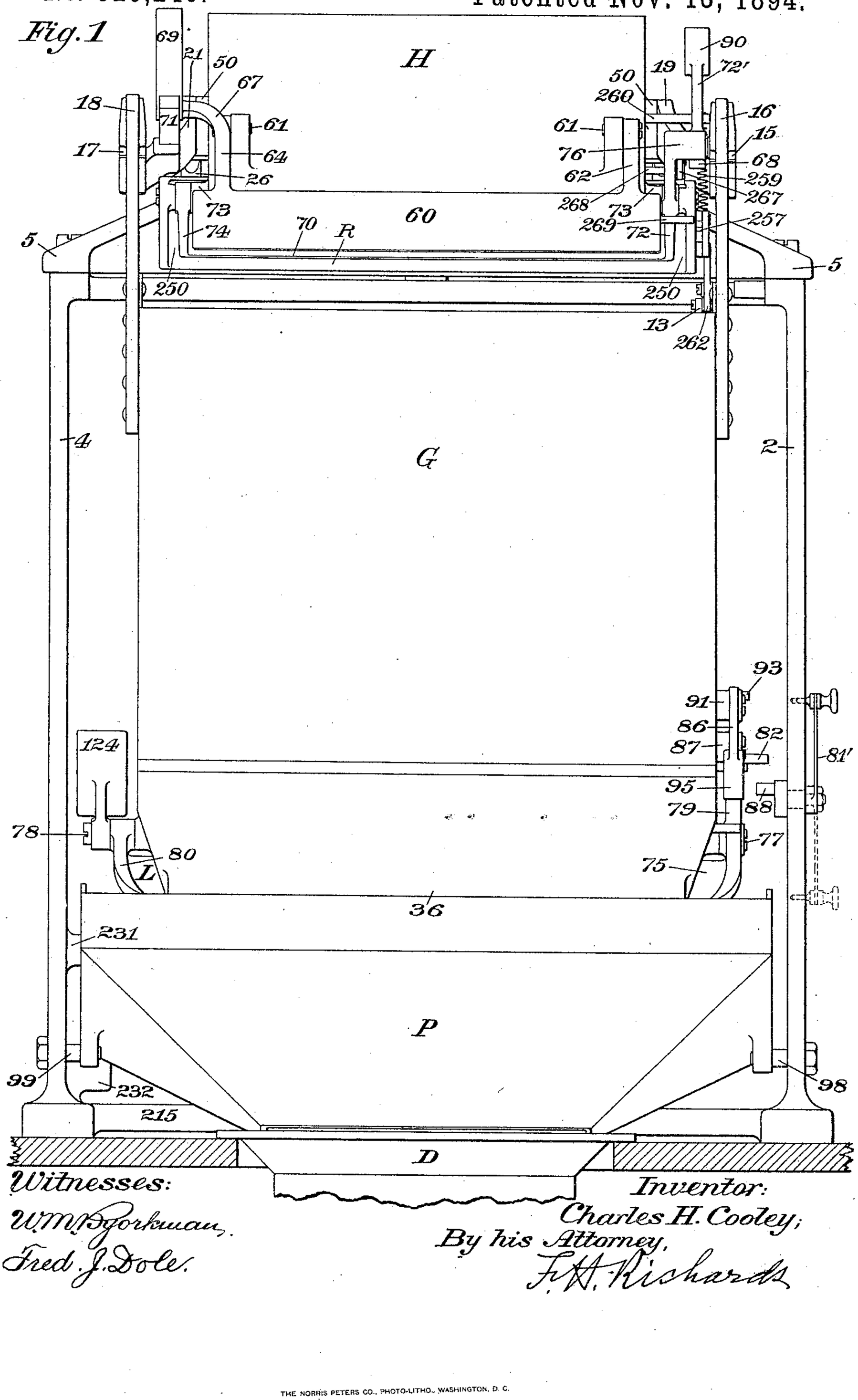
(No Model.) 5 Sheets—Sheet 1.

C. H. COOLEY.

AUTOMATIC GRAIN SCALE.

No. 529,246. Patented Nov. 13, 1894.

Fig. 1



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F. H. Richards

(No Model.)

5 Sheets—Sheet 2.

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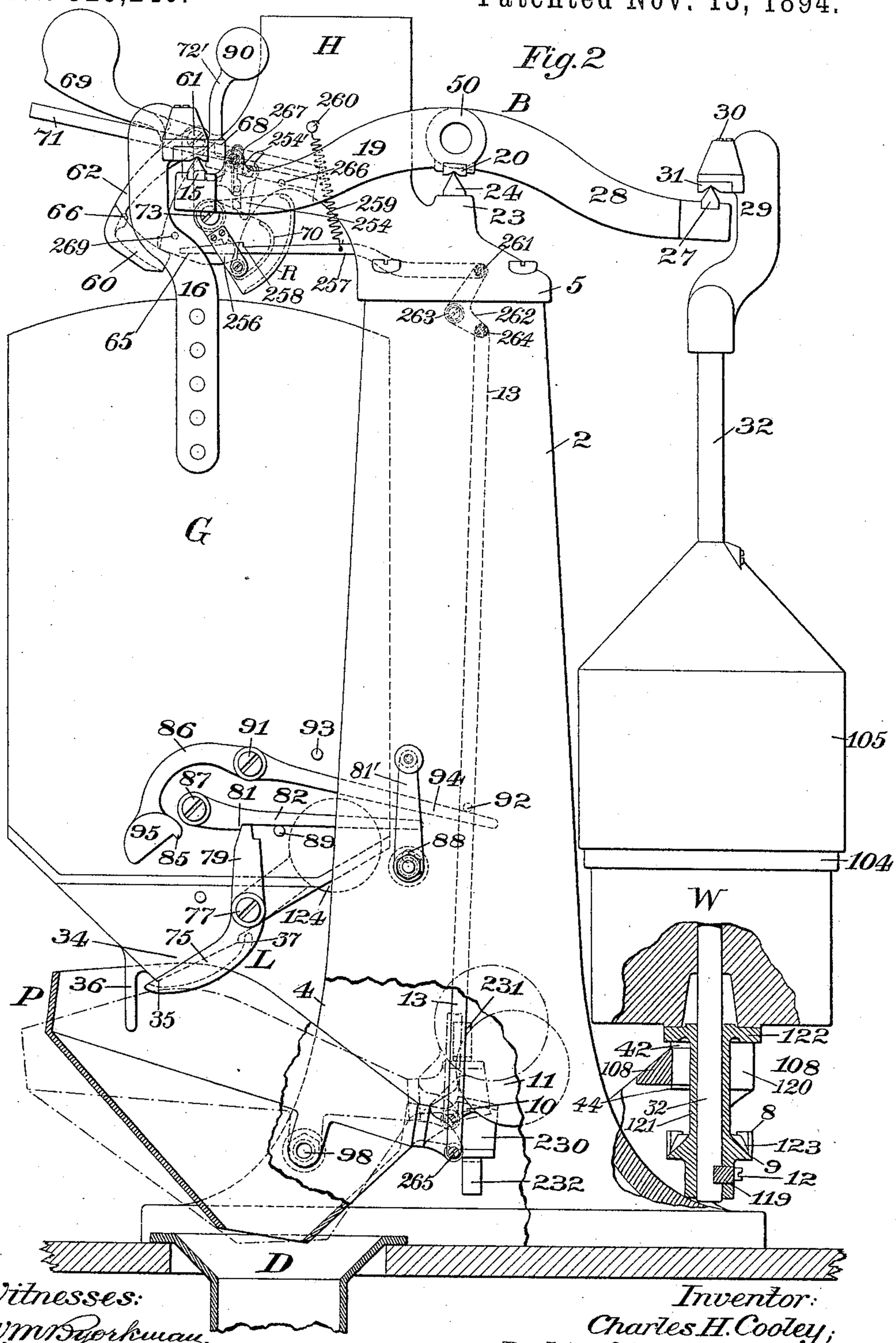
Fig. 2



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(No Model.) 5 Sheets—Sheet 3.

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AUTOMATIC GRAIN SCALE.

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Fig. 4

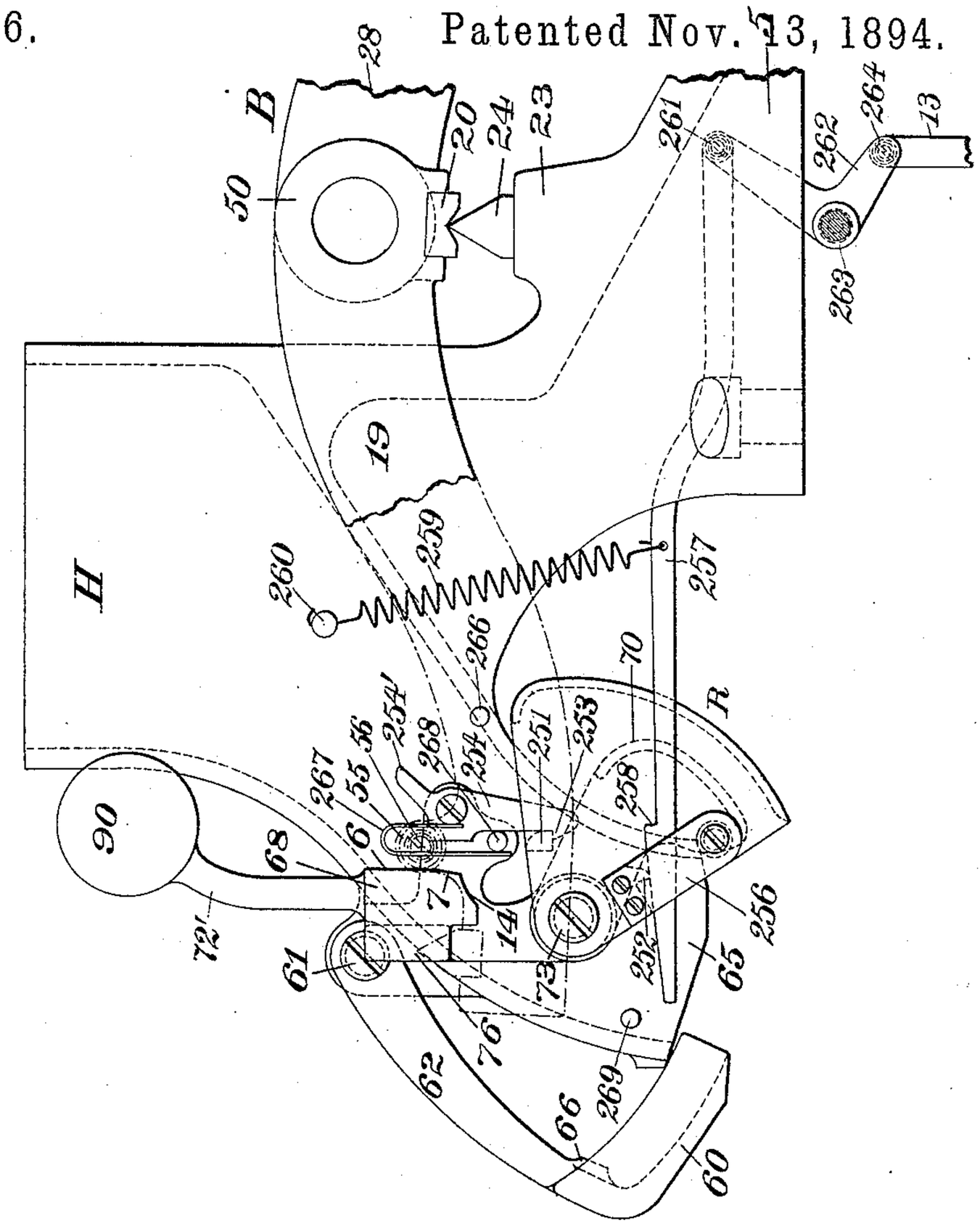
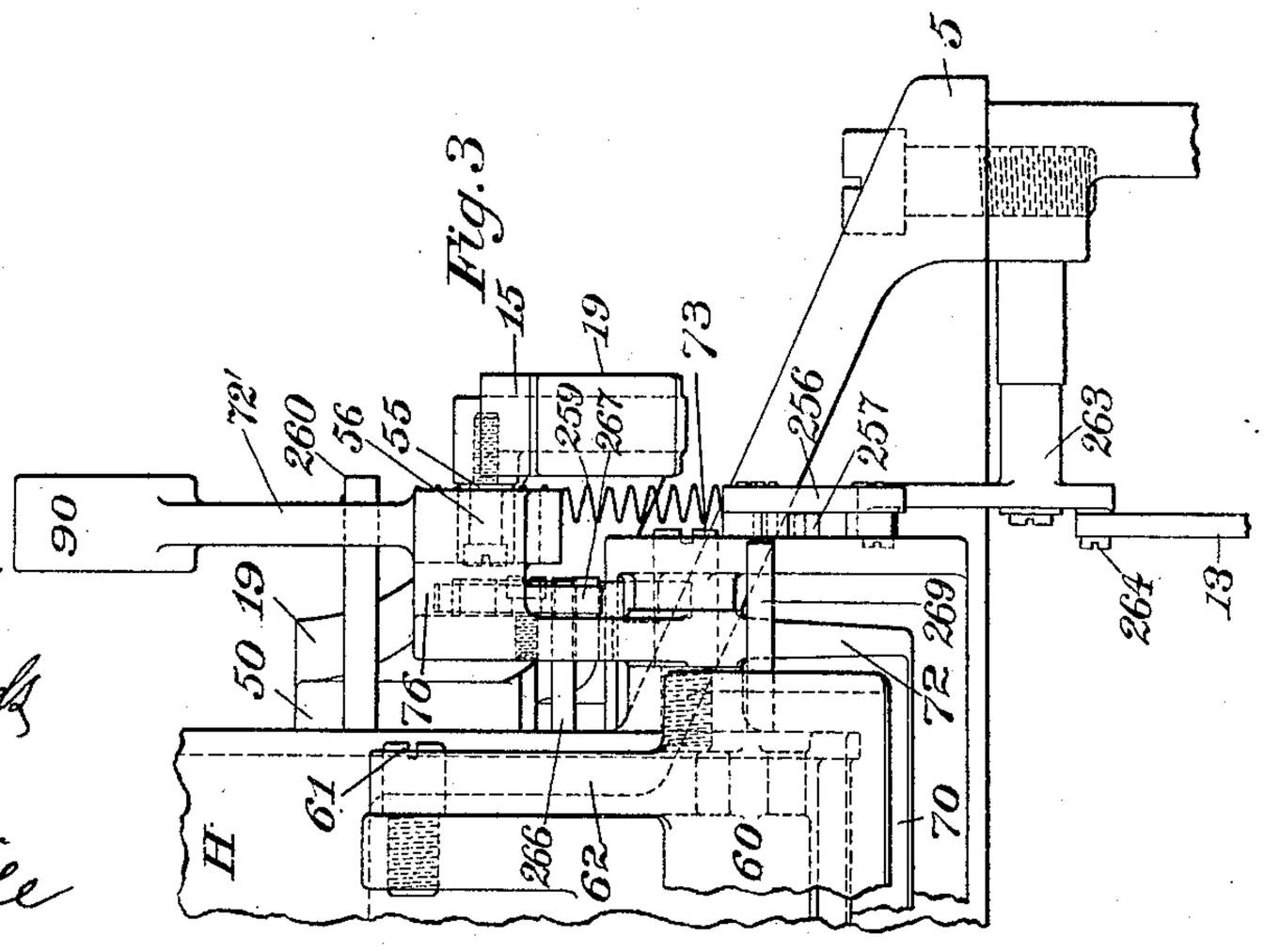


Fig. 3



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(No Model.) 5 Sheets—Sheet 4.

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AUTOMATIC GRAIN SCALE.

No. 529,246. Patented Nov. 13, 1894.

Fig. 5

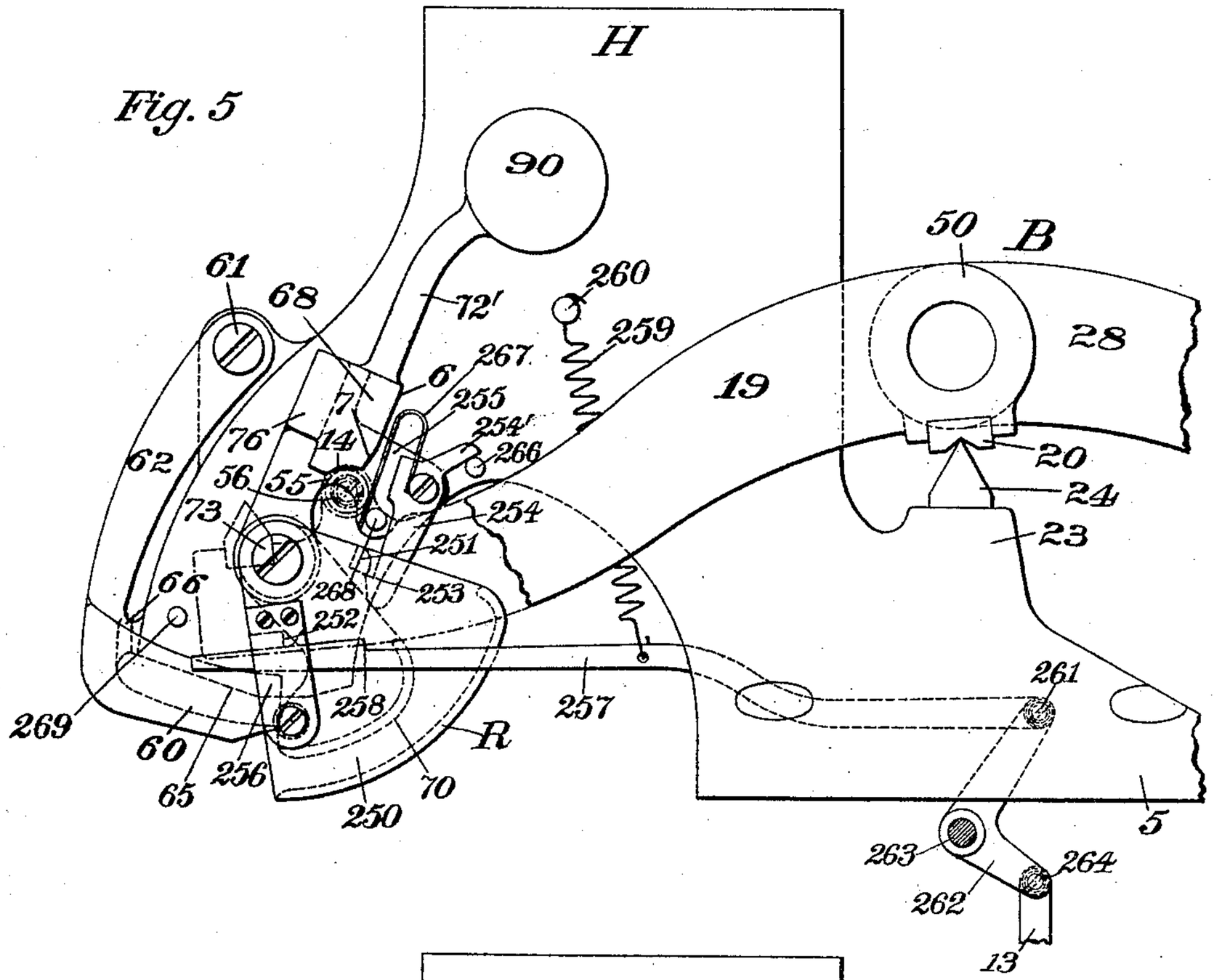
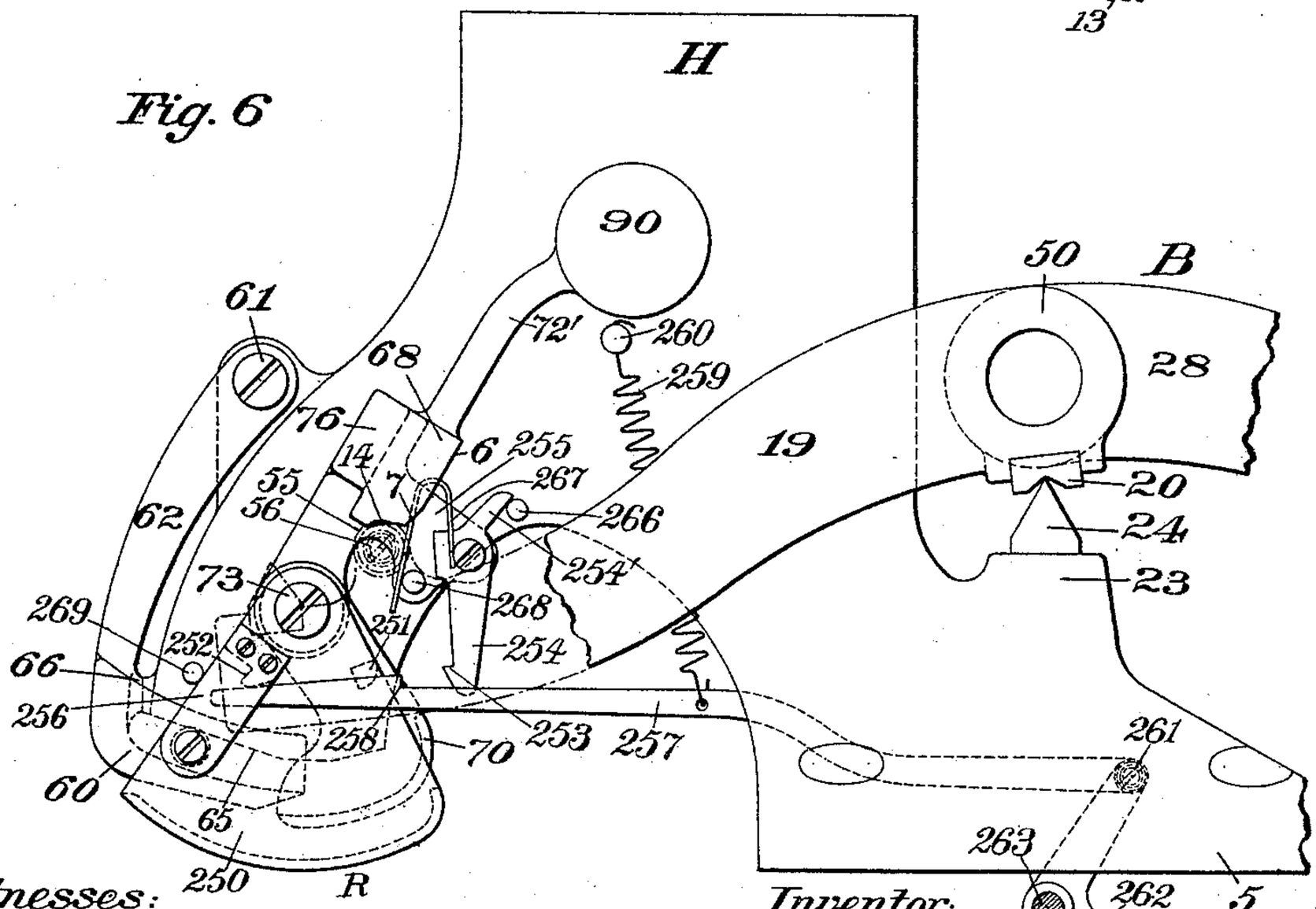


Fig. 6



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(No Model.) 5 Sheets—Sheet 5.

C. H. COOLEY.

AUTOMATIC GRAIN SCALE.

No. 529,246. Patented Nov. 13, 1894.

Fig. 7

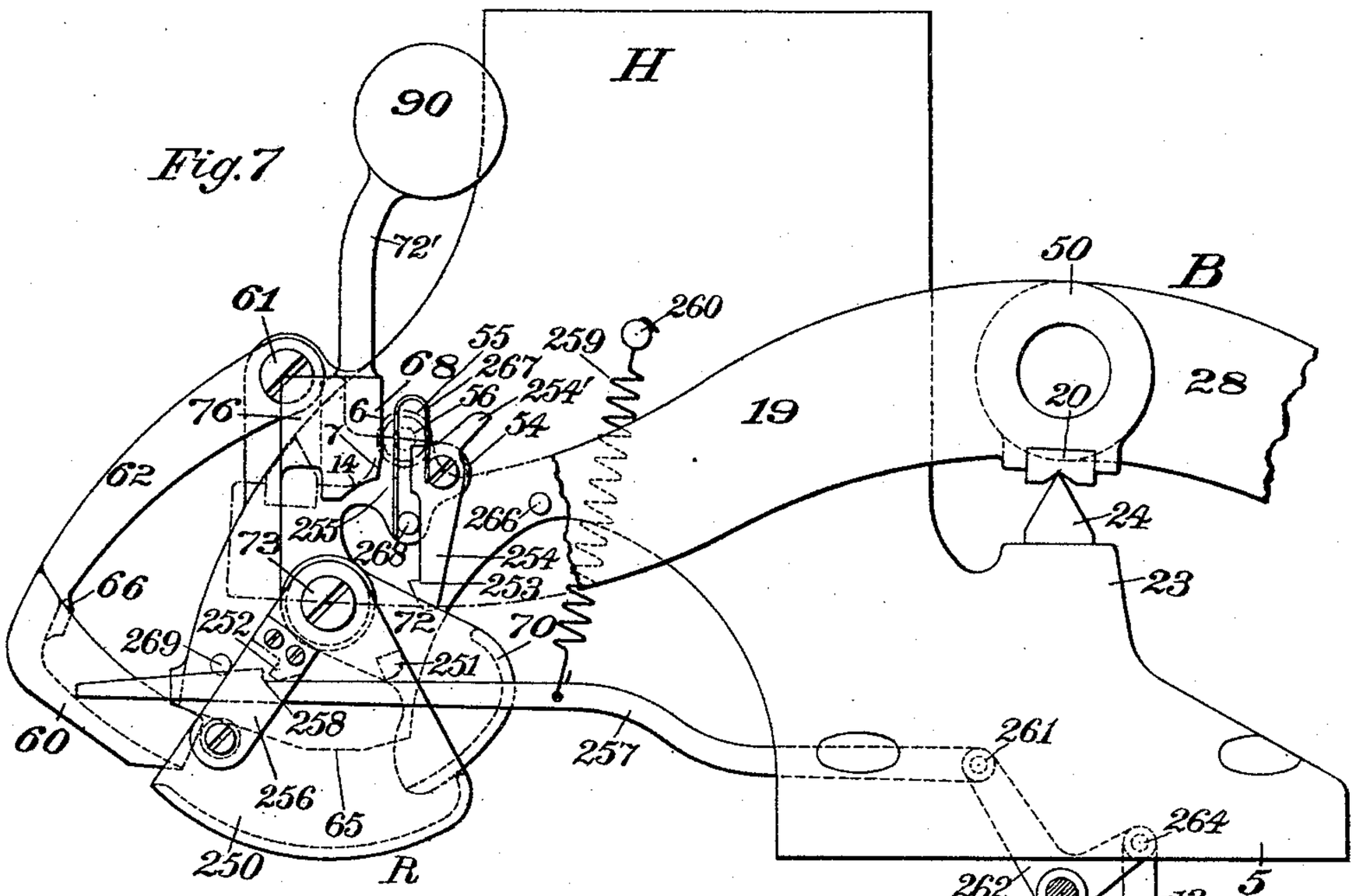
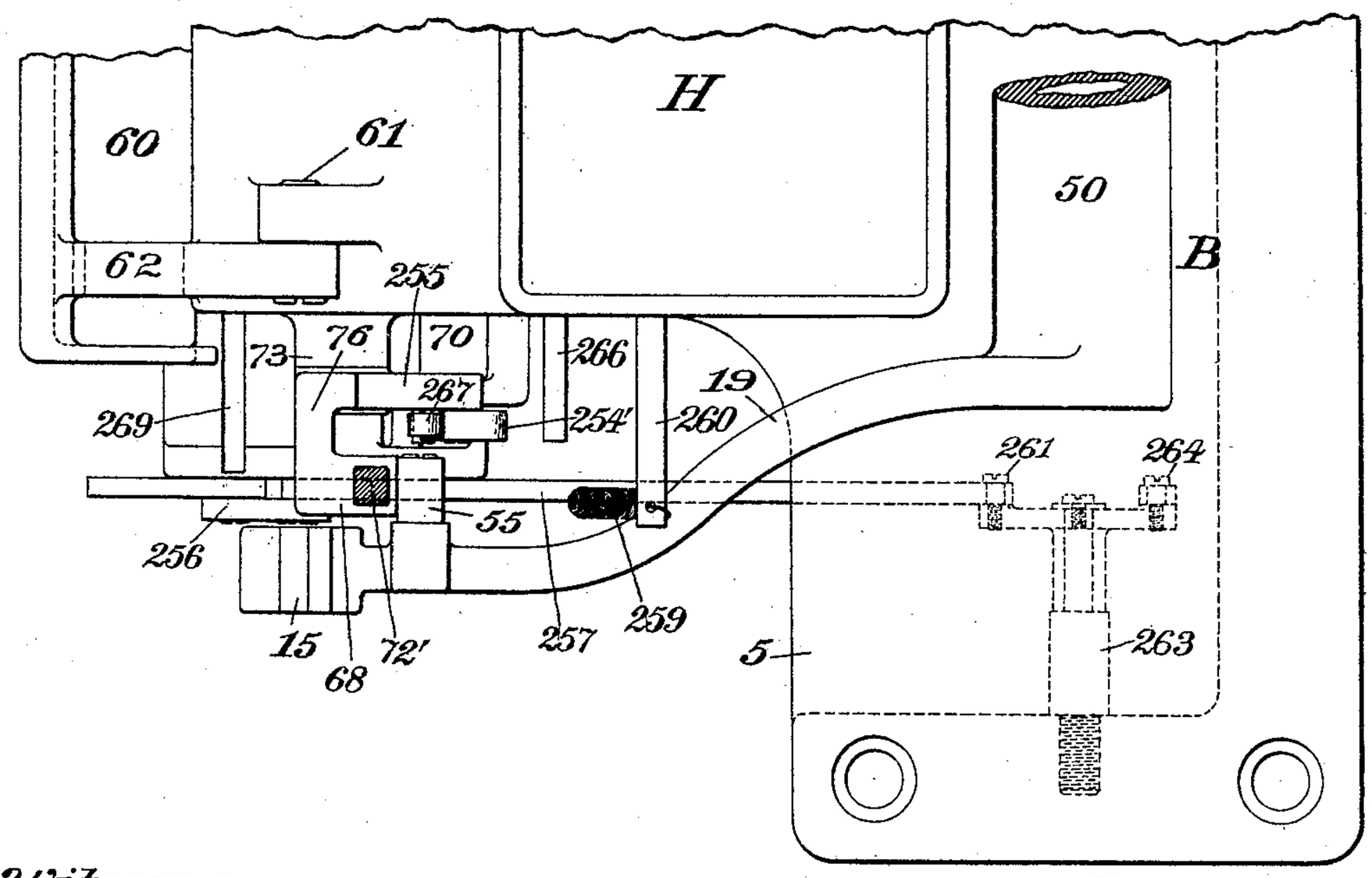


Fig. 8



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES H. COOLEY, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE PRATT & WHITNEY COMPANY, OF SAME PLACE.

AUTOMATIC GRAIN-SCALE.

SPECIFICATION forming part of Letters Patent No. 529,246, dated November 13, 1894.

Application filed December 1, 1893. Serial No. 492,442. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. COOLEY, 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 Automatic Scales, of which the following is a specification.

This invention relates to automatic scales of the single-bucket class, and is in the nature of an improvement upon the invention described in United States Letters Patent No. 442,719, dated December 16, 1890, to which reference may be had; the object of the present invention being to provide an organization of mechanism adapted to be made in large sizes; also, in connection with one or more chute-closing or cut-off valves adapted to be operated directly from the scale-beam by the rising and falling of the bucket, to provide a supplemental cut-off valve operable independently of the bucket, which supplemental valve shall be so constructed, disposed, and timed in its opening and closing movements relative to the other valves, as to close the passage from the chute and the opening between said valves during the entire time that the bucket is in a lowered position, and to retain a closed position until after the bucket is elevated and its outlet to the hopper is closed, and until the hopper is so far emptied of its contents as to return to its normal or elevated position.

In the drawings accompanying and forming a part of this specification, Figure 1 is a front elevation of an automatic scale embodying my present improvements. Fig. 2 is a side elevation thereof, a portion of the frame being broken away and the parts being shown in their normal position. Fig. 3 is an enlarged detail, in front view, of a portion of the right-hand upper part of the scale. Fig. 4 is a side elevation drawn in projection from Fig. 3, the valve-mechanism being shown in its open or normal position. Fig. 5 is a view similar to Fig. 4, showing the valve-mechanism in its poised or partially closed position. Fig. 6 is a view similar to Fig. 5, showing the valve as closed. Fig. 7 is a view similar to Fig. 6, showing the valves in the position they occupy when the grain-bucket is elevated and just prior to the emptying of the hopper. Fig. 8 is a plan view, drawn in projection with Fig. 7.

Similar characters designate like parts in all the figures.

My present invention belongs to that class of automatic scales more generally used for weighing grain, and which are therefore commonly known as "grain-scales," although equally adapted for automatically weighing and registering granular substances and any materials adapted to be handled by spouts and chain-conveyers. In this specification, therefore, I will describe my improved scale as a grain scale.

The framework for carrying the operative parts of the 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 at the bottom by the beam or part 215, Figs. 1 and 2. The grain-bucket G is of the single-chambered type or class, and is suspended under the supply-chute H by means of the hangers 16 and 18, that are fixed to the bucket and 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 framework. 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 bucket-closer (designated in a general way by L) consists of the suitably-formed plate, or closer proper, 75, having the arms 79 and 80 (usually formed integral therewith), which are pivoted at 77 and 78, respectively, to the bucket G. Said plate is preferably formed cup-shaped, as shown, so as to hold the grain without closing against the edges 35 and 37 of the bucket-spout 34, but closes under said spout-edges and contiguous to the guard 36, so that the grain is kept from leaking out, without requiring close-fitting of said parts, as shown in Fig. 2. The arm 79 extends above

the pivot 77, to engage with the catch 81 of the latch 82, and thus lock said closer when this is closed, as in Fig. 2; and to engage with the catch 85 of the latch 86 for locking said closer when open. The latch or lever 82, which is pivoted at 87 to the bucket, extends rearwardly and engages with the stop-pin 88 to unlock and allow the closer 75 to open on the descent of the bucket. This stop-pin 88 is curved or "cranked," as shown best in Fig. 1, and is pivotally journaled in the upright 2 of the framework. Outside of said upright, a lever or crank-arm, 81′, having a handle, is attached to the pin 88, whereby the operator may throw said crank-pin from its upper or operative position to its lower or inoperative position. Formed in the outer face of the upright 2 are notches adapted to be entered by a pin upon the crank-arm 81′ in its different positions, to lock the same against accidental displacement. A stop-pin, 89, fixed in the bucket, limits the downward movement of said latch when the closer is open. The latch or lever 86 is pivoted at 91 to the bucket and extends rearwardly to engage with the pin 92, that is fixed in the rod 13 for unlocking the closer on the rising of the hopper P. A stop-pin, 93, fixed in the bucket, limits the upward movement of the inwardly-projecting arm 94 of said latch 86, which arm is held normally in contact with said pin 93 by means of the weighted end, 95, of the said detent-latch. A suitable weight, as 124, is provided to normally close the bucket-closer 75.

The particular construction and arrangement set forth of the bucket-spout, and the combination therewith of the bucket-closer, is best illustrated, as to the object and utility thereof, in Fig. 2. The edge 35 of the bucket being lower than the edge 37, the grain is directed thereby against the closer 75, as there shown, and thus acts directly and strongly to complete the opening movement of said closer by the pressure of the grain thereon, thus insuring the locking-open of said closer by the detent-latch 86 by continuously acting on the closer until and after the same is fully opened. By this means ample power is obtained for raising the weight 124, which, on the unlocking of said latch 86 by the rising of the hopper P, operates to promptly shut the said closer.

The guard 36, in addition to the function of preventing leakage as above mentioned, acts in conjunction with the opened closer, as clearly shown in Fig. 2, to control the direction of the outflow of grain into the regulator-hopper, and also increases the accumulation of grain against the closer.

As in the patent referred to, the reducing-valve 60 is furnished with arms, 62 and 64, one at either end of the valve-blade, which arms are constructed for pivotally supporting said blade, being pivoted at their upper ends as shown at 61—61, in bosses or projections upon the framework. One of the arms of said reducing-valve is provided with a reducing-cam, 69, set on a radius crosswise to the valve-axis, which cam is joined to the valve-arm by an out-reaching arm, 67. By means of this construction, provision is made for operating the valve from a beam-arm, 71, secured to, or formed upon, the arm 19 of the beam, designated in a general way by B, which beam-arm extends across the line of the valve-axis beyond the valve-blade 60, as shown in Fig. 2 of the drawings. In this form, the valve, together with its said arms and cam, may be an integral structure, thus providing for the operation of the valve without transmitting strains to joints, and also securing efficiency at low cost of manufacture. A suitable stop, 66, is provided near the lower end of the arms 62—64, which abut against projections upon the frame and limit the closing movement of the valve.

The valve 60, which, as before stated, is furnished with a valve-lever, 69, is operated by the rise and fall of the bucket G, through the medium of the beam and the arm 71. This arm will, in practice, be provided with a weight as shown in the drawings, which weight may be either attached thereto, or be formed integral with the cam, or valve-lever, 69.

The cut-off valve 70 is a concaved valve-blade, and is carried by the arms thereof, 72—74, which rise from either side of said blade and are pivoted, at 73—73, to the sides of the supply-chute H. The arm 72 extends above said pivot and has formed thereon the cut-off-valve cam 68; which arm, continuing upward as shown at 72′, is provided with a suitable weight, as 90. The preferred construction, utility, and mode of operation of the cam 68 are matters fully set forth in United States Letters Patent No. 442,724, granted to C. H. Cooley and F. H. Richards, December 16, 1890, to which reference may be had. The actuator for the cam, in this present invention, however, instead of being connected with the regulator as set forth in the patent referred to, is connected directly to the scale-beam. It will be observed that the cam 68 has three faces, 6, 7 and 14. The part 6 of the cam-face is acted upon during the closing of the reducing-valve. The part 7 is used during the poising-period and is substantially coincident with the poising-movement of the beam, and the part 14 is used to cut off the drip and to effect the discharge of the bucket-load of grain. This cam 68 (similar to the cam 69 of the reducing-valve) is set beyond the edge of the valve, as shown most clearly in Figs. 2 and 4, it being carried by the out-reaching part 76 of the arm 72 of the cut-off valve.

The construction and arrangement of the cut-off-valve-actuating mechanism differs materially in my present invention from that shown and described in the Patent No. 442,719 hereinbefore referred to, in that the actuator-arm 54 pivoted to the beam-arm 19, the connecting-rod 84, and the link 97 pivoted to an arm formed on the scale-beam, as shown there-

in, are dispensed with. The actuating-device, in the present instance, as herein shown, consists simply of a roller, 55, pivoted, at 56, directly to the arm 19 of the beam, and acts directly upon the cam 68 to elevate said cam and open the cut-off valve 70 as the bucket G rises, holding the same in this position (the reducing-cam 60 being opened by the beam-arm 71 as hereinbefore described) until the bucket G is filled and descends, when the actuator 55 travels from the position shown in Figs. 2 and 4 to the position shown in Figs. 5 and 6, which allows the upwardly-projecting weighted arm 72′ of the cut-off valve to fall from the position shown in Fig. 2 to that shown in Fig. 6, carrying said valve 70 to the closed position shown in said Fig. 6, the cut-off valve 60 being at the same time closed, or thrown into the position shown in Fig. 6, by means of the actuator-arm 69, as hereinbefore set forth.

Both of the valves 60 and 70 which constitute the main-valve-mechanism for reducing and cutting off the flow of grain to the bucket, are directly actuated by and from the scale-beam, through the action of the grain-bucket G.

The arm 72′ of the cut-off valve 70 serves two separate purposes, especially in its weighted form shown in the drawings; to wit: first, as a valve-arm; and second, as a beam-actuating arm for transferring its own effect and the effect of the weight 90 onto the beam at the completion of the poising. The downward movement of the beam comprises three periods: first, of the reduction of the column; second, of the poising of the scale-beam; and third, the discharge of the load. The first period begins and ends with the closing movement of the reducing-valve. The second begins when the arm 71 of the beam leaves the arm of the reducing-valve lever and then when the cut-off valve begins to close. The third is the period of cut-off-valve closure, during which the bucket-latches are unhooked and the bucket-load begins discharging.

At the poising position, when the bucket is fully loaded, the beam is exactly balanced, so that it has no moving tendency of its own; besides, there is a small but very material resistance due to the friction of the pivot which must be overcome before any extraneous force can continue the beam-movement. At a certain point below said poising-point, the loaded bucket will more than equal in effect the counter-weight, so that the beam at this point will have a self-moving tendency and a power sufficient to continue its movement. The space intervening between said poising and self-moving points I denominate the "sub-poise period," this being that portion of its stroke wherein the loaded beam is practically non-self-moving. To furnish effective means for actuating the beam during this period, the cut-off-valve-actuator 55 is so constructed and disposed with relation to the valve-actuator cam, that at the "sub-poising" period, or when the poising period terminates, the weighted arm 72′ drops over, bearing directly and downwardly upon the actuator 55 pivoted to the beam, thus over-poising the beam to throw the same downward and discharge the load. This latter position is shown in Fig. 6, where the beam is down, the valves 60 and 70 being both closed.

It will be noticed that where the reducing-valve 60 and cut-off valve 70 are constructed and arranged, as herein shown, to be operated directly from the scale-beam, the scale-beam, when it has reached the position it occupies when the bucket G is partially elevated, will act upon and immediately open said valves, which opening operation of the valves occurs just prior to the discharging of the contents of the hopper P.

To prevent the discharge of grain from the chute H into the bucket when the valves 60 and 70 are first opened, and to cut off communication between the hopper and bucket until the beam has been fully elevated and the bucket-outlet closed by the closer 75, and until the hopper has discharged its contents and resumed its normal or elevated position, I have provided a supplemental cut-off valve, designated in a general way by R, to be operated automatically to cut off communication between the chute and bucket while the hopper is discharging its load; and have provided mechanism, in connection with the hopper P and supplemental valve, to automatically open said supplemental valve upon the return movement of the hopper after discharging its load. This supplemental cut-off valve consists of a curved plate having arms, 250—250, one at its either end, which arms are pivoted at their upper ends, by means of the pivots 73—73, to the frame of the chute H. These pivots also form the pivot-bearings for the cut-off valve 70. As shown in the drawings, the side-plates or arms, 250, of the supplemental valve R will preferably be in the form of a quadrant section, and will have two radially-disposed projections, 251—252, either formed thereon or secured thereto, the one 251 acting as a catch to be engaged by a detent-catch, 253, at the lower end of the detent-latch or pawl 254, pivoted at its upper end to the rearward projection, 255, of the arm 72 of the cut-off valve 70. Secured to the outer face of the arm 250 of the supplemental valve, is a guide-plate, 256, between which guide-plate and arm the supplemental-valve-operating latch-lever 257 is extended and guided in its horizontal movement. The supplemental-valve-actuating lever has at its upper face, near its forward end, a detent-catch, 258, adapted, when said lever is in its most forward position, to engage with the catch 252, which is in direct vertical alignment therewith, as clearly shown in the drawings. This lever is held in normal contact with the catch 252 by means of a spiral spring, 259, secured at one end to the lever and at its opposite end to a stud, 260, secured to the side-wall of the chute. This stud also acts as a stop to limit the movement of the cut-off valve act-

uator-arm 72′, as will be seen by reference to Fig. 6 of the drawings.

The supplemental-valve-actuating lever is pivoted at its rear end, as at 261, to an upwardly-projecting arm of a bell-crank, 262; which bell-crank, as shown most clearly in Fig. 8, is pivotally supported upon a stud secured to the inner side of the standard 2. Pivoted to the opposite end of the bell-crank, as at 264, is an operating-rod, 13, which is pivoted at its lower end, at 265, to a rearwardly-projecting portion 230, upon the hopper, which projecting portion 230 also forms a stop-arm, which, in connection with abutments, 231 and 232, formed upon the inner side of the upright 4 of the framework, limits the oscillating movement of the hopper, as will be hereinafter more fully described.

Referring to the latch 254, the function of which is to engage the projection 253 upon the arm of the supplemental valve when this is thrown open by means of the operating-lever 257, and hold the same in a retracted or open position: said latch has at its upper end a rearwardly-projecting arm, 254′, adapted to engage a pin, 266, upon the side-wall of the chute when the rearwardly-projecting portion, 255, of the cut-off valve 72 is depressed to the position shown in Fig. 5, which releases the catch 253 at the lower end of said latch from the catch 251 upon the supplemental valve, allowing the valve to fall by its own gravity and assume the position shown in Fig. 6, the supplemental-valve-blade in this position underlying the valve-blades of the reducing and cut-off valves, and extending across the entire width of the mouth of the chute. The latch is retracted, after being disengaged from the pin 266, by means of the spring 267. A stop-pin, 268, secured to the rearward projection, 255, of the cut-off valve 70 limits the retractive movement of the latch 254; and a pin, 269, secured to the side-wall of the chute in advance of the supplemental valve, limits the forward movement of said valve, as will be clearly understood by reference to Figs. 5 and 6 of the drawings. By this construction and arrangement of the supplemental valve and locking-device therefor, it will be seen that upon the backward movement of the supplemental-valve-actuating lever 257 from the extreme forward position shown in Fig. 7, the detent-catch engages the catch or projection 252 of said valve, retracting said valve to the position shown in Fig. 4, bringing the catch 251 into engagement with the spring-actuated latch 254, which latch retains the supplemental valve in this position until, during the descent of the arm 72′ of the cam 70, the projecting arm 254′ of the latch contacts with the pin, throwing the lower end of said latch out of engagement with the catch upon the supplemental valve, allowing the same to drop into a closed position, as shown in Fig. 6, which position it retains until after the reducing-valve 60 and cut-off valve 70 are opened by the elevation of the bucket G, and until after the hopper P has discharged its contents, when the actuating-lever, which at this time is in its extreme forward position, with its detent-catch in engagement with the catch upon the supplemental valve, is drawn backward, as the hopper returns to its elevated or normal position, through the medium of the operating-rod 13 and bell-crank 262, which throws open the supplemental valve, allowing the grain to run from the chute into the bucket G.

The hopper P is pivoted, at 98 and 99, to the framework, and has an arm, 10, fixed thereto at its rear end, provided with the usual counter-weight 11 of sufficient weight to actuate the rod 13 and open the supplemental valve R when the hopper is empty of grain.

It will, of course, be understood that the oscillating movement of the hopper P is to be limited by some suitable stop-device, as, for instance, those shown in Figs. 1 and 2. In the preferred arrangement thereof shown in said figures, the stop-arm 230 is fixed to, or formed on, the hopper at the rear end thereof, and lies intermediate to suitable stops, or abutments, 231—232, formed upon the inner side of the upright 4 of the frame.

For counterbalancing the bucket-mechanism and its load of grain, I employ the improved weight described and claimed in Patent No. 442,860, granted to C. H. Cooley and F. H. Richards, to which reference may be had. The main weight is designated in a general way by W, and is suspended from the scale-beam by a rod, 32, on which the said weight is freely fitted. The circular cover 104 and the cylindrical cover 105 are or may be the same as the corresponding parts similarly designated in said prior application; but these several details are not essential to my present invention. The suspension-rod 32 is provided with the hook 29, that is fitted with a V-shaped bearing, 31, (similar to the bearings at the upper ends of the hangers 16 and 18,) which is secured thereto by a screw, 30. The said bearing rests on the knife-edge, 27, of the scale-beam B, and thus supports said main weight during the upward movement of the beam-arm 28. For supporting said weight when the same is down, a suitable shelf or bracket, as 108, is provided on the framework, and improved devices are also provided, operating in connection with said bracket, for limiting the ascending and descending movements of said weight and of the scale-beam and the grain-bucket.

It will be understood that 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 the movement of the bucket itself.

The bracket 108 is formed on or secured to the framework, and has formed therein the slot or opening 120, through which passes the rod 32 and the sleeve 121 on said rod. Said sleeve is fixed to the lower end of the rod 32 by means of a key, 119, which is let into a slot

extending across both the sleeve and rod, as shown in section in Fig. 2. On the upper end of said sleeve (which is held in place at its lower end by screws, 12) there is formed a flange or collar, 122, on which rests the weight W, and on the lower end there is formed a flange, 123, that is constructed, substantially as shown in the drawings, so that the grain cannot lodge thereon and thereby interrupt the operation of the machine. The flanges 122 and 123 limit the downward and upward movements, respectively, of the weight W, by their contact with the upper and lower ribs, 42 and 44, respectively, on the said bracket 108, contiguous to the said slot 120. The flange 123 has a narrow external rim formed in short sections, 8, which are separated by the inclined surfaces 9, as shown in Figs. 2, 3, and 5. The rim-sections 8 being so narrow, the grain does not readily lie thereon; and the ribs 44 being also narrow, any grain on the flange 123 is discharged with great certainty when this flange rises against said ribs. It has been found experimentally that this improvement is very reliable and effective for its intended purpose, so that any wheat or corn thrown accidentally or designedly onto the flange quickly runs off or is dislodged, and does not obstruct the machine. It has also been found that with a plain collar instead of said specially-constructed flange, the machines in commercial work are subjected to frequent stoppages from said cause; for it will be remembered that any grain between the said flange and its stop-surfaces would reduce the descending movement of the scale-beam and the bucket, so that the cam 68 could not act properly upon the beam to accelerate the downward movement thereof, and so that the stop 88 could not unhook the latches 82 for discharging the load.

The manner of connecting the sleeve 121 to rod 32 has an important utility, in that it provides for the necessary assembling and disassembling of the parts without giving any opportunity for misadjusting them; so that when the machine is once properly constructed, it may be sent disassembled to distant places and be properly put together by unskilled workmen, without danger of vitiating the accuracy of the machine by improper adjustment.

The general operation of this improved grain-weigher may be described as follows: When the bucket G is receiving the first part of the load of grain, (the hopper P being elevated as shown in Fig. 2,) the beam is up, the cut-off valve, reducing-valve, and supplemental valve are all three open, and the closer 75 is closed, being locked by means of the latch 82. The three valves being open, the grain flows freely and rapidly from the outlet 65 of the supply-chute H into the bucket. When the major part of a load of grain has been deposited in the bucket, the beam descends to the poising-point, as shown in Fig. 5. This descent of the beam allows the reducing-valve 60 to close, thereby reducing the flow of grain to the bucket to a drip. On the full load being made up by the drip, the beam further descends and the cut-off valve 70 is closed, the weighted arm of said cut-off valve, as hereinbefore set forth, assisting the downward movement of the scale-beam past its subpoise. On the descent of the beam below the poising-point, the latch 82 strikes the pin 88, thus unlocking the bucket-closer, which is then opened by the weight of the grain in the bucket and locked in an open position, as hereinbefore described. When the bucket has reached the position just described, or just before the scale-beam is in the lowermost position, as shown in Fig. 5, the latch 254 strikes the pin 266 and is released from engagement with the supplemental valve R, which supplemental valve is allowed to descend to the closed position shown in Fig. 6. The closer being opened as just stated, the grain is discharged from the bucket into the hopper P. The discharge-spout, 34, of the bucket, has an emptying capacity a little in excess of the continuously-open outlet of the hopper, so that the accumulation of grain therein at once lowers said hopper and operates the push-rod 13 upward, and through the medium of the bell-crank 262 throws the supplemental-valve-actuating lever forward with its detent-catch into engagement with the catch upon the supplemental valve and in position to draw back and open said valve upon the reverse movement of said hopper and operating-rod. The construction and arrangement of valve-mechanism permits the beam to rise a portion of its distance without opening the valve and before the load has been fully discharged from the bucket. The scale-beam, during the major portion of its upward movement, or upon the rising of the bucket, acts upon and opens the reducing-valve 60 and cut-off valve 70, as shown in Fig. 7, leaving the supplemental valve in its closed position shown in said figure, until the hopper P discharges its contents and closure 75 is closed. When the major portion of the grain discharged into the hopper has passed out therefrom, said hopper gradually rises, which movement of the hopper operates to draw down the rod 13, so that the pin 92 upon said rod 13 strikes the arm 94 of the latch 86, thereby disengaging said latch from the arm of the closer and allowing said closer to be closed by means of the weight 124 attached thereto, said closer being immediately locked closed by the latch 82, as shown in said Fig. 2. On the further discharge of the grain from the hopper, the outlet to the bucket being closed, and the bucket being in position to receive grain, the hopper rises with greater force, and operates through the rod 13, bell-crank 262 and supplemental-valve-operating rod 257, to throw open the supplemental valve R, which is automatically held in an open position by means of the latch 254, as before described, until the descent of the scale-beam. This opening of

the valve allows the grain to flow freely into the grain-bucket, and the above-described operations are repeated.

Having thus described my invention, I claim—

1. In an automatic scale of the class specified, the combination with the supply-chute, a bucket located below said chute, a scale-beam carrying said bucket, and with the hopper located below said bucket, of one or more chute-closing valves movable underneath said chute and operable by the scale-beam, a supplemental valve movable below said chute-closing valve or valves and adapted for being closed by its own gravity, means in connection with the hopper for engaging and operating the supplemental valve to open the same, and means for disengaging the supplemental valve from its operating devices to allow the same to close, substantially as described and for the purpose set forth.

2. In a grain-weigher, the combination with the supply-chute, the scale-beam, and one or more chute-closing valves operable by said scale-beam, of a supplemental valve constructed to extend below the said valve or valves and having catches thereon, a horizontally-recipocating supplemental-valve-actuating lever having a detent-catch adapted, during its rearward movement, for engagement with the catch upon said valve to open said valve, a latch adapted for engagement with and supporting the supplemental valve in an open position, means for disengaging said latch during the downward movement of the scale-beam, and mechanism, substantially as described, for actuating said supplemental-valve lever, substantially as and for the purpose set forth.

3. In a grain-weigher, the combination with the counter-weighted scale-beam carrying the bucket, of the reducing and cut-off valves operated directly from said scale-beam, substantially as described, an independently movable supplemental gravity-valve having remotely-disposed catches thereon, a spring-actuated latch located in position to engage one of the catches upon and support the supplemental valve in an open position, means for disengaging said latch during the descent of the scale-beam to allow the said valve to automatically close, and supplemental-valve-actuating mechanism consisting of a spring-supported actuating-lever having a detent-catch to engage the catch upon the supplemental valve and open the valve during the backward movement of said lever, a bell-crank pivoted in the frame of the machine and at one end to the valve-actuating lever, and a rod pivoted at its upper end to the opposite end of said bell-crank, and at its lower end to the counter-weighted hopper of the machine, substantially as described and for the purpose set forth.

4. In a grain-weigher, the combination with the scale-beam, and with the reducing-valve having a cam operable by means of an arm secured directly to the forward end of said scale-beam, of the cut-off valve having the upwardly-extended weighted-arm with the cam 76 thereon, an actuator consisting of a roller pivotally supported upon the beam in position to engage the cam to actuate said cut-off valve, and a supplemental valve pivotally supported concentric to said cut-off valve, a latch pivotally supported upon an extension of the side-arm of the cut-off valve and having a detent-catch in position to engage a catch upon the supplemental valve when said valve is in an open position, means for automatically releasing said latch, a hopper, and mechanism, substantially as described, connected with, and operable by, said hopper to open said supplemental valve, substantially as described and for the purpose set forth.

5. In a grain-weigher, the combination with the supply-chute and with the counter-weighted scale-beam carrying the bucket, of the reducing-valve pivoted to said chute and having the cam 69, the beam-arm 71 secured to the beam at one end and in position to act upon the cam 69 to open and close said valve, the cut-off valve pivoted to said chute and having the upwardly-extending weighted actuating-arm 72′ and cam 76, a roller pivotally supported upon the actuator-arm in position to act upon said cam to open the cut-off valve and regulate its closing movement, and an independently-operable supplemental valve pivoted above and intermediate to the ends of the reducing and cut-off valves, a counter-weighted hopper, and mechanism, substantially as described, in connection therewith to open said supplemental valve upon the ascent of the hopper, and latch-mechanism located intermediate to the supplemental valve and actuating-arm of the cut-off valve and adapted for engaging and supporting said supplemental valve in an open position, and means for automatically releasing said latch upon the descent of the bucket, substantially as and for the purpose described.

6. In a grain-weigher, the combination with the frame of the machine, the counter-weighted scale-beam, and the vertically-reciprocating bucket provided with the latch 82 having a catch, 81, of the counter-weighted bucket-closer 75 held in a closed position by said latch, and a cranked stop-pin journaled in the frame in position to be engaged by the end of the latch 82 to unlock the closer, and means for shifting said pin from an operative to an inoperative position, substantially as described and for the purpose set forth.

7. In a grain-weigher, the combination with the frame, the rising and falling bucket-mechanism and the vertically-reciprocating bucket, of the counter-weighted closer 75, the pivoted latch 82 having a catch to engage and lock the closer in its closed position, the cranked stop-pin journaled in the frame in position to unlock the latch 82 from the closer, a crank-arm secured to the end of said crank-pin outside the frame and adapted

for shifting said crank-pin from an operative to an inoperative position, and having a detent-catch thereon to engage alternately in notches in the frame located above and below the axis of the crank-pin, and a pivoted latch, 86, having a weighted catch-end to engage and lock the closer in its open position, and means for disengaging said latch, substantially as and for the purpose described.

8. In an automatic scale of the class specified, the combination with the supply-chute and scale-beam, of one or more chute-closing valves movable underneath the chute and operable by the scale-beam, the bucket carried by the scale-beam and provided with means for closing and opening the discharge-outlet thereof, a vertically-movable hopper in position below the bucket to receive the load discharged therefrom, means for normally elevating the hopper, a supplemental valve movable below said chute-closing valve or valves, and valve-actuating connections intermediate to said hopper and supplemental valve and adapted for retracting and locking-open said valve on the upward movement of the hopper, and means for unlocking the supplemental valve on the downward movement of the bucket, substantially as described.

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Witnesses:
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