

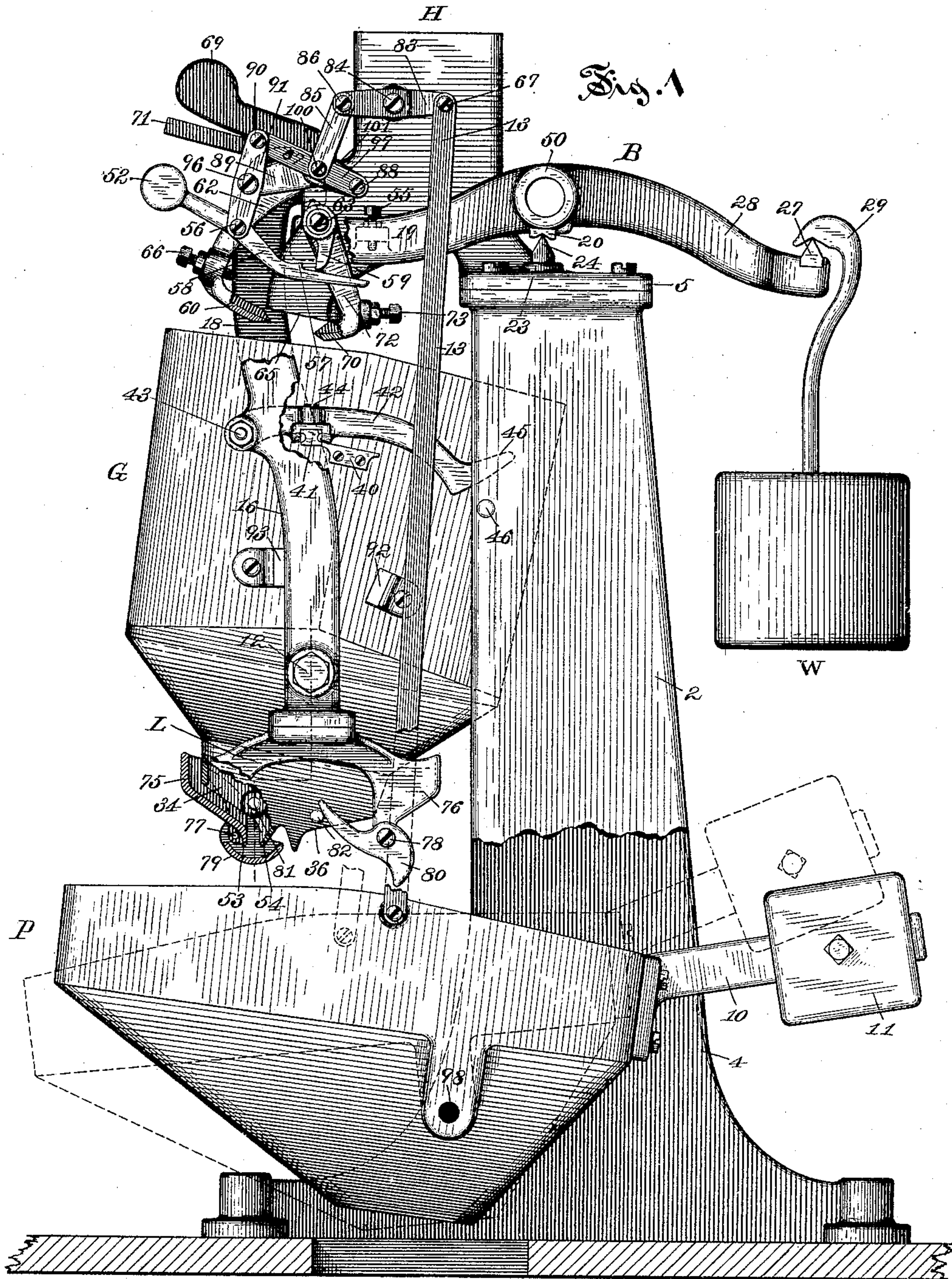
(No Model.)

3 Sheets—Sheet 1.

F. H. RICHARDS.
REGULATOR GRAIN WEIGHER.

No. 442,715.

Patented Dec. 16, 1890.



Witnesses:

W. M. Byorkman.
Henry L. Reckard.

Inventor:

Francis H. Richards

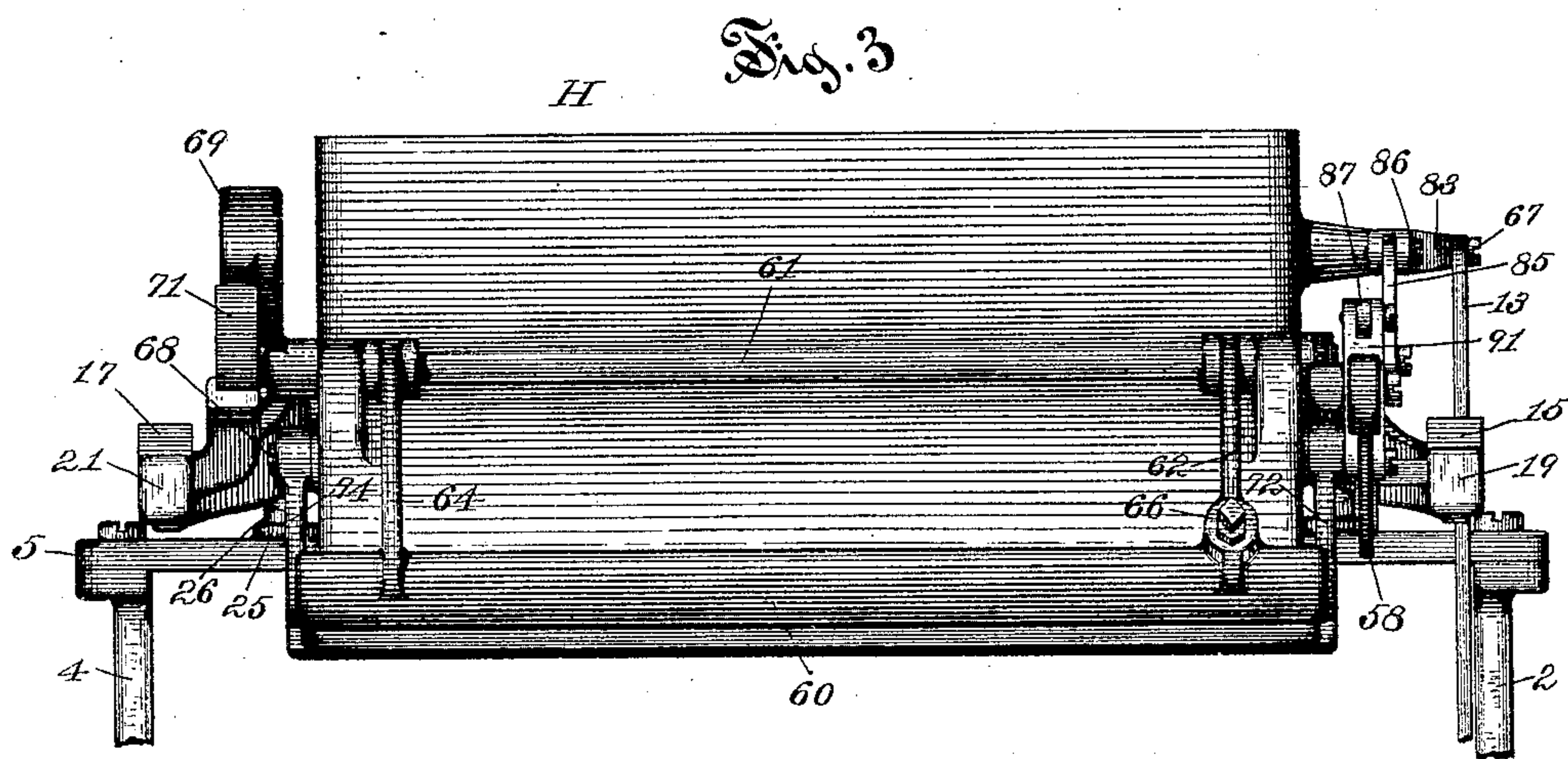
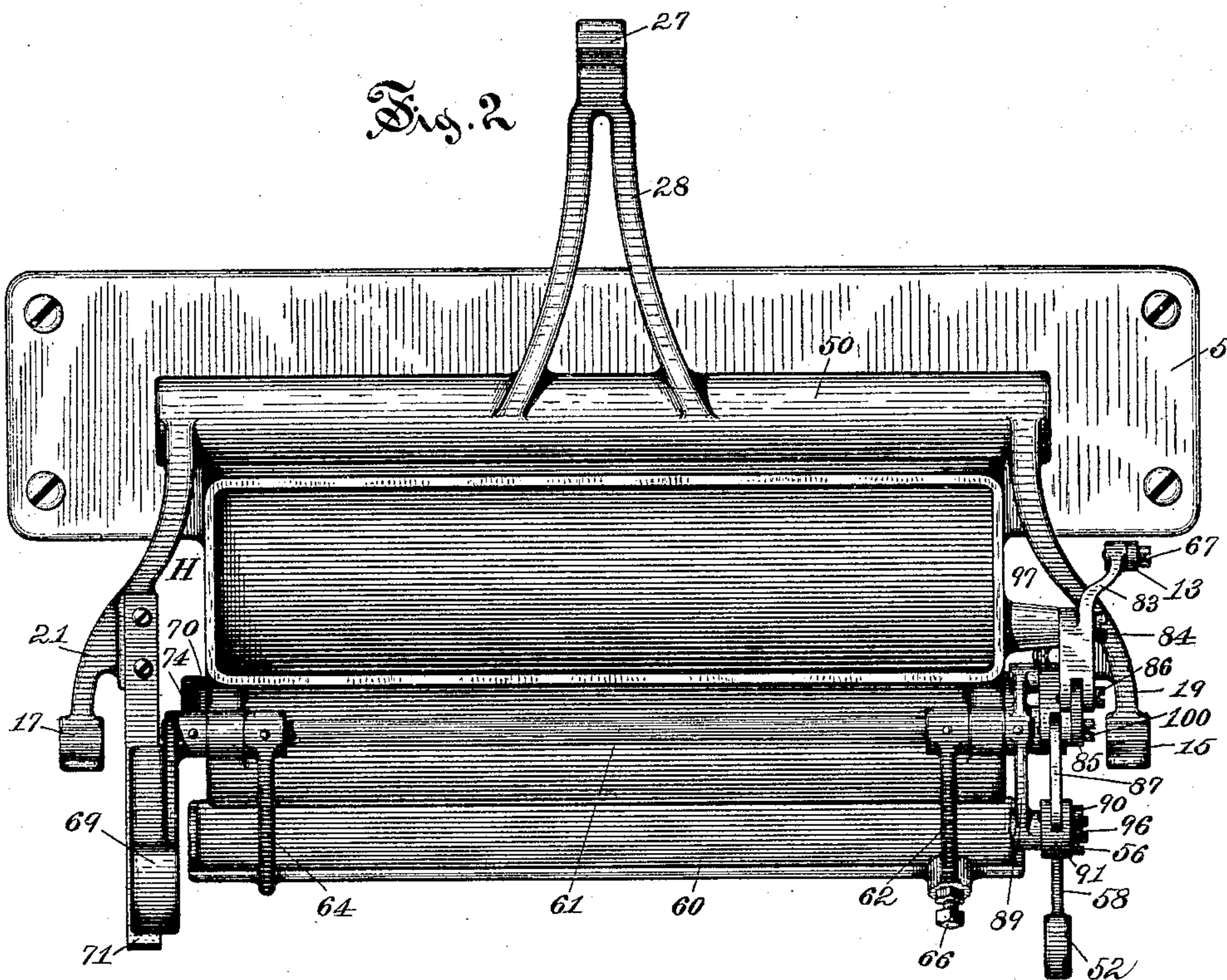
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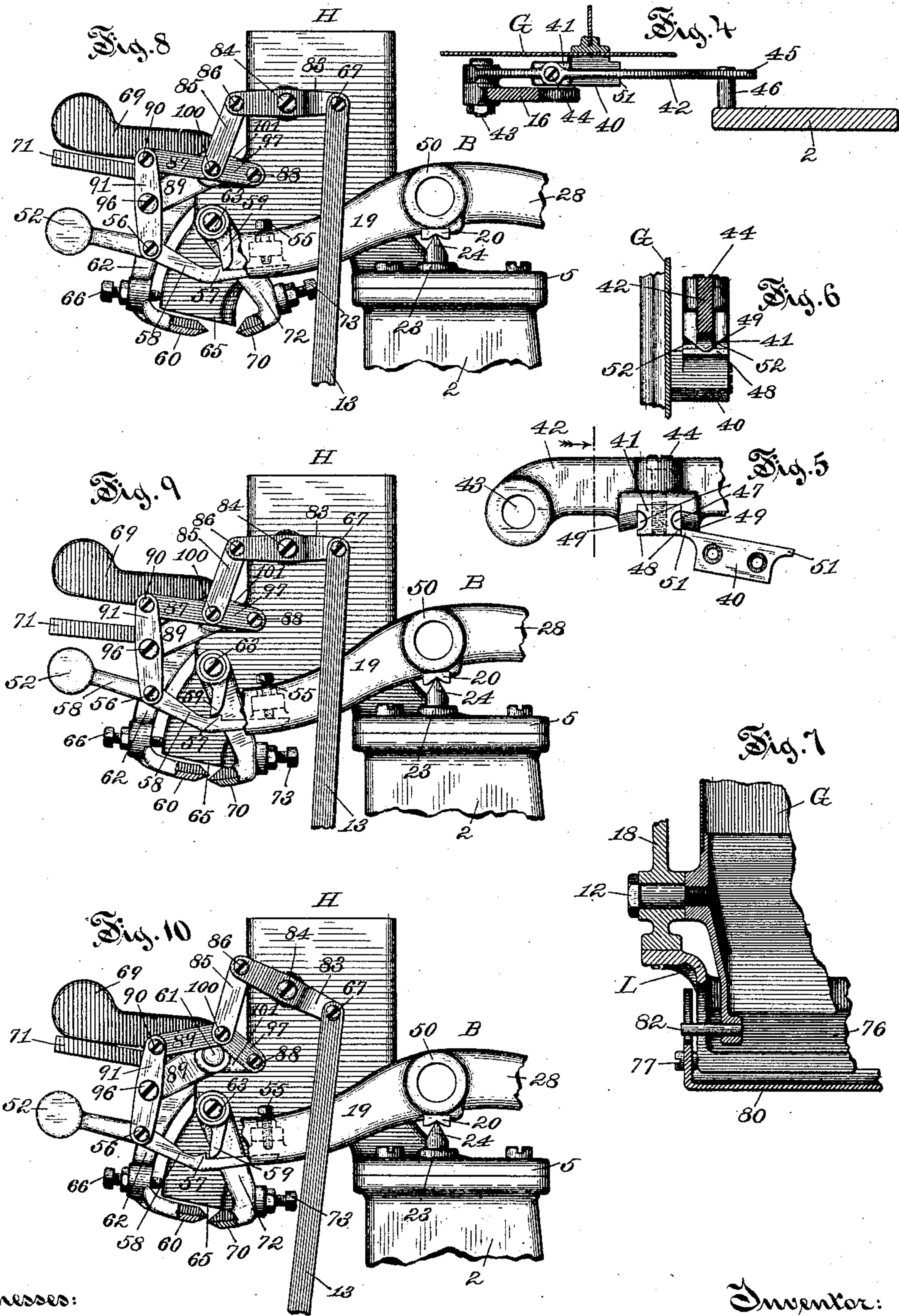
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE
PRATT & WHITNEY COMPANY, OF SAME PLACE.

REGULATOR GRAIN-WEIGHER.

SPECIFICATION forming part of Letters Patent No. 442,715, dated December 16, 1890.

Application filed February 24, 1890. Serial No. 341,499. (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 Regulator Grain-Weighers, of which the following is a specification.

This invention relates to regulator grain-weighers of the two-valve class operated automatically by the power or weight of the grain.

My invention has for its object to furnish an improved machine of this class in which the scale-beam shall be free from contact with the valve mechanism during the poising period, and in which the regulation shall be effected through a shiftable valve-actuator not carried on the scale-beam.

In the drawings accompanying and forming a part of this specification, Figure 1 is a side elevation of an automatic grain-weigher embodying my present improvements with some details shown partially broken away. Fig. 2 is a plan view of the upper portion of the machine. Fig. 3 is a front elevation of the parts shown in Fig. 2 and drawn in projection therewith. Fig. 4 is a plan view of the bucket-detent apparatus, including a section of one side of the frame-work and of one of the hangers. Fig. 5 is an enlarged side view of a portion of the latch-arm, the detent-catch carried thereby, and of the bucket-catches. Fig. 6 is a front or end elevation of the parts shown in Fig. 5. Fig. 7 is a vertical sectional elevation through one end of the grain-bucket, including one of the bucket-closers and a portion of the supplemental closer carried thereby. Figs. 8, 9, and 10 are side elevations similar to the upper portion of Fig. 1 and illustrate the mode of operation of the valve mechanism and of the regular devices for operating the valves independently of the scale-beam.

Similar characters designate like parts in all the figures.

The frame-work for carrying the operative parts of this machine usually, as shown in the drawings, comprises two side frames or uprights 2 and 4, held together by the top

plate 5, carrying the supply-chute H, and by suitable tie-rods or braces. (Not shown.)

The grain-bucket G is of the well-known double-chambered type or class, and is suspended under the chute H and discharges its loads of grain intermittingly in the manner substantially as shown in prior Letters Patent of the United States. Said grain-bucket G is journaled at 12 in bearings formed in the hangers 16 and 18, which are suspended by V-shaped bearings on the pivots or knife-edges 15 and 17, respectively, of the principal arms 19 and 21 of the scale-beam B. This beam has V-shaped bearings 20 and 22, one at each end of the shaft 50 thereof, which rest on the pivots or knife-edges 24 and 26, that are suitably supported, as by bearings 23 and 25, on the frame-work. Opposite to arms 19 and 21 an arm 28 extends rearwardly, and is provided with a pivot or knife-edge 27, on which the main or counter weight W is suspended by a hook 29. The oscillation of the bucket G within the hangers is limited by suitable stops 92 and 93, fixed on the bucket. In practice I provide such stops at each end of the bucket, but have herein shown them on one end only. Said stops may be of any of the well-known kinds which are shown in prior Letters Patent for similar purposes.

The bucket-closer, as it is herein shown, consists of the closer-frame L, which comprises the two closers proper 75 and 76, and is usually formed integral, and the two supplemental closers 79 and 80, that are pivoted at 77 and 78 to the closers 75 and 76, respectively. Pins 81 and 82, fixed in the sides of the bucket, near the bottom thereof, engage with the projecting levers or arms of the said supplemental closers to open or close the same on the oscillation of the grain-bucket. The closer 79 is trough-shaped and covers the lower edges 53 and 54, respectively, Fig. 1, of the bucket-spout and closer-plates. By this means the necessary lateral movement of the bucket-spouts is materially reduced and a combination is secured, whereby the outlet is securely closed against grain, while retaining a considerable space between the said parts at all points. This space or clearance is deemed important in practice, since there is gener-

ally a considerable quantity of foreign substances in the grain, and which frequently obstruct the operation of close-fitting bucket-closers.

5 The detent latch or lever 42 is pivoted at 43 to the hanger 16. The end 45 of said arm or lever engages with the stop or abutment 46, here shown fixed in the inner side of the upright 2. The detent-catch 41 is fitted into
10 the arm 42 and there secured by a screw 44. Said catch 41 engages with the detent catch or stop 40, that is suitably secured, as by screws or otherwise, to the side of the grain-bucket. The catches of this detent apparatus
15 are more fully shown in Figs. 5 and 6. The lever 42 has a comparatively deep cut in the underside thereof, as shown in Fig. 5, wherein is fitted the catch 41, which is held in place by the screw 44. The sides of said catch are
20 undercut, as at 47, leaving the narrow working-face 48.

On either side of the catch 41 are stops 49, formed on the lever 42 and constructed to fit on the upper surface of the bucket-catch 40,
25 as shown in Fig. 5, for limiting the depth of the engagement of the catches. It will be observed that the end face 51 of catch 40 is arranged to slightly overlap the upper corner of the face 48. By this means I insure a uni-
30 form wearing away of the surfaces 48 and 51, after a principle well known to mechanics.

The working-faces 48 and 51 are made narrow, as set forth, for a peculiar reason, to wit: It is necessary that grain-weighers be capable
35 of continuous operation in rooms filled with a moist and dusty atmosphere, whereby there is formed on all parts of the mechanism a tough and adhesive coating resembling glucose in its nature, and if said working-faces
40 be broad the pressure thereon is reduced relatively to the surface thereof, so that the said "glucose" or dust builds onto said surfaces and ultimately causes interruptions in the working of the machine. By my improvements
45 the said faces are reduced to an area at which the pressure abrades the said adhesive material and "grinds" off the same as fast as it is deposited, thus insuring the continued efficiency of said catches. In order that said
50 grinding action shall be effective, the face 48, when in engagement with the face 51, extends fully down to the lower edge of said face 51, so that on the rising of the lever 42 the entire surface 51 is subjected to said grind-
55 ing action, whereby any glutinous material adhering to the catch 40 will be driven from the face 51 either below or above the same. In practice, to insure said result, the stops 49 are so adjusted or constructed that the face
60 48 extends slightly below the face 51 by a distance of about one or two hundredths of an inch, the faces 51 being in vertical height from one-sixteenth to one-eighth of an inch, according to the size of the machine. For
65 similar reasons the stops 49 are tapered to a very narrow lower face, so that the blows of said face on the catch 40, due to the violent

falling down of lever 42, will abrade and "pound off" any accumulation of said material between said face 49 and said catch 40. 70
Another reason for the tapered sides 52, Fig. 6, of the stop 49 is that said sides act as a wedge to dislodge any kernels of grain which may have fallen on said catch 40. Inasmuch
75 as perfect operation of these catches is indispensable to correct operation of the grain-weigher, the improvements here described are highly important, since the same are found in practice to result in the advantages herein
80 set forth.

The rearward end 45 of the lever 42 is of a segmental form, being substantially concentric to the bucket-supporting knife-edges when the beam is at the poising-point. This
85 secures a uniform action of the detent apparatus regardless of the swaying movement of the bucket. This improvement avoids the use of the bracket heretofore employed in this class of grain-weighers and permits the use
90 of a single pin 46, whereon grain cannot lodge, and the said segment 45 having its working-face on the under side thereof no grain can lodge on said face. By means of this combination of the inverted movable seg-
95 ment with the fixed stop-pin perfect security is obtained against accidents from grain being caught between the detent-lever and the bracket for actuating said lever.

The regulator-hopper P is pivoted at 98 to the uprights 2 and 4 and is furnished with
100 the weighted arm 10, having thereon a suitable counter-weight 11. Said hopper, acting through the rod 13 and other connecting devices, operates the regulator devices for closing the valves 60 and 70, and thereby regu-
105 lates the flow of grain into the grain-bucket. This regulator-hopper is not of my sole invention, but is described and claimed in a separate application, Serial No. 340,284, filed by C. H. Cooley and F. H. Richards February
110 13, 1890, to which application reference may be had for a full description thereof.

The reducing-valve 60 is carried by the arms 62 and 64, which are fixed to the pivot or valve-shaft 61, that is journaled in suit-
115 able bearings formed on the supply-chute H, a suitable stop, as 66, being provided to limit the closing movement of said valve. The valve 60 is operated from the scale-beam through the beam-arm 71, carried by the arm
120 21 of said beam. Said arm 71 acts on the weighted valve-lever 69, which is fixed to one end of the pivot-shaft 61. When the arm 69 is lowered or raised by the operation of the beam-arm 71, the said arm 69, being fixed to
125 the shaft 61, turns said shaft in its bearings, and thereby opens or closes the reducing-valve 60, as the case may be. This feature of my present improvements is not of my invention, but is described and claimed in the
130 prior application of C. H. Cooley, Serial No. 338,818, filed January 31, 1890, to which I have permission to refer.

The cut-off valve 70 is carried by the arms

72 and 74, which are pivoted at 63 and 68 to the sides of the chute H. Some suitable stop, as 73, is provided to properly limit the closing movement of this valve. The valve 70 is both a cut-off valve and a regulator-valve. For the first purpose it is operated directly from the reducing-valve 60, and for the second purpose from the hopper P through the shiftable valve-actuator 58. This actuator is carried on a pivot 56, which normally has a fixed relation to the valve 60, as shown in Figs. 1, 8, and 9, so that as said valve 60 is moved the said actuator is carried with it.

Assuming the construction and arrangement to be thus, the regular operation is as follows: The actuator 58 has a catch 57 formed thereon to engage the arm 59 of the cut-off valve 70. A small counter-weight 52 serves to normally hold the actuator 58 in engagement with the arm 59. When the valve 60 is opened, as in Fig. 1, the catch 57 comes forward of arm 59, as there shown, and on the closing of said valve 60 said catch 57 engages said arm 59 and opens the cut-off valve, as shown in Fig. 8. The main column of grain having been thus cut off by the valve 60 the opening of valve 70 allows the "drip" to flow until the bucket-load is completed. This being done the beam descends, as in Fig. 9, until the stop 55 on said beam strikes the end of said actuator 58 and detaches the catch 57, thereby permitting the valve 70 to close, as in Fig. 9. On the rising again of the scale-beam, as in Fig. 1, the valve 60 is again opened and the said several parts are in position for repeating said operations, which constitute the ordinary and regular action of the machine.

For effecting the regulation of the machine the said valve-actuator is made shiftable relatively to the principal valve. This shifting movement may be accomplished by means of various mechanical devices, but is properly accomplished as follows: The actuator 58 is pivotally supported at 56 on the actuator-carrier 91, which is pivoted at 96 to the arm 89, fixed on the shaft 61. The carrier 91 is shifted or turned on its said pivot 96 by means of links or toggles 87 and 97, which connect the upper end of said carrier with the pivot 88 on the opposite arm 101, also fixed on shaft 61. When the said links are in a line, as in Figs. 8 and 9, the pivot 100 should stand about in alignment with the axis of shaft 61, so that the movement on the axis of said shaft and the parts carried thereby will not materially operate said links or the carrier 91. For actuating the toggle-links I connect their center pivot 100 by a link 85 to the end 86 of the lever 83, which is pivoted at 84 to the chute H and at its opposite end 67 to the rod 13, that is actuated by the hopper P. By means of this or any similar connecting device the descent of hopper P by the accumulation of grain therein shifts the carrier 91 to throw the shiftable valve-actuator from its operative position (shown in Figs. 1, 8, and 9) to its

inoperative position. (Shown in Fig. 10.) This allows the valve 70 to close, whether the valve 60 be closed or open, and thus results in stopping the operation of the machine. On the discharge of the grain from the regulator P said regulator rises, and by operating (through connections substantially such as described) the actuator-carrier forces open the valve 70, as in Fig. 8, thus allowing the drip to flow into the bucket to start the machine, which then continues operating, as hereinbefore set forth, until the regulator again operates to close the said cut-off valve.

In Fig. 1 the reducing-valve 60 is shown fully open, and the bucket-closer 75 and the supplemental closer 79 closed under the discharge-chute 34 of the bucket. The cut-off valve 70 being simply hung on the pivots 63 and 68 is closed by its own weight or by a weight (not shown) in a well-known manner. The grain descends from the supply-chute H into the forward chamber of the bucket G until the major part of a load (enough to overcome the weight W, minus weight 69) has been made up by the full flow of grain into the bucket. This lowers the beam and operates the arm 71 to permit the weighted lever 69 to close the reducing-valve 60, and at the same time throws back the actuator 58, whose catch 57 coming in contact with the arm 59 opens the cut-off valve 70. The parts having assumed the positions shown in Fig. 8, the flow of grain into the bucket has been thus reduced to a drip, and as the load is fully made up by the drip the beam further descends until the contact-screw 55 engages and trips the actuator 58, as hereinbefore set forth, to allow the cut-off valve 70 to close under the discharge-chute 65 of the supply-chute H, thus fully cutting off the flow of grain therefrom, as shown in Fig. 9. As the beam and the bucket carried thereby descend, the end 45 of detent-latch 42 strikes the pin 46, disengaging the detent-catch 41 of said latch from the bucket-catch 40. The weight of grain in the forward chamber of the bucket causes the said bucket to turn on its pivot 12 and to swing over until the stop 92 comes in contact with the hanger 16 and the rear compartment of the bucket has come to a position directly under the discharge-chute 65 of the chute H. In swinging over the discharge-chute 34 of bucket swings clear of the bucket-closer 75, and the pin 81 of said bucket coming in contact with the arm of the supplemental closer 79 opens said closer and the said load of grain is discharged into the regulator. The swinging of said bucket also and at the said time brings the discharge-chute 36 of said bucket directly over the closer 76, and the pin 82, engaging with the arm of the supplemental closer 80, closes said closer. As the load is discharged from the bucket G, the beam rises, opening the valve 60, when the grain flows into the rear compartment of the bucket and the above-described operations are repeated.

In this machine the scale-beam during the

poising period is free of all friction due to contact with any part of the valve mechanism, thus insuring a sensitive action thereof. The force required to detach the catch 57 is
 5 extremely slight and is readily supplied by a very slight movement and momentum of the descending bucket.

In this application, and generally in this art, when reference is made to the downward
 10 movement of the scale-beam, the downward movement of the bucket-supporting arms thereof is meant.

For regulating the duration of the poising period of the scale-beam movement the stop
 15 55 is made adjustable on the beam, being usually a screw-stop carried by the beam-arm 19, substantially as shown.

In referring to the actuator 58 in the broader sense it is said to be carried by the
 20 reducing-valve, since this valve and all the parts thereto rigidly affixed or connected constitute for some purposes one integral element of the combinations comprised in this invention.

25 That feature of the grain-weigher herein described which consists in the shiftable valve-actuator normally operated by the scale-beam and exceptionally operated by the regulator, is broadly claimed in a separate application,
 30 Serial No. 340,814, filed February 17, 1890, to which reference may be had.

It will of course be understood that other kinds of regulators than that herein shown may be used for effecting the shifting of the
 35 valve-actuator on the reducing-valve. One such other kind is described in Letters Patent of the United States No. 410,116, granted to me August 27, 1889, and still other suitable kinds are shown in prior Letters Patent.

40 Having thus described my invention, I claim—

1. In a grain-weigher, the combination, with the supply-chute and the scale-beam, of the reducing-valve constructed and supported to
 45 close under said chute and to be actuated from said beam, the cut-off valve, and a valve-actuator carried by the reducing-valve and normally operating to open the cut-off valve on the closing of the reducing-valve.

50 2. In a grain-weigher, the combination, with the supply-chute and the scale-beam, of the reducing-valve constructed and supported to close under said chute and to be actuated from said beam, the cut-off valve, and a valve-actuator carried by the reducing-valve and
 55 normally operating to open the cut-off valve on the closing of the reducing-valve, (said actuator being shiftable, substantially as described,) and actuator-shifting devices oper-
 60 ating to throw said actuator into an inoperative position.

3. In a grain-weigher, the combination, with the supply-chute and the scale-beam, of the reducing-valve constructed and supported to
 65 close under said chute and to be actuated from said beam, the cut-off valve, a valve-actuator carrier supported by the reducing-

valve and movable relatively thereto, the actuator carried by said carrier and adapted to open said cut-off valve on the closing of the
 70 reducing-valve, and carrier-shifting devices operating to shift said carrier relatively to said reducing-valve for throwing said actuator into an inoperative position.

4. In a grain-weigher, the combination, with
 75 the supply-chute and the scale-beam, of the reducing-valve constructed and supported to close under said chute and to be actuated from said beam, the cut-off valve, the actuator-carrier supported by the reducing-valve
 80 and movable relatively thereto, the actuator carried by said carrier, toggle-links operating the carrier, and connections operating said toggle from a regulator.

5. In a grain-weigher, the combination, with
 85 the supply-chute and the scale-beam, of the reducing-valve, the cut-off valve, the valve-actuator carrier movable on said reducing-valve, the actuator supported on said carrier, and carrier-shifting devices operating said
 90 carrier independently of the reducing-valve, whereby the actuator may be thrown into an inoperative position.

6. In a grain-weigher, the combination, with the supply-chute and the scale-beam, of the
 95 reducing-valve constructed and supported substantially as described and to be actuated from said beam, the cut-off valve, the valve-actuator carried on the reducing-valve and operating to open the cut-off valve on the
 100 closing of said reducing-valve, and the stop on the beam set to disengage said actuator and allow the cut-off valve to close.

7. In a grain-weigher, the combination, with the supply-chute and the scale-beam, of the
 105 reducing-valve, the cut-off valve, the valve-actuator carried on the reducing-valve and operating to open the cut-off valve on the closing of said reducing-valve, and the adjustable stop on the beam, whereby the time
 110 of the disengagement of said actuator may be regulated.

8. In a grain-weigher, the combination, with the supply-chute and the scale-beam, of the
 115 reducing-valve, the movable carrier on said valve, regulator apparatus connected to shift said carrier independently of the movement of the reducing-valve, the valve-actuator on
 120 said carrier and having a catch, the cut-off valve having an arm adapted to engage said catch, and the stop on the beam arranged to disengage said actuator-catch on the down-
 125 ward movement of the beam.

9. In a grain-weigher, the combination, with the supply-chute and the scale-beam, of the
 130 valve 60, supported to swing under said chute and adapted to be actuated from said beam, the carrier 91, pivotally supported on an arm fixed to said valve, the actuator 58, having a catch, valve 70, having arm 59, and a stop on
 135 the beam operating to disengage said actuator from said valve 70.

10. In a grain-weigher, the combination, with the reducing-valve carrying pivots 96

and 88, of the carrier 91, supported on pivot 96, the toggle connected to pivot 88 and to one end of the carrier, connections operating said toggle from the regulator, the cut-off valve, and the actuator supported on said carrier for operating said cut-off valve.

11. In a grain-weigher, the combination, with the hangers suspended from the scale-beam, of the oscillating bucket supported in the hangers and having discharge-spouts, substantially as described, the non-oscillating closers fixed on the hangers below said spouts, the supplemental closers pivotally supported to close under the spaces between the spouts and fixed closers, and means operating the supplemental closers through the movement of the bucket in the hangers.

12. In a grain-weigher, the combination, with the hangers and the oscillating bucket supported therein and with a fixed closer, substantially as described, on said hanger below the bucket-spout, of the concave supplemental closer pivotally supported under the lower edge of the fixed closer, and means, substantially as described, operatively connected with the bucket, whereby the concave closer is raised under the lower edge of the bucket-spout on the movement of said spout over the fixed closer.

13. In a grain-weigher, the combination, with the bucket, the hangers, and the fixed closer 34, of the concaved closer 79, pivoted to said fixed closer and having means whereby it is operated from the bucket.

14. In a grain-weigher, the combination, with the moving bucket having thereon the

narrow detent-catch faces 51, of the detent-lever carrying a catch undercut to form a correspondingly narrow working-face, and stops on said lever limiting the depth of engagement of said faces and constructed to permit one catch to pass entirely over the face of the other catch.

15. In a grain-weigher, the combination, with the moving bucket having thereon narrow detent-catch faces, of the detent-lever carrying the catch 41, undercut at the sides thereof to form narrow working-faces, and the stops 49 on said lever adjoining said catch and constructed to limit the movement of said catch 41 to fully cover the detent-catch face on the bucket.

16. In a grain-weigher, the combination, with the moving bucket having catch 40 cut away to form the narrow working-faces 51 at the ends thereof, of the lever 42, having the catch 41 engaging said faces 51, and stops on said lever adapted to strike said catch 40 for limiting the engagement of said working-faces.

17. In a grain-weigher, the combination, with the moving bucket having a catch, substantially as described, of the detent-lever having a catch engaging said bucket-catch, and the stops on the lever for limiting the engagement of said catches, said stops having the inclined sides 52 for dislodging obstructions on the catch 40.

FRANCIS H. RICHARDS.

Witnesses:

HENRY L. RECKARD,
W. M. BYORKMAN.