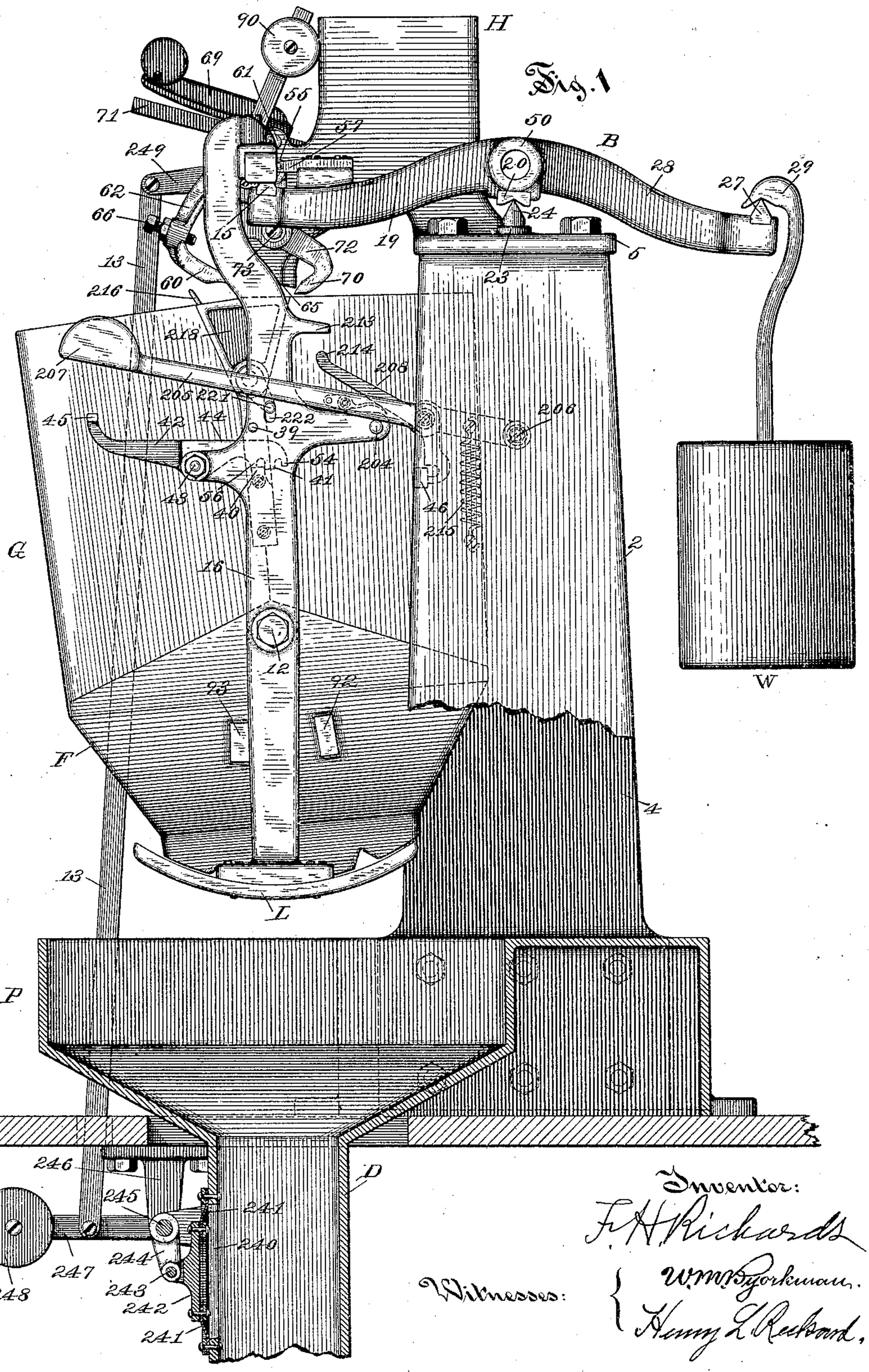
(No Model.) 6 Sheets—Sheet 1.

F. H. RICHARDS.

REGULATOR GRAIN WEIGHER.

No. 442,716. Patented Dec. 16, 1890.

Fig. 1



Inventor:
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Witnesses:
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Henry L. Reckard.

(No Model.) 6 Sheets—Sheet 2.

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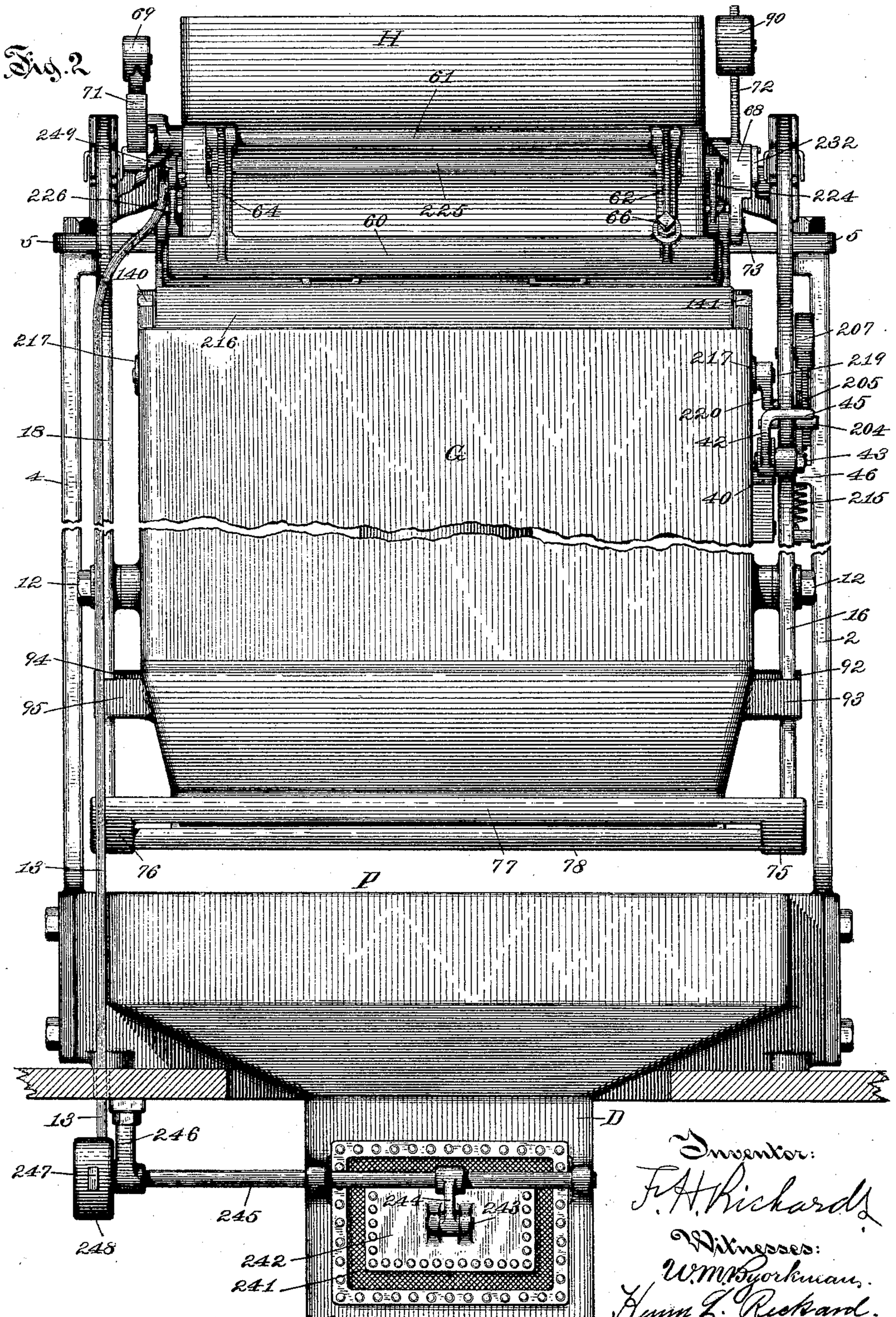
REGULATOR GRAIN WEIGHER.

No. 442,716. Patented Dec. 16, 1890.

Fig. 2



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(No Model.) 6 Sheets—Sheet 3.

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REGULATOR GRAIN WEIGHER.

No. 442,716. Patented Dec. 16, 1890.

Fig. 3

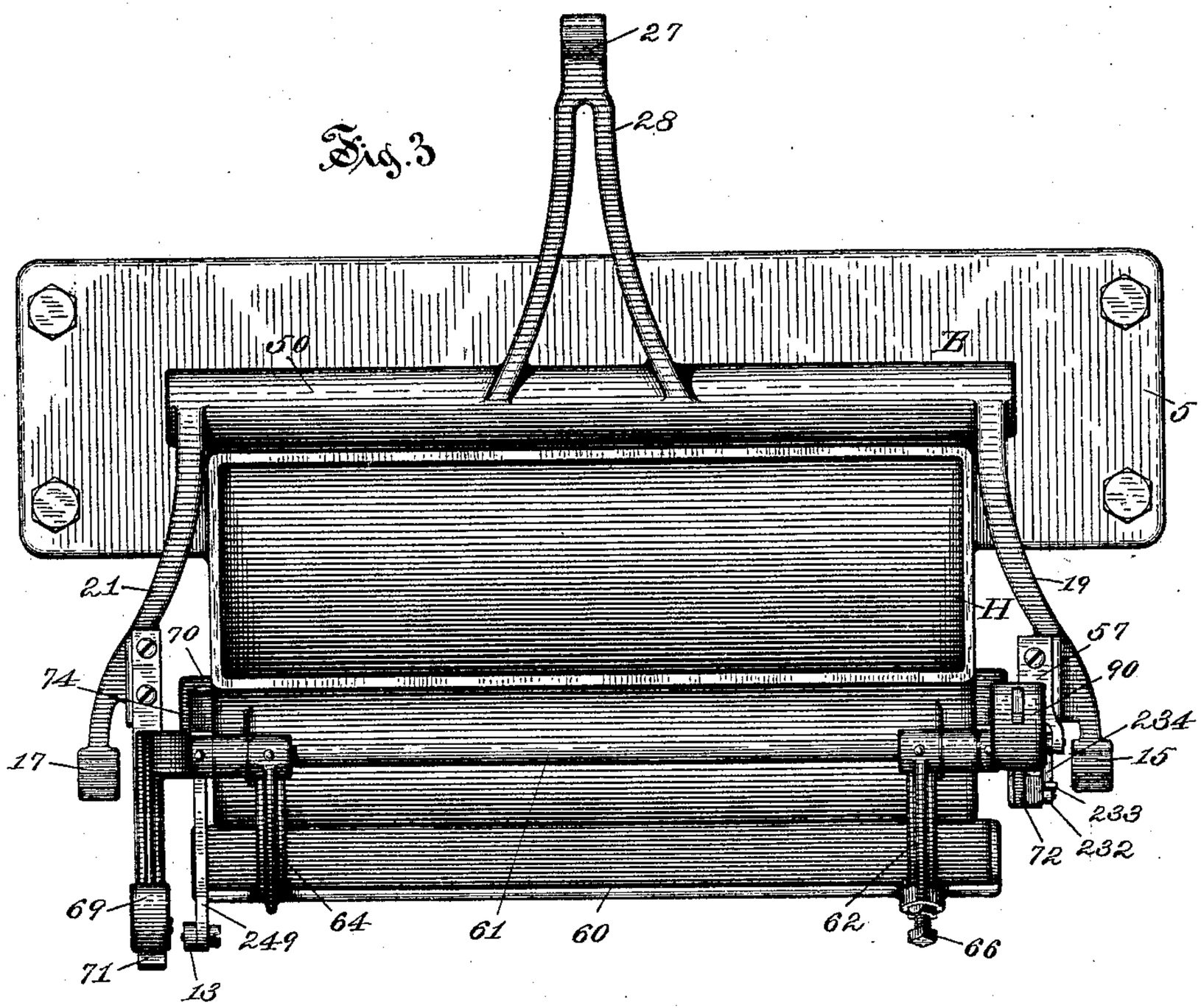

Fig. 12

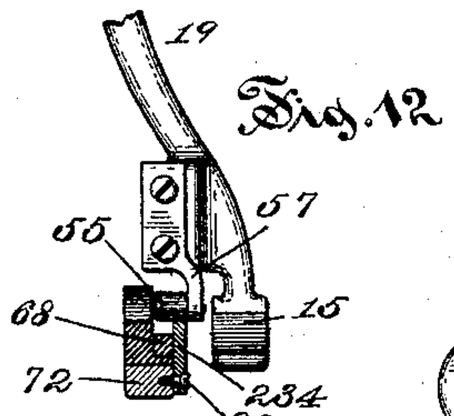

Fig. 18

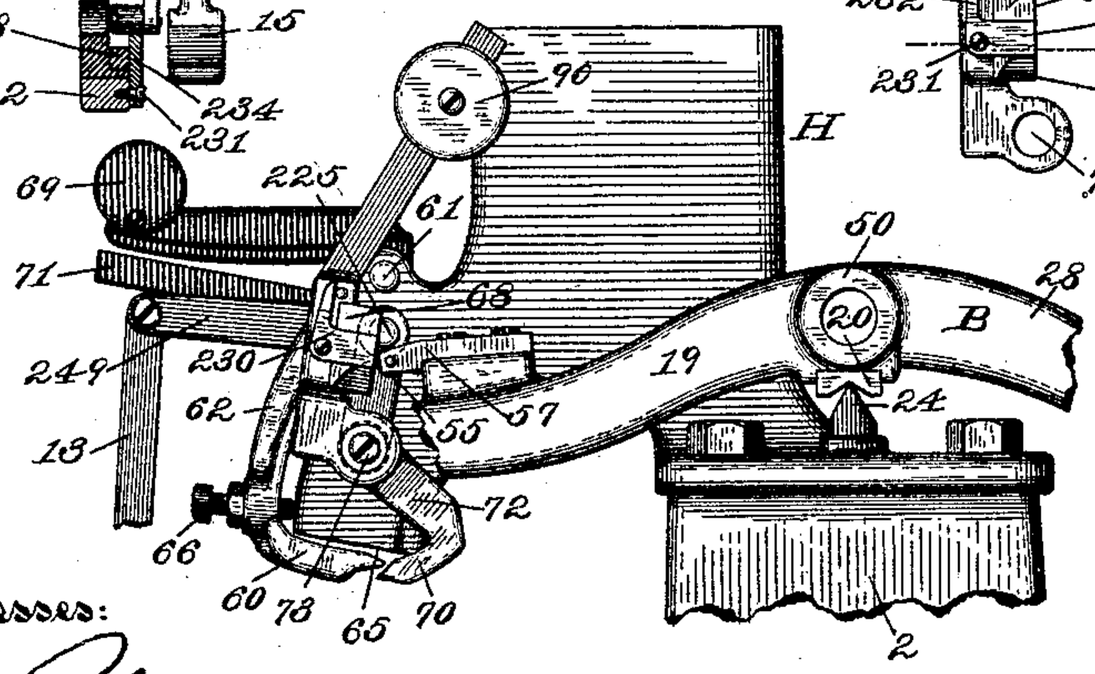

Fig. 13

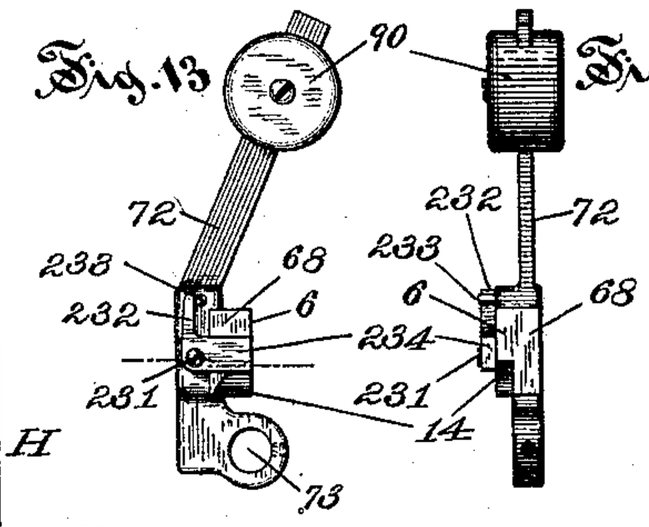

Fig. 14

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(No Model.) 6 Sheets—Sheet 4.

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REGULATOR GRAIN WEIGHER.

No. 442,716. Patented Dec. 16, 1890.

Fig. 4

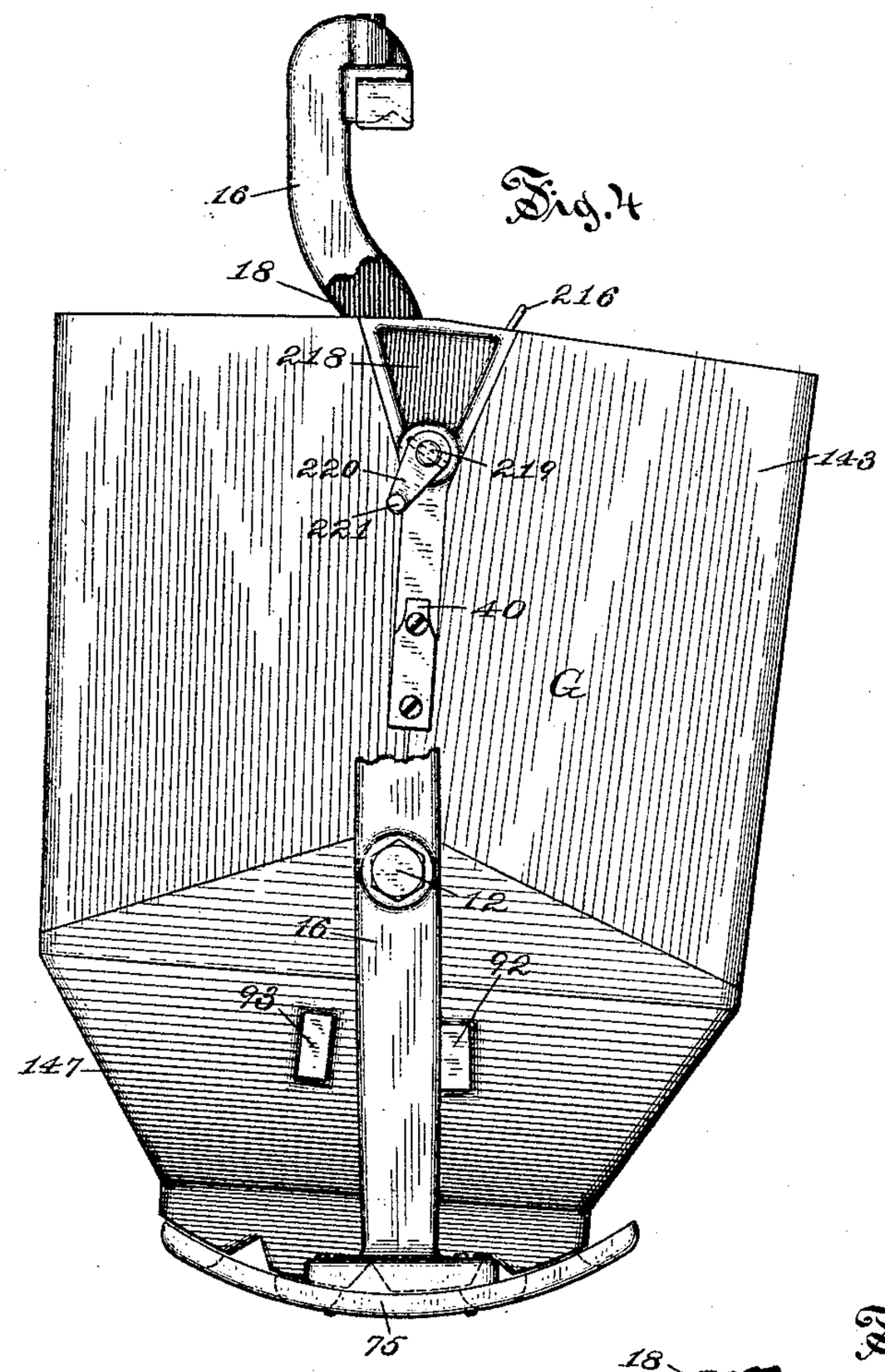


Fig. 6

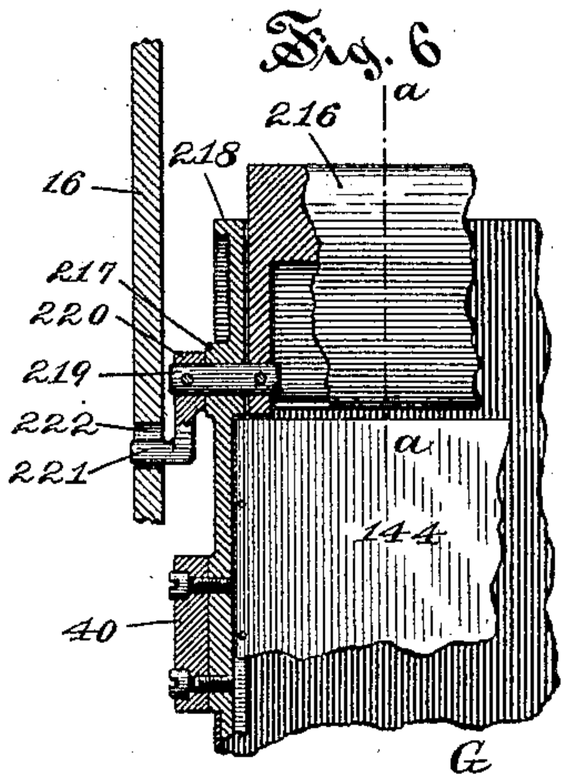


Fig. 7

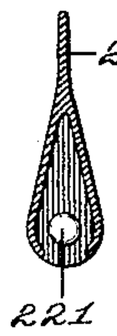
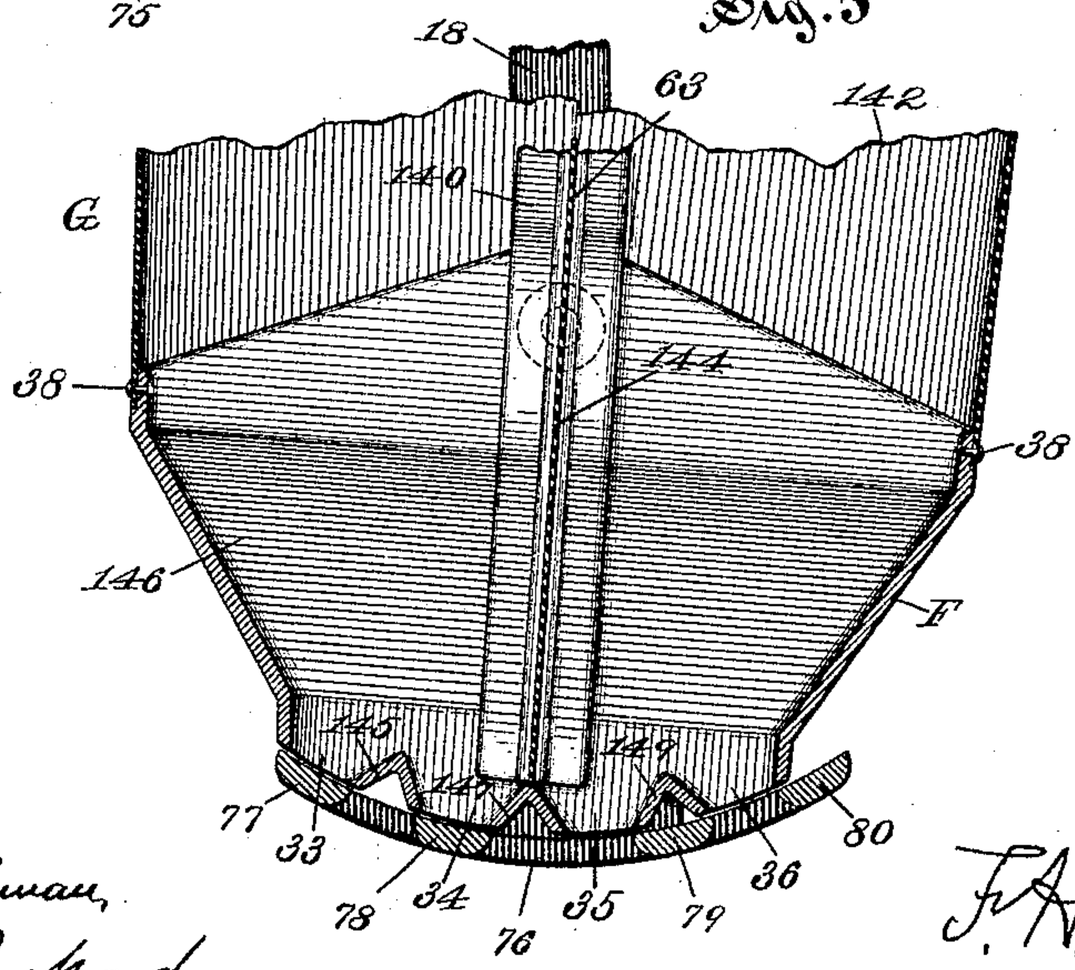


Fig. 5



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(No Model.) 6 Sheets—Sheet 5.

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REGULATOR GRAIN WEIGHER.

No. 442,716. Patented Dec. 16, 1890.

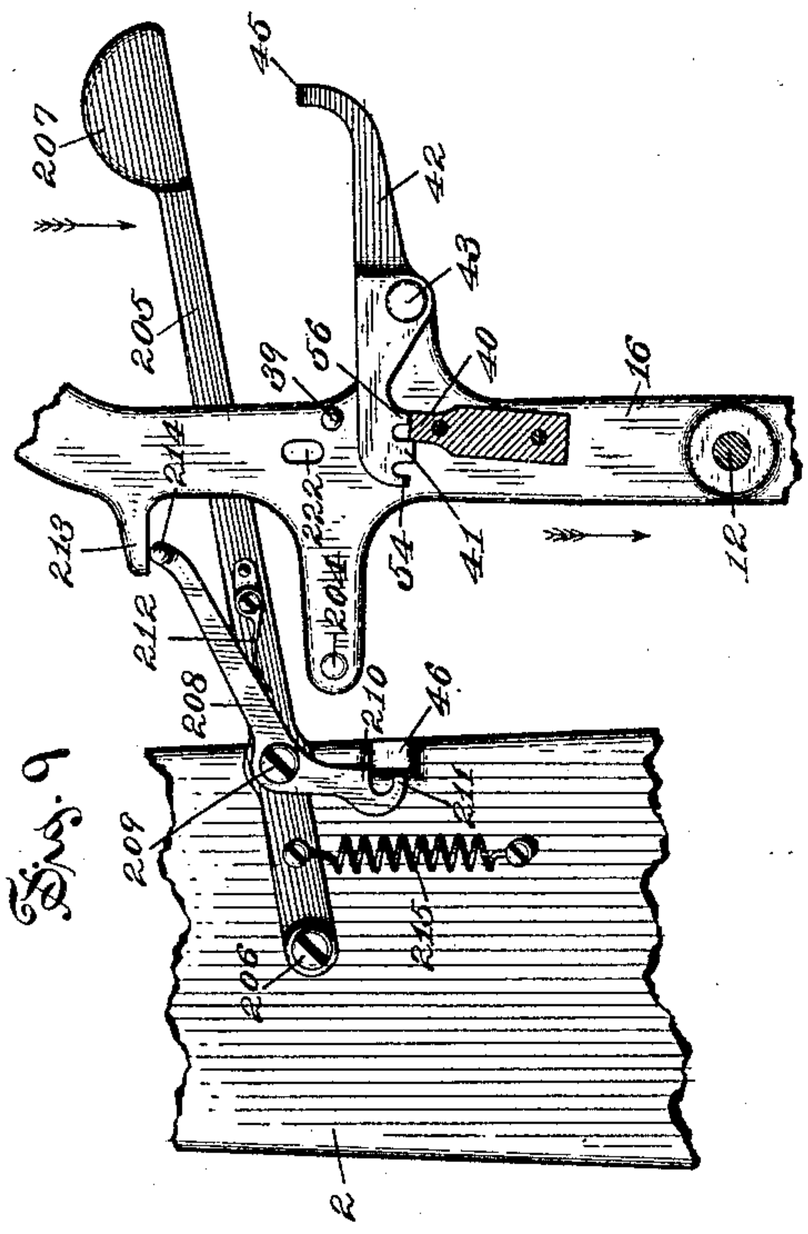

Fig. 9.

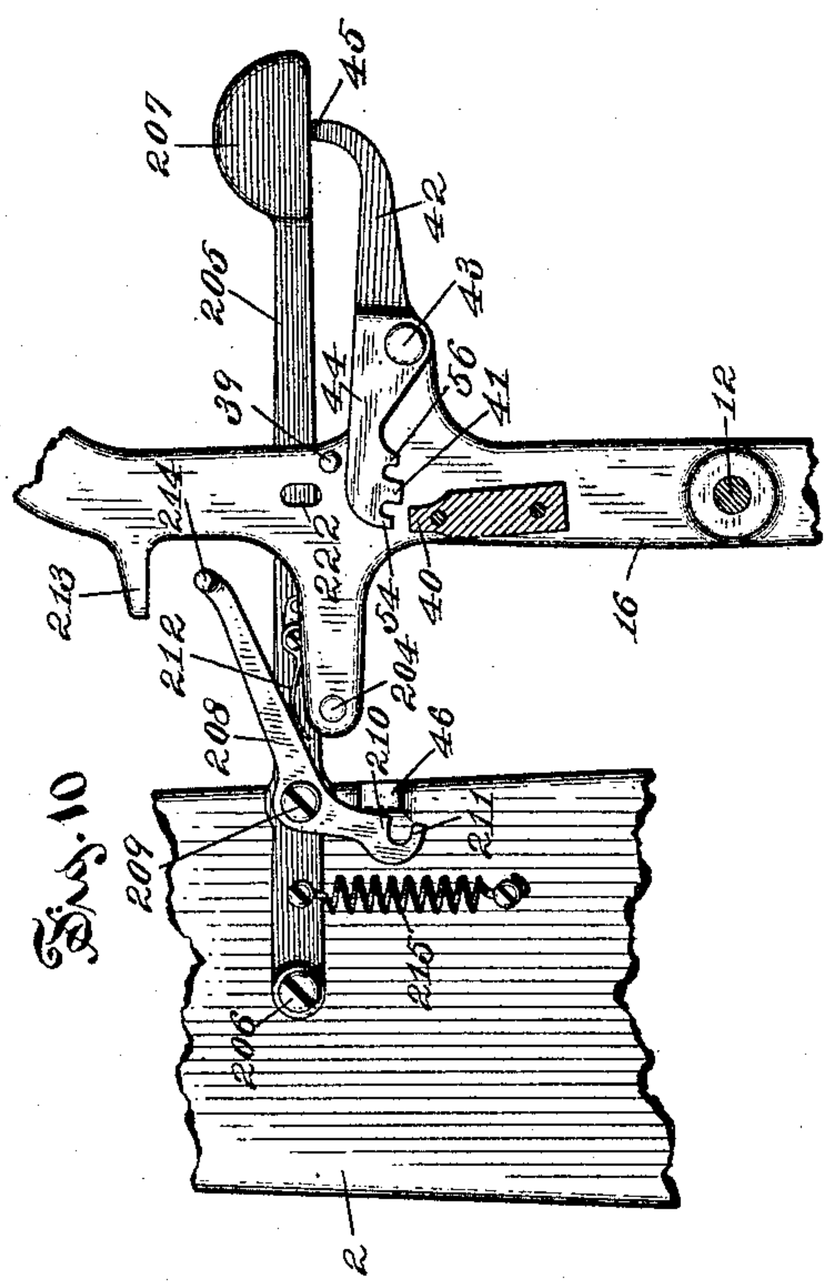

Fig. 10.

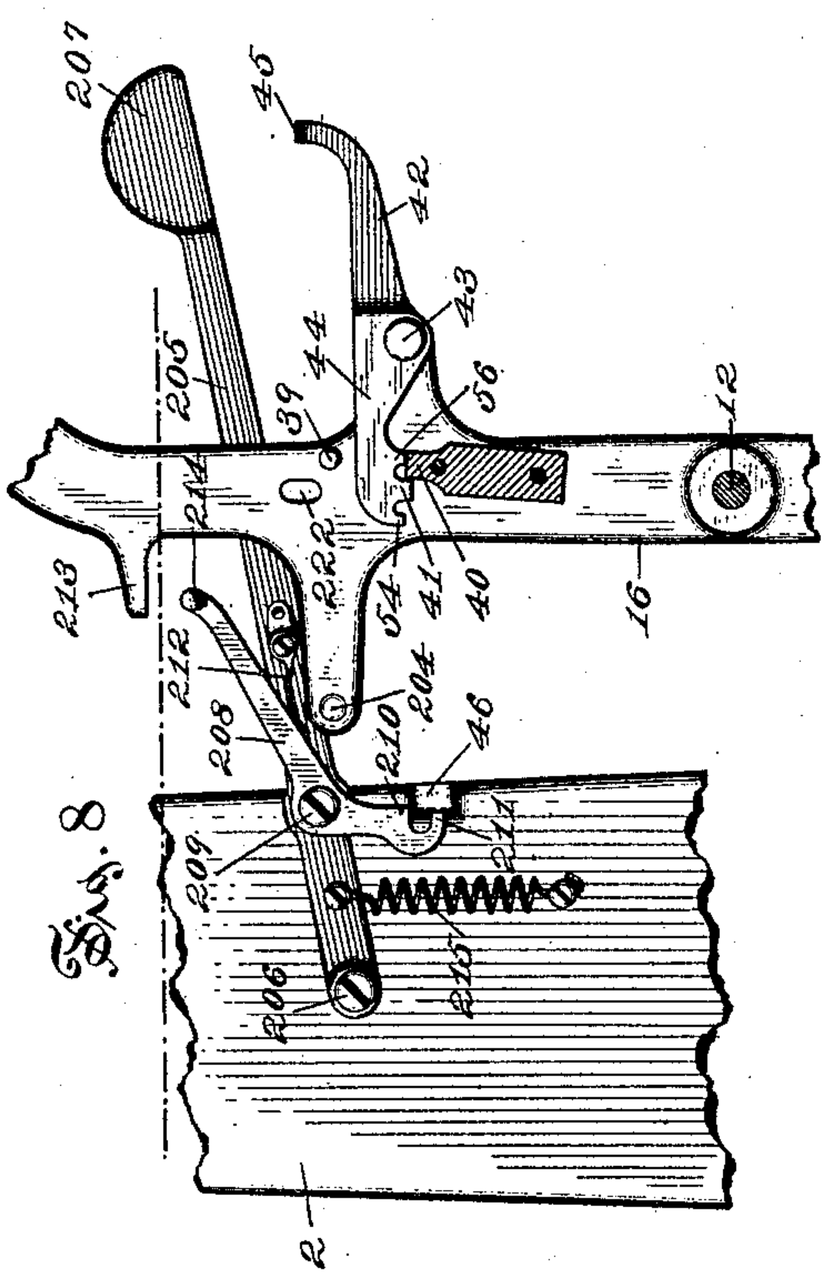

Fig. 8.

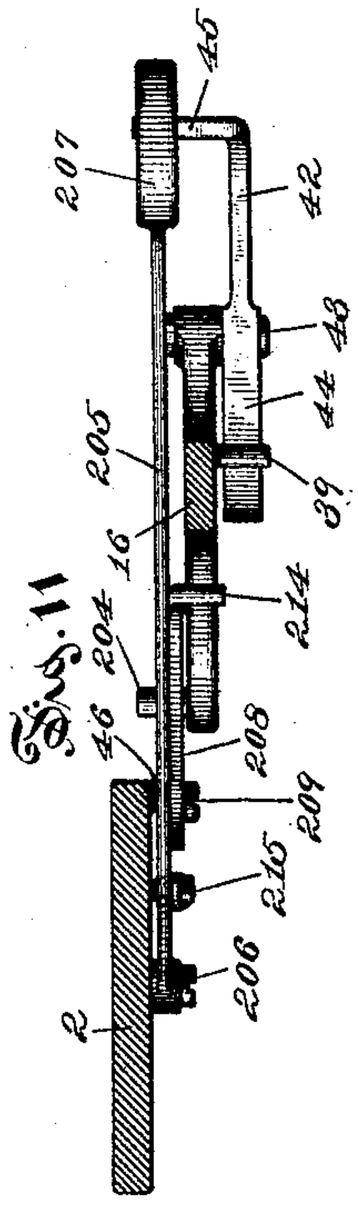

Fig. 11.

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(No Model.) 6 Sheets—Sheet 6.

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REGULATOR GRAIN WEIGHER.

No. 442,716. Patented Dec. 16, 1890.

Fig. 15

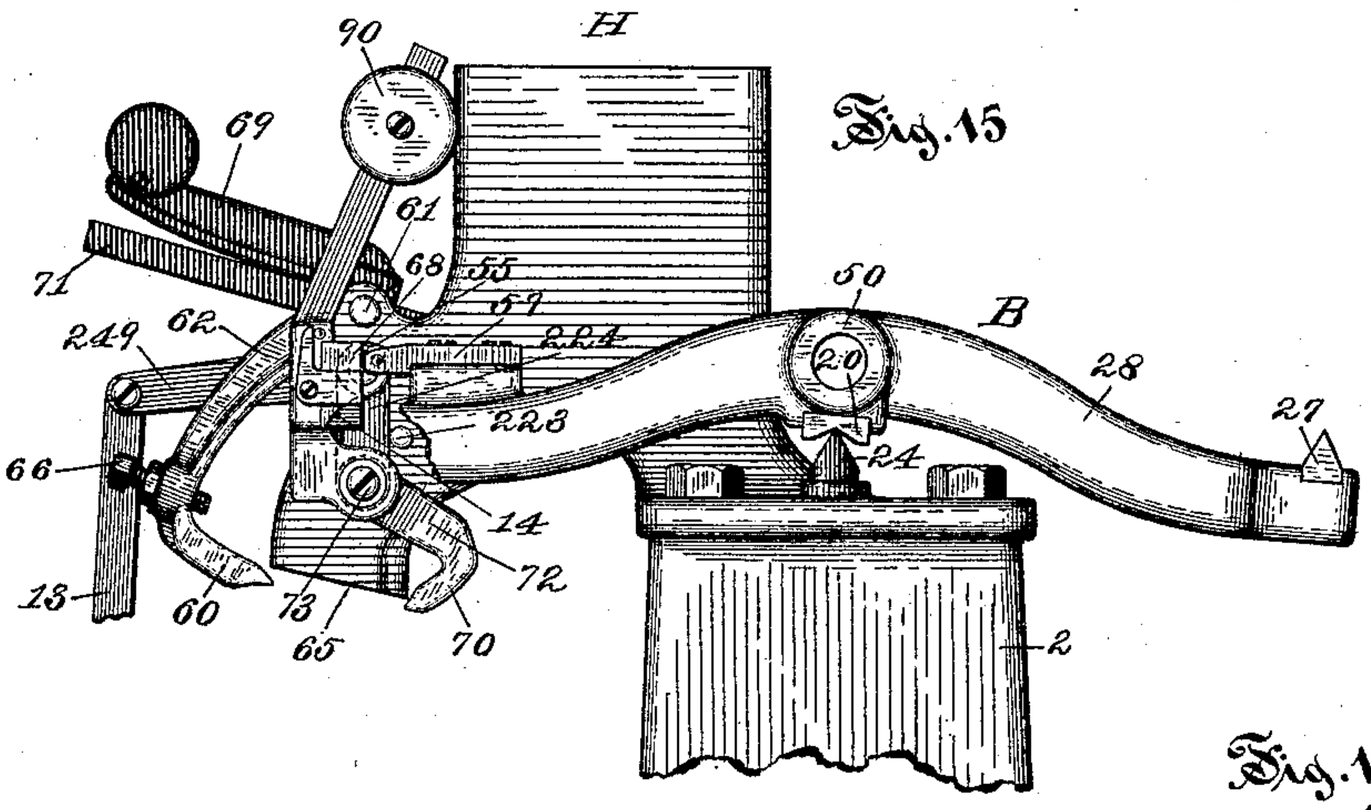


Fig. 16

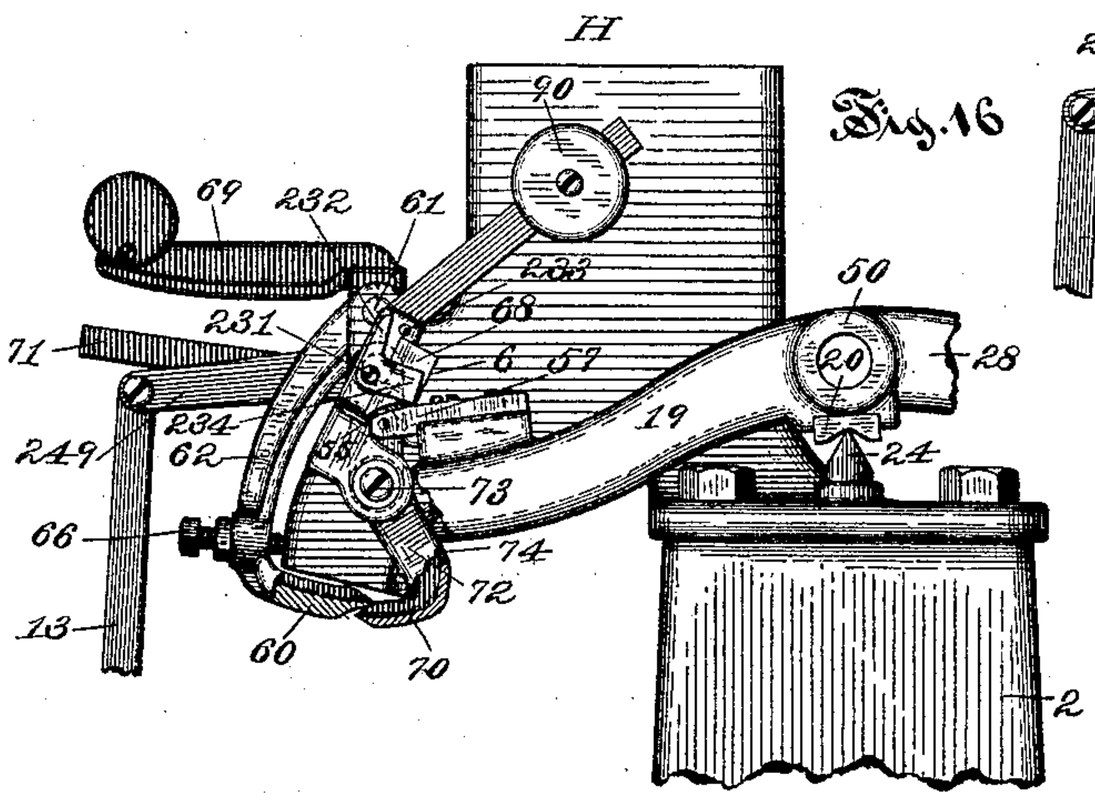


Fig. 17

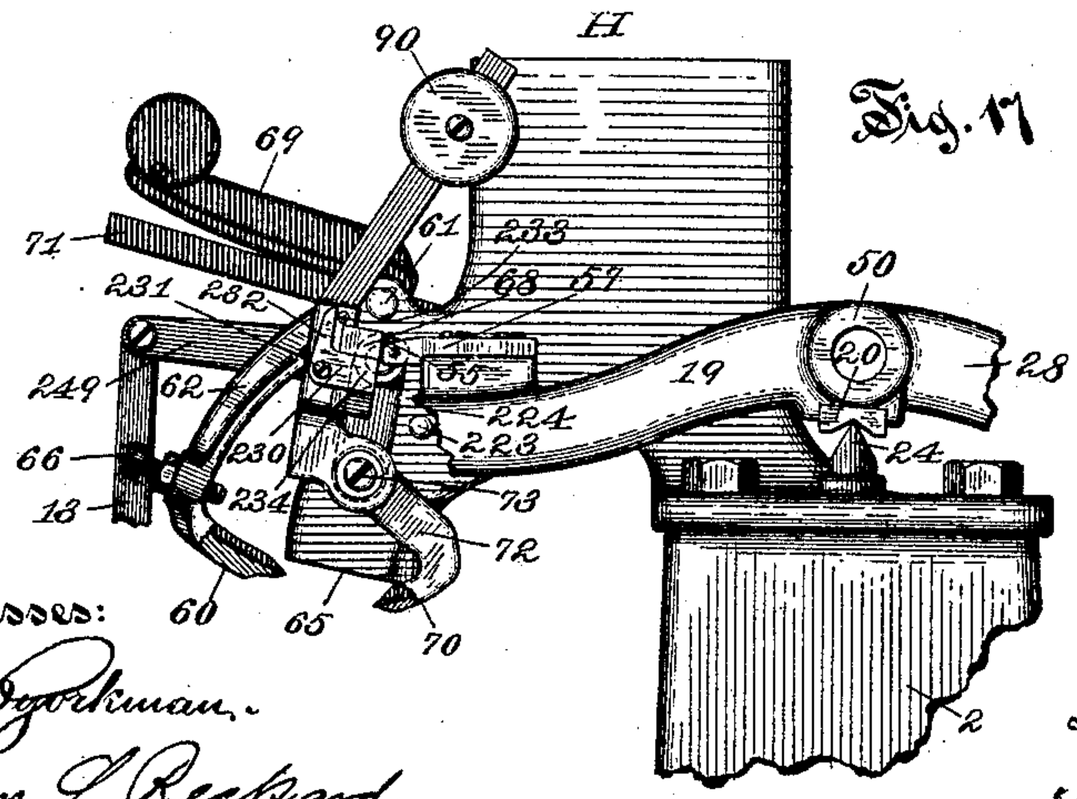
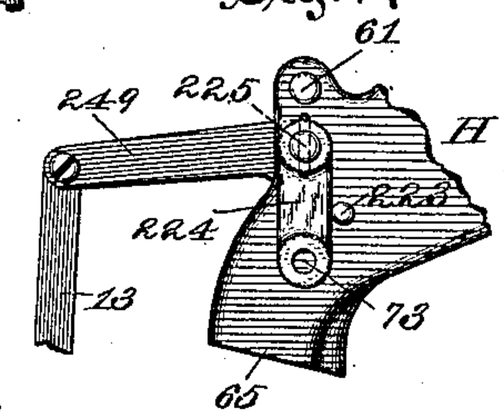


Fig. 19



Witnesses:
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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. 442,716, dated December 16, 1890.

Application filed March 1, 1890. Serial No. 342,297. (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 operated by the power or weight of the grain weighing.

The invention has for its object to provide an automatic regulator grain-weigher of the class having a double-chambered oscillating grain-bucket; and it consists in the improvements hereinafter more fully set forth.

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. Fig. 2 is a front elevation of the machine. Fig. 3 is a plan view of the parts carried by the top plate of the machine. Fig. 4 is a detail view of the grain-bucket in side elevation, and shows, also, a portion of the hangers supporting said bucket and the bucket-closer. Fig. 5 is a vertical transverse section of a portion of the grain-bucket, showing the construction of the bucket-frame and bucket-closer. Fig. 6 is a central longitudinal vertical section of a portion of the grain-bucket, showing, also, a portion of the deflector and of one of the hangers. Fig. 7 is a vertical section of the deflector, the view being taken in line *a a* of Fig. 6. Figs. 8, 9, 10, and 11 are detail views showing the construction and mode of operation of the bucket-detent apparatus, including the "hammer" for detaching the same. Figs. 12, 13, and 14 are views illustrating certain features and details of the cut-off-valve actuating devices. Figs. 15, 16, 17, and 18 are side elevations of the upper portion of the machine, illustrating the operation of the valve mechanism. Fig. 19 shows a portion of the supply-chute, together with certain details of the regulator apparatus.

Similar characters designate like parts in all the figures.

The frame-work for carrying the operative parts of this machine usually, and 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 the hopper P, which in this case constitutes the base of the machine.

The 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 hollow 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 of the scale-beam shaft 50, and is provided with a pivot or knife-edge 27, on which the main weight W (also designated as the "counter-weight") is suspended by a hook 29. The oscillation of the bucket G within the hangers is limited by two pairs of suitable stops 92 and 94 and 93 and 95; but said stops may be of any of the well-known kinds, which are shown in prior Letters Patent for the like purpose. The bucket-closer L, which is of the nature of a "grid-iron" valve, is secured to the lower ends of the hangers 16 and 18 by screws, as shown. The said closer consists of the end bars 75 and 76, connected by the closer-bars 77, 78, 79, and 80, which close under the outlets 33, 34, 35, and 36 of the grain-bucket.

A suitable and preferred construction of the grain-bucket is particularly illustrated by Figs. 1, 4, 5, and 6. The bucket consists of a bucket-frame F, side ribs 140 140, outer walls 142 and 143, and partition-wall 144. The frame F has three division-bars 145, 147, and 149, separating the discharge spaces or "spouts" 33, 34, 35, and 36. (See Fig. 5.) The upper edges of the frame F are shaped to have secured thereto the lower edges of the bucket-walls by rivets 38 or other similar means. The end ribs 140 are secured by rivets (not shown) or otherwise to the end walls 146 and 147, respectively, of the frame F and extend upward to the top of the bucket. These ribs have a groove 63 for receiving the edges of the division-wall 144, as shown in Fig. 5. The

outer walls 142 and 143 (which are usually, and as shown herein, formed of sheet-metal plates) are secured by their lower edges to the frame F and at their inner edges to the said end ribs. This mode of constructing the bucket results in a strong and light structure well adapted to its purpose. The frame F, being integral and having its several walls arranged substantially as shown, is very rigid without being unnecessarily heavy.

The grain-bucket structure above described is also described in the application of Cooley and Richards, Serial No. 339,967, filed February 11, 1890. The grain-bucket G, being of the class described and having the multiplicity of discharge-spouts combined with a multiplicity of closer-bars, has but a slight oscillating movement, which is favorable to the use of large sizes of machines. A deflector 216 is provided to guide the column of grain into the forward or rear chamber of the bucket, as the case may be. Said deflector is journaled at 217 in the "cheek-pieces" 218, which are usually castings inserted in the sides of the bucket G. The pin 219 is fixed in one end of the said deflector and is fitted to turn freely in the journal 217. To the outer end of said pin or shaft is fixed an arm or crank 220, having a projecting crank-pin 221 to fit into the slot 222, that is formed in the hanger 16. When the bucket stands forward, as in Fig. 1, the deflector is also forward, as there shown, and guides the grain into the rearward bucket-chamber. When the bucket moves in either direction, the deflector, by means of the accessory devices set forth, is moved in the same direction a greater distance, thus reducing the extent of the bucket movement which otherwise would be required. This will be understood by comparison of Figs. 1 and 4.

The bucket-detent apparatus is shown in detail in Figs. 1 and 2, and in 8 to 11, inclusive. The detent latch or lever 42 is pivoted at 43 to the hanger 16, and at its outer end has the projecting end 45 formed thereon. The inner arm 44 of said lever 42 has a catch 41 formed thereon to engage with the catch 40, that is fixed to the bucket. Stops 54 and 56 are formed on the arm 44 to limit the fall thereof, and a stop-pin 39 is provided to normally limit the upward movement of said arm. For suddenly detaching said catch 41 at the proper moment I provide a falling weight or "hammer" 207, which is lifted by the rising bucket-hanger, and is then held up by a catch or "trigger" ready to be discharged when required. This weight is carried by an arm 205, which is pivoted at 206 to the upright 2 of the frame-work. When allowed to fall at the proper moment, said weight strikes the end 45 of the lever 42 and disengages the catch 41 from the bucket-catch 40. A stop-pin 204 is provided to limit the fall of said weight-arm. A latch or lever 208, pivoted at 209 to the hammer-arm 205, has a catch 210, designed to normally rest on the stop 46 (that is formed on the inner side of the upright 2) for the purpose of upholding said hammer-arm. The end 211 of said latch or lever strikes the side of the stop 46, thereby limiting the overlap of the catch 210 onto the said stop 46. A spring 212 is provided to hold the catch 210 normally in engagement with the stop 46. A projection 213 is formed on the hanger 16 to engage the end 214 of the latch 208 and trip said latch on the descent of the beam. A pull-spring 215, one end of which is attached to the hammer-arm 205 and the opposite end to the upright 2, is or may be provided to accelerate the movement of the arm 205, and thus increase the blow of the hammer. In Fig. 8 the hammer is raised and locked. In Fig. 9 the hanger 16 is descending and has just unhooked the hammer. In Fig. 10 the hammer has fallen and unhooked the catch 41, the changed position of the catch 40 indicating the consequent bucket movement.

The valve mechanism for reducing and for cutting off the flow of grain to the bucket is actuated, except for the purposes of regulation, from and by the scale-beam. The reducing-valve 60 is carried by the arms 62 and 64, that are carried on the pivot or valve shaft 61, said valve being furnished with a suitable stop, sometimes made adjustable, as the stop 66, to regulate or limit its closing movement. This valve 60 closes under the outlet 65 of the chute H somewhat more than half the width thereof. The valve is actuated by the valve-lever 69 from the valve-actuating arm 71 of the beam B. The construction and mode of operation of this reducing-valve in its preferred form are fully set forth in the 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, pivoted at 73 to the arms 224 and 226 of the valve-carrier shaft 225. A stop, as pin 223, Fig. 19, is provided for limiting the movement of said carrier. One of the valve-arms 72 continues above the pivot 73 and is furnished with a suitable weight, as 90, which operates in the manner more fully described in the joint application of Cooley and Richards, Serial No. 339,967, filed February 11, 1890, to which reference may be had.

The mode of operating the cut-off valve is fully shown in the detail views, Figs. 15 to 19, inclusive. The actuator 55, which in this case is a small roller, is carried by the stem 57, that is fixed on the arm 19 of the beam, as shown in the drawings. The valve-cam 68 is fixed to the arm 72 above the pivot 73, and has a straight or "neutral" face 6 and a curved face 14, against which faces the actuator 55 bears. A cam-latch 230, pivoted at 231 to the arm 72, (contiguous to one side of said cam 68,) has an arm 232, normally held in engagement with the stop-pin 233 by reason of the greater weight of its other arm 234. The face or end of said arm 234 coincides with and forms an extension of the said face 6, as best under-

stood from Figs. 13 and 14, the lower edge of said latch-face being below the lower end of the face 6, as in Fig. 14. The part 6 of the cam-face is used during the closing of the reducing-valve, and the part 14 is used to cut off the drip and to effect the discharge of the grain; but these operations are modified by the latch 230 as follows: On the descent of the beam to the poising-point the actuator-roll 55 follows down the face 6 of the cam 68 the full length of said face, at which time the actuator 55 engages with the end of the arm 234 of the catch 230, against which it bears during the poising period, during which period the weight 90 exerts little or no effect on the beam. On the farther descent of the beam the actuator 55 passes so far below the arm 234 of said latch that the latch is thrown up and the weight 90 quickly falls, thus bringing the cam-face 14 suddenly to bear on the actuator 55. Thus the cut-off valve 70 is quickly and positively closed, and the force of the weight 90 is suddenly thrown onto the beam, adding its force to that of the descending loaded bucket, to unlock the bucket-catches and discharge the load of grain therefrom, the several parts assuming the positions shown in Fig. 16. On the discharge of the load the beam again rises and opens both valves, the reducing-valve being opened by means of the actuator-arm 71, the valve-lever 69, and the connections described, and the cut-off valve by means of the actuator 55 operating on the cam 68. As the beam rises the actuator 55 turns the catch 230 on its pivot, so that no resistance is offered by said catch to the working of the actuator 55 on the face 14 of the cam 68. By means of the latch 230, in connection with the cam 68, a more sudden closing of the cut-off valve is obtained without increasing the resistance to the opening thereof. The cam 68 being above the pivot 73 of the cut-off valve and the valve-arm being of a short radius, the cam follows the beam in its downward movement, and thus has a more direct and effective action thereon. This arrangement and combination of the several parts enables me to use a large angular movement of the valve, respectively, to the extent of the beam movement, thereby obtaining a long stroke for the weight 90 on the arm of the cut-off valve. This result is highly important, because it is necessary that the position and stroke of said weight shall be such as to have a very small effect on the beam when in the position shown in Fig. 15 and shall have a rapidly-increasing effect when the valve begins to close. In Fig. 15 said weight 90 stands almost directly over the pivot 73, thus exerting a very slight effect on the beam. In Fig. 16 the effective leverage of said weight is several fold increased, owing to its aforesaid great angular movement. This feature, however, is set forth in said prior joint application.

The automatic regulation is accomplished by means of a "regulator" operated by the accumulation of discharged grain and connected to shift the "valve-carrier." For the regulator I may use any well-known form of vertically-movable hopper shown in prior Letters Patent; but I prefer to use in connection with my present improvements the improved form herein shown, and which may be described substantially as follows: An opening 240 is formed in the front wall of the conduit D of the hopper P. Said opening is covered with a loosely-fitting piece of canvas or other flexible material 241, secured around the edges of said opening by rivets or otherwise. A metal or other plate 242 is centrally secured to the said canvas in a similar manner. Said plate carries a pin 243, which passes through one end of an arm 244, whose opposite end is fixed on the shaft 245, that is journaled in suitable bearings formed on the front wall of the said conduit and in the bracket or hanger 246. To the left-hand end of the shaft 245 is fixed an arm 247, provided with a suitable weight 248. A connecting-rod 13 is connected at its lower end to the arm 247 and at its upper end to the arm 249, that is fixed to the valve-carrier 225, whose depending arms 224 and 226 carry, pivoted, as aforesaid, to their lower ends, the cut-off valve 70. When at any time the flow of grain from the hopper P through the conduit D is checked by reason of the stopping of the mill or the filling of a bin to which said conduit may lead, and when sufficient grain has been delivered into the said hopper to create a pressure sufficient to distend the flexible diaphragm 241, the distending or bulging outward of said diaphragm operates, in a manner easily understood and through the connections described, to throw forward the cut-off valve 70, as in Fig. 17, so that said valve will stand under the chute H, notwithstanding the beam is up. If now the bucket be sufficiently loaded to close the valve 60, as in Fig. 18, the operation of the machine will be stopped. When the grain in the hopper is sufficiently discharged, the weight 248 overcomes the thrust of the diaphragm or regulator and through the rod 13 shifts the valve 70 from its position in Fig. 18 to that in Fig. 15, thus starting the machine, which then completes the load and discharges the same, as hereinbefore set forth. The weight 207 serves not only as a hammer for detaching the bucket-latches, but also as a "supplemental" weight, in addition to the weighted valve-lever 69, for determining the amount of the load to be made up by the "drip." This division of said supplemental weight is deemed to be of special utility in large-sized machines, since in these the total weight proper for this purpose is greater than required for closing the valve.

When reference is herein made to the movement of the "scale-beam," the movement of the bucket-supporting arms thereof is meant, this coinciding of course with that of the bucket itself.

Having thus described my invention, I claim—

1. In a grain-weigher, the combination, with the hangers and with the oscillating bucket supported therein, of the upwardly-extending deflector journaled in the bucket and the downwardly-extending crank fixed on the deflector-shaft, the pin of said crank engaging a slot in the hanger, all being organized substantially as set forth, whereby the deflector is actuated on the movement of and in the same direction as the bucket.

2. In a grain-weigher, the combination, with the bucket supported to oscillate and carried by vertically-movable hangers, of the bucket-detent latch, a hammer carried by the grain-weigher frame-work and arranged to be lifted by the bucket-hanger, a catch normally upholding the hammer, and means detaching the said catch on the descent of the hanger, whereby said hammer falls on the bucket-latch.

3. In a grain-weigher, the combination, with the bucket and bucket-carrying hangers, of the bucket-latch, the arm pivoted to the frame-work and carrying the hammer over said latch, the trigger and catch upholding the hammer, and the stop on the hammer located to detach said trigger on the descent of the hanger below a predetermined point.

4. In a grain-weigher, the combination, with the bucket-hangers, of the oscillating bucket carried by said hangers, the latch 42, engaging the bucket, the hammer carried by the frame-work, the trigger carried by the hammer and engaging a catch fixed on the frame-work, and means detaching the trigger on the descent of the hanger below the poising-point.

5. In a grain-weigher, the combination, with the scale-beam and the valve to be actuated thereby, of the cam 68 on the valve, the actuator on the beam, and a latch, substantially as described, carried by the valve and contiguous to the upper face of said cam.

6. In a grain-weigher, the combination, with the scale-beam and valve-actuator thereon, of the valve 70, having the cam 68, provided with the faces 6 and 14, and the latch contiguous to said face 6 and overlapping face 14.

7. In a grain-weigher, the combination, with the cut-off valve and with the scale-beam carrying the actuator for said valve, of a shiftable valve-carrier on which the valve is supported, said carrier being adapted to have a movement for throwing the valve into an inoperative position.

8. In a grain-weigher, the combination, with the valve-carrier journaled in bearings on the frame-work and having arms, of the valve pivoted to said arms, and means, substantially as described, normally actuating the valve on its pivots from the scale-beam, said valve-carrier being adapted to be swung to bring the valve into an inoperative position.

9. In a grain-weigher, the combination, with the supply-chute and the scale-beam, of the reducing and cut-off valves, each actuated from said beam and together closing said chute, and a shiftable valve-carrier carrying one of said valves and constructed for movement independently of the beam.

10. In a grain-weigher, the combination, with a regulator, substantially as described, and with the shiftable valve-carrier carrying a valve normally actuated from the scale-beam, of means, substantially as described, operatively connecting the regulator with the carrier, whereby the carrier is actuated on the working-stroke of the regulator to throw the valve into an inoperative position.

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