



F. H. RICHARDS.  
WEIGHING MACHINE.

No. 574,169.

Patented Dec. 29, 1896.

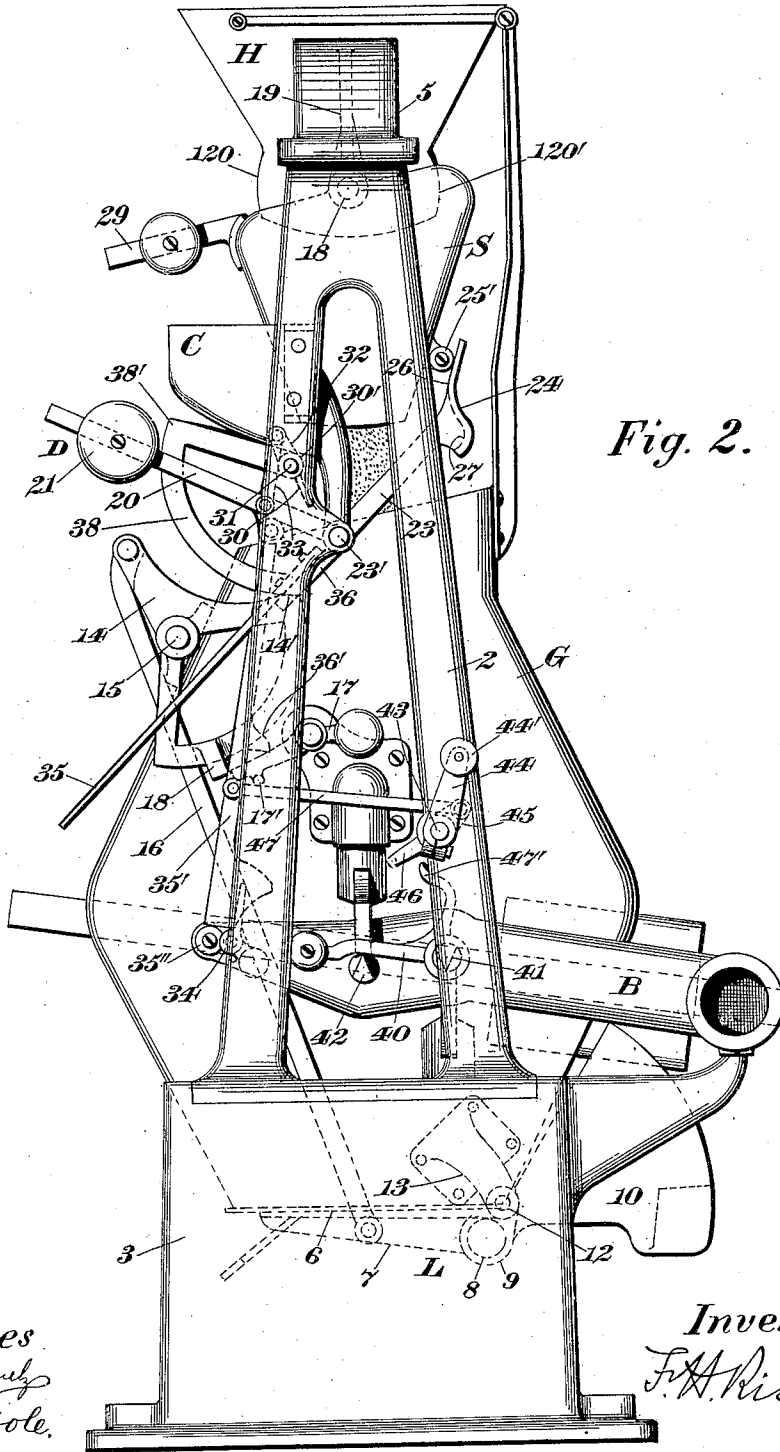


Fig. 2.

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(No Model.)

4 Sheets—Sheet 3.

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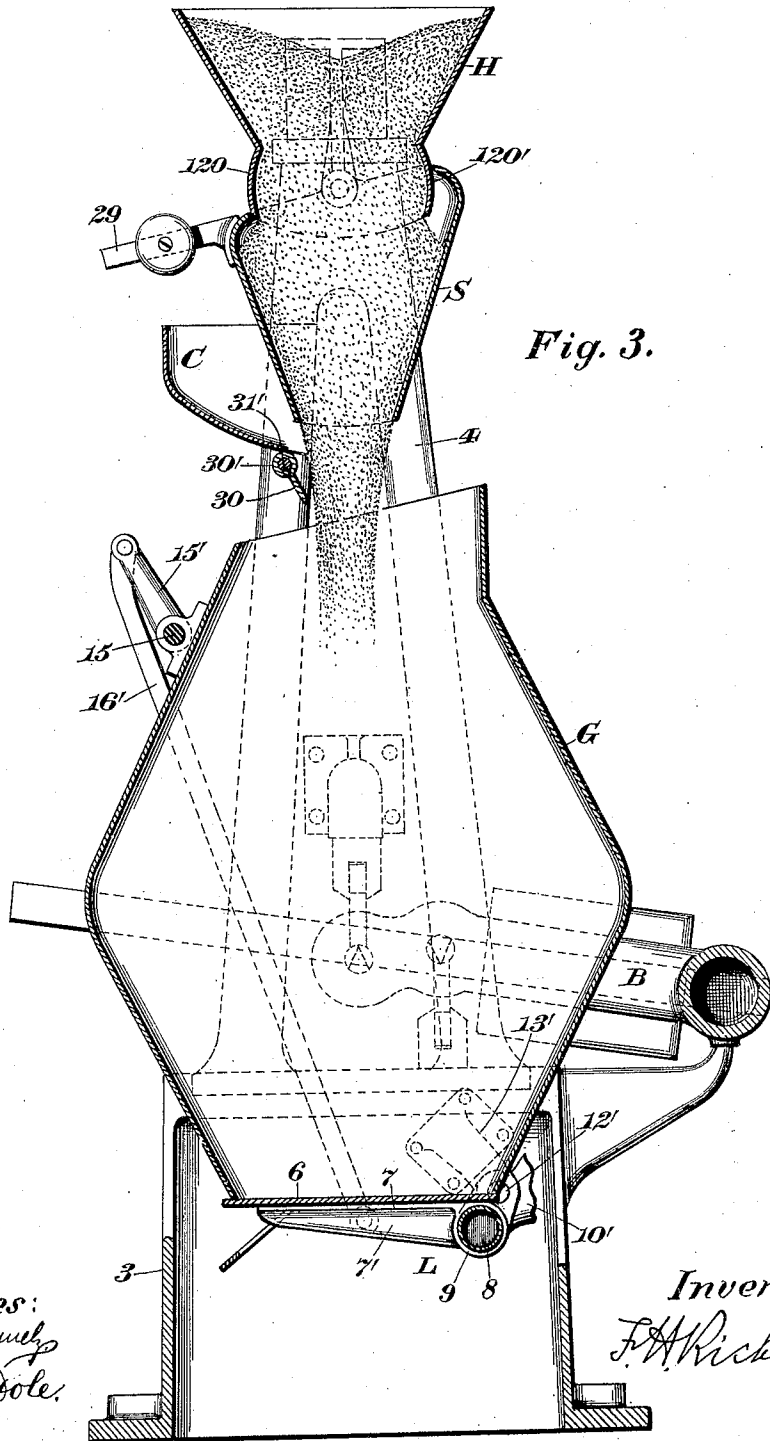


Fig. 3.

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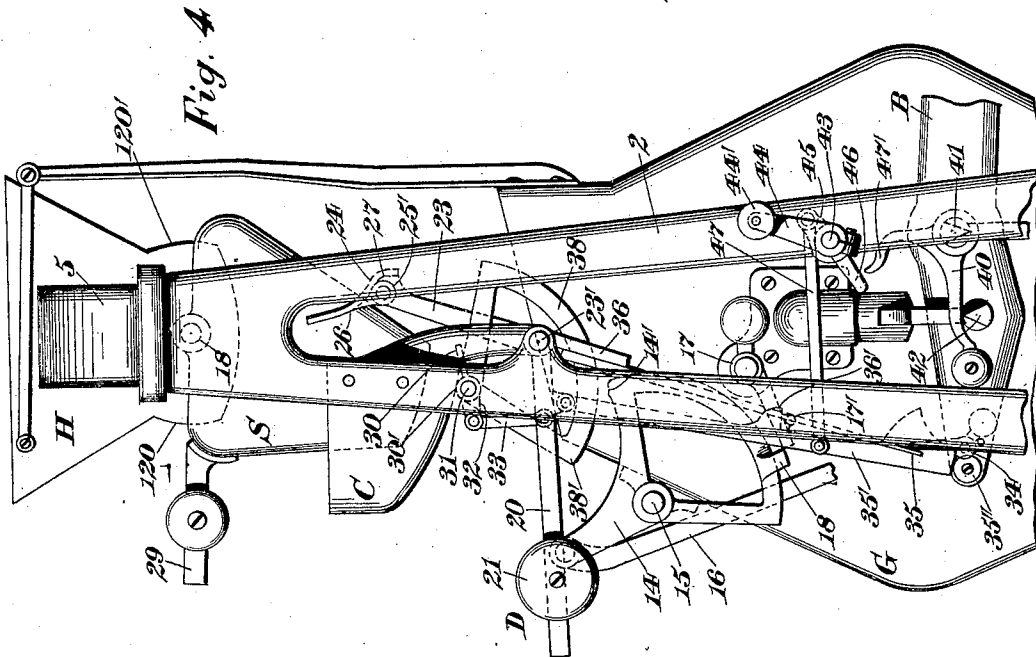
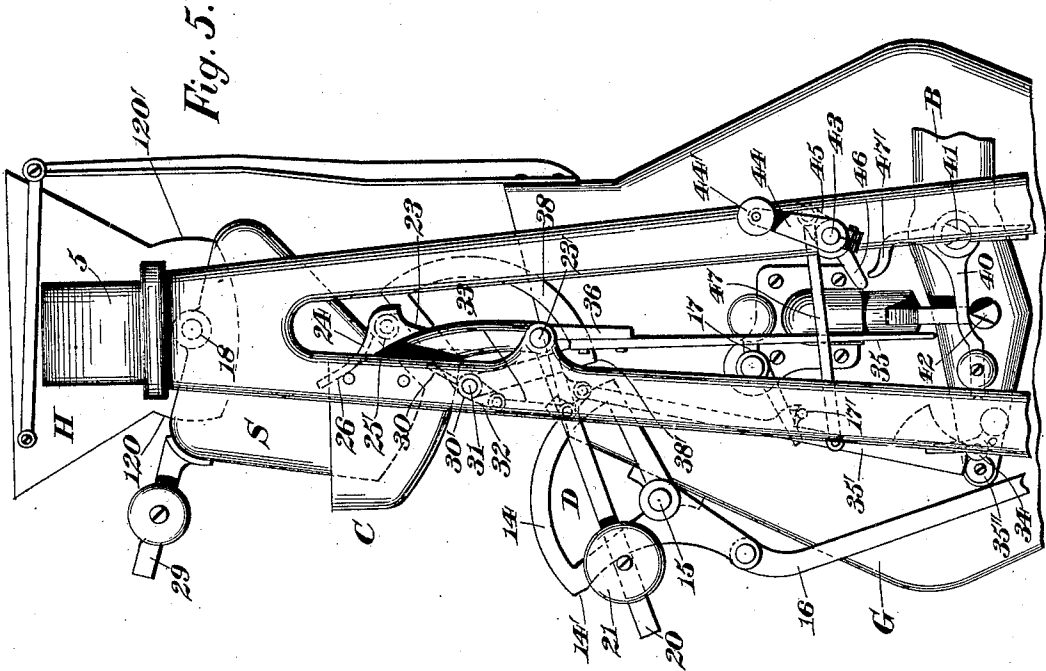
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# UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

## WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 574,169, dated December 29, 1896.

Application filed October 15, 1896. Serial No. 608,999. (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 organization of valve mechanism comprehending a supply-hopper, a stationary cut-off, and an intermediate or interposed oscillatory regulator-spout and actuating mechanism for operating or swinging said spout rearward during the making of a load and the descent of the weighing-bucket, whereby the downflowing stream from the supply-hopper is gradually directed toward the stationary cut-off and the amount of material supplied to said weighing-bucket is progressively decreased, the various parts cooperating to prevent blocking and clogging of the material at different points in its passage toward said bucket.

Another object of the invention is to furnish an improved closer for the bucket which shall be light and serviceable and which possesses also great rigidity, so that it effectually resists the shocks and hard usage generally present in machines for weighing such substances as coal and crushed stone.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine including my present improvements and illustrates the positions assumed by the respective parts at the commencement of operation. Fig. 2 is an end elevation of the machine as seen from the left in Fig. 1. Fig. 3 is a transverse central section of Fig. 1. Figs. 4 and 5 are left-hand end elevations of the principal part of the machine and show the positions of the valve mechanism and operative parts during the reducing and load-discharge periods, respectively.

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

The framework for sustaining the various parts of the machine may be of any suitable or preferred structure, and in the form shown it consists of the chambered base 3 and the end frames 2 and 4 rising therefrom, the lat-

ter being joined at the top by the plate or beam 5.

A supply chute or hopper is illustrated at H, it being adapted to contain the mass of material to be weighed, which will be supplied thereto in some convenient manner.

The weighing mechanism proper, which is similar in operation to that disclosed by Letters Patent No. 548,840, granted to me October 29, 1895, to which reference may be had, comprises beam mechanism and a load-receiver supported thereby for ascending and descending movements therewith.

The load-receiver, which is designated by G, is in the form of a well-known single-chambered bucket, and for sustaining the same I have illustrated the counterweighted scale-beam B, which consists of a pair of parallel arms joined at the rear by a weight, said beam being pivotally mounted or fulcrumed on the base 3 and its arms being furnished with suitable supports for the bucket. The bucket G will have the usual discharge-outlet, which is regulated or controlled by a closer, (designated in a general way by L.)

The closer L will be suitably connected to the bucket G, adjacent to its discharge-outlet, for opening and closing movements, as by a hinge-joint, said closer comprising in its make-up a flat plate or closer proper, 6, which is contiguous to the under side of the bucket G when in its normal position, said plate being suitably fastened to a series of arms 7, which have strengthening ribs or webs 7', said arms extending from the tubular or hollow shaft 8, being furnished at their inner ends with collars or bands 9, which encircle or embrace said tubular shaft, they being rigidly secured thereto in some suitable manner, as by brazing. The outermost arms of the series will be furnished with the preferably integral counterweighted plates 10 and 10', which project rearward therefrom, and each of which has adjacent to the tubular shaft 8 a bearing or opening.

A pair of pivots or pins are shown at 12 and 12', extending from the brackets 13 and 13', secured to the bucket near the lower rearward side thereof, said pins working in the bearings in the end plates 10 and 10', to which I have just referred. A closer such as that just described will be light and serviceable

and will also resist shocks, which features are of prime importance when the machine is weighing very heavy lumpy substances.

For maintaining the closer in its normal position I have shown an inverted toggle, one of the members of which is adapted to be engaged by a suitable detent or restraining device for holding said closer in such position.

A rocker is shown at 14, mounted on the bucket G for oscillation, it being rigidly secured to the transverse rock-shaft 15 and having a long rod 16, pivotally connected thereto and to the closer, one of the arms 7 of the closer having a projecting stud which passes loosely through an eye or opening in the lower end of said rod. The shaft 15 will also preferably have a crank-arm 15', connected by a rod 16' to the closer L by a joint similar to that of the rod 16.

A counterweighted bucket-latch is illustrated at 17, pivotally mounted on a bracket on the bucket G, its working arm engaging a lug or shoulder 18 on the rocker when the closer is shut, said latch swinging upward for this purpose.

The bucket-supply means include a stationary cut-off and a hopper, such as that shown at H, and an intermediate or interposed swinging or oscillatory stream-controlling spout. The stationary cut-off is designated by C and the oscillatory spout by S. The stationary cut-off is in the form of a hopper or box rigidly secured by suitable means between the end frames 2 and 4, its floor being concave or curved and in parallelism with the curved lower edge of the oscillatory spout, so that as the latter swings in and out the usual tendency of the material to block at this point is prevented. The spout S is in the form of a tubular conduit, it having in its upper side the projecting trunnions 18 and 18', working in bearings in the depending arms 19 and 19' of the top plate or beam 5.

The lower portion of the supply hopper or chute H is convex or outwardly bulged at opposite sides thereof, as at 120 and 120', the outer surface of said portion being concentric with the axis of movement of the spout S, and against which the adjacent and upper portion of the spout is adapted to run approximately in contact as it oscillates or reciprocates back and forth, whereby an easy-running joint is provided, and the escape of material at this point is done away with.

The spout S is illustrated in Figs. 2 and 3 in its position where it is delivering a stream of material of large volume into the empty bucket, such supply being received from the chute or hopper H. As the spout S is swung rearward the downflowing stream of material will be directed slowly toward the stationary cut-off C, the mass or stream to the bucket being correspondingly reduced.

For operating the spout S to obtain the foregoing result an actuating device is illustrated at D, it consisting of a counterweighted arm 20, the weight 21 of said arm being preferably

adjustable along the same, the hub or sleeve 22 of said arm being rigidly secured to the rocking stub-shaft 23', which is supported by the framing of the machine in some suitable manner, said shaft, near its inner end, also having fixed thereto the hub of the arm 23, which terminates in the spout-actuating cam 24, which is adapted to engage a suitable projection, such as the rigid arm 25 of said spout, said projection having an antifriction-roll 25', which serves its well-known function. The cam 24 has a working face 26, which is convex and which merges in a concavity or depression 27. The tendency of the counterweighted arm 20 is to drop, thereby imparting an opposite movement or thrust to the cooperating arm 23, this action, however, being suitably controlled or governed during the making of a load by the weighing mechanism, whereby the work of the machine may be performed with precision. Let it be assumed that the counterweighted arm 20 is dropping, an opposite movement is imparted thereby to the connected arm 23, so that the cam-face 26, being in contact with the roll 25' of the spout projection 25, said spout will be slowly swung outward as the counterweighted arm drops, through the action of the cam-face 26, as it travels in contact with the roll 25', whereby the volume of the supply-stream from the spout S will be properly diminished. At the commencement of the poisoning period the roll 25' will be nearly in the concavity 27, at which point the further inward movement of the spout S will be arrested to permit the supply to the bucket of an attenuated or reduced stream, it being understood, of course, that the arm 20 will be likewise held.

When the spout S is released, the said arm 20 will instantly drop and the face of the concavity 27 on the arm 24 will be immediately caused to impinge against the roll 25', so that as said arm drops a direct push may be exerted on the spout S for forcing the same rapidly outward, whereby the remainder of the supply will be directed to the stationary cut-off C.

For swinging the spout S inward it is furnished with a rearwardly-extending counterweighted arm 29, which, as the arm 20 is elevated or returned to its normal position, as will be hereinafter pointed out, will act reversely to the action of the cam 24, so that said spout will be caused to resume its normal position by the action of the counterweighted arm 29, as will be clear.

For the purpose of cutting off or catching the particles which drop from the main cut-off C and spout S on the completion of the bucket-load and final movement of the spout I employ a movably-mounted auxiliary cut-off supported independently of the main cut-off and which, in the present instance, consists of a flat plate 30, located adjacent to the discharge edge of the cut-off C and being sleeved to the shaft 31, said shaft being sup-

ported for rocking movement between the end frames 2 and 4. The sleeve 30' of the auxiliary cut-off 30 is cylindrical and is disposed longitudinally of the discharge edge of the cut-off C and bears thereagainst, so that as it rocks during the weighing of the load a free movement of the auxiliary valve will be insured, and the working of particles between the discharge edge of the main cut-off and the adjacent curved surface of the valve-sleeve 30' is prevented. The longitudinal sleeve 30' will embrace the reduced portion 31' of the shaft 31, and will be formed preferably in one piece with its cut-off.

For effecting the movement of the auxiliary valve 30 to open and close the same connections will be made with the counterweighted arm 20, which has been previously described. The shaft 31 is furnished with a crank-arm 32, to the outer end of which is connected a link 33, said link being similarly connected to the counterweighted arm 20, so that as said lever drops the auxiliary cut-off or valve 30 will be swung upward, and at the close of the weighing operation said auxiliary valve is given an accelerated movement for holding back the drip or catching particles of material which drop from the cut-off and spout.

For arresting the outward movement of the spout S and for also intercepting the progress of the connected parts a stop on the scale-beam B will be employed, such stop consisting of a counterweighted angle-lever 34, pivoted near the outer or poising side of the scale-beam B, and having its upright arm so located as to engage the depending rod 35, which is attached to an extension 36 of the hub 22.

It will be understood that as the arm 20 drops and the spout S is swung outward the rod or arm 35 will be oscillated to the right and the by-pass stop 34, being disposed in the path of movement of the rod or arm 35, will engage the same, thereby holding the spout and cooperative members, which at this time occupy the positions illustrated in Fig. 4, so that a drip-stream may be delivered to the bucket G, said by-pass at this time being suitably held against oscillation. On the return stroke of the rod 35 it will engage the upright arm of the by-pass 34 and swing the latter idly about its center.

When the bucket-load is completed by the drip-stream, the beam B will descend below the poising-line, so that the by-pass will release the rod 35, and consequently the spout S and its cooperative members, whereby they may be given their final strokes, the spout S being swung outward and the auxiliary valve 30 upward to cross the path of flow of the drip-stream to hold the same back.

For the purpose of limiting the outward movement of the spout S on the closure of the auxiliary cut-off 30 the beam B will be preferably employed.

A rod or link is illustrated at 35', it being pivoted to the counterweighted arm 20 and its free end resting on or bearing against the

scale-beam B or a projection or roll thereon, whereby as the bucket and beam descend during the making up of a load in the usual manner said beam by falling away from said rod will permit the operation of the various parts governed by the counterweighted arm 20, it being understood that the movement of said members is in correspondence with that of the weighing mechanism.

For the purpose of tripping the counterweighted latch 17, which engages a shoulder 18 on the rocker 14, the reciprocatory rod 35' has, at a suitable point thereon, the latch-tripper 36', which is in the form of a projection and which on the final closure of the auxiliary valve 30 and the final outward movement of the spout S, when these parts are released by the stop 34, is adapted to abut against the pin or stud 17' on the latch 17, thereby depressing said latch and disengaging it from its cooperating shoulder 18 on the rocker. When these parts are thus disengaged, it will be understood that the closer L is free of all restraint and will be forced open by the weight of the contents in the bucket G.

In connection with the auxiliary valve and the closer L, I employ reciprocally-effective stops operable for maintaining the closer against opening movement while the said valve is open, and for also maintaining said auxiliary valve in its closed position while the closer is open and the bucket is discharging any part of its contents, the action of the arm 20 and spout S being likewise automatically regulated by the two stops.

The rocker 14, which is in the form of a skeleton segment, constitutes one of said stops, the coating stop being substantially similar in construction and being rigidly joined to the auxiliary cut-off shaft 31. The operation of these stops will be understood from an inspection of Figs. 2, 4, and 5 of the drawings.

In Fig. 2 the closer is shut, the auxiliary valve 30 being open, and the plane face 14' of the rocking stop is contiguous to the curved face of the stop 38, so that should the latch 17 be prematurely tripped the stop member 38 will block the action of its mate as soon as the latter starts to oscillate, thereby holding the closer shut. When the auxiliary cut-off or valve 30 has reached the end of its effective or cut-off movement, the curved face of its connecting stop member 38 will have passed out of contact with the plane face 14' of the counterweighted stop 14, as illustrated in Fig. 5, so that the latch 17 being tripped the stop 14 is free to rock about its center, and in so doing its curved face will be adjacent to the point 38' of the stop 38, as illustrated in Fig. 5, whereby the latter may have a very limited amount of movement, or until it abuts against the rocking stop 14, at which point its further movement is arrested, the auxiliary cut-off thereby being maintained in its fully-closed position.

It is desirable at infrequent intervals to

make tests to ascertain if the machine is working properly, and I have shown a short weighted lever at 40, suitably supported by the extended knife or pivot 41 of the beam B, said lever being adapted to normally rest on the extended knife-edge or bucket-support 41, whereby its weight is added to the total weight of the bucket mechanism, the result being that the bucket will be carried down below the poising-line at a point immediately preceding the completion of a true load, the balance of the load being in the air between the valve mechanism and the mass in the bucket and falling into the bucket at about the time the latch is tripped, in the manner more completely set forth in Patent No. 548,841, granted to me October 29, 1895, to which reference may be had.

When a test is to be made, the latch-tripper 36' should be first thrown into its inoperative position to prevent the depression of the latch on the stoppage of the supply, which I accomplish by the following means: A short rock-shaft is shown at 43, having an actuating handle or crank 44 at its outside and furnished at its inner ends with two crank-arms 45 and 46, the first-mentioned of which is connected by a link 47 to the thrust-rod 35', the other being adapted to engage under the curved hook 47' of the weighted lever 40.

The following is the method employed in making a test: The thumb-piece 44' of the crank will be grasped and said crank will be oscillated for a short distance to the left, the rod 35', of course, being moved in correspondence therewith and until the tripper 36' is carried to a position beyond or across its normal plane of action, though said rod will be still in operative relation with the projection or roll 35'' of the beam B, whereby the action of the various parts may be properly controlled. When the spout S has reached the end of its effective movement and when the auxiliary valve 30 has been fully closed, the actuating handle or crank 44 will be again grasped and turned, which will throw the crank 46 under the hook 47', and on the continuation of such movement the weighted lever 40 will be raised or elevated from the knife-edge 42, thereby simultaneously swinging the rod 35' farther to the left, whereby it will be removed from contact with the projecting roll 35'', so that if a true load be in the bucket the loaded bucket and beam will assume an equipoised position after a few very slight oscillations. The operation of the hereinbefore-described machine, briefly, is as follows: Fig. 2 represents the positions occupied by the respective working parts at the commencement of operation, the closer L being shut and held in such position by the latch 17, which is in engagement with the rocker 14, the spout S being in its extreme outer position, whereby a stream of material of large volume may gravitate from the chute II and through the spout S, from whence it passes into the empty bucket G. When a certain

proportion of the load has been received, the bucket will descend and the scale-beam B, moving therewith and falling away from the rod 35', will permit the dropping of the weighted arm 20 and the rearward swinging of the spout S by the cam 24, which is connected to and operated by said arm 20.

At the commencement of the poising period the parts will be in the positions illustrated in Fig. 4, the spout S having nearly reached the limit of its outward movement and the valve or cut-off 30 being near the end of its effective or cut-off stroke, the by-pass stop 34 on the beam B at this point being in engagement with the depending rod 35 of the auxiliary valve-shaft 31, so that a drip-stream may be delivered to the bucket G.

When the load is completed by the bucket G, it and the beam mechanism will descend farther, so that the rod 35, and consequently the parts connected thereto, will be released by the by-pass 34 on the beam B, the spout S and auxiliary valve will be given their final movements, and during this last-mentioned operation the tripper or projection 36' on the rod 35' will be thrust downward into engagement with the pin 17' on the latch 17, thereby depressing said latch and disengaging it from the rocker 14 and consequently releasing the closer L, so that the latter is free to open, this result being effected by the weight of the contents within the bucket, which press against said closer.

Having described my invention, I claim—

1. The combination with a spout, of a main cut-off therefor; a shaft; and an auxiliary cut-off sleeved to said shaft, the sleeve of said auxiliary cut-off bearing against the discharge edge of the main cut-off and preventing the entrance of material between said parts.

2. The combination with a supply-hopper, of a stationary cut-off; an interposed oscillatory spout adapted to deliver a stream of material into said stationary cut-off; a shaft; a second cut-off sleeved to said shaft, the sleeve of which bears against the discharge edge of the stationary cut-off and preventing the entrance of material between said parts.

3. The combination with weighing mechanism including a bucket, of a hopper; a shaft; a cut-off sleeved to said shaft, the sleeve of which is adapted to bear against the discharge edge of said hopper and prevent the entrance of material between said parts.

4. The combination with weighing mechanism including a bucket, of a supply-hopper; a cut-off; an oscillatory spout cooperative with said hopper and controlled by the weighing mechanism, the lower portion of said hopper being convex, against which convexity the adjacent portion of the spout is adapted to run approximately in contact as it swings back and forth, said convexity being concentric with the axis of movement of said spout; a shaft; and an auxiliary cut-off sleeved to said shaft, the sleeve of which bears against the discharge edge of said main cut-off.

5. The combination with weighing mechanism including a bucket, of a supply-hopper; a stream-controller having a projection; an arm provided with a cam, the working face of which is adapted to travel along said projection, said cam also having a concavity which is adapted to receive said projection; and means for operating said arm.

6. The combination with weighing mechanism including a bucket, of a supply-hopper; a cut-off; an oscillatory spout located between said cut-off and supply-hopper and having a projection; an arm provided with a cam, the working face of which is adapted to travel in contact with said projection, said cam also being furnished with a concavity adapted to receive said projection; and means for operating said arm.

7. The combination with weighing mechanism including a bucket, of a supply-hopper; an oscillatory stream-controller having a projection; a shaft having an arm thereon provided with a cam, the working face of which is adapted to travel in contact with said projection, said cam also having a concavity for receiving said projection; and a counter-weighted arm on said shaft.

8. The combination with a bucket and with a scale-beam for supporting the same, of a supply-hopper; an oscillatory stream-controller cooperative therewith; an arm provided with a cam, the working face of which is adapted to travel in contact with said projection, said cam also having a concavity for receiving said projection; means for operat-

ing said arm; and a connection between said operating means and the scale-beam.

9. The combination with weighing mechanism including a bucket, of a supply-hopper; a main cut-off; an oscillatory spout located between said main cut-off and supply-hopper, and having a projection; a shaft having an arm provided with a cam, the working face of which is adapted to travel in contact with said projection; an operating-arm connected to said shaft and controlled by the weighing mechanism; a second shaft having an auxiliary cut-off cooperative with the main cut-off; and a connection between said second shaft and said operating-arm.

10. The combination with a bucket and with a scale-beam for supporting the same, said bucket having a closer; of means comprehending a latch for holding said closer against movement; a supply-hopper; a cut-off; an oscillatory spout located between said cut-off and supply-hopper; an actuating device for said oscillatory spout; a weighted member normally carried by the scale-beam; a rod directly connected to said actuating device and bearing against the scale-beam, said rod having a tripper for the latch; and shifting means simultaneously operative for elevating said weighted member and for throwing said rod into an inoperative position, whereby it will be disengaged from the scale-beam.

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