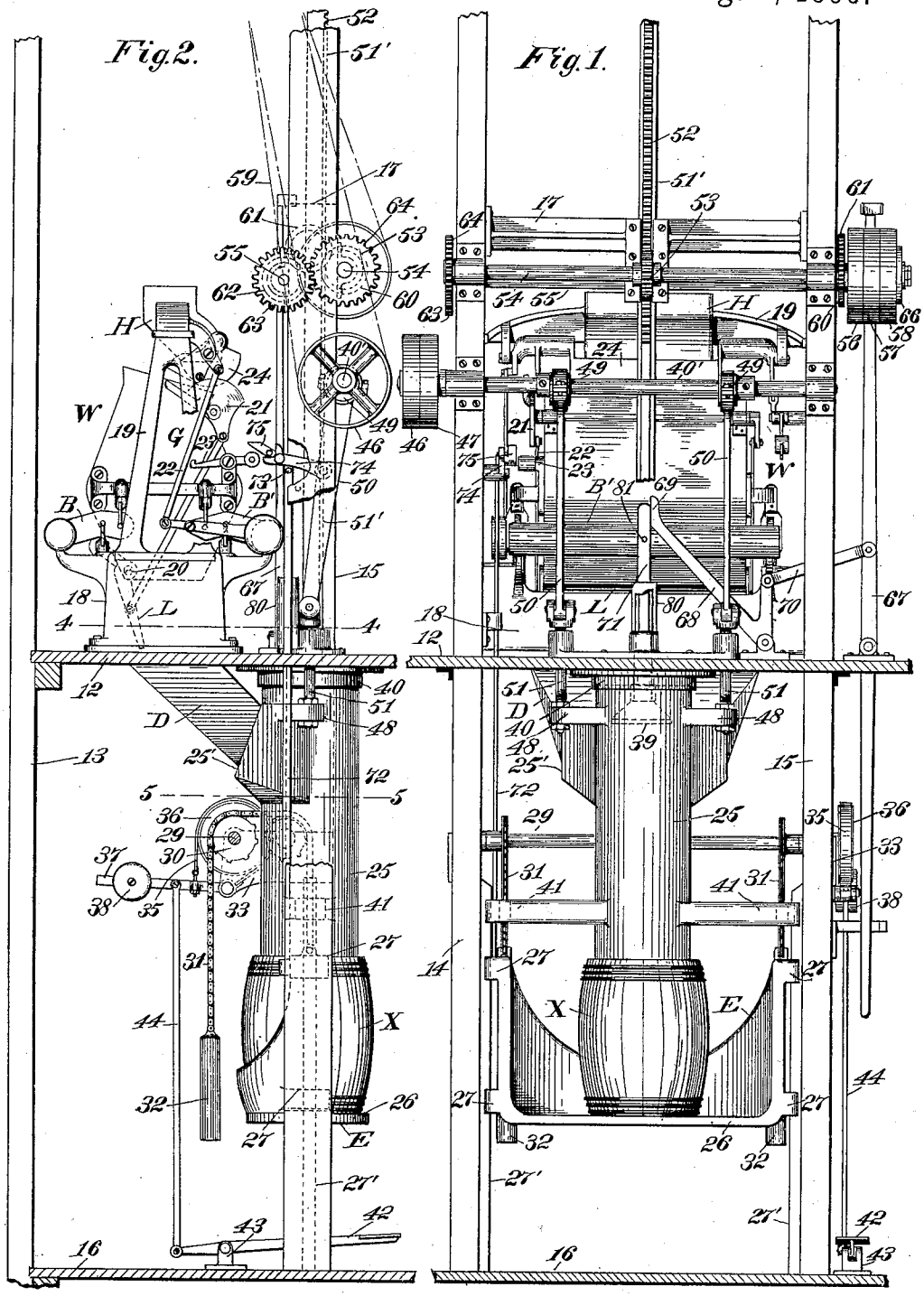
(No Model.) 3 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING AND PACKING MACHINE.

No. 565,228. Patented Aug. 4, 1896.



Witnesses
R. W. Pittman
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Inventor:
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(No Model.)

3 Sheets—Sheet 2.

F. H. RICHARDS.

WEIGHING AND PACKING MACHINE.

No. 565,228. Patented Aug. 4, 1896.

Fig. 3.

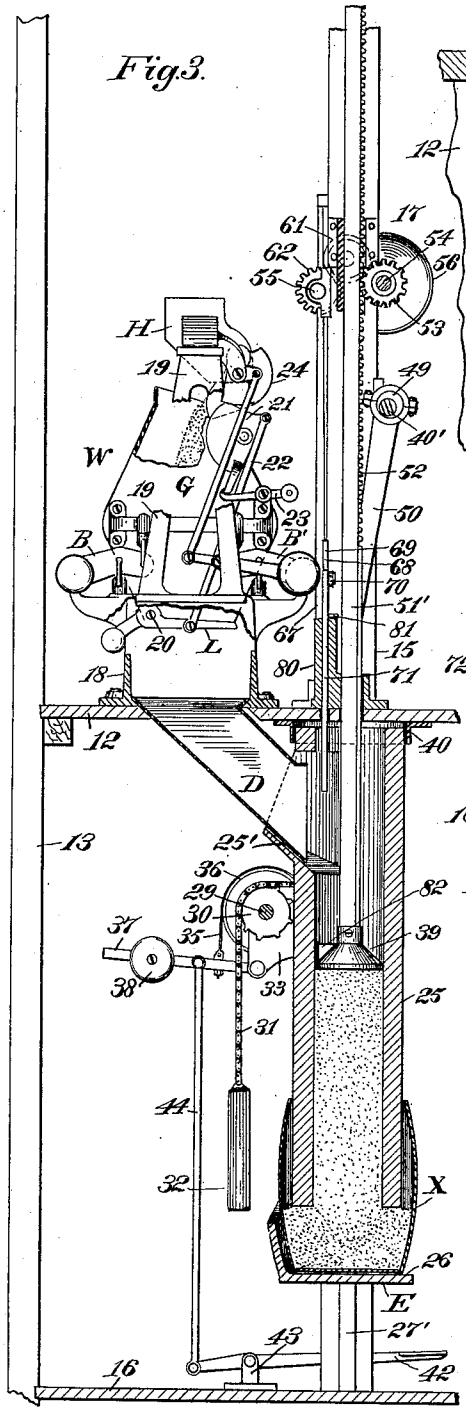


Fig. 4.

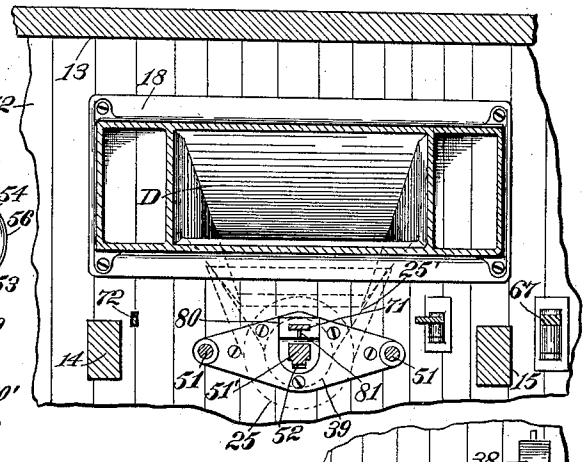


Fig. 5.

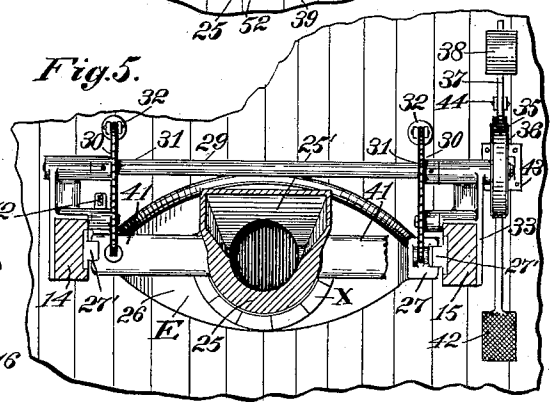


Fig. 6.

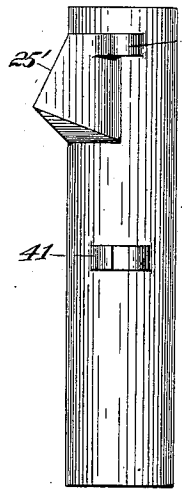
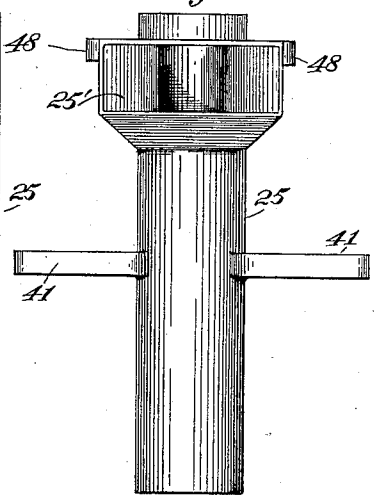


Fig. 7.



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(No Model.) 3 Sheets—Sheet 3.

F. H. RICHARDS.

WEIGHING AND PACKING MACHINE.

No. 565,228. Patented Aug. 4, 1896.

Fig. 8.

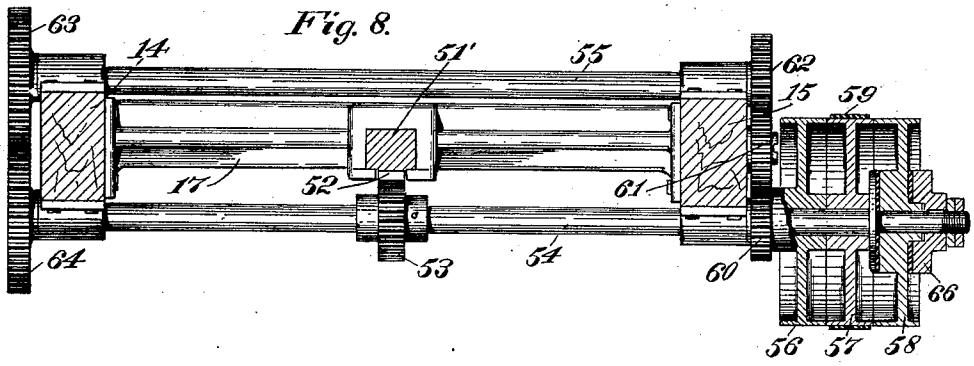


Fig. 9.

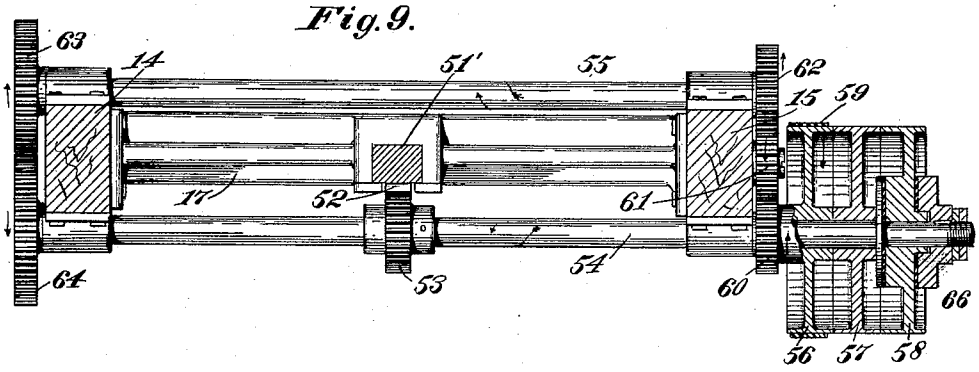
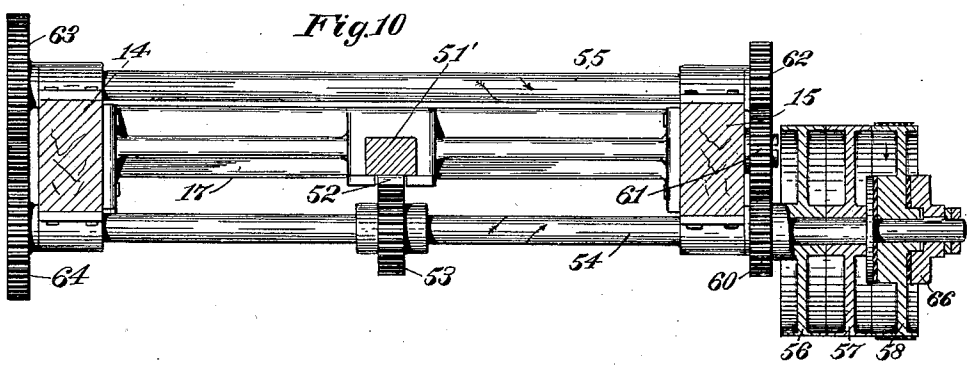


Fig. 10.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING AND PACKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 565,228, dated August 4, 1896.

Application filed April 10, 1896. Serial No. 586,927. (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 Weighing and Packing Machines, of which the following is a specification.

This invention relates to weighing and packing machines, an object being to provide an improved apparatus of this character embodying means for supplying predetermined complete quantities or charges of material of various classes to the packing mechanism to be packed or compressed by the latter in a suitable receptacle or vessel, each of said quantities being fully disposed of before said mechanism is ready for a repetition of the operation.

Another object of the invention is to provide improved means for firmly and densely packing suitable material in a receptacle and evenly distributing the mass therein, so that its pressure, during the process of packing and when packed, is not directed to any one point or points, whereby the usual tendency—particularly in the case of bags, both textile and paper—to rupture or break at the point of greatest stress is wholly obviated.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of my apparatus in the preferred embodiment thereof, showing a barrel in position for receiving a charge of material to be packed therein. Fig. 2 is an end elevation of the apparatus as seen from the left in Fig. 1, the operative mechanisms thereof being in positions corresponding with Fig. 1. Fig. 3 is a similar view showing a charge of material in the barrel in course of compression. Fig. 4 is a sectional plan view, the section being taken on line 4 4, Fig. 2, and illustrating a means for supplying a receptacle with a charge of material. Fig. 5 is a detail view in sectional plan, the section being taken on the line 5 5, Fig. 2, said figure illustrating a part of the packing mechanism. Figs. 6 and 7 are detail views, in end and rear elevation, respectively, of a combined conduit and plunger. Figs. 8, 9, and 10 are horizontal sectional plan views of driving or actuating mechanism for a plunger, said mechanism being illustrated in three successive positions. Similar characters designate like parts in all the figures of the drawings.

My present invention embodies, fundamentally, means of a suitable nature for supplying the packing mechanism with separated quantities or lots of material, each of which is entirely disposed of or packed before said mechanism is reset for receiving a succeeding charge, and being, in this respect, and so far as I am aware, dissimilar from prior methods, and also particularly advantageous. As heretofore, where a continuous unbroken supply or stream of material has been maintained, the packing mechanism is rendered susceptible in a marked degree to clogging, which seriously interferes with the successful operation of such mechanism, oftentimes necessitating its stoppage until the difficulty is removed by hand.

In the embodiment of the invention herein illustrated it comprises, as one of its constituent elements or members, weighing mechanism which may be of any suitable construction adapted for intermittently supplying the packing mechanism with charges of material, the bucket-discharge being also preferably controlled from and by means operative with the packing mechanism, whereby the apparatus is rendered absolutely automatic in its action. The capacity of the bucket or load-carrying receptacle of the weighing mechanism should preferably approximate that of a receptacle—such as a barrel—which is adapted to receive such weighed load, so that there will be no excess of material after such receiving-receptacle has been fully packed.

For convenience in illustrating the nature and purpose of my present apparatus a weighing machine or mechanism of the type disclosed in Letters Patent No. 548,840, granted to me October 29, 1895, is herein shown, the principal operative parts of which, or so much thereof as bear a relation to the improvements hereof, will be hereinafter specifically described, and reference may be had to said Letters Patent for a more extended description of said mechanism.

The weighing machine or mechanism is designated, in a general way, by W, and it is also shown suitably supported—in the present instance by the bracket or floor 12, extending from the wall 13.

The framework for supporting the various

operative mechanisms of the apparatus—irrespective of the weighing mechanism, which, as has been stated, is shown supported by the bracket 12—may be of any suitable or preferred form, but is herein illustrated comprising the two side frames or uprights 14 and 15, extending upward from the floor 16, and which may project through openings formed in the supporting-bracket 12, said side frames being suitably secured against movement and also shown connected near their top by the brace or cross-beam 17.

The weighing mechanism is illustrated comprising a chambered or hollow supporting-base 18, said base being bolted or otherwise suitably fastened to the bracket 12.

The supporting-base 18 is illustrated constituting a means for supporting the beam mechanism, which consists of the oppositely-disposed scale-beams B and B′, said beam mechanism carrying the bucket or load-carrying receptacle G, which intermittently discharges its loads or charges of material into the chamber of the supporting-base 18, to be disposed of in a manner hereinafter described.

The framework for supporting certain of the operative members of the weighing mechanism is designated by 19, and is mounted on the base 18, being shown carrying the supply chute or hopper H, which contains the mass of material to be weighed and subsequently packed, and which, in turn, may be supplied with such material in some suitable manner.

The weighing-bucket G is shown provided with the closer L, pivotally supported thereto at 20 and adjacent to one side of its discharge-opening.

As a means for maintaining the closer L in its normal or shut position an inverted toggle is shown, one member of which may be suitably locked by a latch or analogous device. In the form herein illustrated this toggle comprises the rocker 21, pivotally supported near the upper side of the bucket and having the connecting-rod 22, pivotally connected to said rocker and also to the bucket-closer, so that when the latter is in its normal position, as indicated in Fig. 3, with the three toggle-pivots substantially in line and the rocker-pivot above the other pivots, said rocker may be engaged by a latch and held against oscillatory movement with a minimum pressure thereon, the entire weight of the bucket contents being supported practically by the rocker-pivot. As a means for thus holding the rocker, and thereby the bucket-closer L, against opening or bucket-discharge movement, a pivotally-supported counterweighted latch 23 is illustrated, it being preferably provided with a detent for engaging a coöperating detent formed on the rocker 21 when the closer is in its normal or shut position, as previously described. The latch is also preferably depressible for disengaging the two described detents, thereby freeing the bucket-closer L, so that the bucket contents may force said closer open.

It will be remembered that the packing mechanism has been hereinbefore described as embodying means for effecting the discharge of a bucket-load, and for obtaining this result said mechanism may carry an actuator for depressing or tripping the latch 23, as will hereinafter appear.

The valve for controlling the supply-stream which flows from the chute or hopper H is designated by 24, and for opening and closing the same some suitable mechanism may be employed. As these members, however, form no part of my present improvements, it is deemed unnecessary to specifically describe them.

An inclined discharge-chute is shown at D, communicating with and suitably secured within the chamber of the supporting-base 18 of the weighing mechanism W, said chute constituting a means for conveying a weighed charge of material to the packing mechanism to be by the latter packed or compressed in suitable vessels or receptacles.

My present invention contemplates the provision of two plungers, one of which is located and operative within the other, said plungers coöperating to firmly and densely pack a substance in a barrel, bag, or other receptacle, and by their combined and peculiar action minimizing the liability of rupture or breakage of such receptacles during the process of packing. In the form herein illustrated these plungers are independently supported, the exterior plunger being designated by 25, it being preferably tubular, thereby also serving as a means for delivering the mass or charge of material received from the weighing mechanism or other source of supply to a barrel, bag, or the like, it constituting, as will be obvious, a combined conduit and plunger and also serving, individually, to pack the material.

The exterior plunger 25, which constitutes the packing-plunger, is illustrated provided with an inlet-opening 25′, communicating with the chamber of the supporting-base 18 by the discharge-chute D, the latter projecting through said opening, which is of a sufficient height and size to permit free vertical movement of the plunger 25 within limits. The connection between the plunger and chute D should also be such a one as will prevent waste at this point.

An elevator is herein illustrated, it being designated, in a general way, by E, constituting a means for supporting a receptacle and for moving the same toward and from its charge-receiving position. The elevator may be of any ordinary or preferred construction, and is herein shown comprising a platform or support 26, on which a barrel X is shown resting, said elevator being also illustrated provided with the guides 27 in sliding engagement with the two tracks 27′, formed on or secured to the side frames 14 and 15.

A transverse shaft is illustrated at 29, its opposite ends being preferably loosely jour-

naled in the side frames 14 and 15, one end of said shaft being also shown extending beyond the side frame 15, for a purpose to be hereinafter described. The shaft 29 is also shown carrying the sprockets or sprocket-wheels 30, which may be keyed or otherwise suitably secured thereto. Two sprocket-chains 31 are also illustrated passed around the sprocket-wheels 30, one end of each of said chains being connected with the elevator E, the free ends of said chains being provided with balance-weights 32, which overbalance, or slightly exceed in weight, the combined weight of the elevator E and an empty receptacle or barrel thereon, the function of said balance-weights being to raise said elevator, so that a receptacle thereon may be carried to its charge-receiving position under the tubular plunger 25. Means are also employed for controlling or checking the descending movement of the elevator E as the barrel X thereon is being filled and packed, and the means illustrated for this purpose will now be described.

The side frame 15 is illustrated provided with the bracket 33, which may be secured thereto by suitable fastening means and through an opening in which the transverse shaft 29 extends, to which shaft may be splined or otherwise secured the friction wheel or pulley 36, the periphery of which will preferably be of some adhesive material. A pressure or friction brake is also illustrated at 35, consisting of a strap partially passed around the pulley 36 and in peripheral engagement therewith, one end of said strap being shown fastened to the bracket 33, the opposite end of said strap being connected with the counterweighted lever 37 at a point intermediate its fulcrum and weight. Said counterweighted lever 37 is shown pivotally supported adjacent to its inner end to the bracket 33, and as also carrying the weight 38, which is preferably adjustable along said lever to better adapt the same to varying conditions.

The counterweighted lever 37, through the intervention of the friction or pressure brake 35, should apply such a pressure to the wheel or pulley 36 as to prevent the shaft 29 from turning or rotating, and thereby also prevent the descending movement of the elevator E, until the exertion of such a force as will overcome the frictional resistance of the brake 35, which is held in contact with the wheel 36, and in accordance with the density or weight of a mass of material under process of compression or impaction in the barrel X.

The internal or force-feed plunger is designated by 39, its working face being preferably flat and in diameter equaling the bore of the external plunger 25. On the downward movement of the interior plunger—this being, like the tubular plunger 25, reciprocal, but intermittent, it being simply raised to permit the introduction of a charge of material to a receiving-receptacle—the mass will be force-fed downward by the internal plunger, the latter acting similarly to a piston, and out of the tubular plunger, which latter, by its constant reciprocations, tamps or impacts the mass, the compressed mass or the upper edge thereof at the commencement of operation assuming an oblique plane, the angularity of which is considerable; but as the load in the receptacle is built up or approaches completion the obliquity of the impacted mass is gradually decreased, the upper edge thereof at the conclusion of the packing operation being practically flat.

It will be obvious that on the reciprocation of the packing-plunger 25 the force thereof will be directed practically downward, being taken up or received by the elevator E, which is in the nature of a yielding support, and any lateral pressure that may occur during the process of compression is not directed to any one point of a barrel or other receptacle, but is circumferentially distributed.

An annular guide is shown at 40, secured to the under face of the supporting-bracket 12, the upper edge of the packing-plunger operating within the wall thereof, and said guide preventing lateral movement of the plunger during its reciprocations. A second pair of plunger-guides is also shown, consisting of the laterally-projecting arms 41 in sliding engagement with the tracks or ways 27′.

The operation of the elevator apparatus will be readily understood from the preceding description.

As the barrel being filled descends with the elevator E, and when the elevator-platform 26 has reached the floor 16, the filled or packed barrel or receptacle X may be readily removed and an empty barrel substituted therefor. It will be evident, however, that the elevator will be prevented from rising with its empty barrel, due to the exertion of pressure by the brake 35 on the pulley 36. For disengaging this brake from the pulley to permit the ascent of the elevator with its empty barrel the mechanism illustrated may be employed.

A treadle or foot-lever is illustrated at 42, pivotally supported by the bracket 43, being also shown connected at its inner end with the counterweighted lever 37 by the relatively long connecting-rod 44, so that when said lever is depressed by the foot or otherwise the counterweighted lever 37 will be raised, and the friction-brake 35, which is operated thereby, raised free of the wheel 36, so that the balance-weights 32, which at this point are at the limit of their ascending movement, may descend to raise the elevator E.

As a means for effecting the reciprocal movement of the exterior plunger 25, the mechanism shown may be employed, and which will now be described.

A shaft is illustrated at 40′, the ends of the same being journaled in brackets or bearings formed on or carried by the side frames 14 and 15, and said shaft is shown carrying on its extended end the fast and loose pulleys 46 and 47, which may be connected by belt-

ing with a suitable motor, (not shown,) or said shaft may be otherwise connected with the motor, and, in practice, a suitable shipper (not shown) may be employed for moving the belt to the fast pulley from the loose one to effect the movement of the plunger 25, or to the loose pulley to stop the same.

The connection between the shaft 40′ and the reciprocatory plunger 25, which is herein illustrated, will now be described.

The plunger 25 is shown having formed thereon the laterally-extending arms or members 48. The shaft 40′ at suitable points thereon is shown provided with the eccentrics 49, which are embraced by the semiannular connected straps of the pitmen 50, the opposite or lower ends of said pitmen being shown pivotally connected with the two plunger-rods 51, which latter are shown connected with the laterally-extending plunger-arms 48, so that on the rotation of the shaft 40′ by a suitable motor the reciprocatory movements of the plunger 25 may be obtained in an obvious manner.

For effecting the force-feeding movement of the internal plunger 39, the mechanism shown will be preferably employed, said mechanism being fully illustrated in Figs. 8 to 10, inclusive.

The interior plunger 39 is shown having the relatively long rod or bar 51′, which is shown provided with a rack 52, which meshes with and is driven by the pinion 53, so that on the rotation of said pinion in one direction the rack-bar 51′ will be moved downward to feed a charge of material to a receptacle, and so that on the reverse movement of said pinion 53 the rack-bar 51′ and also the internal plunger 39 will be oppositely moved, whereby when said plunger has reached a point above the inlet-opening 25′ of the external plunger a mass of material may flow into the bore of said exterior plunger 25, and be thereby conducted into a receiving-receptacle therefor.

On the downward movement of the force-feed plunger 39 a yielding driving device, constituting a part of the driving mechanism, and herein shown as a friction-clutch, will be preferably employed, so that on the effective movement of said plunger it will "give" on the exertion of too great pressure thereby.

The side frames or members 14 and 15 are also shown supporting near the upper end thereof the two shafts 54 and 55, the first-mentioned of which is illustrated carrying a series of three pulleys 56, 57, and 58, the peculiar functions of which will now be described, and which pulleys may be connected by the belt 59 with a motor. (Not shown.)

The three pulleys 56, 57, and 58 are loosely supported by the shaft 54, the intermediate or middle pulley constituting an idler, and to which the belt 59 may be shipped from the others for stopping the interior plunger 39.

The first pulley 56 of the series is shown having formed integrally therewith for rotary movement about the supporting-shaft 54 the pinion or gear 60, which meshes with the pinion 61, supported by a stub-shaft on the side frame 15, a third pinion 62 being also illustrated meshing with said second pinion, the pinion 62 being suitably fixed to its shaft 55.

The shaft 55 is illustrated carrying at its opposite end the pinion 63, which meshes with a pinion 64, keyed to the supporting-shaft 54, which shaft, it will be remembered, is provided with the actuating-pinion 53 for the plunger. The operation of this train of gearing is as follows: Motion being imparted to the pulley 56, and it rotating in the direction of the arrow in Fig. 9, its pinion 60 will move in a corresponding direction, oppositely rotating the meshing pinion 61, which, in turn, oppositely rotates the pinion 62—the third of the series—for effecting the rotative movement of the shaft 55, and by the latter, through the two meshing pinions 63 and 64, the rotative movement of the shaft 54, whereby the pinion 53 fixed thereto will be rotated in a direction opposite to that of the pulley 56, and the plunger 39, being at the limit of its descending movement, it will be evident that it will, through the rack-bar 51′, with the rack of which the pinion 53 meshes, be moved upward to permit the gravitation of a charge of material to a barrel or other receptacle. The direction of movement of the various connected gears and shafts on the upstroke of the plunger 39 is clearly indicated by the arrows in Fig. 9.

It will be evident that when the belt 59 is slipped from the pulley 56 on the idler-pulley 57 the internal plunger will not be driven.

The shaft 54 at its extreme outer end is shown fixedly carrying one member of a friction-clutch, said member being designated by 66, its contacting face being of some adhesive material—such as leather or rubber—and the opposite or engaging member of said clutch being practically the pulley 58, the clutch-face of which is likewise provided with adhesive material. The belt 59 being on the pulley 58, and the internal plunger 39 being at the limit of its upstroke, it will be evident that on the rotation of the pulley 58 in the direction of the arrow (indicated in Fig. 10) the clutch member 66 will be moved in correspondence therewith, as will also the plunger-actuating pinion 53, which meshes with the rack 52 of the plunger-rod 51′, and will move the internal plunger downward, so that it may force-feed the mass of material into the barrel X. When the mass has been firmly packed in said barrel, the driving-belt may be shifted on the pulley 56 and the ascending movement of said plunger 39 effected, and when it has reached the limit of its upstroke the belt may be again shifted on the idler-pulley 57 to stop the plunger 39, so that an empty barrel may be placed in posi-

tion on the elevator E to receive a charge of material from the weighing mechanism or other source of supply.

A belt shifter or shipper of ordinary construction is shown at 67, pivotally supported at a point about midway of its extremities by a bracket secured to the support 12, which is provided at its working end with belt-engaging fingers, by which the belt 59 may be shifted from one to the other of the pulleys of the series.

Automatically-operated means are herein illustrated for shipping the belt 59 from the outside pulley 56 to the idler-pulley 57 on the ascending movement of the plunger 39, so that when it has reached the limit of its ascending movement it will quickly be stopped; but for shipping the belt 59 from the idler-pulley 57 to either of the other pulleys, to either effect the ascent or descent of the plunger, the lower arm of the shipper-lever 67 may be grasped and the belt thereby moved in either direction.

The means illustrated for obtaining the automatic shipping of the belt 59, and thereby also automatically controlling the plunger 39, will now be described.

An angle-lever is shown at 68, having formed at the extremities of one of its arms the cam 69, the opposite arm or member being much shorter and shown as connected by the link 70 with the shipper-lever 67 at a point above the pivot or center of movement thereof.

It will be evident that and by reason of the connection between the shipper-lever 67 and the angle-lever 68 said lever 68 may be moved by hand or otherwise, and into position to be operated by said automatic means for moving the belt 59 from the pulley 56 to the idler 57.

When the interior plunger 39 has reached the limit of its descending movement, the barrel or other receptacle having been fully packed and the belt 59 being on the pulley 58, the belt-shipping lever 67 will be grasped and the belt 59 thereby shifted from said pulley to the pulley 56 to effect the ascending movement of said plunger and to also permit the removal of the filled barrel and the substitution of an empty one therefor.

The automatic plunger-controlling means, to which allusion has been made, will be preferably called into requisition when the plunger has nearly reached the limit of its ascending movement, and said means, as herein illustrated, will now be described.

A vertically-sliding rod is shown at 71, movable within the guide 80, and also having a suitable stop or projection 81 thereon to prevent too great descending movement of said rod. The plunger-head is also shown having a projection 82 so located thereon that on the ascending movement of said plunger it will engage the lower end of the rod 71 and raise the latter.

The cam 69 resting on the rod 71 when such action takes place, and the belt 59 being on the pulley 56, it will be evident that the angle-lever 68 will be oscillated to what is herein illustrated as the "right" and the shipper-lever 67 moved in correspondence therewith, so that, through said shipper 67, the belt 59 will be immediately shipped from the pulley 56 to the idler-pulley 57, whereby the plunger 39 will be instantly stopped.

It will be remembered that a depressible latch 23 has been hereinbefore described as normally holding the bucket-closer L against opening or bucket-discharge movement. For actuating the latch the means illustrated may be employed, and which will now be described.

The elevator E is illustrated provided with the relatively long vertical rod 72, which is shown having at its upper end the pin 73, the purpose of which will be hereinafter specified.

A lever is shown at 74, pivotally supported by the side frame 14, and also carrying at its free end the actuator 75, which, in the form illustrated, is a by-pass actuator having effective and ineffective movements, respectively, on the two movements of its supporting-lever 74. The by-pass actuator 75 is also illustrated pivotally supported by the lever 74, the latter of which is disposed in the path of movement of the pin 73. Suitable stops will also be employed for maintaining the by-pass against oscillatory movement on the upstroke of the rod 72, so that on said stroke the pin 73, by engaging the lever 74 and moving it upward with its actuator, the latter will trip the latch 23 to thereby release the bucket-closer L. This action occurs on the ascending movement of the elevator E and when an empty barrel X is in position for receiving a weighed charge of material. On the opposite movement of the actuator 75 it will be simply ineffectively oscillated about its pivot on the lever 74 by the latch 23, and when it has passed thereby will resume its normal position to again trip the latch on a repetition of the operation.

The operation of the hereinbefore-described apparatus, briefly, is as follows: The platform of the elevator E, resting on the floor 16, an empty barrel may be placed on said elevator, and the friction-brake 35 being raised free of the pulley 36 by the treadle 42 the overbalance-weights 32 will raise the elevator E with its empty barrel to a proper height, and at a point very near the end of this last-mentioned movement the pin 73 on the ascending rod 72, which moves with the elevator E, will engage and raise the lever 74, whereby the actuator 75 thereon becomes immediately effective for tripping the closer-holding latch 23. On the tripping of this latch the bucket-closer L will be free of all restraint, so that the bucket contents may force the same open. On the opening movement of the bucket-closer L the bucket contents will be discharged into the chamber of the supporting-base 18, and from thence will gravitate to the discharge-chute D, being conducted thereby into the tubular plunger, which directs the mass into an empty barrel.

The interior plunger 39, being then disposed above the inlet-opening 25′ of the tubular plunger 25, will then be caused to descend, the external plunger 25, of course, during this described operation being constantly in motion. The two plungers then coöperate to firmly compress or pack the charge of material in the barrel X, the elevator E, in the meantime, slowly descending. When the mass has been firmly packed in the barrel and the elevator has reached the floor 16, the filled barrel may be easily removed and an empty one substituted therefor, when the operation just described will be repeated.

Having described my invention, I claim—

1. A packing device comprising two reciprocative packing-plungers, one operative within the other, one of said plungers being provided with an opening to receive the material to be packed.

2. A packing device comprising a tubular reciprocative plunger having a supply-opening in one side thereof, and a second reciprocative packing-plunger operative with the first-mentioned plunger.

3. A packing device comprising two coöperative reciprocative packing-plungers, one of which is tubular and is provided with a supply-opening; means for reciprocating said plungers; and means for supplying the tubular plunger with a charge of material.

4. The combination with weighing mechanism embodying a bucket, of a tubular plunger; a chute adapted to receive a load of material discharged by said bucket and to convey the same to said tubular plunger; and means for effecting the discharge of a bucket-load of material.

5. The combination with weighing mechanism embodying a bucket, of a tubular plunger; a chute adapted to receive a load of material discharged by said bucket and to convey the same to said tubular plunger; and a force-feed plunger located in said first-mentioned plunger.

6. The combination with weighing mechanism embodying a shiftable bucket-discharge member; of a latch normally holding the same against movement; an elevator; a rod carried by said elevator and having a pin; and a latch-actuator operated by said pin at a predetermined point in the ascending movement of said elevator.

7. The combination with weighing mechanism embodying a shiftable bucket-discharge member; of a latch normally holding the same against movement; an elevator; a by-pass latch-actuator; and means operative with the elevator for operating said actuator.

8. The combination of two plungers, one of which is operative within the other; means for imparting a constant reciprocatory movement to the exterior plunger; and means for imparting an intermittent reciprocatory movement to the interior plunger.

9. The combination of a plunger and its bar having a rack; two shafts, one of which carries a pinion meshing with said rack; a pulley having a pinion and supported by said shaft and also connected by gearing to the other shaft; and gearing connecting said shafts at the opposite ends thereof; a friction device; a pulley carried by said first-mentioned shaft and in engagement with said friction device; and a third pulley constituting an idler and located between said other pulleys.

10. The combination with two coöperating reciprocative packing-plungers one within the other, of automatically-operated means for controlling the movement of one of said plungers; and means for actuating the other plunger.

11. The combination with an elevator for holding a receptacle, of two reciprocative packing-plungers, one operative within the other; and means for reciprocating said plungers.

12. The combination with an elevator for holding a receptacle, of a tubular packing-plunger; a force-feed packing-plunger operative in said tubular plunger; driving mechanism for said force-feed plunger; and means for automatically stopping the movement of said force-feed plunger.

13. The combination with an elevator for holding a receptacle, of a packing-plunger; driving mechanism embodying a pulley; a belt on said pulley; a belt-shipper; an angle-lever operatively connected with said shipper; means for operating said shipper; a second packing-plunger coöperative with and surrounding said first-mentioned plunger; and means for reciprocating the second plunger.

14. The combination with an elevator for holding a receptacle, of a tubular plunger; a plunger operative within the tubular plunger and carrying a projection; a pulley; a belt on said pulley; a belt-shipper; an angle-lever; a link connecting one arm of said angle-lever with the belt-shipper; and a rod for supporting the other arm of said angle-lever.

15. The combination with a packing-plunger and its rod provided with a rack; a pinion meshing with said rack; a pinion-carrying shaft; a pulley loose on said shaft; a friction device fixed to said shaft and in engagement with said pulley; a tubular plunger surrounding and coöperative with the first-named packing-plunger; and means for actuating said tubular plunger.

16. The combination with weighing mechanism embodying a shiftable bucket-discharge member; a latch normally holding the same against movement; an elevator; means operative with said elevator for tripping the latch; and two coöperative packing-plungers, one within the other, for packing material in a receptacle carried by the elevator.

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Witnesses:
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