two coupling members 65 and 97 operate oppositely—that is to say, when the clutch 65 is clutched to the bevel-pinion 63 the friction-roller 97 does not operate the box-shifting feed-belt, while when the toggle 94 95 is straightened out the clutch member 65 is out of engagement with the corresponding clutch member on the bevel-pinion 63 and the latter turns loosely on its shaft. Moreover it will be noticed that by reason of the fact that the blocking device and the coupling members are counterweighted said members tend to return or be reactive to their normal positions, but of course a spring or other equivalent of a weight may be employed to render each of these devices reactive.

In the box-transferring mechanism illustrated herein six boxes or cans will be filled at each operation and all of the boxes will usually be presented in position for filling in a single row. Hence the several discharge-spouts from the weighing-machines, which spouts are designated by 115, are disposed with their discharge ends in alinement substantially over the center of the upper run of the belt 86. The boxes or cans to be filled must therefore be brought to a position substantially central with respect to the extreme ends of the upper run of the belt before they can receive the material from the discharge-spouts of the box-filling means or weighing-machines. These boxes, however, are not fed directly into this position, as will be obvious by referring particularly to Fig. 4, but are first fed into position between the two guides 100 and 104, while the belt 86 is still and are afterward shifted to the central position below the discharge-spouts 115 when the box-shifting feeder is operated. After the boxes have been filled, which operation will of course take place while the box-shifting feeder is at rest, the filled boxes will be shifted to the third position into the path of the movement of the actuating-blades 67 of the box-discharging belt F, these filled boxes being carried away by said belt while the belt 86 is at rest, the operation of the box-shifting feeder and of the box-discharging belt F being substantially similar in all respects to the operation of the corresponding belts shown in my application, to which I have hereinbefore referred.

The operation of a box-filling machine constructed in accordance with this invention, as embodied in the apparatus shown in the drawings of this application, is as follows: It being understood that all the parts will be in their normal positions for the making up of a new load in each of the load-receivers and for advancing a row of empty boxes onto the box-shifting feed-belt 86, it will be seen that all of the valves of the weighing-machines are wide open and delivering material into their receivers, the closers therefore being shut of course at such time. The several weighing-machines will operate in the usual manner of mechanisms of this class, each making up its own load entirely independently of the operation of the weighing mechanisms of the other machines, and each valve closing at the proper time when the charge delivered thereby has been completed. As each closer shuts it will of course shift that element of the connector-train with which it is directly connected, and other members of the train may be operated without, however, affecting the operation of those other valve-controlled members which act directly to determine the movement of the operated member or intermediate of the connector-train. Hence this intermediate will not be shifted to the end of the range of its final partial movement, and therefore to the end of the range of its total movement, until all of the valves or operating members shall have closed under the several spouts 6 and cut off the several flow-streams, and until this operated member or intermediate shall have been moved to this final position it will not be capable of coöperating with a coacting releasing member for tripping the bucket-latches controlling the discharge of the several loads. During the operation of the several weighing-machines the box-transferring mechanism will of course be operating, the two belts 50 and 56 traveling continuously and the box feeder or pusher 77′ also moving continuously in its orbit. As these two box-receiving feeders operate they will of course gradually feed onto the box-shifting feed-belt 86 a row of empty boxes, the operation of the several belts being so timed that when a full row of empty boxes is in place the last box of a row of previously-filled boxes will have just been discharged onto the belt 56 by the feed-belt F. Obviously at the beginning of the operation the action of the transferring mechanism will be controlled by the attendant, who will manipulate the rock-arm 109 and the lever 43 in such a manner as to cause three rows of cans to be fed to the machine successively and shifted sidewise after they are filled, the weighing-machines of course discharging their contents into the cans at the proper times. As soon as there are two rows of filled cans and one row of empty cans on the transfer-belt the operation of the machine of course becomes entirely automatic. It being assumed that there are two rows of filled boxes on the box-shifting feed-belt 86 and one row of empty boxes, it will be clear that as soon as the last empty box is in place the last filled box of the last row will be discharged. The discharge of this box will cause the release of the blocking device or lever 109, and the latter being immediately shifted by its counterweight into the position shown in Fig. 2 the box-guide actuator, of which such counterweight forms a part, will cause the withdrawal of the shiftable box-

guide 100 out of the path of movement of the boxes. At the same time the connecting links or rods will withdraw the clutch 65 from engagement with the coacting clutch member 65′ to stop the movement of the belt F, the friction-roller 97 being carried also into operative relation with the box-shifting feed-belt and its carrying-cylinder. At this time the pin 38′ on the latch-tripping slide 38 is of course out of operative relation with the intermediate, no matter what the position of the latter may be, as there is no box at the beginning of the last row of filled boxes, and hence the counterweighted lever 43 holds the rod 42 in its uppermost position. As soon as the belt F stops moving and the box-shifting feeder starts in operation the row of empty boxes, released by the box-guide 100, will be carried underneath the spouts 115 into position to be filled. As soon as they arrive at this position the row of filled boxes immediately in advance of them will reach the position shown at the left in Fig. 1, and the last box of such row will engage the depending arm of the angle-lever 43 and shift the angle-lever into position to carry the tripping-finger 38′ into the path of the intermediate, and thereby operate the slide-rod 35 to release all of the latches of the weighing-machines. At the same time that the counterweighted lever 43 is thus shifted the lever-arm 109 is also oscillated to the position shown in Fig. 1 by the first filled box of the row shown at the left in said figure, and the coupling devices are operated in a manner opposite of that last hereinbefore described, the clutch 65 being carried into engagement with the coacting clutch member 65′ to start the belt F in operation and the friction-roller 97 being simultaneously released from the box-shifting feed-belt 86, the box-guide 100 being also carried down to its operative position. As soon as a single box is shifted onto the discharge-belt 56 the counterweighted lever 43 is released and carries the slide 38 back to its inoperative position. Obviously of course the weighing-machines will all return to their normal positions for making up new loads as soon as one series of loads is discharged. On the delivery of the last filled box of the row just referred to onto the discharge-belt 56 the coupling devices will be operated again to stop the feeder F and start the box-shifting feeder 86 again to shift the filled boxes from under the discharge-spouts 115, this operation and all succeeding ones being substantially similar to those set forth at the beginning of the operation of the apparatus.

Having described my invention, I claim—

1. The combination, with a plurality of operating members, of an operated member having a total movement comprising a plurality of partial movements controlled, respectively, by said respective operating members, and a movement-accumulating connector-train connected with the operating members at different points at one end of the train and connected with the operated member at a single point at the other end of the train.

2. The combination, with a plurality of operating members, of an operated member having a total movement comprising a plurality of equal partial movements controlled, respectively, by said respective operating members, and a movement-accumulating connector-train connected with the operating members at different points at one end of the train and connected with the operated member at a single point at the other end of the train.

3. The combination, with a plurality of independently-operating members, of an operated member having a total movement controlled, respectively, by said respective operating members, and a movement-accumulating connector-train connected with the operating members at different points at one end of the train and connected with the operated member at a single point at the other end of the train.

4. The combination with a plurality of operating members, of an operated member having a total movement comprising a plurality of partial movements controlled, respectively, by said respective operating members, and a movement-accumulating lever-train connected with the operating members at different points at one end of the train and connected with the operated member at a single point at the other end of the train.

5. The combination, with a plurality of operating members, of an operated member having a total movement comprising a plurality of partial movements controlled, respectively, by said respective operating members, and a movement-accumulating lever-train connected with the operating members at different points at one end of the train and connected with the operated member at a single point at the other end of the train, said train embodying levers having shiftable pivots.

6. The combination, with a plurality of operating members, of an operated member having a total movement comprising a plurality of partial movements controlled, respectively, by said respective operating members; a movement-accumulating connector-train connected with the operating members at different points at one end of the train and connected with the operated member at a single point at the other end of the train; and a shiftable member operative by the final partial movement of the operated member.

7. The combination, with a plurality of operating members, of an operated member having a total movement comprising a plurality of partial movements controlled, respectively, by said respective operating member; a movement-accumulating connector-train connected with the operating members at different points at one end of the train and connected with the operated member at a single point at the other end of the train; and a plurality of shiftable members all operative by

the final partial movement of the operated member.

8. The combination, with a plurality of operating members, of an operated member having a total movement comprising a plurality of partial movements controlled, respectively, by said respective operating members; a movement-accumulating connector-train connected with the operating members at different points at one end of the train and connected with the operated member at a single point at the other end of the train; and a plurality of shiftable members simultaneously operative by the final partial movement of the operated member.

9. In weighing mechanism, the combination, with a plurality of operating members, of load-receivers each having a member shiftable for discharging a load; a releasing device for said shiftable members and having a total movement comprising a plurality of partial movements controlled, respectively, by said respective operating members; and a movement-accumulating connector-train connected with the operating members at different points at one end of the train and connected with the releasing device at a single point at the other end of the train.

10. In weighing mechanism, the combination, with a plurality of operating stream-controllers, of a plurality of load-receivers; a plurality of load-dischargers; holding means for said load-dischargers; a releasing device controlling all of said holding means and having a total movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the releasing device at a single point at the other end of the train.

11. In weighing mechanism, the combination, with a plurality of oscillatory operating-valves, of a plurality of load-receivers each having a member shiftable for discharging a load; a releasing device controlling all of said shiftable members, and having a total movement comprising a plurality of partial movements controlled, respectively, by said respective valves; and a movement-accumulating connector-train connected with the valves at different points at one end of the train and connected with the releasing device at a single point at the other end of the train.

12. In a weighing mechanism, the combination, with a plurality of operating stream-controllers, of load-receivers each having a member shiftable for discharging a load; releasing means for said shiftable member and embodying two members, one of which is shiftable relatively to the other, and one of which has a total releasing movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; controlling means governing one of said members of the releasing means; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the releasing means at a single point at the other end of the train.

13. In weighing mechanism, the combination, with a plurality of operating stream-controllers, of a load-receiver having a member shiftable for discharging a load; releasing means for said shiftable member and embodying two members, one of which is shiftable relatively to the other, and one of which has a total releasing movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; automatic controlling means governing one of said members of the releasing means; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the releasing means at a single point at the other end of the train.

14. In weighing mechanism, the combination, with a plurality of operating stream-controllers, of a load-receiver having a member shiftable for discharging a load; an intermediate having a total movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; a tripper controlling the release of the shiftable member of the load-receiver and shiftable into and out of operative relation with said intermediate and operative by the latter; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the intermediate at a single point at the other end of the train.

15. In weighing mechanism, the combination, with a plurality of stream-controllers, of a plurality of load-receivers each having a member shiftable for discharging a load; an intermediate having a total movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; a tripping-slide operative for releasing all of said shiftable members of the load-receivers; a slide on said tripping-slide and shiftable into and out of operative relation with the intermediate; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the intermediate at a single point at the other end of the train.

16. In a box filling and transferring machine, the combination, with a plurality of weighing-machines each embodying a member shiftable for discharging a load, and holding means for said shiftable members, of automatic box-feeding means, and a releasing device common to all of said weighing-machines and automatically operative from said box-feeding means for releasing said holding means.

17. In a box filling and transferring ma-

chine, the combination, with a plurality of weighing-machines each embodying a member shiftable for discharging a load, and holding means for said shiftable members, of automatic box-feeding means, and a box-controlled releasing device common to all of said weighing-machines and automatically operative by a box for releasing said holding means.

18. In a box filling and transferring machine embodying weighing mechanism, the combination, with box-feeding means, of a plurality of operating stream-controllers; a load-receiver having a member shiftable for discharging a load; an intermediate having a total movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; a tripping member controlling the release of the shiftable member of the load-receiver and controlled by the box-feeding means, and shiftable into and out of operative relation with said intermediate and operative by the latter; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the intermediate at a single point at the other end of the train.

19. In a box filling and transferring machine embodying weighing mechanism, the combination, with a box-advancing feeder and with a box-shifting feeder, of a plurality of operating stream-controllers; a load-receiver having a member shiftable for discharging a load; an intermediate having a total movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; a tripping member controlling the release of the shiftable member of the load-receiver and controlled by the box-shifting feeder, and shiftable into and out of operative relation with said intermediate and operative by the latter; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the intermediate at a single point at the other end of the train.

20. In a box filling and transferring machine embodying weighing mechanism, the combination, with a box-advancing feeder and with a box-shifting feed-belt, of plurality of operating stream-controllers; a load-receiver having a member shiftable for discharging a load; an intermediate having a total movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; a tripping member controlling the release of the shiftable member of the load-receiver and controlled by the box-shifting feed-belt, and shiftable into and out of operative relation with said intermediate and operative by the latter; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the intermediate at a single point at the other end of the train.

21. In a box filling and transferring machine embodying weighing mechanism, the combination, with box-feeding means, of a plurality of operating stream-controllers; a load-receiver having a member shiftable for discharging a load; an intermediate having a total movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; a box-controlled tripping member controlling the release of the shiftable member of the load-receiver and controlled by the box-feeding means, and shiftable into and out of operative relation with said intermediate and operative by the latter; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the intermediate at a single point at the other end of the train.

22. In a box filling and transferring machine, the combination, with box-feeding means, of a plurality of stream-controllers; a load-receiver having a member shiftable for discharging a load; an intermediate having a total movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; a counterpoised tripping member controlling the release of the shiftable member of the load-receiver and controlled by the box-filling means, and shiftable into and out of operative relation with said intermediate and operative by the latter; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the intermediate at a single point at the other end of the train.

23. In a box filling and transferring machine embodying weighing mechanism, the combination, with box-feeding means, of a plurality of operating stream-controllers; a load-receiver having a member shiftable for discharging a load; an intermediate having a total movement comprising a plurality of partial movements controlled, respectively, by said respective stream-controllers; a tripping member shiftable into and out of operative relation with the intermediate and coöperative therewith for releasing the shiftable member of the load-receiver; a reactive box-operated blocking device connected with said tripping member; and a movement-accumulating connector-train connected with the stream-controllers at different points at one end of the train and connected with the intermediate at a single point at the other end of the train.

24. In a box filling and transferring machine embodying weighing mechanism, the combination, with box-feeding means, of a stream-controller; a load-receiver having a member shiftable for discharging a load; tripping means embodying two coöperative

tripping members one of which is shiftable into and out of operative relation with the other; and a box-operated blocking device connected with one of said tripping members and controlling the operation of the tripping means.

25. In a box filling and transferring machine embodying weighing mechanism, the combination, with box-feeding means, of a stream-controller; a load-receiver having a member shiftable for discharging a load; tripping means embodying two coöperative tripping members one of which is shiftable into and out of operative relation with the other; and a counterweighted box-operated blocking device connected with one of said tripping members and controlling the operation of the tripping means.

26. In a box filling and transferring machine, the combination, with box-feeding means, of a stream-controller; a load-receiver having a member shiftable for discharging a load; and a reactive blocking device controlled by the box-feeding means and controlling the release of the shiftable member of the load-receiver.

27. In a box filling and transferring machine, the combination, with box-feeding means, of a plurality of weighing-machines each having a member shiftable for discharging a load, and a reactive blocking device controlled by the box-feeding means and controlling the release of all of said shiftable members of the load-receivers.

28. In a box filling and transferring machine, the combination, with a box-advancing feed-belt and with a box-shifting feed-belt, of a plurality of weighing-machines each having a member shiftable for discharging a load, and a reactive box-operated blocking device controlled by the box-shifting feed-belt and controlling the release of all of said shiftable members of the load-receivers.

29. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; a box-shifting feeder; and a shiftable box-guide coöperative with said box-shifting feeder.

30. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; a box-shifting feeder; and a shiftable box-guide coöperative with, and disposed over, said box-shifting feeder.

31. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; a box-shifting feeder; and a box-guide coöperative with, and shiftable toward and from, said box-shifting feeder.

32. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; a box-shifting feeder; and a vertically-shiftable box-guide coöperative with said box-shifting feeder.

33. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; a box-shifting feeder; and a shiftable box-guide disposed at that side of an entering empty box which is adjacent to the discharge end of said box-shifting feeder.

34. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; a box-shifting feeder; a box-guide at that side of an entering empty box which is adjacent to the receiving end of the box-shifting feeder; and a shiftable box-guide at that side of said box which is adjacent to the discharge end of said feeder.

35. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; an intermittently-operative box-shifting feeder; means for starting and stopping said box-shifting feeder; and a box-guide shiftable on the starting of the box-shifting feeder.

36. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; an intermittently-operative box-shifting feeder; means for starting and stopping said box-shifting feeder; and a box-guide normally disposed at that side of an entering empty box which is adjacent to the discharge end of the box-shifting feeder, and shiftable out of the path of movement of such box on the starting of the box-shifting feeder.

37. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; a box-shifting feeder; and a box-operated shiftable box-guide coöperative with said box-shifting feeder.

38. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; a box-shifting feeder; a shiftable box-guide coöperative with said box-shifting feeder; and a box-controlled box-guide actuator.

39. In a box filling and transferring machine, the combination, with box-filling means, of a box-advancing feeder; a box-shifting feeder; a shiftable box-guide coöperative with said box-shifting feeder; and a counterweighted box-controlled box-guide actuator.

40. In a box filling and transferring machine, the combination, with box-filling means, of a pair of alternately-operative box-feeders movable transversely to each other and one constituting a box-discharger; a shiftable box-guide; and a box-controlled box-guide actuator.

41. In a box filling and transferring machine, the combination, with box-filling means, of a driving member; box-feeding means; and box-controlled coupling means controlling the movements of said box-feeding means.

42. In a box filling and transferring machine, the combination, with box-filling

means, of driving means; a pair of alternately-operative box-feeders; and box-controlled coupling means controlling the movements of said box-feeders.

43. In a box filling and transferring machine, the combination, with box-filling means, of a driving member; box-feeding means; and reactive box-controlled coupling means controlling the movements of said box-feeding means.

44. In a box filling and transferring machine, the combination, with box-filling means, of a pair of alternately-operative box-feeders movable transversely to each other and one constituting a box-discharger; driving means; a box-controlled box-guide; and box-controlled coupling means operative simultaneously with said box-guide and controlling the movements of said box-feeders.

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Witnesses:
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