(No Model.) 2 Sheets—Sheet 1.

F. H. RICHARDS.

FEEDING APPARATUS FOR WEIGHING MACHINES.

No. 560,544. Patented May 19, 1896.

Fig. 2.

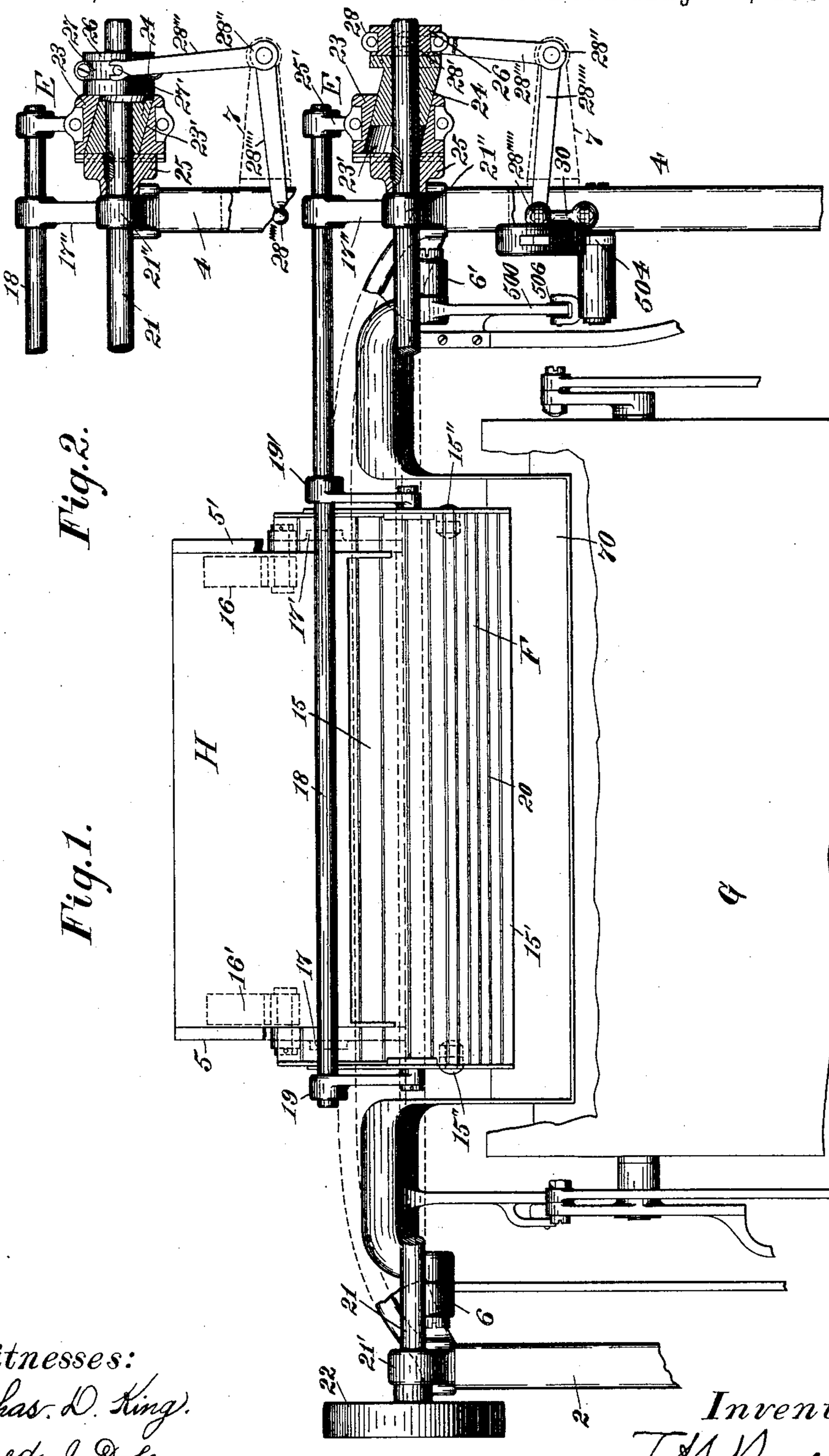

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

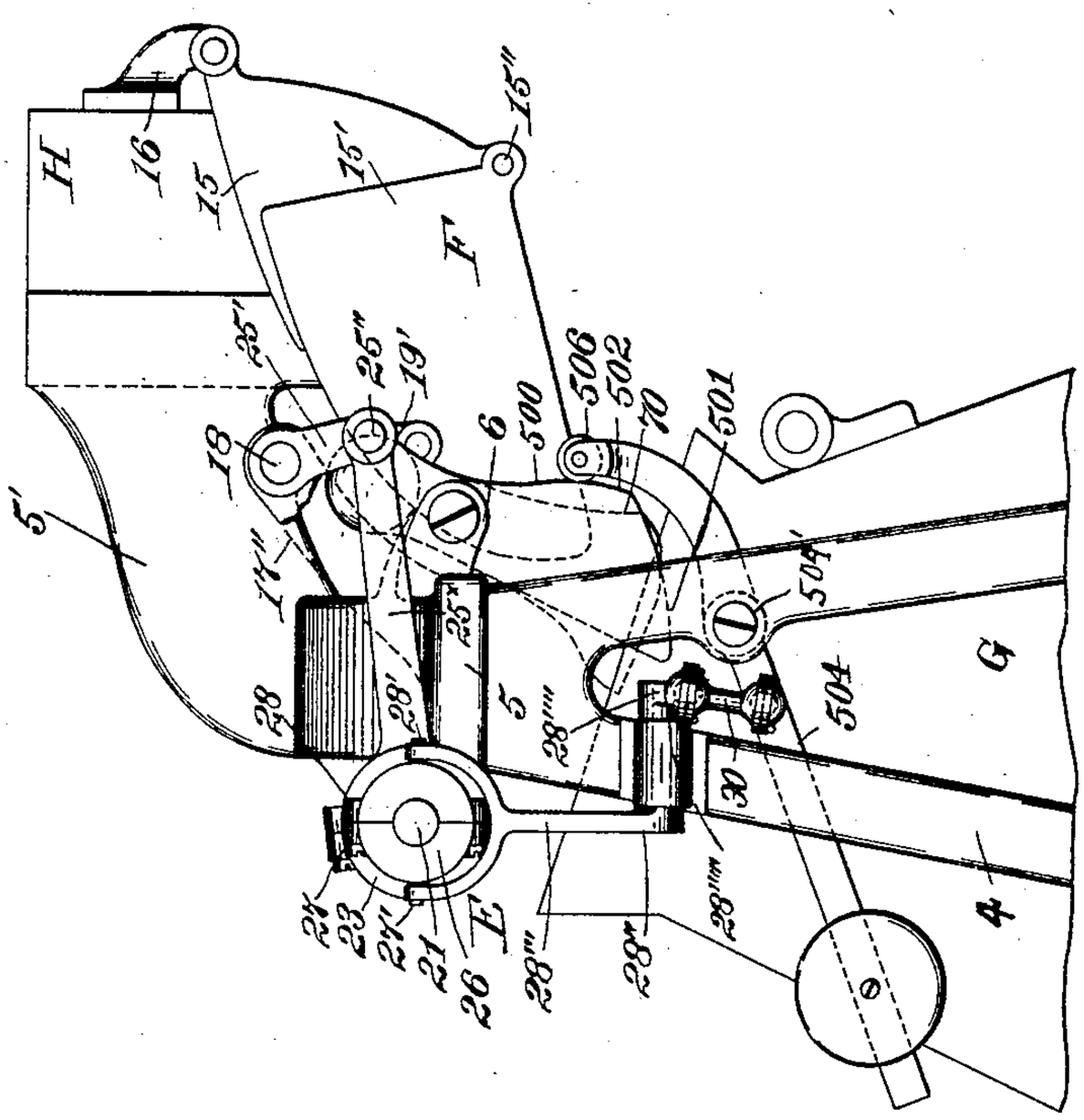
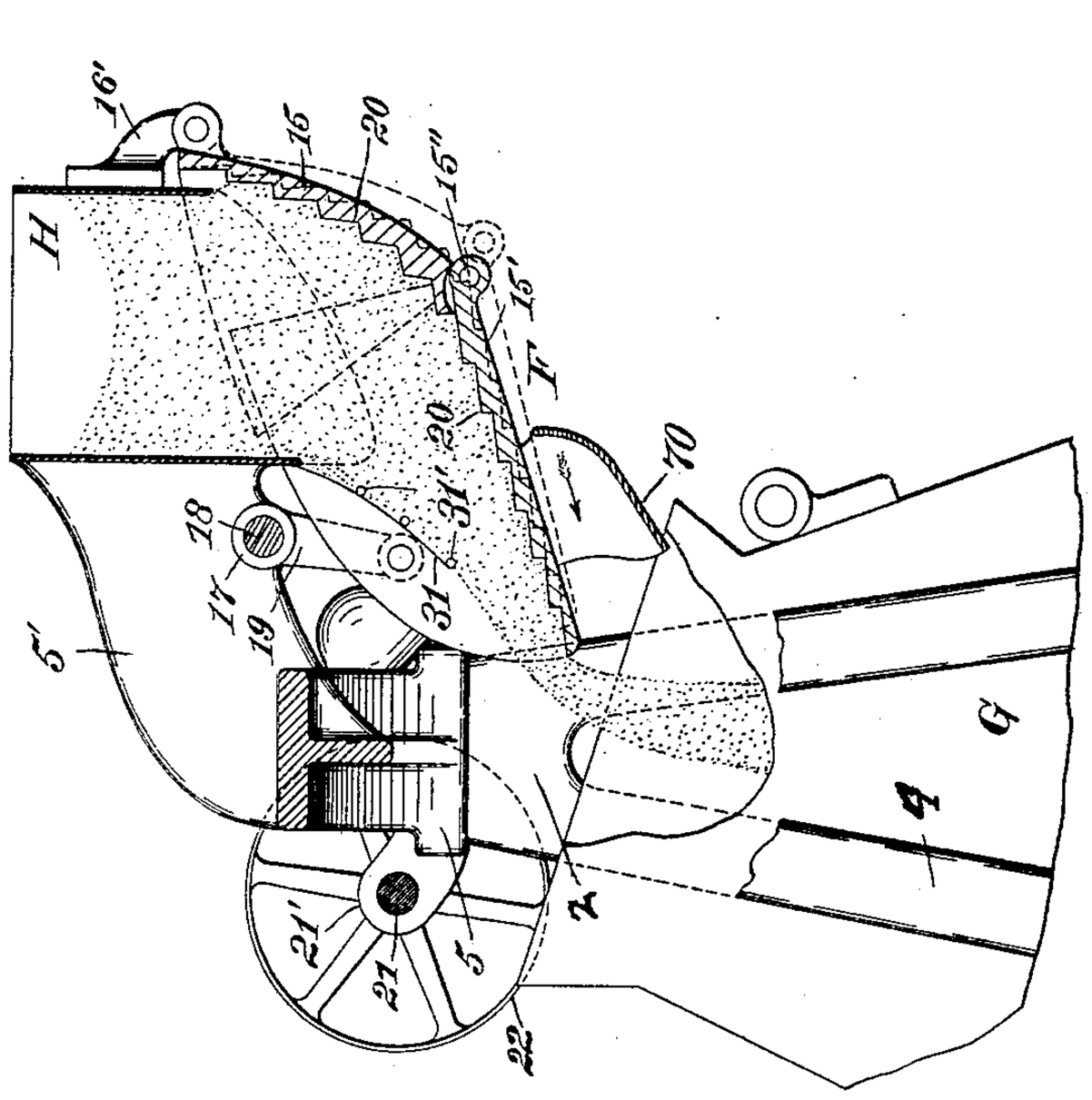


Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

FEEDING APPARATUS FOR WEIGHING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 560,544, dated May 19, 1896.

Application filed January 13, 1896. Serial No. 575,219. (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 Feeding Apparatus for Weighing-Machines, of which the following is a specification.

This invention relates to feeding apparatuses, and is more especially adapted for use in connection with weighing-machines or mechanisms, the object being to furnish an improved feeder and to provide the same with means for imparting thereto a variable stroke, so that said feeder will be effective for feeding or forcing from the chute or other source of supply a stream of material of variable volume.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of the upper portion of a weighing-machine embodying the preferred form of feeder and showing also one form of mechanism for varying the stroke thereof. Fig. 2 is a detail view, in front elevation, with parts in section, of the feeder-stroke-varying mechanism and in a different position from which it is illustrated in Fig. 1. Fig. 3 is an end elevation seen from the right in Fig. 1, the chute, the feeder, and certain adjacent parts thereto being in transverse section; and Fig. 4 is a right-hand end elevation of the upper part of the machine with the stroke-varying mechanism in position.

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

My present invention is peculiarly adapted to weighing machinery for weighing sluggish and lumpy materials, and, when used in connection therewith, on the stroke of said feeder a steady even flow of the supply-stream will be fed or forced from the chute of the apparatus into the bucket of the weighing-machine.

My improved feeder is shown located below the chute, and is operable on each of its strokes for feeding or forcing into the bucket of the weighing-machine a portion of the supply-stream, and it has a variable stroke, whereby the volume of the fed or forced stream of material is correspondingly varied with the variation in stroke of the feeder.

At the commencement of each operation or cycle of movements of the machine the feeder will have its maximum stroke or highest efficiency, the latter being progressively decreased as the load in the bucket approaches completion, the result being a corresponding decrease or diminution in volume of the fed or forced supply-stream. On the completion of the bucket-load the feeder will be stopped in its movement, the consequence being a stoppage also of the stream. As a means for securing this variation in stroke of the feeder, I prefer to employ a changeable or variable stroke eccentric—that is to say, one the eccentricity of which may be increased or decreased relatively to its supporting member to likewise increase or decrease the stroke of the feeder which is operatively connected therewith. The eccentric is preferably controlled by means operative with the weighing mechanism, whereby its eccentricity is varied at successive and proper points in the operation of said weighing-machine. On the completion of the bucket-load the eccentric will be at a "dead-center," so that the same will then be ineffective as a "stroke-transmitting" factor, though its supporting member continues to move, thereby stopping the feeder.

In the drawings I have illustrated and will hereinafter briefly describe the upper portion of a weighing-machine constructed in accordance with Letters Patent No. 548,840, dated October 29, 1895, in connection with which, to illustrate the nature and mode of operation thereof, my present invention will be described. It will be understood, however, that I do not limit the application of my invention to a weighing-machine, as it is adapted for effective use with other forms of machines which require the feeding of a stream of material of a variable volume.

The operative parts of a weighing-machine are usually carried by two connected side frames or members mounted upon a suitable supporting-base, and there is shown in the drawings the upper portions of said side frames or members, which are designated, respectively, by 2 and 4, and are shown connected by a top plate or beam 5. The top plate 5 is illustrated carrying the bracket 5′, which carries the chute H, the latter being secured

thereto in some suitable manner, for containing the mass of material to be fed into the bucket or other receptacle of the machine, the material being supplied to the chute or hopper H by an elevator or other suitable apparatus. (Not shown.) The upper portion of the bucket or load-carrying receptacle is designated in a general way by G, and in practice is suitably supported by beam mechanism, preferably carried by the supporting-base of the machine.

The shaking feeder, which is designated in a general way by F, embodies two connected sections or members, (designated, respectively, by 15 and 15′,) which are shown pivotally connected at 15″, the juncture of these members being approximately in alinement with the middle of the descending column or stream of material in the chute or hopper H, these members being in different planes or angularly disposed relatively to each other.

In Fig. 3 I have indicated by the arrow the direction of movement or working stroke of the feeder F. On the movement of the feeder F in the direction indicated there will be a pivotal action of these two connected sections or members 15 and 15′ at their point of connection, which tends to thoroughly shake or agitate the entire mass in the chute supported thereby, which loosens up the same throughout its entire area and insures a free flow thereof by the feeder into the bucket or other load-carrying receptacle of the machine. The feeder is provided with upwardly-extending end walls, one of which overlaps the other and effectually prevents scattering and consequent waste of the material. The member 15′ of the feeder F, which is shown approximately horizontally disposed relatively to the chute H, has a stroke different from the stroke of its connected member 15, so that as the mass is loosened up by the combined action of the two members the approximately vertical member 15 pushes the mass forward onto the member 15′, the latter forcing said mass or stream into the bucket G. As the stroke of the feeder F is progressively decreased, a progressive diminution in volume, due to the shortening in stroke of the feeder, results.

At the commencement of the poising period of the machine there will be fed into the bucket thereof a stream of very small volume, the stroke of the feeder at this point in the operation of the machine having been materially reduced, the purpose being to complete or "top off" the nearly-completed bucket-load.

The chute H is illustrated carrying bearings 17 and 17′ for supporting the rock-shaft 18, and the side frame 4 is also illustrated provided with a bearing 17″ for supporting the outer end of said rock-shaft 18, the purpose of which rock-shaft will be hereinafter described. The chute or hopper is illustrated supporting the member 15 of the feeder, and the rear wall of said chute is shown provided with brackets 16 and 16′, to which is shown, pivotally connected for oscillatory movement, said member 15. The rock-shaft 18, at points adjacent to the chute H, is shown provided with rock-arms 19 and 19′, which are secured thereto in some suitable manner, the opposite ends of said rock-shaft being illustrated pivotally connected with the member 15′ of the feeder F. As the feeder F moves in the direction of the arrow (its effective or working stroke) the member 15 thereof will have a considerable radial movement about its axis, while the connected member 15′ will have, by reason of its pivotal connection therewith and its support from the rock-shaft 18, a relatively limited radial movement about its pivot with the member 15. The forward stroke of the member 15′, however, is a relatively long one, being of greater length than its connected member, and is in a plane approximately coinciding with its plane of inclination. It will be apparent that when the feeder F moves in the direction indicated a movement of the two connected members 15 and 15′ will occur at the junction thereof, which tends to thoroughly shake or agitate and loosen up the entire mass supported thereby and contained in the chute or hopper H, so that a free even flow of the stream by the feeder into the bucket or other receptacle will be positively insured.

As a means for securing a more efficient action of the feeder I prefer to corrugate the same, as indicated at 20, the corrugations thereof taking a firm hold of the mass supported thereby and pushing or forcing the same into the bucket.

As a means for securing a variable stroke of the feeder F, I prefer to employ a changeable or variable stroke eccentric, which is preferably controlled from the weighing mechanism, and as a means for actuating the feeder any suitable mechanism may be employed, and the changeable or variable stroke eccentric will be preferably carried by and operative with the actuating mechanism. A transverse shaft is shown at 21, constituting a part of the actuating or driving mechanism of the feeder F, and which shaft is shown extending beyond the framework of the machine said framework being illustrated provided with bearings 21′ and 21″, in which said shaft 21 is journaled for rotative movement. The shaft 21 is illustrated carrying at one end thereof the pulley 22, which is operatively connected by a belt (not shown) with the power or drive wheel of some suitable motor. (Not shown.) The shaft 21 is illustrated carrying a changeable or variable stroke eccentric, which is designated in a general way by E, which latter is operatively connected with the feeder F, and also with the weighing or other machine to which the feeder may be applied, so that the stroke of said last-mentioned member may be automatically varied

or controlled from and by the weighing mechanism by correspondingly varying the stroke or throw of said eccentric.

The eccentric E, as shown, embodies an eccentric proper, 23, and a device 24, the movements of which latter are controlled by the weighing mechanism for varying the eccentricity of the eccentric relatively to its supporting-shaft, though the latter continues its movement to thereby correspondingly vary the stroke of the feeder F. The shaft 21 is shown carrying a guide-collar 25, which is splined thereto for rotative movement with said shaft, and this guide-collar 25 is also operatively connected with the eccentric proper, so that on the rotation of said guide-collar 25 with the shaft 21 the eccentric may also have a rotative movement therewith. The connection between the guide-collar 25 and the eccentric proper, 23, should be such a one as will freely permit lateral movement of said eccentric relatively to the supporting-shaft 21, while positively preventing longitudinal movement of said member 23 relatively to said shaft. The inner face of the eccentric proper has formed thereon a guideway, in which is fitted a rib or tongue formed on the outer face of the guide-collar 25. It will be apparent that by virtue of this connection between these two members the eccentric 23 may rotate with the guide-collar 25, but that the former may be freely moved toward or from the shaft 21, to thereby increase or decrease its eccentricity relatively thereto. The eccentric proper, 23, may also be brought to a dead-center, and it will be obvious that when it is in this position it will be ineffective as a stroke-transmitting medium.

The eccentric member 23 is shown cylindrically bored at 23′, the axis of said bore being oblique relatively to the supporting-shaft 21, and in this bore will be located for transverse movement a cylindrical core 24, the axis of which is also oblique relatively to the shaft 21, and coincident with that of the cylindrical bore 23′ of the eccentric member 23, so that when said core 24, which is also supported by the shaft 21, is reciprocated, either in the one direction or the other, the eccentric member 23 will be likewise moved toward or from its supporting-shaft 21, thereby varying the eccentricity of said member 23 and similarly varying the stroke of the feeder F through its operative connections with said eccentric. The eccentric member 23 will, as just stated, be operatively connected with the feeder F, preferably through the medium of the connecting-strap $25^{\times}$, which is suitably formed on said eccentric member 23. The rock-shaft 18 is shown carrying at the outer end thereof the rock-arm 25′, and to the lower end of the latter is shown pivotally connected at 25″ the connecting-strap $25^{\times}$, carried by the eccentric member 23. On the rotation of the shaft 21 the eccentric member 23 will rotate therewith and, through the connecting-strap $25^{\times}$, impart a stroke to and rock the rock-arm 25′, and hence the rock-shaft 18, which supports the feeder. As the shaft 18 is rocked, it imparts a reciprocatory movement or stroke, through the arms 19 and 19′, to the feeder F, and this stroke will be in correspondence with that of the eccentric member 23, so that as the stroke of the latter is varied that of the feeder will be likewise increased or decreased, so that the volume of the fed or forced supply-stream, acted upon by the feeder F, may be similarly varied.

The oblique cylindrical core 24, which is shown as a means for varying the eccentricity of the eccentric member 23, will have operable therewith a slidable member carried thereby, and also supported for sliding movement by the shaft 21, such slidable member being shown at 26, operatively connected with and controlled in its movement by some device operative with the weighing mechanism, so that the stroke of the feeder may be positively and automatically controlled from the machine embodying my present improvements.

On the stoppage of the feeder F there will generally fall from the discharge edge thereof in the form of a drizzle or spray a portion of the mass supported thereby, and as a means for catching this drizzle or spray to prevent its entrance into the loaded bucket or other receptacle I prefer to employ, and have shown, a valve, which is substantially similar to the improved valve disclosed in Letters Patent No. 535,727, granted to me March 12, 1895. Such a valve is shown at 70, supported for oscillatory movement by the brackets 6 and 6′, carried by the top plate 5 of the machine. This valve will be normally located away from the line of flow of the forced supply-stream, but at the close of the poising period or completion of the bucket-load will be quickly projected across said line to catch the drizzle or spray that falls from the feeder F on the stoppage thereof. As a means for closing this valve or moving the same toward the line of flow of the forced stream I prefer to employ the valve-closing mechanism disclosed and claimed in Letters Patent No. 548,843, granted to me October 29, 1895, to which reference may be had and which will now be briefly described.

The valve 70 is illustrated carrying for oscillatory movement therewith the valve-closing cam 500, which is shown provided with two connected cam-faces, (designated, respectively, by 501 and 502,) the latter being of relatively greater power or efficiency than the former. These cam-faces are in position to be engaged by a valve-closing actuator, which is illustrated as a counterweighted lever 504, pivoted to the side frame 4, and as having at the rear thereof the antifriction-roll 506, which is in position to engage one of the two cam-faces 501 and 502 of the cam 500 to thereby close the valve 70. During the major portion of the operation of the machine the antifriction-roll 506 will be in engagement with the cam-face 501, so that a slow closing

movement will be imparted to said cam for closing said valve, means (not shown) in practice being also employed for limiting said closing movement. At the commencement of the poising period the valve 70, at this point in the operation of the machine being adjacent to the line of flow of the stream, will be held against further closing movement by any suitable means (not shown) to permit the flow of an unobstructed drip-stream into the bucket for the purpose of completing the bucket-load therein. At the commencement of the poising period the friction-roll 506 will be at the intersection of the cam-faces 501 and 502, so that when the said valve 70 is released the friction-roll 506 will engage the cam-face 502, which is of relatively great power or efficiency, thereby quickly closing said valve, the latter catching drizzle or spray from the feeder F when this has been stopped.

The movement or variability in stroke of the feeder F is controlled by means operatively connected with the lever 504, which is in the nature of a reciprocatory member and is adapted, on one reciprocation thereof, through operative connections with the feeder for decreasing the stroke thereof, to thereby diminish in volume the fed or forced supply-stream, and this reciprocation of the lever 504 is illustrated as the downward movement of said lever. It will be obvious that when the lever is oppositely moved or in an upward direction, the feeder will, when said lever has assumed its normal position and the valve 70 opened, have its maximum stroke.

The slidable core-regulating member 26 is illustrated peripherally grooved or channeled, and in said groove or channel is shown, seated for non-rotative movement therewith, the connected straps 27 and 28, which carry thereon the projections 27′ and 28′, respectively.

The side frame 4 is illustrated carrying a laterally-projecting bracket 7, (see dotted lines, Figs. 1 and 2,) which supports for working movement the angle-lever 28″, which is operatively connected, respectively, with the slidable member 26, which controls the movements of the core 24 and with the lever 504 at a point forward of the pivot thereof.

The member 28‴ of the angle-lever 28″ is shown bifurcated, and the branches thereof are forked, the latter embracing the pins or projections 27′ and 28′ of the connected straps carried by the slidable member. On the descending movement of the forward portion of the lever the member 28⁗ of the angle-lever 28″ will be pulled downwardly, thereby forcing the member 28‴ inwardly, the core 24 also moving therewith, and the latter is forced into the oblique cylindrical bore 23′ of the eccentric member 23, so that as said core 24 is moved inwardly with said slidable member 26 the eccentricity of the eccentric member will be decreased, the oblique core acting in the nature of a double-acting wedge. It will be apparent that as the axis of the eccentric member 23 approaches that of the shaft 21 the eccentricity of the former relative to said shaft will be decreased, and when these axes occupy a coinciding plane the eccentric will be in the dead-center position thereof and will be ineffective as a stroke-transmitting factor, though, of course, it continues to rotate with the shaft 21. The member 28⁗ of the angle-lever 28″ is shown provided with a ball end 28⁗′, which lies in a socket, and the lever 504 is also provided with a ball at a point adjacent the center of movement thereof, which works in a socket similar to that just mentioned. A connecting member is shown at 30, having formed at its extremities semispherical sockets, each of which forms one of the complementary members of the sockets for receiving the corresponding balls carried, respectively, by the member 28⁗ of the angle-lever 28″ and the valve-closing lever, the other members of said sockets being shown also as semispherical and as having annular flanges, through which pass suitable fastening devices. Means are also provided for steadying the outgoing supply-stream, and the means shown for this purpose is a flexible guard 31, suitably carried by the chute H, and which is shown provided with a series of weights 31′ at the proper intervals thereon, the weights holding the flexible guard against the outgoing stream or mass of material and steadying the stream, as well as preventing spattering of the material at this point.

Having thus described my invention, I claim—

1. An apparatus of the class specified, embodying weighing mechanism; a feeder; and mechanism for automatically effecting a variable stroke of said feeder; said mechanism being controlled by means operative with the weighing mechanism.

2. In an apparatus of the class specified, the combination of a feeder; a driving mechanism therefor embodying a changeable-stroke eccentric; and weighing mechanism, said eccentric being controlled by means operative with the weighing mechanism.

3. An apparatus of the class specified, embodying a two-part feeder, and driving mechanism for automatically effecting a variable stroke of said feeder.

4. In an apparatus of the class specified, the combination with a chute, of a power-driven feeder therefor embodying two pivotally-connected contiguous sections, said feeder being also pivoted to said chute.

5. In an apparatus of the class specified, the combination with a chute, of a feeder comprising two movably-connected corrugated sections; and driving mechanism for said feeder.

6. An apparatus of the class specified, embodying weighing mechanism; a feeder consisting of two connected sections having different movements; and mechanism controlled

by the weighing mechanism for effecting a variable stroke of said feeder.

7. In an apparatus of the class specified, the combination with weighing mechanism and a feeder, of a drive-shaft; a changeable-stroke eccentric operative with said shaft; and connections between said eccentric and feeder.

8. In an apparatus of the class specified, the combination with weighing mechanism, of a chute; a variable-stroke feeder; actuating mechanism for said feeder; and means operative with the weighing mechanism for controlling the movement of said feeder.

9. In an apparatus of the class specified, the combination with weighing mechanism, of a chute; a variable-stroke feeder; a changeable-stroke eccentric operatively connected with said feeder; and means operative with the weighing mechanism for controlling the movement of said feeder.

10. In an apparatus of the class specified, the combination with weighing mechanism, of a chute; a variable-stroke feeder; actuating mechanism for said feeder; a valve; a valve-closing actuator; and means, operatively connecting said actuator with the feeder, to thereby control the movements of the latter.

11. In an apparatus of the class specified, the combination with weighing mechanism, of a chute; a feeder for said chute; a rock-shaft; rock-arms carried by said shaft, and operatively connected with said feeder; a variable-stroke eccentric; connections between said eccentric and said rock-shaft; and means for varying the stroke of said eccentric.

12. In an apparatus of the class specified, the combination with a chute, of a feeder; a variable-stroke eccentric; connections between said eccentric and feeder; a lever; and connections between said lever and eccentric for varying the eccentricity of the latter.

13. In an apparatus of the class specified, the combination with a chute, of a feeder operative for forcing a stream of material from said chute; actuating mechanism for said feeder; and a flexible guard suspended from said chute, and having a weight or weights thereon operable for holding said guard against the outgoing stream.

14. In an apparatus of the class specified, the combination with a chute, of a feeder; a rock-shaft; connections between said rock-shaft and feeder; a rock-arm carried by said shaft; a variable-stroke eccentric operatively connected with said rock-arm; and means for varying the eccentricity of said eccentric.

15. In an apparatus of the class specified, the combination with a chute, of a feeder; a variable-stroke eccentric operatively connected with said feeder; a pivotally-supported lever; and an angle-lever operatively connected, respectively, with said eccentric and with said lever, whereby, on the movement of said lever, the eccentricity of said eccentric will be varied.

16. In an apparatus of the class specified, the combination with weighing mechanism, of a chute; a power-driven feeder therefor embodying two operatively-connected sections disposed approximately in vertical and horizontal planes, respectively, relatively to said chute; and means operatively connecting said feeder with said weighing mechanism.

17. The combination with weighing mechanism, of a chute; a feeder embodying two operatively-connected sections disposed in different crosswise planes; and actuating mechanism connecting said feeder with said weighing mechanism.

18. In an apparatus of the class specified, the combination with weighing mechanism, of a chute, a feeder therefor embodying two connected plates approximately disposed in horizontal and vertical planes, respectively; and means controlled by the weighing mechanism for reciprocating one of said plates in a direction substantially parallel with the plane thereof, and for also reciprocating the other plate.

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