(No Model.)

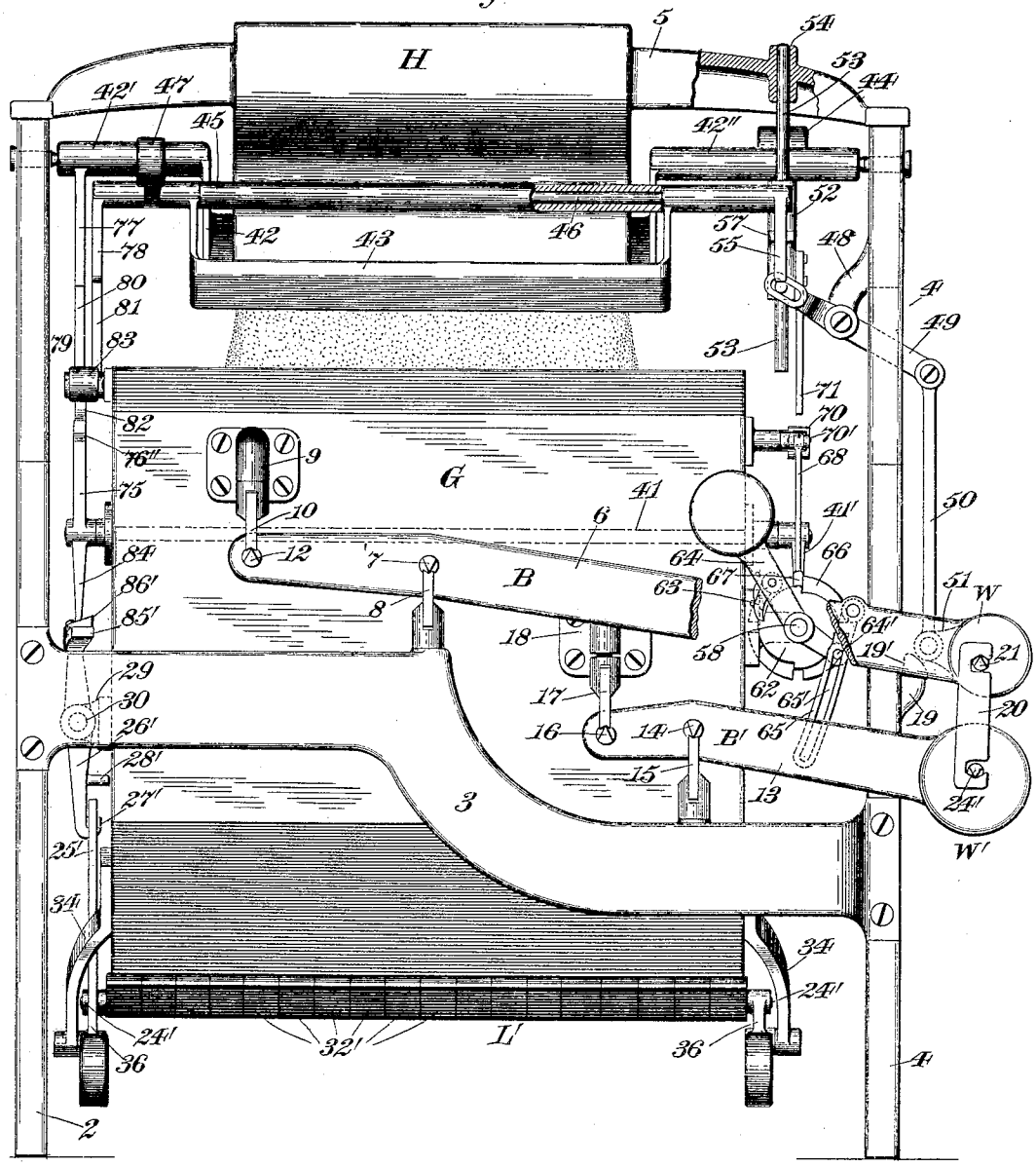
5 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 570,295. Patented Oct. 27, 1896.

Fig. 1.



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(No Model.) 5 Sheets—Sheet 2.

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WEIGHING MACHINE.

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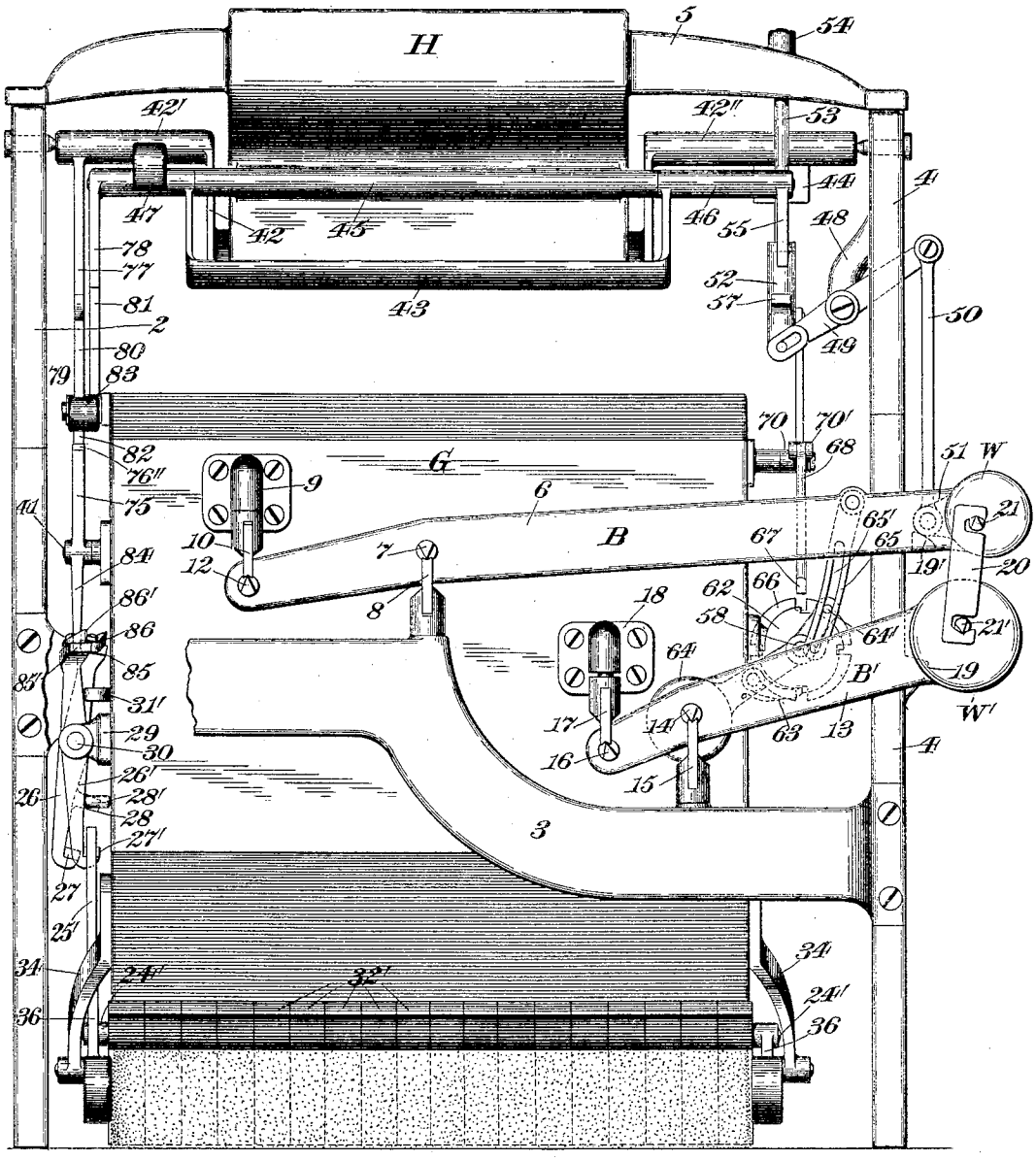
Fig. 2.



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WEIGHING MACHINE.

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Fig. 3.

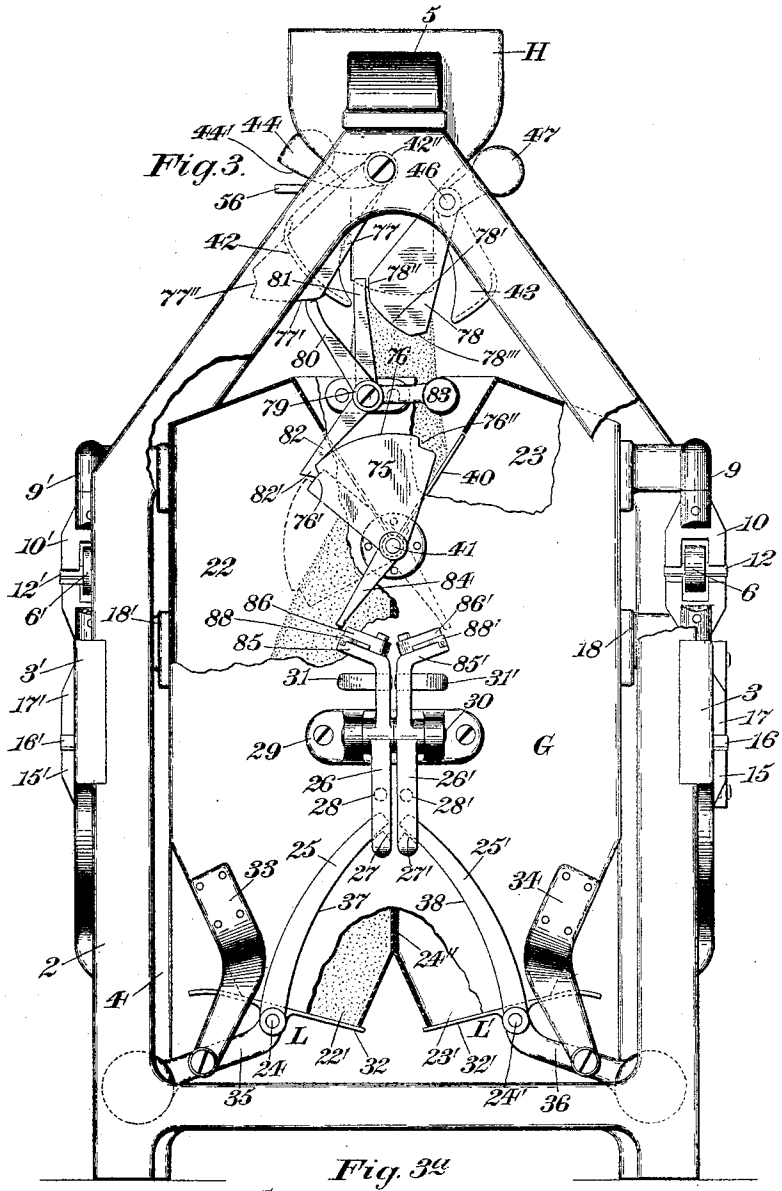
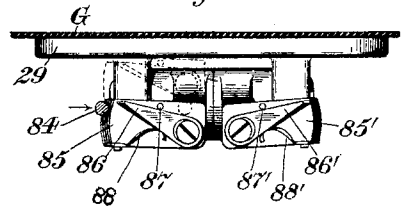


Fig. 3a.



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5 Sheets—Sheet 4.

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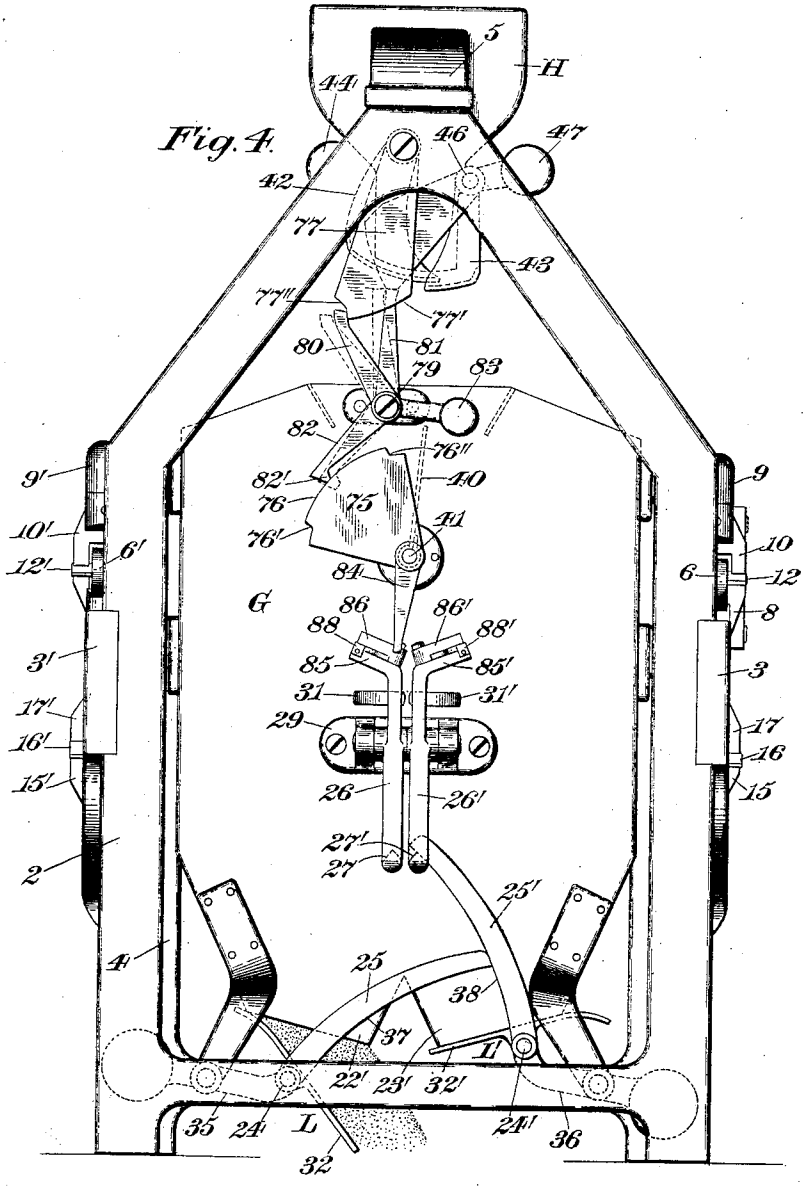
WEIGHING MACHINE.

No. 570,295. Patented Oct. 27, 1896.

Fig. 4.



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WEIGHING MACHINE.

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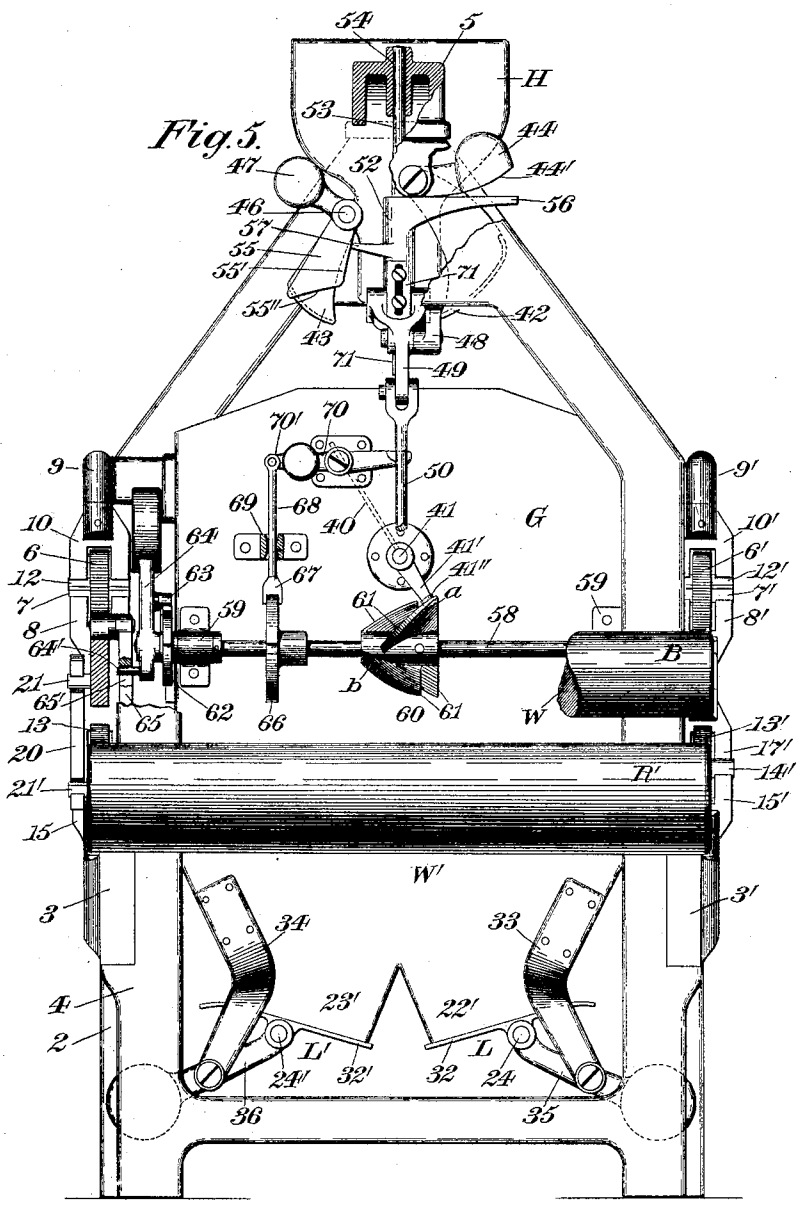
Fig. 5.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,295, dated October 27, 1896.

Application filed May 21, 1896. Serial No. 592,395. (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-Machines, of which the following is a specification.

This invention relates to weighing-machines, an object of the invention being to provide an improved machine of this character comprehending efficient means for insuring the sequential operation of the various coacting parts during the cycle of movements thereof, by virtue of which accurate bucket-loads of predetermined quantities may be readily obtained and waste of the material at all points will be positively prevented.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine comprising my improvements in the preferred embodiment thereof, the valves being open, the stream flowing into one of the compartments of the bucket, and the closer therefor being in its shut or normal position. Fig. 2 is a similar view illustrating the valves closed and one of the closers open to permit the discharge of a load of material. Fig. 3 is an end elevation as seen from the left in Fig. 1, the operating parts being in positions corresponding therewith. Fig. 3^a is an enlarged detail in plan view of a portion of the means employed herein for effecting the release of the closer or closers. Fig. 4 is a view similar to Fig. 3, the various operating parts being in positions corresponding with Fig. 2. Fig. 5 is an end elevation as seen from the right in Fig. 1, certain parts being broken away to illustrate more clearly certain peculiar features of construction.

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

Certain of my present improvements are more especially adapted for use in connection with weighing-machines provided with buckets of the "two-compartment" or "double-chambered" type, said improvements being illustrated herein applied to such a machine. It is distinctly to be understood, however, that the invention is not limited to such an application, as it is capable of employment in connection with other classes of machines.

The framework for supporting the operative parts of the machine may be of any suitable construction, and it is herein illustrated comprising the end frames or members 2 and 4, connected by the plates 3 and 3', suitably held in mortises formed in said end frames. The end frames 2 and 4 are shown connected at the top by the plate or beam 5, with which may be integrally formed the chute or hopper H, adapted to contain the mass of material to be weighed, and which gravitates therefrom into the bucket or load-carrying receptacle of the machine.

As a means for supporting and balancing the bucket, which is designated by G, and is also of the double-chambered class, the beam mechanism illustrated may be employed.

The beam mechanism comprises the scale-beams B and B', respectively, the bucket-supports of which are located at points on each side of and relatively remote from a vertical line passing transversely through the bucket, and preferably also at each side of a horizontal line intersecting the center of gravity of the loaded bucket, so that the latter will be maintained in a true vertical path during its circuits of movement. For effecting this peculiar result the arms of one of said scale-beams (herein shown as the scale-beam B) will be relatively longer than that of the other, though said scale-beams will preferably exert the same amount of leverage, the weight of the beam B' being made heavier for this purpose.

The scale-beam B comprises the arms 6 and 6', respectively, joined by the combined connecting-shaft and counterweight W. The beam-arms 6 and 6' of the scale-beam B will be preferably provided with pivots or knife-edges in transverse alinement, one of said pivots or knife-edges being illustrated at 7, Figs. 1 and 2, by which said beam may be pivotally suspended. The plates 3 and 3' will also preferably carry beam-supports, one of said beam-supports being shown at 8 as a V-shaped bearing, suitably connected to the plate 3.

The bucket G on its front and rear walls is illustrated provided with the brackets 9 and

9′, respectively, to which are suitably connected the V-shaped bearings 10 and 10′, the beam-arms being provided with pivots or knife-edges 12 and 12′, constituting bucket-supports and sustaining said V-shaped bearings.

The beam B′ is similar in construction to the beam B, except that its arms are much shorter, said arms (designated by 13 and 13′, respectively) being connected by the combined counterweight and shaft W′. Said beam-arms will also be provided with pivots or knife-edges, one of which is shown at 14, Figs. 1 and 2, resting on the beam-support or V-shaped bearing 15, connected to the plate 3. Said beam-arms will also carry, preferably adjacent to the inner ends thereof, suitable bucket-supports, one of said bucket-supports being illustrated at 16 as a pivot or knife-edge, the bucket having connected thereto, through the medium of the bracket or hanger 18, the V-shaped bearing 17, said construction being duplicated on the opposite side of the machine.

As a means for supporting the beam mechanism when in its normal position, or when the machine is at rest, the following-described instrumentalities are illustrated: The end frame 4 is illustrated having suitably formed thereon the projection 19, the beam-arm 6 having a complementary projection formed on the inner face thereof, which rests on said first-mentioned projection when said scale-beam B is in its normal position, as indicated in Fig. 1. The beam B′ is illustrated connected to the beam B by a link 20, which serves two purposes—one of insuring a movement in unison of the connected beams and the other as a convenient device for supporting the beam B′ when the companion beam is in its normal position, as stated. The link 20, at points near the extremities thereof, is shown recessed or notched, in the wall of which recesses suitable V-shaped or other bearings may be formed, which take over the pivots or knife-edges 21 and 21′, connected to the ends of the weights W and W′, respectively.

The bucket G is provided with the vertical partition 24″, dividing it into two chambers or compartments 22 and 23, respectively, in which the loads of material are alternately made up and discharged. This partition is herein illustrated as consisting of two attached plates, which are spread apart or separated near the lower edge thereof in the shape of an inverted V, which forms, in connection with the front and rear inclined and opposite end walls of the bucket, the two discharge spouts or outlets 22′ and 23′, through which the weighed material may flow, to be disposed of in any convenient manner.

Each of the outlets of the bucket G will preferably be provided with a closer, which snugly fits against the lower edge of the spout when in the normal position thereof, to thereby prevent the accidental escape of material during the weighing operation. Said closers are designated by L and L′, respectively, and the peculiar construction thereof will be hereinafter more particularly described.

The means herein illustrated for supporting and for maintaining the closers L and L′ in the shut or normal position thereof are the same in each case, and it is deemed necessary, therefore, only to describe in detail such means for one of the closers, the same reference-characters with prime marks being employed to designate corresponding parts in the other.

As a means for supporting the closer L, the following-described instrumentalities may be employed: The bucket G is illustrated having attached to its opposite end walls the depending arms or brackets 33 and 34. The closer L is shown attached to the transverse shaft 24. The brackets 33 and 34 are illustrated pivotally supporting the counterweighted levers 35 and 36, the non-counterweighted arms of which are rigidly attached to the supporting-shaft 24 at points adjacent to the opposite ends thereof.

The closer L, it will be understood, is normally held against opening movement, and when released at the proper time in the operation of the machine the weight of the contents contained in the compartment 22 will force said closer open to cause a discharge of the load.

When the mass discharged by the bucket has passed below the inner edge or lip of a closer L or L′, the latter is free to return to its normal position, which operation, as will be obvious, is effected by the counterweighted levers 35 and 36, which normally tend to close the same.

As a means for maintaining the closer L in its normal position, the following devices may be employed: The transverse shaft 24 is illustrated having rigidly attached thereto adjacent to one of its ends the arm 25, which serves as a stop device, as will hereinafter appear, said arm being preferably segmental or arc-shaped, as shown. The free end of said arm is in position to be engaged by a suitable latch or analogous device, whereby it and the connected closer L may be held against movement while such engagement continues. For this purpose the laterally-movable latch 26 is illustrated, it being provided with the inward-projecting hook 27, which is adapted to engage the arm 25 when the closer L is in its normal position, as indicated in Fig. 3. The latch 26 is provided with a pin or stud 28, which abuts against the wall of the bucket when said latch is in its normal position, to thereby prevent further inward movement thereof. In the embodiment illustrated it will be evident that the latch 26 is swung outward to release the closer L, so that the weight of the contents or load in the compartment 22 may force said closer open when such action takes place, to cause a discharge thereof.

A bracket is represented at 29, and it serves to support the latch 26 for oscillatory or swinging movement, a relatively short shaft 30 being illustrated, said shaft passing through suitable bearings formed in the bracket and the hub of the latch 26.

As a means for returning the latch 26 to its normal position a retracting-spring is shown at 31, it being suitably connected to said latch at a point above its center of movement and to the bucket G.

The closer L consists of a series of independent bars or slats 32, strung on and preferably loosely supported by and hinged to the shaft 24, so that said bars or slats may be individually shaken by the force of the closer in opening, and the dislodgment of any particles of material which might tend to stick or cling thereto will be positively insured, it being observed that the edges of said bars are normally in contact.

Each of the closers, it will be remembered, has been described as having a stop connected thereto, which stops coact, they being reciprocally effective, or each serving as a stop device for the other, so that if one of said closers be open for permitting the discharge of a load of material from one compartment the other closer will be positively maintained in the shut position thereof by said stop devices. The action of these members is as follows: The inner faces 37 and 38 of the two arms 25 and 25′ are illustrated as curved, the curvature of the face 37 being concentric with the axis of movement of the lever 36 and the face 38 being concentric with the axis of movement of the lever 35. On the opening movement of the closer L the upper or free end of the arm 25 will ride in contact with and along the curved face 38 of the arm 25′, as indicated in Fig. 4, so that the latter will be positively held against movement by the arm 25, the said arm firmly resisting any tendency of the arm 25 to swing about its pivot, the closer L′ being likewise firmly held against discharge movement. On the return of the closer L, and when this has resumed its normal position, as indicated in Fig. 3, the arm 25 will pass out of contact with the curved face 38, so that the closer L′ may be opened, and the operation just described will be reversed, the upper or free end of the arm 25′ riding in contact with and along the curved face 37.

The supply-stream of materal will be alternately directed into the two compartments or chambers of the bucket, said stream descending from the chute or hopper. For thus changing the course of the down-flowing stream a stream-diverter is herein illustrated, it consisting of the flat blade 40, shiftable between two positions interiorly of the bucket, suitable actuating means being employed for securing such operation, said blade being also of a length approximately equaling the width of the bucket.

As a means for supporting the blade 40 a shaft 41 is illustrated, said blade being rigidly attached to said shaft, the shaft being preferably journaled in the end walls of the bucket and extending therebeyond, as indicated in Fig. 1.

The two positions of the stream-diverter are illustrated in Fig. 3 by full and dotted lines, said diverter when in each of said positions being disposed at an inclination and directing the supply-stream into either of the two compartments, and when in the full-line position thereof directing the stream into the compartment 22. The means herein illustrated for shifting the diverter 40 between its two positions will be hereinafter described.

As a means for controlling the supply stream flowing from the hopper H, a pair of valves is shown, these being designated by 42 and 43, and constituting, respectively, a main or reducing and a supplemental or cut-off valve. The main valve 42 will close under the chute and will be relatively wider than the supplemental valve, so that when such action takes place the volume of the supply-stream will be materially reduced, or to a drip-stream, the supplemental valve 43 on its closing movement cutting off such drip-stream.

The valve 42 is illustrated provided with the lateral arms 42′ and 42″, having suitable bearings or sockets in the end thereof for receiving pivot-screws or other convenient journals carried by the framing of the machine.

For effecting the closing movement of the main valve 42 a counterweighted arm 44 is illustrated, it being preferably rigidly connected with the lateral arm 42″.

The chute H is illustrated as having connected thereto the bearing-sleeve 45, which supports for oscillatory movement the shaft 46 of the supplemental valve 43, said shaft being provided with a counterweighted arm 47 for effecting the closing movement of said supplemental valve.

For opening the two valves the means herein illustrated will now be described, and such means will be preferably operatively connected with one of the scale-beams, (herein illustrated as the beam B.)

A bracket or arm is illustrated at 48, formed on the inner face of the end frame 4 and serving as a means for supporting the lever 49, which constitutes a device for transmitting a valve-opening thrust to the two valves, said lever being pivotally connected to the bracket 48 for oscillatory movement. The outer end of the transmission-lever 49 is shown operatively connected with the scale-beam B by the link or rod 50, pivotally attached to said lever 49 and also to a lug or ear 51, formed on the periphery of the weight W at a point preferably intermediate the ends thereof. The inner end of the lever 49 is in sliding connection with a hub or sleeve 52, said lever being shown as bifurcated at its point of connection with said hub or sleeve. The branches of said bifurcation are illustrated provided with longitudinal slots, which take over or

embrace suitable pins or projections extending laterally at diametrically opposite sides from the hub or sleeve 52. The hub or sleeve 52 is shown rigidly attached to the spindle or rod 53, which passes through the guide bore or bearing 54, formed in the top plate 5.

The shaft 46 of the supplemental valve 43 is illustrated rigidly carrying the cam 55, having the two cam-faces 55′ and 55″, the peculiar function of which will hereinafter appear. The under surface 44′ of the main-valve closing counterweighted arm 44 is illustrated having a cam or curved face, the purpose of which will now be made evident.

The hub or sleeve 52, which is illustrated operatively connected with the scale-beam B, is shown having the lateral projections or arms 56 and 57, respectively, the first mentioned of which is relatively longer than the other. The relatively long arm 56 is adapted to support the counterweighted arm 44, so that on the descent of said sleeve or hub 52 the arm 56 tends to fall from under the counterweighted arm 44, whereby the latter is operable for effecting the closing movement of the main valve 42. On the ascending movement of the sleeve 52 it will be evident that this operation will be reversed, so that said lateral arm 56 is adapted to cause the opening movement of the valve 42. On the descending movement of said sleeve 52 the lateral arm or projection 57 will ride in contact with the cam-face 55′, and thereby permit a very slow closing movement of the supplemental valve 43 by the counterweighted arm 47 thereof. When the arm 57 leaves the cam-face 55′, it will ride along the cam-face 55″ and permit an accelerated and final closing movement of the cut-off valve 43 by the counterweighted arm 47, as will be apparent from an inspection of the drawings. On the ascending movement of the sleeve 52, and simultaneously with the opening movement of the main valve 42 in the manner previously described, the arm 57 will first ride along the cam-face 55″ for a limited length of time, and, leaving the same, will enter the cam-face 55′, so that the supplemental valve 43 may be simultaneously opened. When both of the valves are open, as indicated in Fig. 5, the supply-stream may flow from the chute or hopper H and be directed by the diverter 40 into one or the other of the two compartments of the bucket.

The operation of the valve opening and closing means will be readily apparent from an examination of the drawings. As the beam mechanism descends with the loaded bucket, the counterweight W of the beam B will ascend, the connecting-link 50 being caused to move in correspondence therewith, and thus rocking the lever 49 about its pivot on the framing of the machine and drawing the sleeve 52 downward, whereby the two valves 42 and 43 may be closed in the manner previously described, it being understood that the main valve 42 will have its closing movement in advance of the supplemental valve 43, so that when said main valve is closed a drip-stream may flow from the chute H to complete a partial load in either of the compartments of the bucket G.

As a means for shifting the stream-diverter 40 between its two positions within the bucket G, whereby the supply-stream may be alternately directed into the two compartments of the bucket G, the following-described instrumentalities may be employed: A shaft is shown at 58, rotatively supported by suitable brackets, as 59, attached to one of the end walls of the bucket, near the opposite sides thereof. The shaft 58 is illustrated rigidly carrying, at a point preferably intermediate its extremities, a cam member 60, the peculiar office of which will now be described. The transverse diverter-supporting shaft 41 is illustrated having rigidly attached thereto the downwardly-projecting arm or extension 41′, which is provided at its free end with a suitable disk, as 41″. The cam member 60 is composed of a series of cams or curved blades 61, which alternately project from the hub of said member, as indicated in Fig. 5. The operation of these connected parts will be apparent from an inspection of said figure of the drawings. On the rotation of the shaft 58 by suitable means the cam member 60 will be rotated therewith, the cam *a* engaging the disk 41″ and swinging the arm 41′ to the left, the stream-diverter 40 being oppositely oscillated. The action of the cam member 60 in rotating will bring the cam *b* into position for engaging the disk 41″, at which point said cam member will be held against further rotative movement by suitable detent means. When said cam is released, the cam *b* will be effective for oppositely rotating the stream-diverter 40.

For rotating the shaft 58 a pawl-and-ratchet device is employed. The shaft 58 is illustrated having fixedly connected thereto at one of its ends the four-tooth ratchet 62, the pawl 63 therefor being shown as a spring-actuating pawl and as also pivotally attached to the counterweighted lever 64, which is loosely supported by said shaft.

The arm 6 of the scale-beam B is shown having connected thereto the depending link 65, provided with a relatively long curved slot 65′, through which is passed the pin 64′, formed on the non-counterweighted arm of the lever 64, the link 65 serving as a suitable guide for maintaining the counterweighted lever 64 in its operative position, and also as a convenient means for returning said counterweighted lever to its normal position. The pin 64′ being against the short upper wall of the longitudinal guide-slot 65′, it will be evident that on the ascent of the counterpoising side of the scale-beam said wall of the slot will be moved away from the pin 64′, so that when said counterpoised side of the scale-beam B has reached the limit of its ascending movement the counterweighted lever 64 is free to oscillate, as will be apparent. It will be assumed that the shaft

58 has been released by suitable detent means employed for the purpose, so that on the descending movement of the counterweighted arm of the lever 64 the pawl 63, being in contact with one of the teeth of the ratchet 62, said ratchet, and hence the shaft 58, will be given a partial rotation to effect a shifting movement of the stream-diverter 40 through the intervention of the hereinbefore-mentioned instrumentalities. On the downward or return movement of the counterpoised side of the scale beam B, the upper end wall of the guide-slot 65′ will engage the pin 64′ of the counterweighted lever 64, so that on such movement the lever 64 will be returned to its normal position, as indicated in Fig. 1, whereby the pawl 63 may engage a succeeding tooth of the ratchet 62.

As a means for normally preventing the rotation of the shaft 58, the following devices may be employed: The shaft 58 is shown fixedly carrying the stop-wheel 66, which has formed thereon a series of peripheral recesses—four in number—into which may be thrust a suitable dog or detent device, as 67, formed on the lower end of the vertical rod 68, said rod being guided in its movement by the bracket 69, suitably secured to the bucket G. It will be evident that when the dog or detent 67 is seated in any one of the peripheral recesses of the stop-wheel 66 the shaft 58 and the parts connected thereto will be held against rotative movement. The dog or detent is normally maintained in engagement with the peripheral recesses of the stop-wheel 66 by suitable means, and the counterweighted lever 70, pivotally supported on one end of the bucket, is shown as a convenient means for accomplishing this purpose, the rod 68 being illustrated as pivoted to a lug or ear 70′, formed on the counterweight of said lever. When the lever 70 is tripped or oscillated by a suitable device, the dog or detent 67 will be withdrawn from a recess of the stop-wheel 66 in which it may be seated, so that when such action takes place the rotation of the shaft 58 and the shifting of the diverter 40 in the manner previously described may be effected.

For tripping the counterweighted lever 70 means operatively connected with the vertically-movable sleeve 52 is illustrated, such means consisting in the present instance of the vertically-adjustable rod 71, said rod being longitudinally slotted. Suitable adjusting-screws are shown passing through the longitudinal slot of said rod 71 and as seated in the sleeve 52.

At a predetermined point in the operation of the machine, or when the two valves have cut off the supply-stream from the chute or hopper H, the lower end of the rod 71 will be carried into contact with the free arm of the lever 70, which action will oscillate said lever and raise the counterweighted arm thereof, so that the detent 67 may be withdrawn from a recess in the stop-wheel 66 in which it may be seated, whereby the stream-diverter 40 may be shifted, as hereinbefore described.

Reciprocally effective stops operative, respectively, with the valve mechanism and with the stream-diverting plate or blade 40 are employed, whereby said stream-diverting blade 40 will be positively held against shifting movement when either or both of the valves are open, and the valves will be likewise held against opening movement while the stream-diverter 40 is being moved between its two extreme positions.

A segmental stop device is shown at 75, rigidly supported by the transverse shaft 41, to which is connected the diverter 40. The segmental stop device 75 is illustrated provided with the concentrically-curved stop-face 76, which terminates in the supplemental stops 76′ and 76″, respectively.

A valve-stop is shown at 77. The stop member 77 is illustrated having the two stop-faces 77′ and 77″, the first mentioned of which is a cam-face, the other consisting of an obtuse angular recess, said stop member being operative with the main valve 42.

A second valve-operative stop member is shown at 78, having the cam or stop face 78′ and the two straight or plane faces 78″ and 78‴ departing therefrom, said member 78 being operative with the supplemental valve 43.

The bucket G is illustrated pivotally carrying the interlocking stop or detent device 79, having the three arms 80, 81, and 82, the first two of which coact with the stops 77 and 78, while the arm 82 coöperates with the stop member 76. The arm 82 is shown provided with a projection 82′, which is adapted to seat itself alternately in the two stop-recesses 76′ and 76″ of the stop member 75.

The action of the described stop members is as follows: It being assumed that the stream of material is being directed into the compartment 22 of the bucket G, the diverter 40 will be in the position shown in full lines in Fig. 3. The projection 82′ of the arm 82 will be seated in the recess 76′ of the segmental stop device 75, and the free end of the arm 80 will be in engagement with the cam-face 77′ of the stop member 77, the free end of the arm 81 being in contact with the straight face 78″ of the stop member 78. It will be evident that the stop device 79 will be positively prevented from oscillation while the arm 81 thereof is in contact with the straight or plane face 78″ of stop member 78, so that the projection 82′ will be maintained in the recess 76′ of the said stop 75, and the latter, and also the diverter 40, will be firmly held against shifting movement. When, however, the free end of the arm 80 has passed out of contact with the cam-face 77′, it will be thrust into the recess 77″, which action may be effected by counterweighting the detent device 79, as at 83. At this point the main valve will have closed and the arm 81 will have reached the cam-face 78′ of the stop member 78, which

operation is caused by the descent of the loaded bucket. As the valve 43 closes, the cam-face 78′ will ride in contact with the arm 81 and prevent oscillation of the detent device 79, whereby the projection 82′ will be maintained in the recess 76′ so long as this relation continues. When, however, the cam-face 78′ has passed out of contact with the arm 81, it being understood that the cam-face 77′ has already passed out of contact with the free end of the arm 80, the latch or detent device 79 is free to oscillate about its pivot, so that the arm 80 may be thrust into the recess 77″ and the arm 81 into contact with the straight stop-face 78‴. When this action takes place, the projection 82′ will be instantly withdrawn from its recess 76′ by the counterweight 83, so that the member 75 is free to be swung about its axis, whereby the stream-diverter 40 will be also shifted to the position shown in dotted lines in Fig. 3 by the hereinbefore-described means. When the under face of the projection 82′ is in contact with the curved face 76 of the member 75, the arm 80 will be located in the recess 77″ and the arm 81 will be in contact with the straight stop-face 78‴, the detent device 79 being firmly held against rocking movement by the device 75, so that the two valves will be firmly held thereby against opening movement, as indicated in Fig. 4. When the recess 76″ is opposite the projection 82′, it will be evident that the stop device 79 is free to oscillate, as the blocking influence of the stop device 75 has been removed. As the two valves are swung open in the manner previously described, the stops 77 and 78 will be moved in coincidence therewith, the latter being operable for thrusting the two arms 80 and 81 to what is herein illustrated as the "left," the arm 82 being oppositely moved, so that the projection 82′ will be forced into the recess 76′.

It will be remembered that latches 26 and 26′ have been hereinbefore described as normally operative for preventing the opening movement of the two closers L and L′, respectively, said latches being provided with projections 27 and 27′ for engaging the closer-connected arms 25 and 25′, respectively.

As a means for tripping or swinging the latches 26 and 26′ outward alternately to effect the release of the closers L and L′, respectively, a device operative with the diverter 40 may be employed, said device being herein shown as the downwardly-extending arm 84, preferably formed integral with the stop member 75.

The latch 26 is shown having the inclined shoulder 85, on which is pivotally supported the spring-actuated by-pass pawl 86, which normally abuts against a pin 87, formed on the upper face of the shoulder 85, the spring 88 being shown for this purpose, so that when the inner face of said pawl 86 is in contact with the pin 87 and pressure is applied to the opposite face of said pawl the latter becomes in effect a fixed abutment. The arm 84 being in the position indicated in Fig. 3 and the stop 75 being ready to rock upon its pivot, as described, said arm 84 will be moved to the right and the free end thereof will ride along the outer face of the pawl 86, which action will swing the shouldered arm of the latch inward and the latch proper outward, so that the projection 27 will be disengaged from the arm 25, which is connected to the closer L, whereby the latter may be forced open by the weight of the bucket contents. When the arm 84 has passed out of contact with the pawl 86, it will be moved into contact with the pawl 86′, swinging the latter ineffectively about its pivot, so that said arm may reach the position indicated by the dotted lines in Fig. 3, and the diverter 40 will then occupy the position shown by the dotted lines in said figure. On the return movement of the arm 84 the action just described will be reversed.

Briefly stated, the operation of the hereinbefore-described machine is as follows: Fig. 3 represents the positions occupied by the various parts at the commencement of operation of the machine, the closer L for the compartment 22 being held in its shut position by the latch 26, the diverter 40 being in the position shown by the full lines in said figure, and the valves 42 and 43 open, so that the descending stream of material from the chute H will be directed into the compartment 22 by said diverter. When a certain proportion of the load has been received by the bucket, this will descend, the counterpoised side of the beam mechanism will ascend, so that the rod 50 will be thrust upward by the scale-beam B, to which and to the lever 49 said rod is operatively connected. When such action takes place, the inner or bifurcated arm of the lever 49 will be moved downward, which causes the descent of the sleeve 52. As the arm 56 of said sleeve falls from under the counterweighted arm 44 of the main valve 42, the latter will be closed by said arm, so that when said valve is closed a reduction in volume of the supply-stream will be the result. On the descent of the sleeve 52 the lateral arm 57 will first ride along the cam-face 55′ of the supplemental-valve cam 55, so that the supplemental valve 43 may be slowly closed. When said arm leaves the cam-face 55′, it will engage the cam-face 55″, whereby an accelerated or final closing movement may be imparted to the supplemental valve 43 by the counterweighted arm 47 for cutting off the drip-stream. On the cut-off of the stream the rod 71 will be thrust downward and into contact with the counterweighted lever 70, thereby oscillating the same, which action raises the detent 67 and withdraws it from a peripheral recess of the stop-wheel 66, so that the shaft 58 may be rotated by the pawl 63 on the counterweighted lever 64 as said lever drops from its normal position. On the rotation of the shaft 58 the cam *a* (see Fig. 5) is adapted to swing the diverter by oscillating the arm 41′, which rocks the shaft 41. As

the shaft 41 rocks, the arm 84 will be rocked in unison therewith, and be thereby caused to ride along the outer face of the by-pass pawl 86, (see Fig. 3ª,) swinging the latch 26 outward and disengaging the projection 27 from the rigid arm 25 of the closer L, so that the latter is free to open.

Having described my invention, I claim—

1. The combination with a compartment bucket, of closers, one for each of the compartments; and a stop operative with each of said closers, said stops blocking each other.

2. The combination with a compartment bucket, of closers, one for each of the compartments of the bucket; and arms coöperative with said closers, each of which arms constitutes a stop device for the other.

3. The combination with a compartment bucket, of closers, one for each of the compartments; means for shutting said closers; and arms coöperative with the closers, each of which arms constitutes a stop device for the other.

4. The combination with a compartment bucket, of closers, one for each of the compartments; shafts supporting said closers; counterweighted levers operative with said closers; and arms also connected to said closers, each of which arms constitutes a stop device for the other.

5. A bucket-closer consisting of a series of loosely-movable slats or bars with their edges normally in contact.

6. A bucket-closer consisting of a series of independently-movable hinged slats or bars.

7. The combination with a compartment bucket, of closers, one for each of the compartments, one of which closers consists of a series of slats; and stops operative with each of said closers, each of which constitutes a stop device for the other.

8. The combination with a bucket, of a closer; a stop operative with said closer; a latch engaging the stop and normally holding said closer against opening movement, said latch having a by-pass device; and a stream-diverter and its supporting-shaft provided with an arm adapted to engage said by-pass device.

9. The combination with a bucket, of a closer; a latch operative to hold said closer against opening movement; a by-pass pawl carried by the latch; and a stream-diverter provided with an arm for engaging said pawl.

10. The combination with a bucket having a closer, of a latch operative for holding said closer against opening movement and having an inclined shoulder provided with a spring-actuated by-pass pawl; a stream-diverter; and an arm operative with said stream-diverter for engaging said pawl.

11. The combination with a bucket having a closer, of an arm connected to said closer; a laterally-movable latch provided with a hook for engaging said arm; a latch-retracting spring; a by-pass pawl; a stream-diverter; and an arm operative with the stream-diverter and adapted to engage said pawl.

12. The combination with a bucket, of a stream-diverter; an arm operative therewith; a shaft having a cam adapted to engage said arm; and means for rotating said shaft.

13. The combination with a bucket, of a stream-diverter; an arm operative therewith; a rotatively-supported shaft having a cam for engaging said arm; and means normally operative for preventing rotation of said shaft.

14. The combination with a compartment bucket, of a stream-diverter; an arm operative therewith, a rotatively-supported shaft having a cam for engaging said arm, said shaft also having a peripherally-recessed stop-wheel; and a detent for controlling the movement of said wheel.

15. The combination with a compartment bucket, of a stream-diverter therefor; a shaft provided with a cam for shifting said stream-diverter and having also a ratchet; a pawl in engagement with said ratchet; and means for operating said pawl.

16. The combination with a compartment bucket, of a stream-diverter; a shaft provided with a cam for shifting said diverter and having also a ratchet; a counterweighted lever provided with a pawl; and means normally operable for preventing the rotation of said shaft.

17. The combination with a compartment bucket, of a stream-diverter; a rotative shaft provided with a cam for shifting said diverter and having also a ratchet; a lever provided with a pawl for engaging said ratchet; means for operating said lever; a stop-wheel connected to said shaft; and a detent for engaging said stop-wheel.

18. The combination with a compartment bucket, of a stream-diverter; rotative shaft provided with a cam for shifting said diverter; a ratchet on said shaft; a suitably-operated pawl for engaging said ratchet; a stop-wheel on said shaft; and a counterweighted lever provided with a detent adapted to engage said stop-wheel.

19. The combination with a scale-beam having a longitudinally-slotted link connected thereto, of a compartment bucket provided with a stream-diverter; a shaft having a cam for shifting said stream-diverter; a ratchet on said shaft; and a counterweighted lever provided with a pin projecting through the slot of said link and having a pawl adapted to engage said ratchet.

20. The combination with a scale-beam, of a compartment bucket supported thereby; a valve-opening device operatively connected with said scale-beam; a stream-diverter; a rotatively-supported shaft provided with a cam for shifting said diverter; and means normally operative for preventing the rotation of said shaft.

21. The combination with a compartment bucket having a stream-diverter, of a shaft

provided with a cam for shifting said diverter; a detent normally operative for preventing the rotation of said shaft; a valve; and a valve-actuating device provided with means for releasing said shaft.

22. The combination with a compartment bucket and with a valve, of a stream-diverter; a shaft provided with a cam for shifting said diverter; means comprising a counterweighted lever for normally preventing the rotation of said shaft; and a valve-actuating device provided with a rod for tripping said lever.

23. The combination with a compartment bucket and with a valve, of a stream-diverter; a shaft provided with a cam for shifting said diverter; means comprising a counterweighted lever for normally preventing the rotation of said shaft; and a valve-actuating device provided with an adjustable rod for tripping said lever.

24. The combination with a compartment bucket provided with a stream-diverter, of a rotative shaft having a member comprising a series of cams for actuating said shifter, the effective surfaces of which are disposed in opposing planes.

25. The combination with a scale-beam, of a lever operatively connected to said scale-beam; a valve having a cam operative therewith; and a device operatively connected with said lever and adapted to ride in contact with the face of said cam.

26. The combination with a scale-beam, of a lever operatively connected to said scale-beam; a valve having a cam operative therewith provided with two cam-faces; and a device operatively connected with said lever and adapted to ride successively in contact with the faces of said cam.

27. The combination with a scale-beam, of a lever; a rod operatively connected to said lever and scale-beam; a pair of valves, one of which is provided with a cam and the other of which has a counterweighted arm; and a device having a pair of laterally-extending arms adapted to come into contact, respectively, with said cam and counterweighted arm.

28. The combination with a compartment bucket having a stream-diverter, of a rotatively-supported shaft having a cam for shifting said diverter; means normally operative for preventing the rotation of said shaft; a scale-beam; a lever operatively connected thereto; a valve and its actuating device, the last mentioned of which is operatively connected with said lever and is provided also with means for releasing said shaft.

29. The combination with a bucket, of supporting-beams therefor, the bucket-supports of which are located at each side of a vertical central line passing through said bucket and also located at each side of a horizontal line passing through the center of gravity of the loaded bucket.

30. The combination with a bucket, of supporting-beams therefor, each of which is provided with a counterweight, and having the bucket-supports of said beams located at each side of a vertical central line passing through said bucket and also located at each side of a horizontal line passing through the center of gravity of the loaded bucket, and a link operatively connecting the weights of said scale-beams.

31. The combination with a compartment bucket, of a valve having a stop device operative therewith; a stream-diverter operable for alternately directing a stream of material into any one of the compartments of the bucket; and having a stop device operative therewith; and a third stop device operable between said first-mentioned devices for alternately governing the movements thereof.

32. The combination with a compartment bucket, of a pair of valves; a stream-diverter operable for alternately directing a stream of material into any one of the compartments of the bucket; stops operative with said valves; a stop operative with the stream-diverter; and a three-arm device operable for coacting with said stops for reciprocally limiting the movements thereof.

33. The combination with a compartment bucket having a closer, of a latch normally operable for holding said closer against opening movement; a stream-diverter alternately operable for directing a stream of material into the compartments of the bucket; a valve; reciprocally effective means for governing the movements of said valve and stream-diverter; and a device operative with said stream-diverter for tripping said latch.

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Witnesses:
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