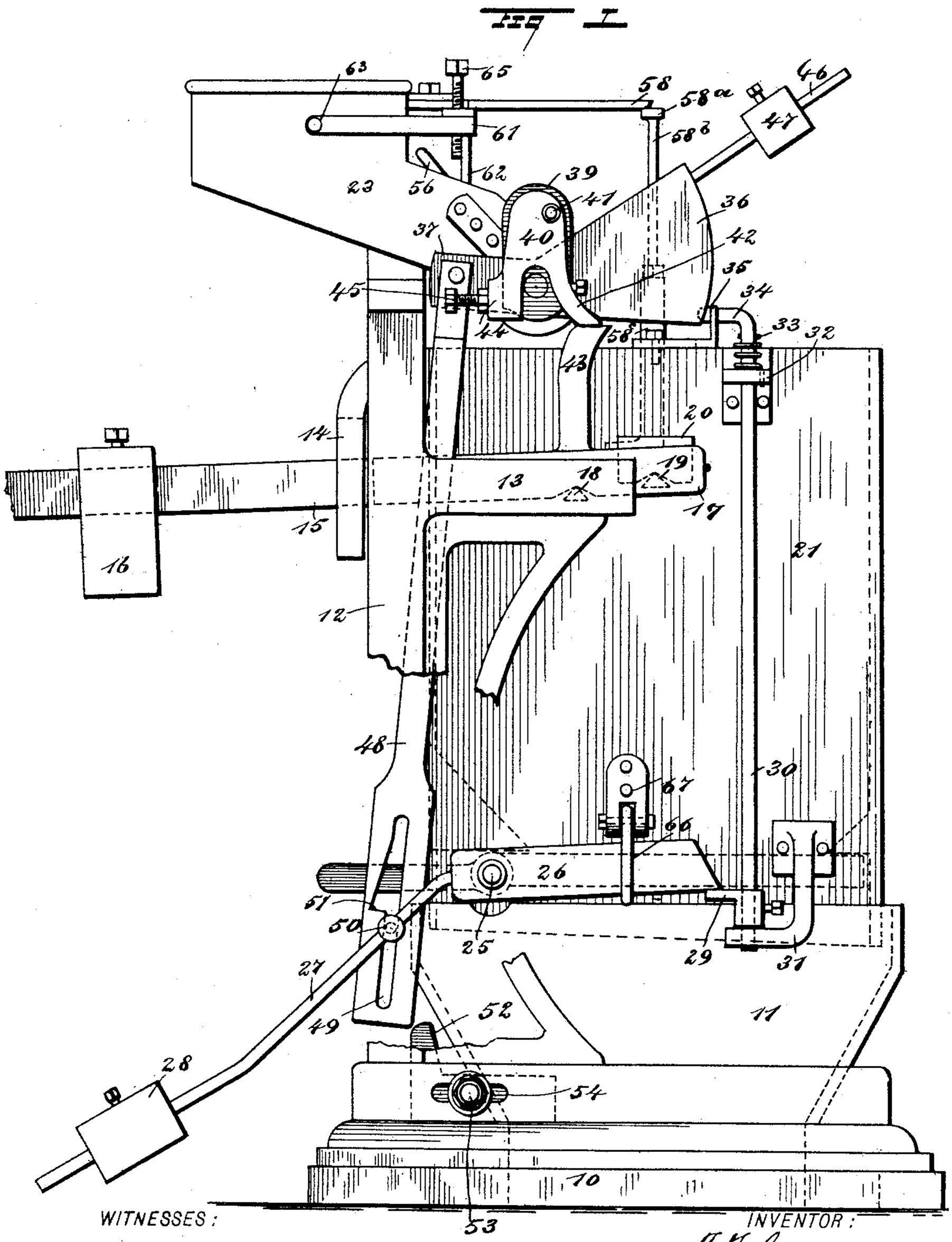
(No Model.) 4 Sheets—Sheet 1.

T. F. GRAY.

AUTOMATIC GRAIN SCALE.

No. 472,872. Patented Apr. 12, 1892.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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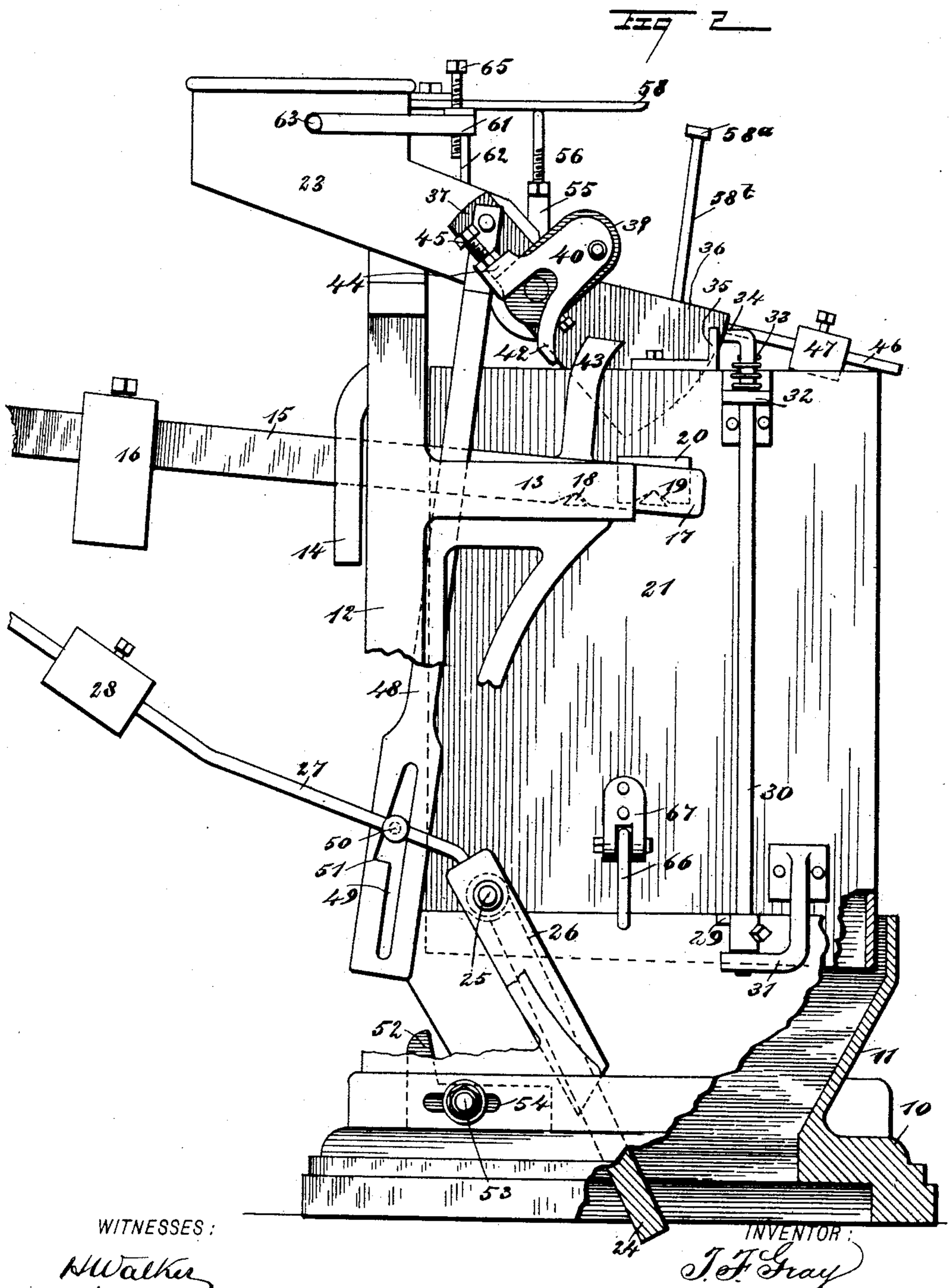
Fig. 2.



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AUTOMATIC GRAIN SCALE.

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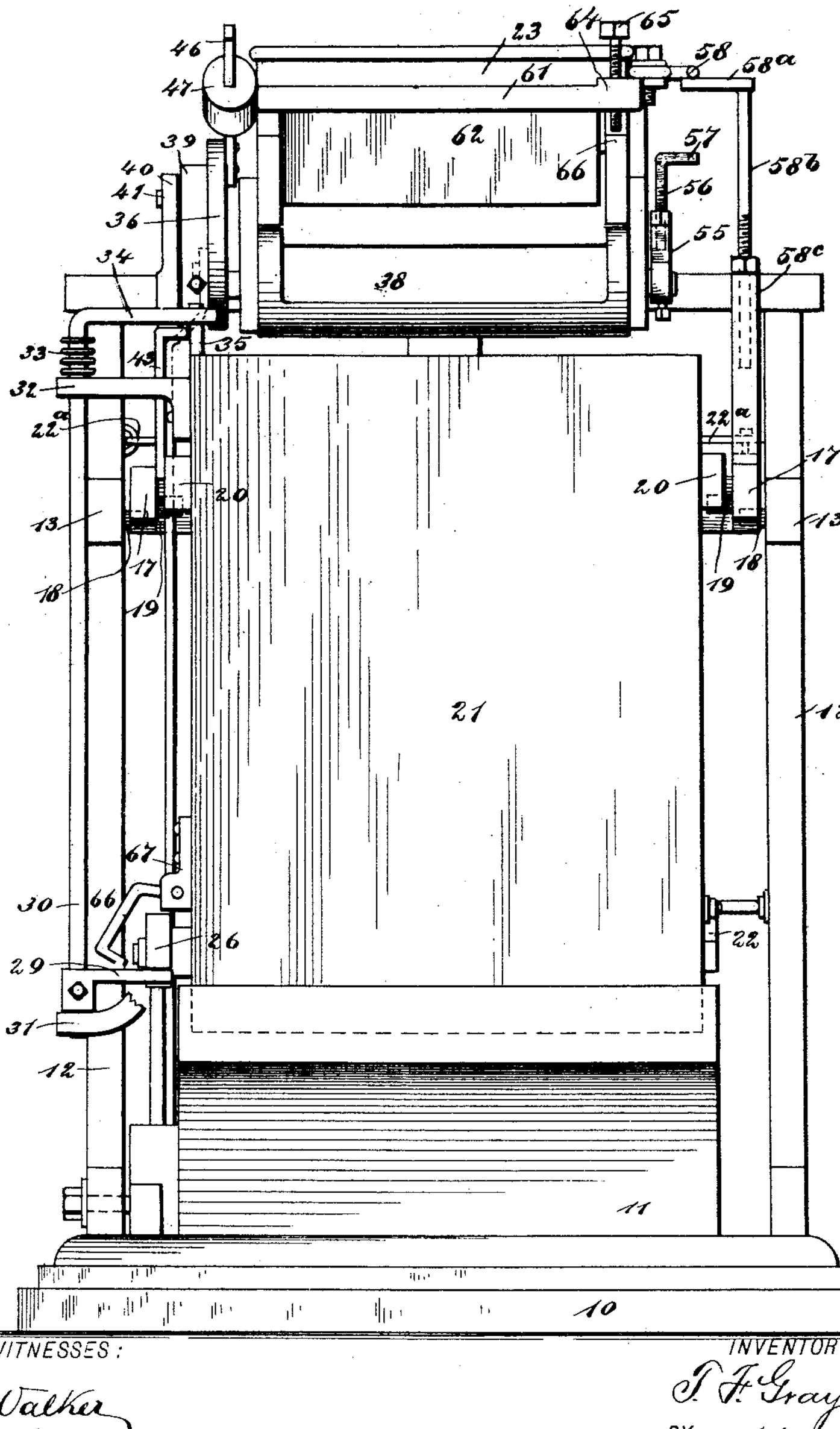
Fig 3



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4 Sheets—Sheet 4.

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Fig 4

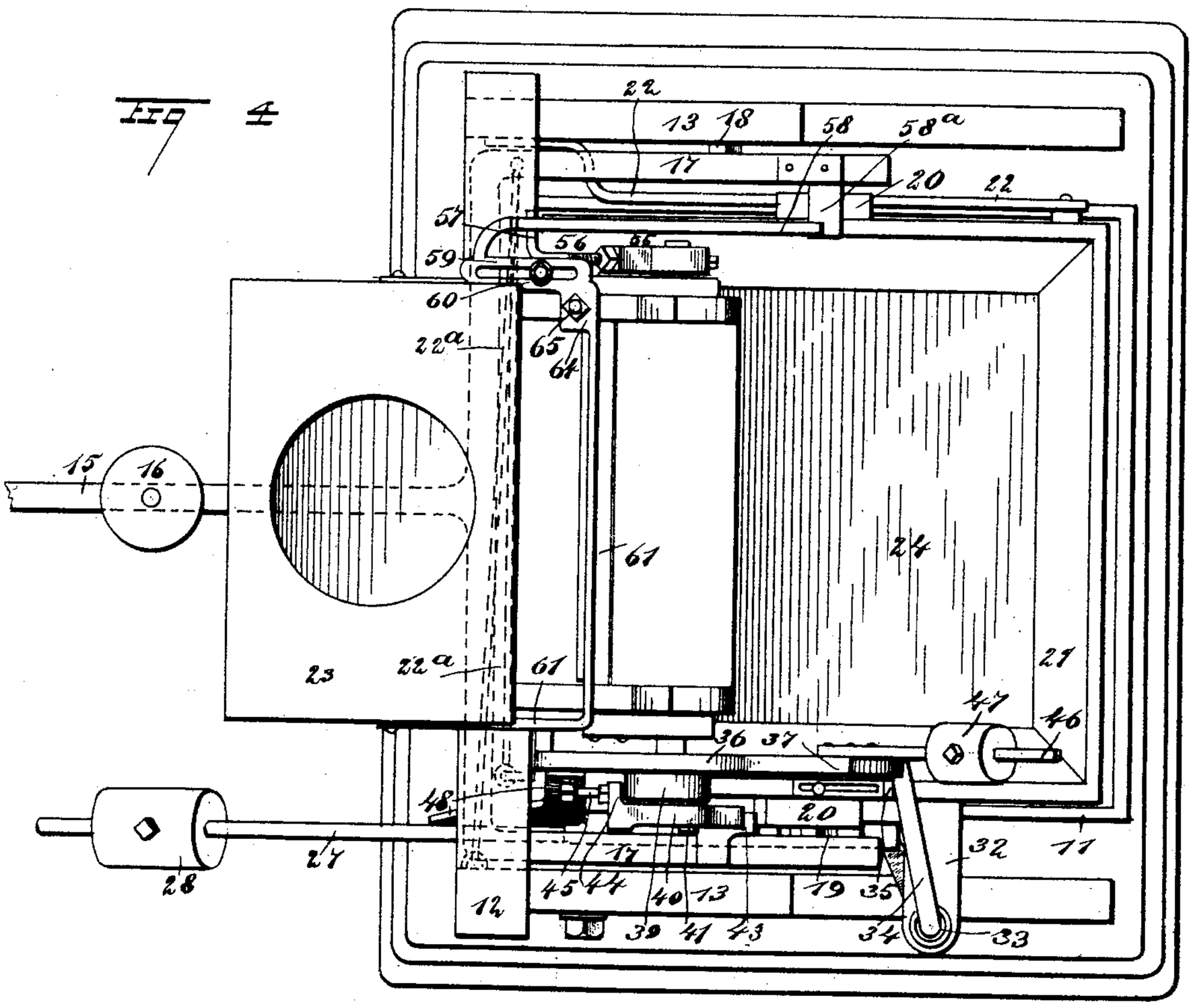


Fig 5

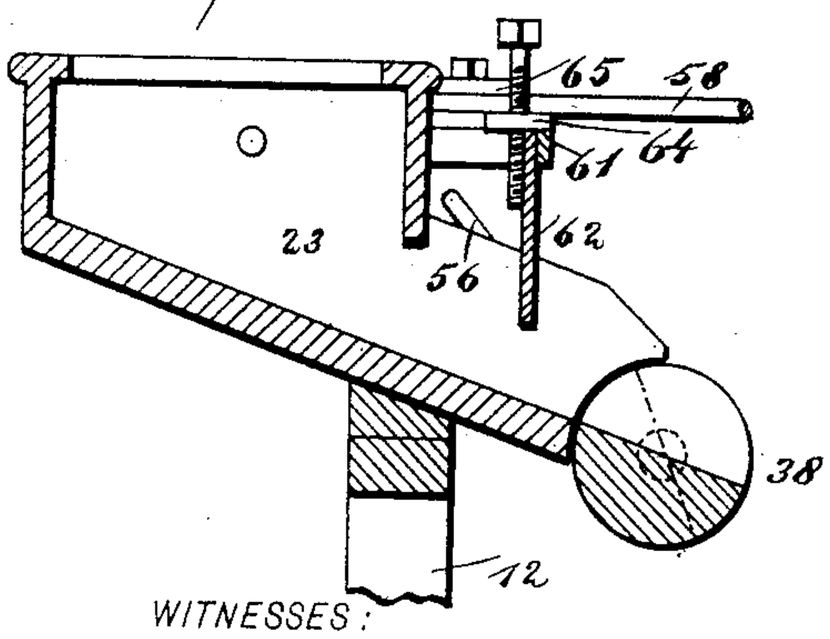
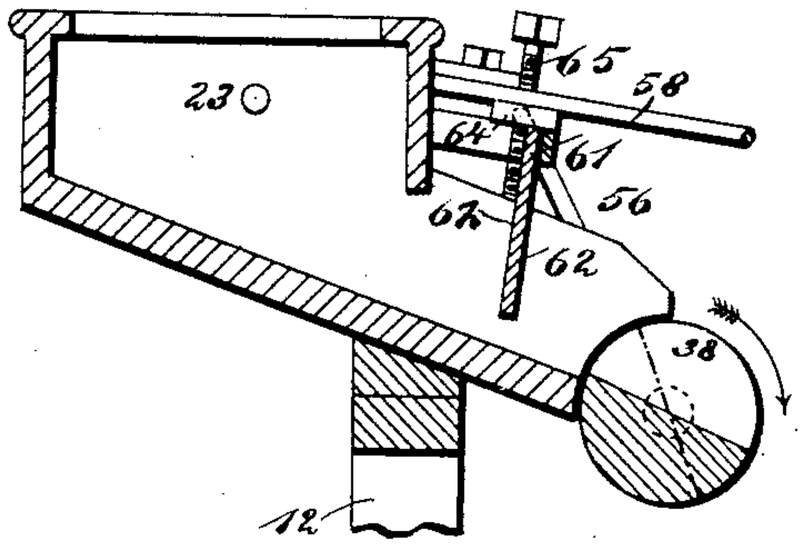


Fig 6



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UNITED STATES PATENT OFFICE.

THOMAS F. GRAY, OF MONROEVILLE, OHIO.

AUTOMATIC GRAIN-SCALE.

SPECIFICATION forming part of Letters Patent No. 472,872, dated April 12, 1892.

Application filed November 17, 1891. Serial No. 412,131. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. GRAY, of Monroeville, in the county of Huron and State of Ohio, have invented a new and Improved Automatic Grain-Scale, of which the following is a full, clear, and exact description.

My invention relates to improvements in automatic grain-scales which are adapted to successively weigh drafts of grain, but which may also be used for weighing other material, the invention being especially intended as an improvement on the apparatus for which I obtained Letters Patent of the United States No. 441,658, dated December 2, 1890.

The object of the present invention is to improve the construction of the machine described in the former patent, so as to enable the machine to automatically cut off the supply of grain or other material at a point which will insure an even balance of the scales; to provide means for cutting off the supply independently of the operation of the discharge-valve, thus enabling the operator to independently lock the discharge-valve and test the scales to see if they are accurate, and in general to construct the parts of the machine so that they will be durable and efficient and may be very nicely adjusted.

To this end my invention consists in certain features of construction and combinations of parts, as will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a broken side elevation of the scales in normal position ready to receive a load. Fig. 2 is a broken side elevation showing the scales in discharging position. Fig. 3 is a front elevation of the scales. Fig. 4 is a plan view of the same, and Figs. 5 and 6 are broken detail sectional views showing the supply-valves in open and closed position.

The main portion of the machine is substantially like that described in my other patent referred to; but I have shown all the parts and will describe them to enable the movements in detail to be thoroughly understood.

The machine is provided with a hollow base 10, which supports a chute 11, adapted to deliver to any sort of receptacle, and the base also supports an upright frame 12, which has near its upper end and on opposite sides projecting arms 13, which are adapted to embrace the weighing-hopper, as described below.

On the back side of the frame is a keeper 14, in which the scale-beam 15 works, and the scale-beam is provided with the usual counterpoise 16, adapted to balance the load. The scale-beam 15 is forked, it having its inner end, which projects into the frame, formed into parallel arms 17, which extend alongside and between the arms 13, and these arms 17 of the scale-beam are pivoted on knife-edge supports 18, which are secured to the arms 13 of the main frame, as shown in Figs. 1 and 2.

The arms 17 are also provided near their inner ends and on their inner sides with projecting knife-edge pivots 19, which fit recesses in blocks 20, which are secured to the sides of the weighing-hopper 21, which hopper is suspended above the chute 11 and is supported, as described, by the scale-beam. The hopper will thus be held to move vertically between the arms 13 of the frame. In order that the hopper may be held in proper position, a guide-bar 22 is pivoted to one side of it near the bottom, and the opposite end of the bar is pivoted to the frame 12, as shown in Figs. 3 and 4, and the hopper is also guided by the cross-rods 22^a, pivoted to it and the frame near the top.

Above the weighing-hopper 21 is a supply-spout 23, which delivers into the hopper, and the flow of grain or other material through the spout is automatically regulated by means of valves and their connections, as hereinafter described. The hopper is open at the top and its lower end is closed by a vertically-swinging gate or valve 24, the axle 25 of which projects through the walls of the hopper, and secured to the axle at one end is a lever 26, one end of which is secured to a rearwardly-extending bent rod 27, on which is a counter-balance 28, the counter-balance being sufficiently heavy to normally hold the valve 24 in a closed position, and also to operate the cut-off valve, as hereinafter described. The lever 26 has an inclined free end, as shown best in Figs. 1 and 2, and it is normally held

in a nearly horizontal position, so as to hold the valve 24 closed, by means of an arm 29, which is adapted to extend beneath the free end of the lever 26, and which is secured to a rod 30, mounted vertically on one side of the hopper 21, and held to turn in brackets 31 and 32, arranged at the lower and upper ends of the hopper. This rod 30 is normally pressed by a spiral spring 33, which is coiled around it near its upper end, one end being secured to the rod and the other to an adjacent support, so as to swing the arm 29 beneath the lever 26. The upper end of the rod 30 terminates in a crank 34, which projects inward above the hopper, and the rear movement of which is limited by a stop 35, which is secured to the top edge of the hopper and which may be adjusted so as to properly limit the movement of the crank and rod.

The construction above described is substantially like that shown and described in my former part above referred to and forms no part of this invention. The crank 34 at the upper end of the rod 30 extends into the path of a segment 36, which is formed on one end of a lever 37, which lever is secured near the center to the axle of the lower cut-off valve 38, which valve is of a substantially semi-cylindrical form and is held to turn at the lower extremity of the supply-spout 23, the valve being adapted to entirely shut off the supply. This valve is substantially like that described in my former patent.

The lever 37 is provided near the center with a block 39, on which is pivoted a pendulum-catch 40, which is pivoted eccentrically to the block 39, as shown at 41, and which at its lower end terminates in two arms, one 42 of which is adapted to swing forward when the lever is in a nearly-horizontal position and rests upon an arm 43, which extends upward from one of the scale-beam arms 17, thus locking the lever and the valve with which it is connected. The opposite arm of the pendulum-catch 40 is provided with an offset 44, which overlaps one side of the block 39, and extending through this offset is a set-screw 45, which is adapted to impinge upon the block, and by adjusting the set-screw the throw of the catch may be regulated.

In order that the lever 37 may be sure to swing when the arm 43 of the scale-beam is removed from the pendulum-catch, the segment 36 of the lever is provided with a forwardly-extending rod 46, on which a weight 47 is adjustably secured. The short end of the lever 37 is pivoted to a rod 48, which extends downward alongside the hopper 21 and is provided with a slot 49 at its lower end, which slot is produced lengthwise of the rod and is adapted to receive a pin 50 on the rod 27, which is secured to the lever 26, and this slot is provided with a notch 51 on one side, which is adapted to engage the pin and enable the weight 28 to pull downward on the rod 48, and thus operate the lever 37 and valve 38, as described below. This slotted rod 48 is substantially like the rod shown in my former patent and used for an analogous purpose. In the path of the lower end of the rod 48 is a block 52, which is secured to the base of the machine by a screw 53, which extends through a slot 54 in the base, and it will thus be seen that the block 52 may be adjusted so as to engage the lower end of the rod 48 at the right time. The function of this block 52 is to prevent the rod 48 from swinging forward at a certain time, and thus cause the pin 50 to slide from the notch 51, and thus permit the weight 47 to tilt the lever 37.

On the end of the axle of the valve 38 opposite to that which is connected with the lever 37 is a socket 55, into which an arm 56 is screwed, the said arm having a bent end 57, which is adapted to strike the arm 58 of the main or primary cut-off valve in the spout 23. Consequently when the lever 37 is tilted, so as to close the valve 38, the arm 56 will strike the arm 58, and thus raise the arm and the primary valve, as described presently. This arm 58 terminates at one end in a loop 59, which is adapted to receive a screw 60, and by means of the screw the arm is secured to the frame 61 of the primary cut-off valve 62, which valve swings vertically in the supply-spout 23 and is adapted to regulate the flow of material through the spout. The frame 61 of the valve is of an essential **U** shape and it embraces the spout 23, its ends being pivoted thereto, as best shown at 63 in Figs. 1 and 2. The frame 61 has an offset 64 at one end, extending vertically through which is a set-screw 65, the lower end of which is adapted to impinge on one side of the spout, as shown at 66 in Fig. 3, and by adjusting the set-screw the valve 62 may be regulated so that it will shut down to within any required distance of the floor of the spout. The arm 58 and the valve 62 are held raised and open by the bent end 58^a of the arm 58^b, which arm is screwed into a socketed post 58^c, which post extends upward from one of the scale-beam arms 17. It will be seen that the height of the arm 58^b may be nicely regulated by screwing it in or out of the socketed post 58^c, and the arm 56 of the lower valve 38 of the spout may also be regulated in the same manner by screwing it into or out of the socket 55, and as a result these two valves may be timed so that they will work properly in relation to each other, and so that the upper or primary valve will be held at the desired height and will be operated by the arm 56 at the right time.

On one side of the hopper 21 and adjacent to the lever 26 is a latch 66, which is pivoted in a lug 67 and which is adapted to hook over the lever 26, and, if desired, the lever may be held in a raised position by the latch, so that the valve 24 will not open, and the weighing mechanism may then be tested to see if the scales are accurate; but under ordinary circumstances the latch 66 is not used.

The operation of the machine is as follows:

In its normal position (shown in Fig. 1) the valve 24 will be closed and the lever 26 locked, so as to hold the valve, while the valves 38 and 62 of the supply-spout 23 will be opened, as shown in Figs. 1 and 5. The counterpoise of the scale-beam is set at the required weight, and when the hopper contains nearly enough grain to balance the counterpoise the counterpoise will be raised slightly, and this movement of the scale-beam will swing the arm 58^b from beneath the arm 58 of the primary cut-off valve 62. This will permit the valve 62 to drop, so as to nearly close the spout, the extent it drops being regulated by the set-screw 65, as described, and the material to be weighed will consequently flow in a thin stream beneath the valve 62 and over the valve 38 into the hopper. This will enable just the exact amount of material to be delivered to the hopper, and just as this amount is delivered the counterpoise 16 and scale-beam 15 will have been raised sufficiently to swing the arm 43 from beneath the pendulum-catch 42, and the weight 47 will then throw down the lever 37, as shown in Fig. 2, and will turn the valve 38 into the position shown by dotted lines in Fig. 6, thus entirely closing the supply-spout. When the lever 37 and valve 38 are tilted, as described, to close the valve, the bent end 57 of the arm 56 will be carried upward into the position shown in Fig. 2, so as to strike the arm 58 and raise the said arm into a position to permit the return of the arm 58^a beneath it, and will also open the primary cut-off. When the lever 37 is tilted, as described, to shut off the supply, the segment 36 at the free end of the lever will strike the crank 34 of the rod 30, thus turning the rod and swinging the arm 29 from beneath the free end of the lever 26, and the weight of the material in the hopper will then push down the valve 24 and permit the material to flow freely through the chute 11. This downward movement of the valve 24 and lever 26 will raise the rod 27 and counterpoise 28, so as to bring the pin 50 above the notch 51 in the rod 48, and when the material has passed out of the hopper the weight 28 will swing the lever 26 and valve 24 back to their normal positions. When the weight 28 drops, the pin 50 on the rod 27 will engage the notch 51 of the rod 48, the rod swinging by gravity, so as to accomplish this result, and the downward movement of the weight will thus pull down the rod 48 and swing the lever 37 back to its normal position, thus opening the valve 38 and raising the segment 36, so that the spring 33 may return the rod 30 to its normal position and swing the arm 29 beneath the lever 26. When the lever 37 is tilted, as described, the pendulum-catch 40 will swing forward, and the arm 42 will engage the arm 43 of the scale-beam and hold the valve 38 in open position. When the valve 38 is opened, as described, the arm 56 will be swung from beneath the arm 58, thus permitting the latter arm to drop upon the arm 58^a, as shown in Fig. 1, and the machine will then be set ready for another operation.

It will be seen, then, that the machine is thoroughly automatic, that the discharge-valve will open as soon as the required weight is delivered into the hopper, and that the supply-valve will automatically close when the discharge-valve is opened and will automatically open when the discharge-valve is closed. It will also be seen that by having the two valves in the spout operate successively, as described, the exact amount desired may be delivered in the hopper.

In practice the arms 58^b and 43 of the scale-beam are arranged so that the first-mentioned arm will swing from beneath the arm 58 a little before the arm 43 swings from beneath the pendulum-catch, and it will be understood that by changing the length of the arm 58 this difference in time in the operation of the two valves may be either increased or diminished.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. An automatic scale comprising a tilting scale-beam having upwardly-extending arms thereon, a weighing-hopper supported by the scale-beam and having a counterbalanced discharge-valve at its lower end, a supply-spout adapted to deliver into the hopper, a cut-off valve held to swing in the spout and having an arm adapted to rest upon one of the scale-beam arms, an oscillating valve mounted at the lower end of the spout and provided at one end with an arm adapted to swing against the arm of the primary cut-off, a lever secured to one end of the lower spout-valve and operatively connected with the discharge-valve of the hopper, so as to operate in unison therewith, a catch pivoted on the valve-lever and adapted to engage one of the scale-beam arms, and a rock-shaft pivoted on the weighing-hopper, said shaft having at its lower end an arm adapted to support the discharge-valve and at its upper end a crank which extends into the path of the spout-valve lever, substantially as described.

2. In an automatic scale, the combination, with the tilting scale-beam having upwardly-extending arms near its inner end, and the weighing-hopper supported on the scale-beam, said hopper having a counterbalanced discharge-valve at its lower end, of a supply-spout adapted to deliver into the hopper, a primary cut-off valve held to swing in the spout and provided with an arm adapted to rest upon one of the scale-beam arms, an oscillating cut-off valve mounted at the lower end of the hopper, said valve having at one end an arm adapted to swing against the arm of the primary cut-off valve, a weighted lever secured to one end of the lower cut-off valve, said lever terminating at one end in a cam or segment, a swinging catch pivoted on the valve-lever and adapted to engage one of the scale-beam arms, an operative connection be-

tween the lower valve-lever and the discharge-valve, and a rock-shaft pivoted on the weighing-hopper, said shaft having at its lower end an arm to engage and hold the discharge-valve and at its upper end a crank which extends into the path of the valve-lever, substantially as described.

3. The combination, with the tilting scale-beam having upwardly-extending arms thereon and the weighing-hopper carried by the scale-beam, of the supply-spout adapted to deliver into the weighing-hopper, a primary cut-off valve held to swing in the supply-spout and having an arm adapted to rest on one of the scale-beam arms, an oscillating cut-off valve mounted at the lower end of the supply-spout, a catch pivoted at one end of the valve and adapted to engage an arm on the scale-beam, and a bent arm secured to the axle of the lower valve and adapted to swing against the arm of the primary cut-off valve, substantially as described.

4. The combination, with the tilting scale-beam having upwardly-extending arms thereon, said scale-beam being adapted to carry a weighing-hopper, as described, and the supply-spout arranged above the scale-beam, of the primary cut-off valve held to swing in the spout, a supporting-arm adjustably connected with the cut-off valve and adapted to rest upon one of the scale-beam arms, a catch pivoted at one end of the lower cut-off valve and adapted to engage one of the scale-beam arms, and a bent arm secured to the axle of the lower cut-off valve and having means for longitudinal adjustment, said arm being adapted to strike the arm of the primary cut-off valve, substantially as described.

5. In a scale of the character described, the combination, with the supply-spout, of the swinging primary cut-off valve mounted therein and having a projecting arm, and the oscillating cut-off valve at the lower end of the spout, said valve having an arm extending into the path of the primary cut-off-valve arm, substantially as described.

6. The combination, with the tilting scale-beam having a projecting arm thereon, the weighing-scale pivoted on the scale-beam and having a discharge-valve at the bottom with a counterbalanced lever pivoted to its stem, the rock-shaft pivoted on the weighing-hopper and having an arm to engage the lever of the discharge-valve, and the supply-spout adapted to deliver into the weighing-hopper, of an oscillating cut-off valve mounted at the lower end of the spout, a weighted lever secured to one end of the valve and having a segment thereon adapted to operate the rock-shaft, a connecting-rod extending from the lever to the weight-rod of the discharge-valve, and a pendulum-catch pivoted on the cut-off-valve lever and adapted to engage the arm of the scale-beam, substantially as described.

7. The combination, with the tilting scale-beam having an upwardly-extending arm thereon, and the oscillating valve having a weighted lever at one end, of a block on the lever, and a swinging pendulum-catch adjustably pivoted to the block and adapted to swing upon the arm of the scale-beam, substantially as described.

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