

(No Model.)

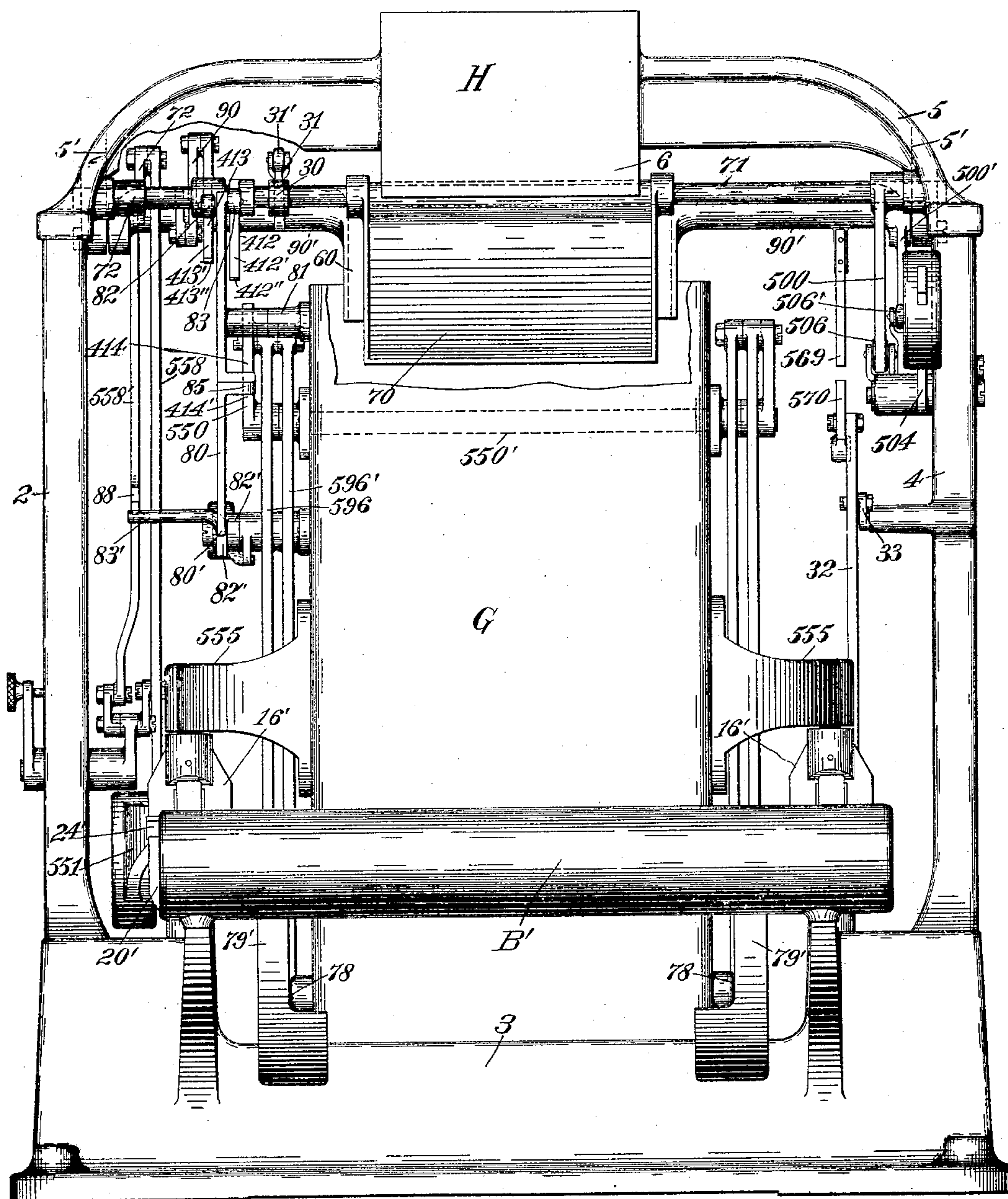
7 Sheets—Sheet 1.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 559,751.

Patented May 5, 1896.

Fig.1.



Witnesses:
Chas. D. King.
Fred. J. Dole.

Inventor:
F. A. Richards.

(No Model.)

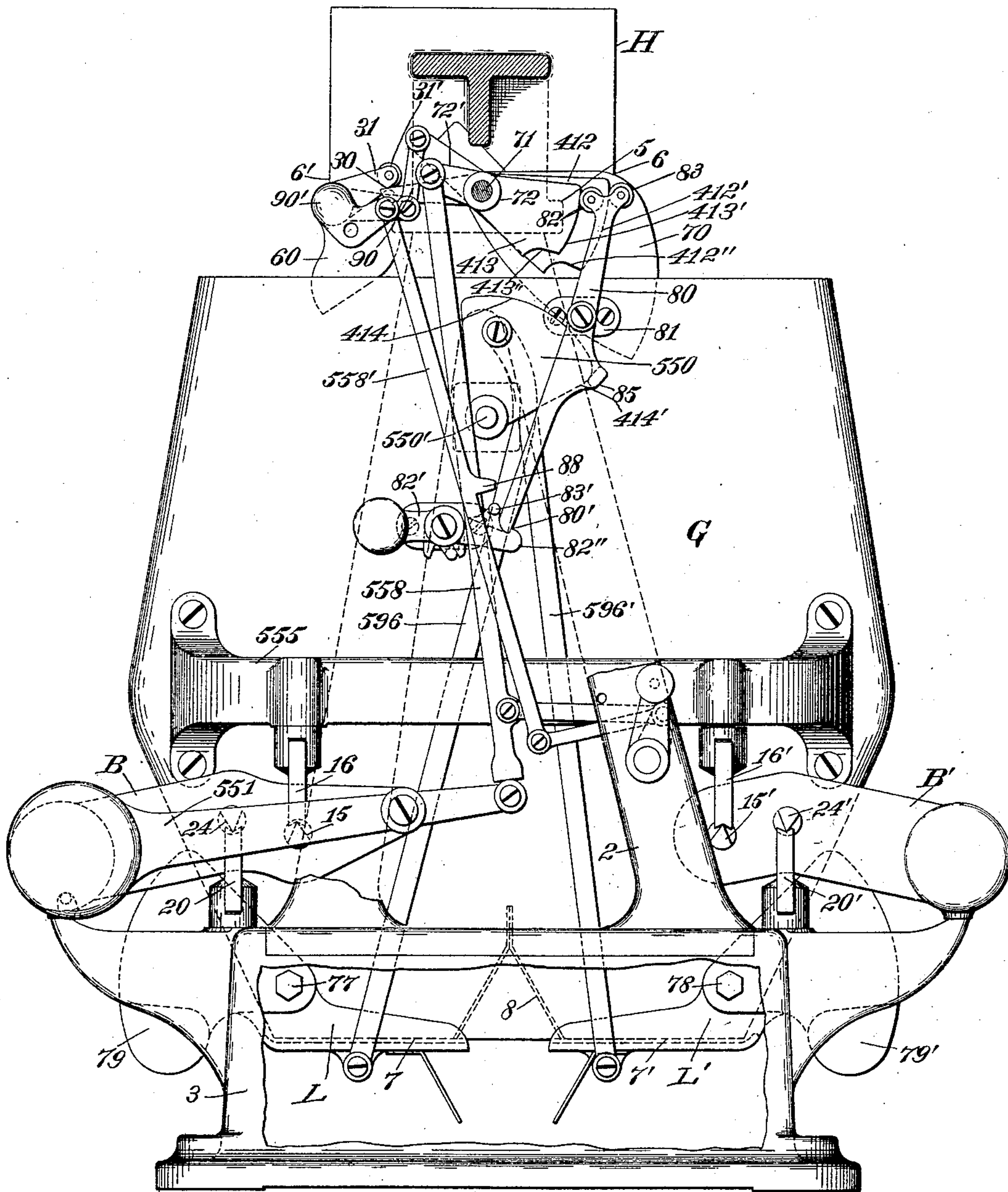
7 Sheets—Sheet 2.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 559,751.

Patented May 5, 1896.

Fig. 2.



Witnesses:
Chas. W. King.
Fred. J. Dole.

Inventor:
F. H. Richards.

(No Model.)

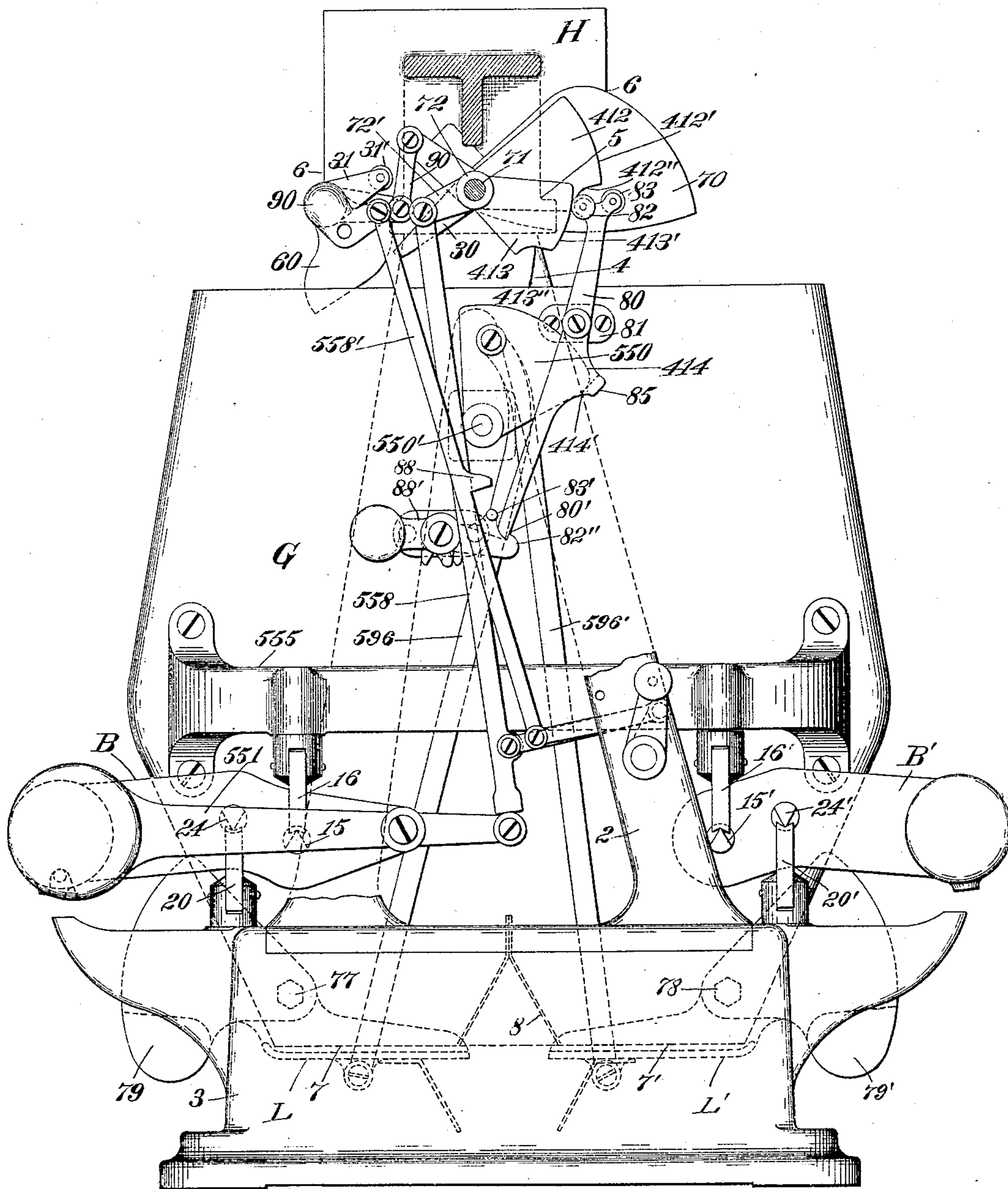
7 Sheets—Sheet 3.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 559,751.

Patented May 5, 1896.

Fig. 3.



Witnesses:
Chas. W. King.
Fred. J. Gole.

Inventor:
F. H. Richards.

(No Model.)

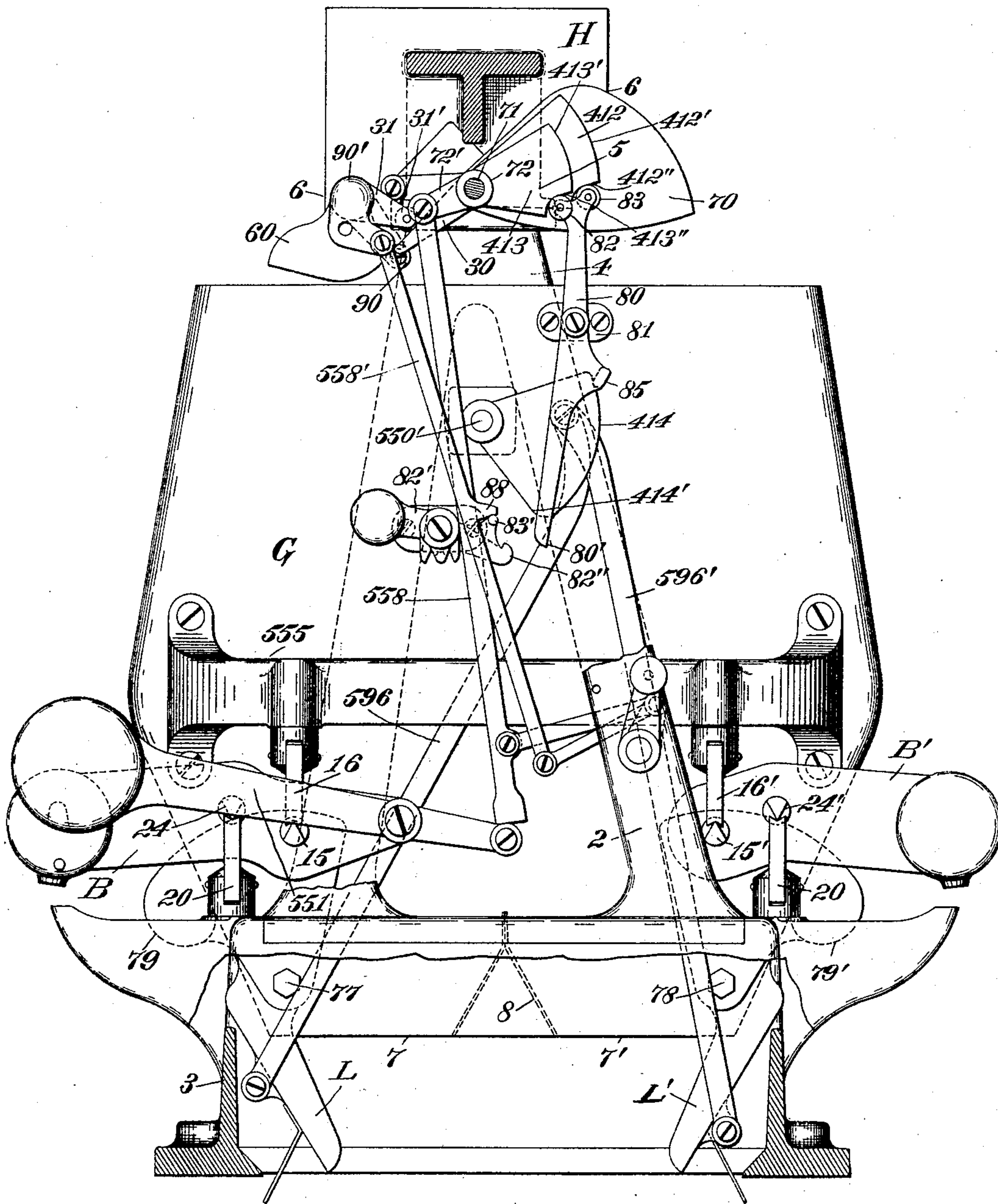
7 Sheets—Sheet 4.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 559,751.

Patented May 5, 1896.

Fig. 4.



Witnesses:
Chas. W. King.
Fred. J. Gole,

Inventor:
F. H. Richards

(No Model.)

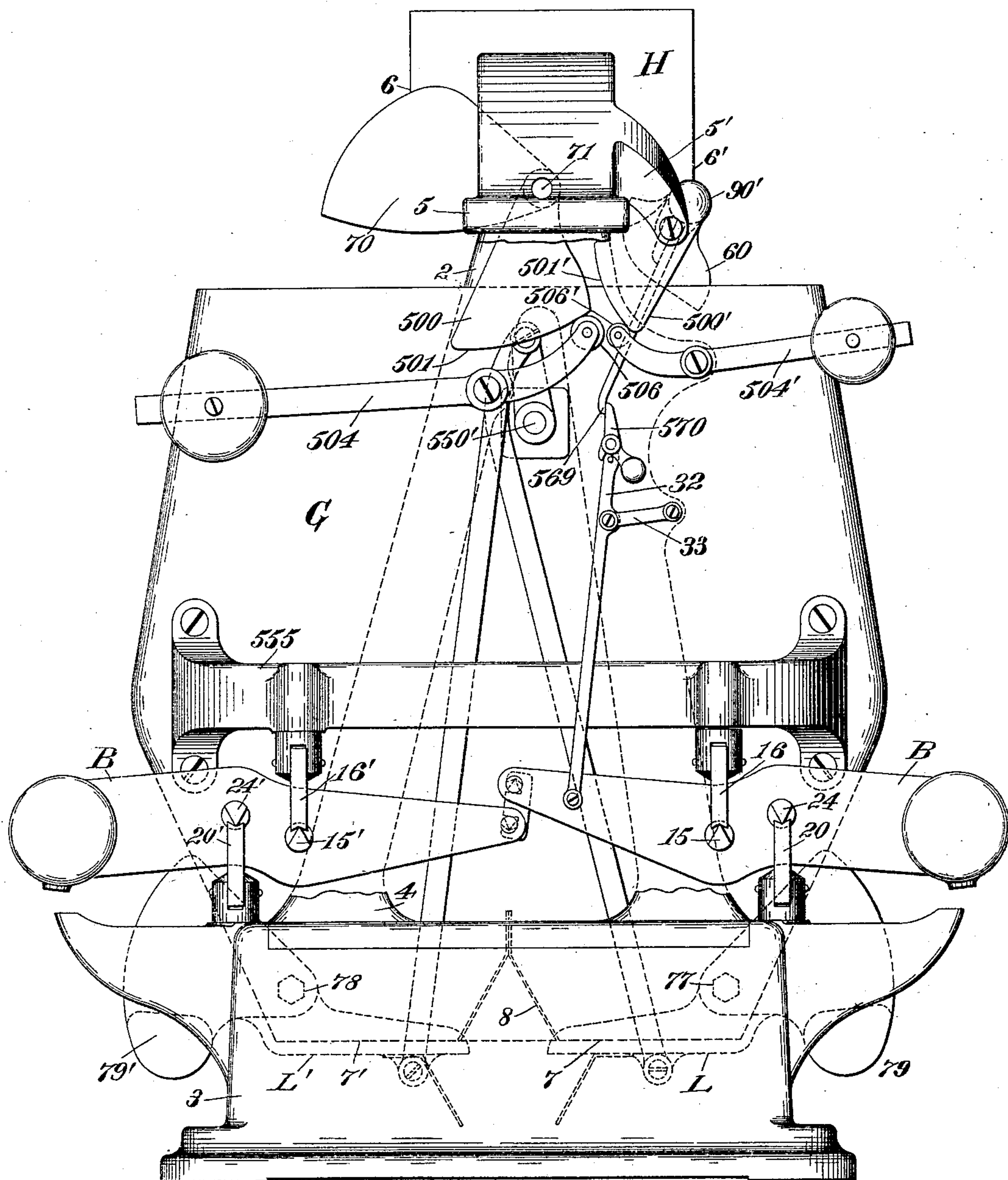
7 Sheets—Sheet 5.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 559,751.

Patented May 5, 1896.

Fig. 5.



Witnesses:
Chas. W. King.
Fred. J. Gole.

Inventor:
F. H. Richards

F. H. RICHARDS.
WEIGHING MACHINE.

No. 559,751.

Patented May 5, 1896.

Fig. 6.

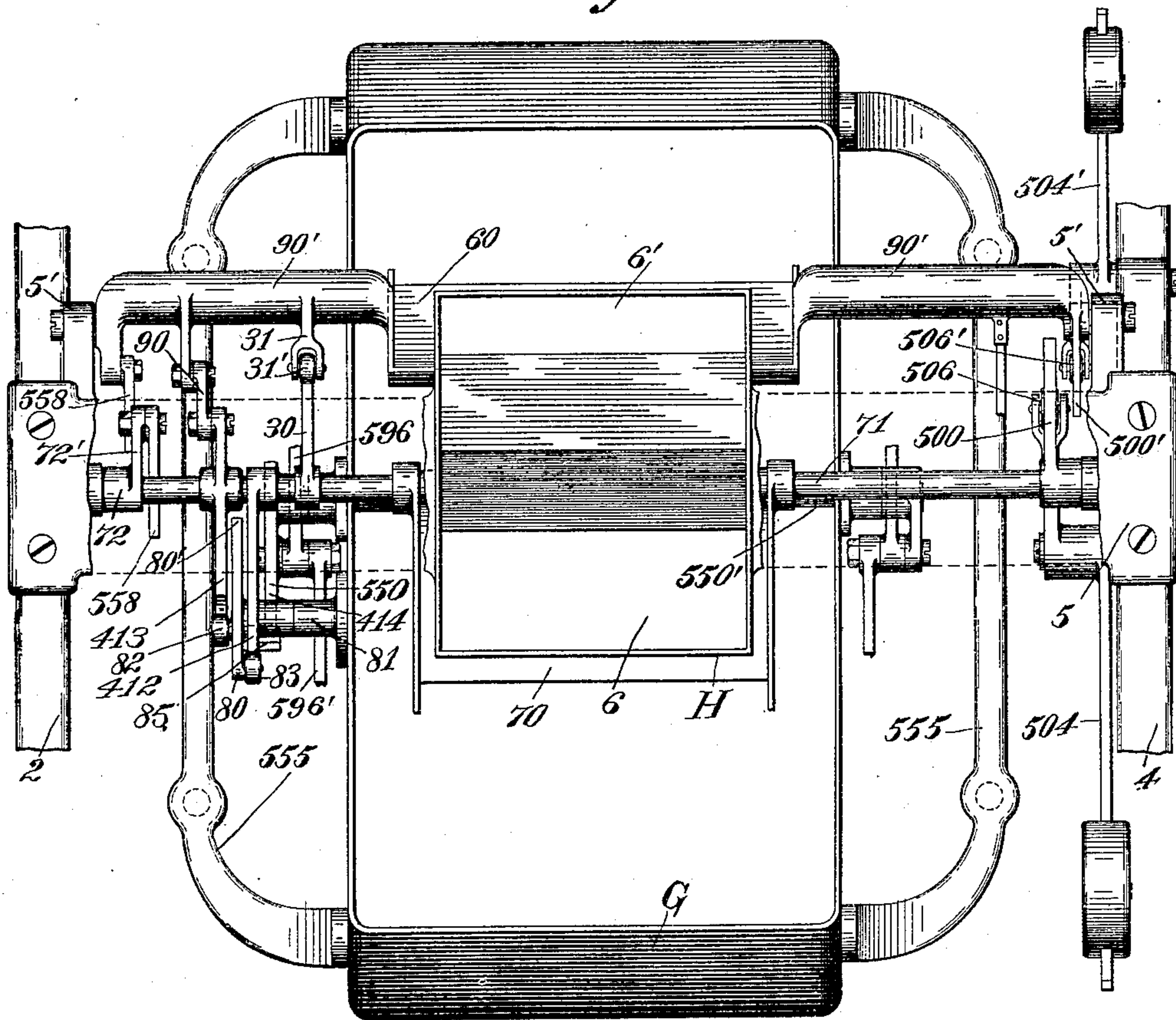


Fig. 7.

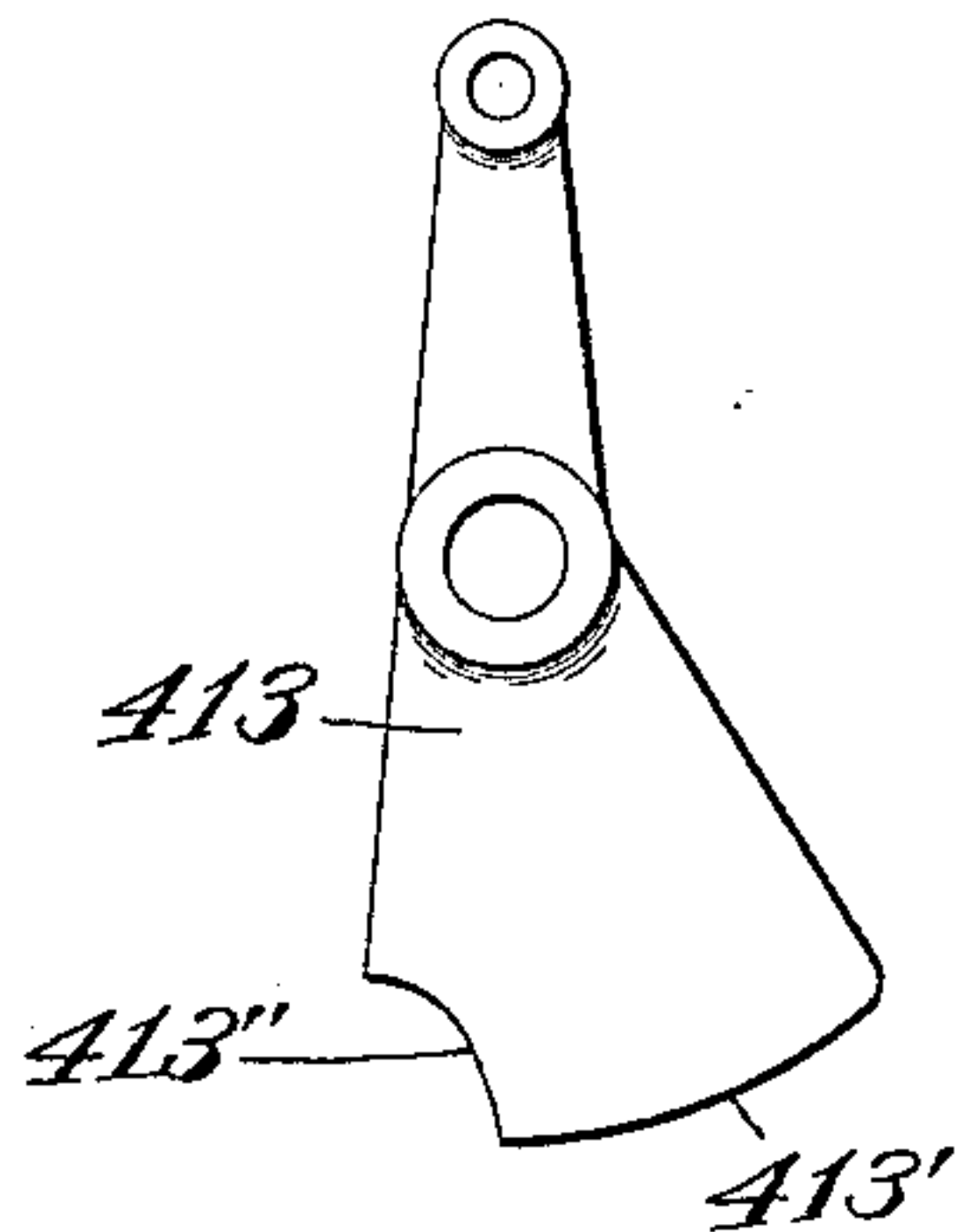
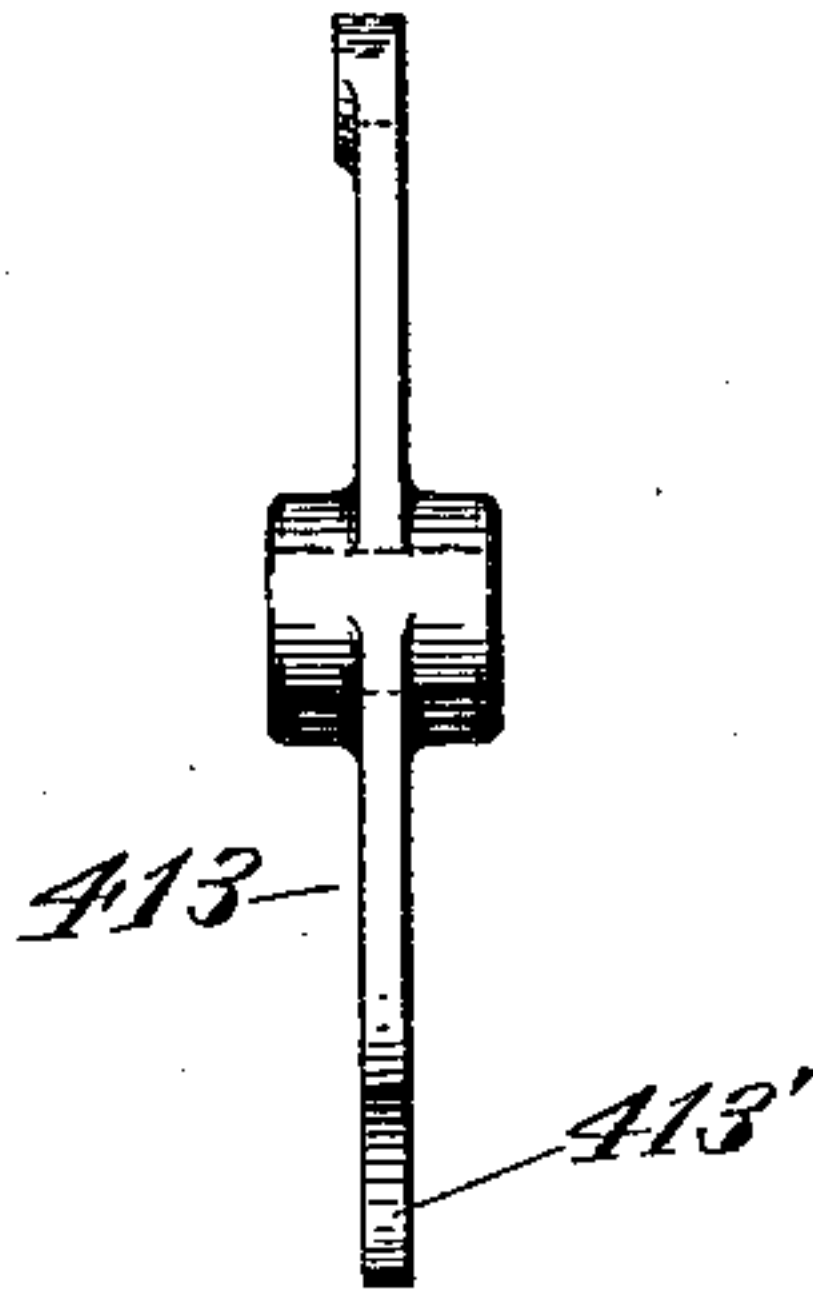


Fig. 8.



Witnesses:
Chas. W. King.
Fred. J. Gole.

Inventor:
F. H. Richards.

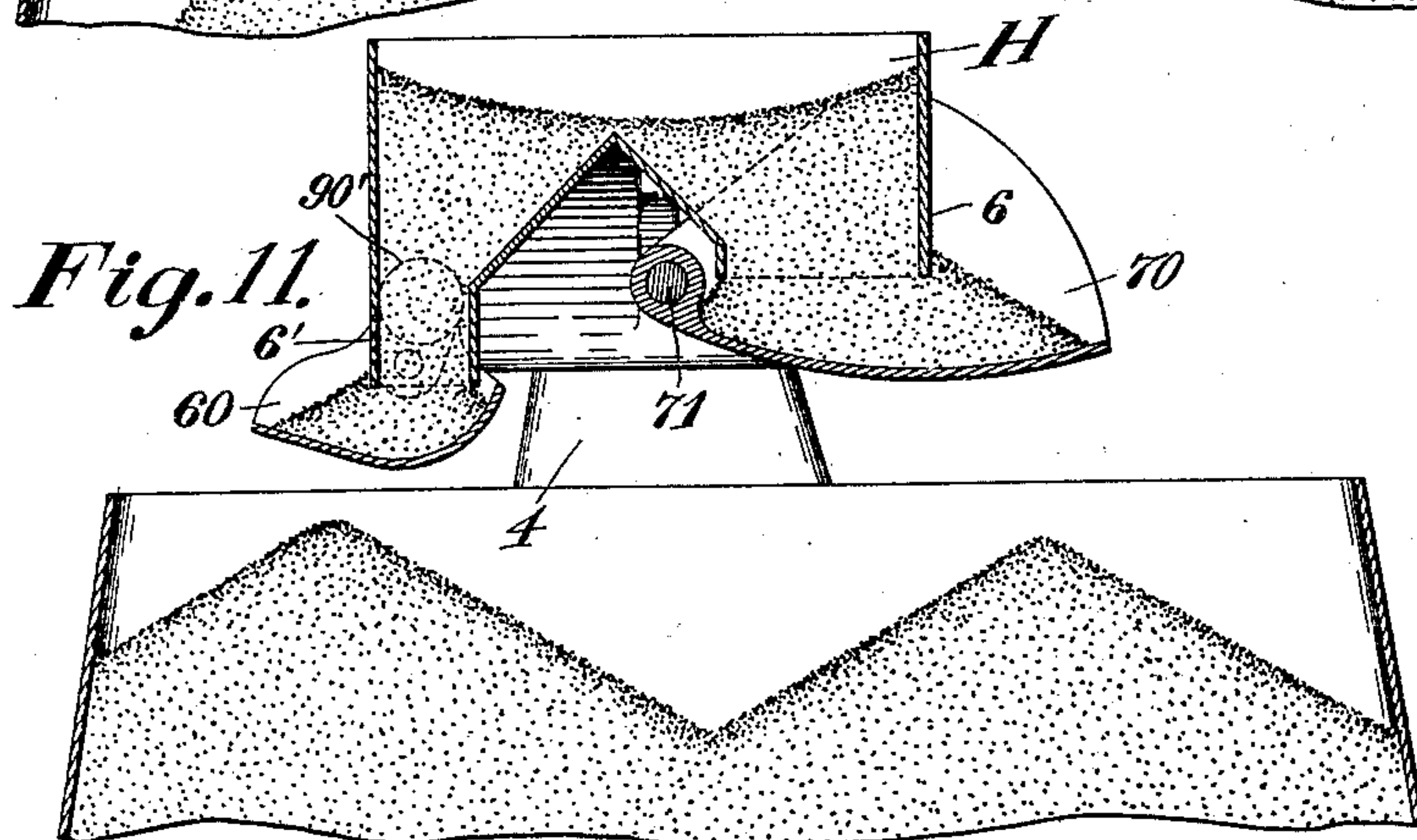
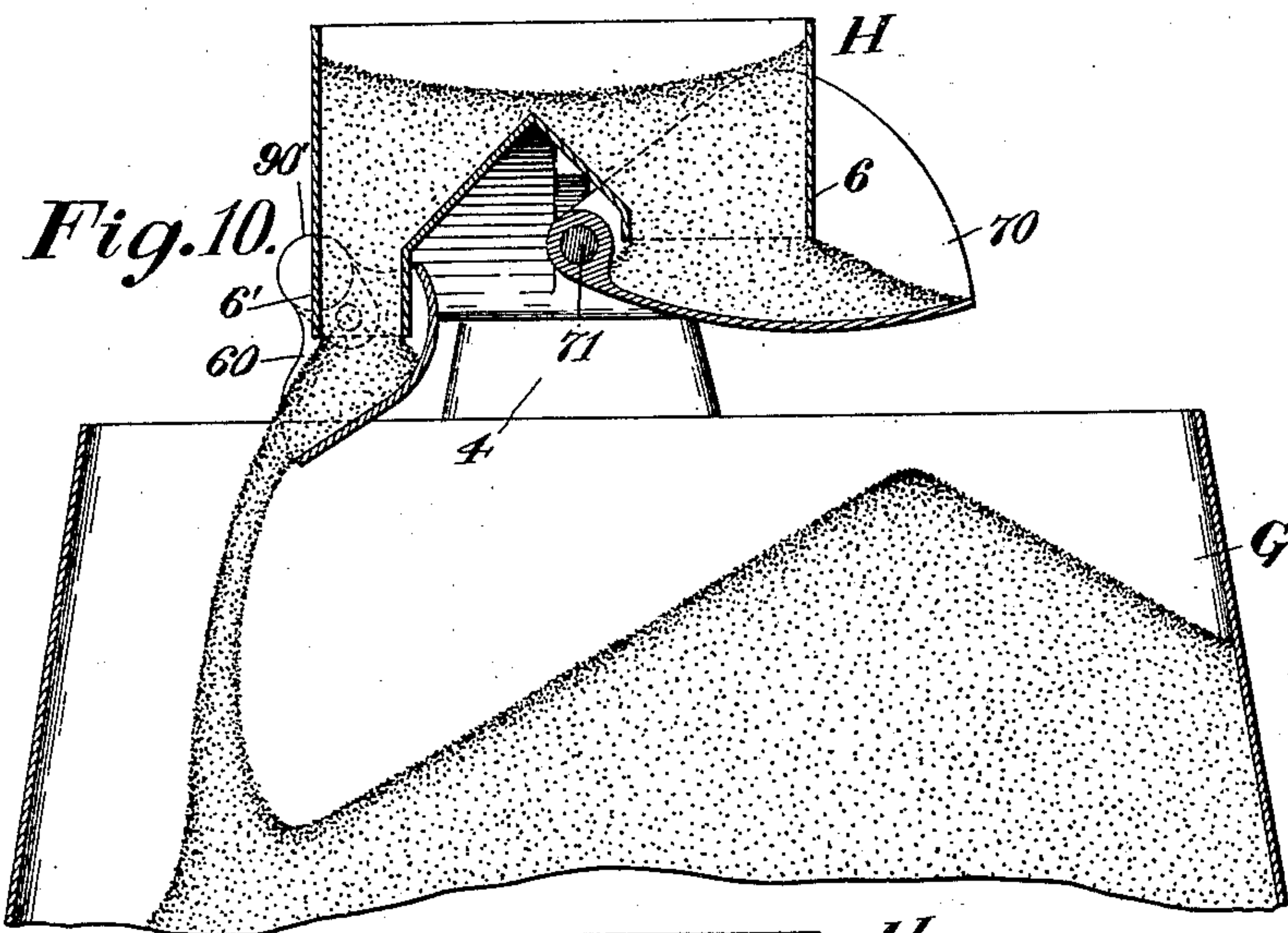
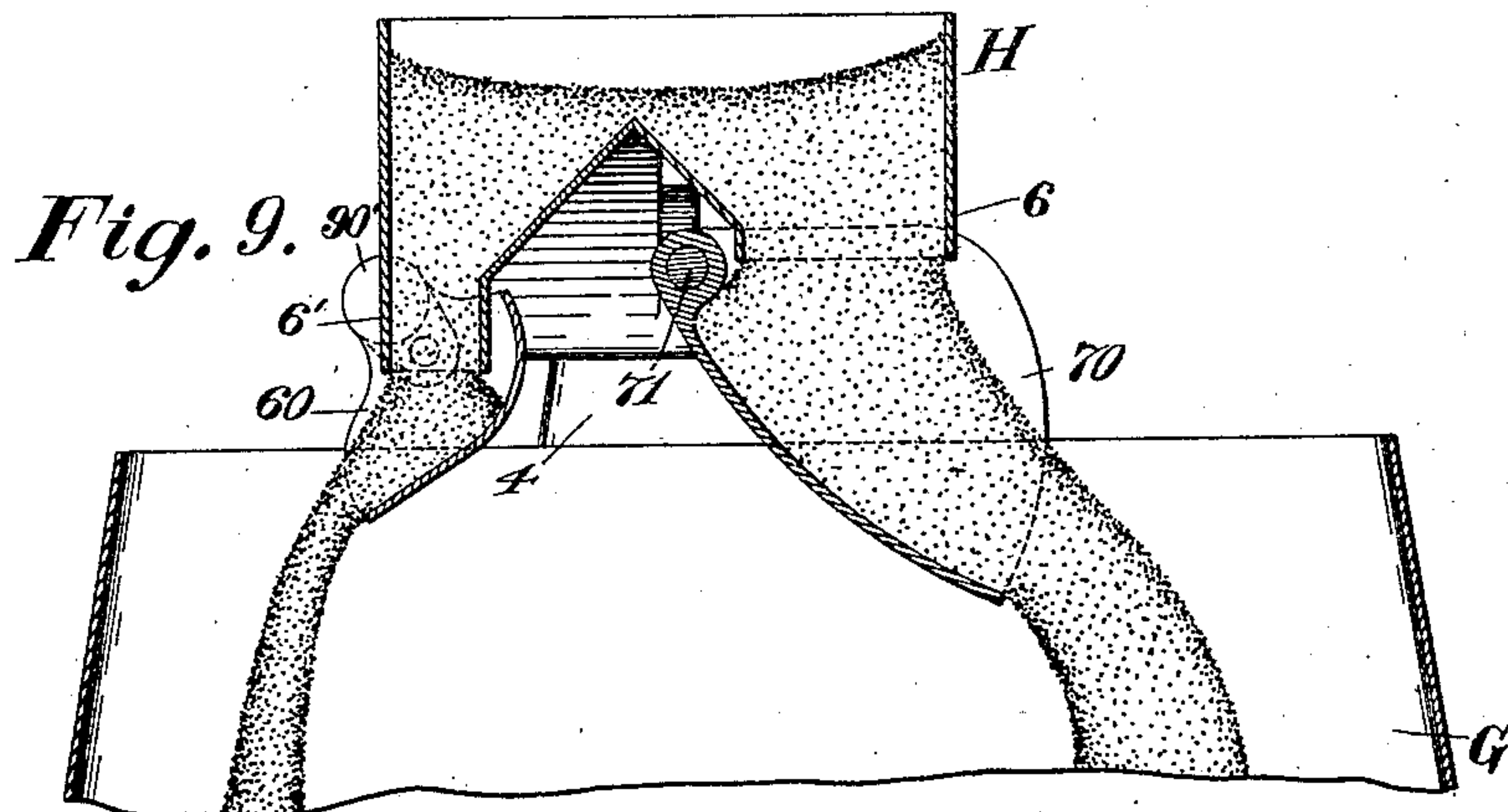
(No Model.)

7 Sheets—Sheet 7.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 559,751.

Patented May 5, 1896.



Witnesses:

Chas. D. King.
Fred. J. Dole,

Inventor:

F. H. Richards

UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 559,751, dated May 5, 1896.

Application filed March 7, 1896. Serial No. 582,220. (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 Weighing-Machines, of which the following is a specification.

This invention relates to weighing-machines.

One object of the invention is to provide improved valve mechanism embodying a pair of valves, one of which is of relatively-larger dimensions than the other, whereby the time consumed in filling a bucket is materially reduced.

A further object of the invention is the provision of an improved interlocking stop mechanism operative for preventing the opening movement of the valves while the bucket is discharging its load, and for also preventing the discharge of the bucket contents while either or both of the valves are open.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine embodying my present improvements, and it illustrates the respective positions of the various mechanisms at the commencement of a cycle of movements. Fig. 2 is an end elevation as seen from the left in Fig. 1, both valves being open and the bucket-closers closed. Figs. 3 and 4 are views similar to Fig. 2 and illustrate two successive steps in the operation of the machine. Fig. 5 is an opposite end elevation of the machine, the valves and other mechanisms being in positions corresponding with Fig. 3. Fig. 6 is a plan view of the principal parts of the machine, the top plate of the framework being broken away to better illustrate certain of said parts. Figs. 7 and 8 are detail views of a valve-operative stop. Figs. 9, 10, and 11 are central vertical sections of the supply-chute, the valves therefor, and the upper part of the bucket, and they illustrate three successive positions of the valves.

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

The framework for carrying the operative parts of the weighing-machine may be of any suitable construction, and it is shown in the drawings comprising two side frames or up-rights 2 and 4, mounted upon the chambered

supporting-base 3 and connected by a top plate 5, which latter is illustrated carrying a chute or hopper H, embodying the main and dripstream chutes 6 and 6', respectively. The base 3 is illustrated carrying the V-shaped bearings 20 and 20', which constitute beam-supports for supporting the beam mechanism which carries the bucket mechanism.

As a means for supporting the bucket, which is designated in a general way by G, the beam mechanism shown will be preferably employed, which is illustrated comprising the oppositely-disposed counterweighted scale-beams B and B', respectively, the arms of which are provided with pivots or knife-edges 24 and 24', resting on the beam-supports 20 and 20'. The beam-arms are also shown provided with a second series of knife-edges 15 and 15', which constitute bucket-supports, the hangers 555 on each end of the bucket being illustrated provided with depending V-shaped bearings 16 and 16', supported by the pivots or knife-edges 15 and 15'.

The bucket G is illustrated having the discharge-outlets 7 and 7', respectively, which are formed by the inverted-Y-shaped partition 8, which extends from the inner faces of the two end walls of the bucket. The bucket is also illustrated having two closers, the closer for the discharge-opening 7 being designated by L and that for the discharge-opening 7' being designated by L', said closers being preferably alike in construction. These closers are illustrated pivoted at 77 and 78, adjacent to the front and rear walls, respectively, of the bucket G, and having the counterweighted plates 79 and 79', which are operable for returning the same to the normal or closed positions thereof, as indicated in Figs. 2 and 3.

As a means for supporting the bucket-closers L and L', respectively, I prefer to employ the inverted toggle mechanism shown, which is illustrated comprising the pivotally-supported rocker 550 and the connecting-rods 596 and 596', respectively, said rods being pivotally connected with said rocker and with the bucket-closers L and L' in such a manner that when the bucket-closers are shut the several toggle-pivots will be approximately in line and the pivots of the two rods 596 and 596' will be above the rock-pivot 550', whereby, when said rocker is engaged and held against movement

by a suitable device, in a manner to be hereinafter described, the two closers L and L' will be supported with a minimum pressure on said device, as practically the weight of the bucket contents will be carried on the support of the rocker, which is herein illustrated as a shaft 550', extending across and through the end walls of the bucket, the opposite end of said shaft being also operatively connected with the two closers, as illustrated.

As a means for controlling the two streams of material flowing from the supply-chute II, I prefer to employ the pair of successively-closing stream-controlling valves illustrated, the main valve (designated by 70) controlling the main stream which flows from the main chute 6 and the supplemental valve (designated by 60) controlling the drip-stream which flows from the drip-stream chute 6', and it will be noticed that the main valve is of much greater dimensions than the supplemental valve.

As a means for supporting the main valve 70 a two-part shaft 71 is illustrated, the two sections or parts of which project laterally from the end walls of the valve-pan, the opposite or outer ends of said sections being journaled in suitable bearings carried by or formed on the inner faces of the side frames 2 and 4.

It will be observed that in the embodiment illustrated the valve-supporting shaft 71 is located between the two chutes 6 and 6' and that the valve is secured at its rear end to said shaft 71. It will also be obvious that when the valve is in its full-open position (see Fig. 2) a supply-outlet of relatively large space between the discharge edge of said valve 70 and the lower forward edge of the chute 6 is formed, so that when the valve is in said position the flow of a stream of very large volume is positively insured, whereby the time consumed in making up a bucket-load is reduced to a minimum, which is an important consideration in machines of very large capacities.

The supplemental valve, it will be observed, is much smaller than the main valve 70, controls a relatively-finer stream of material than the main valve, so that the bucket-loads may be made up with nicety and precision, and it is substantially similar in construction and mode of operation to the improved valve shown and described in Letters Patent No. 535,727, granted to me March 12, 1895, to which reference may be had. Said supplemental valve is shown having a balance-weight in the nature of a two-part shaft 90' projecting from the opposite end walls of said valve, said balance-weight being pivotally supported between the arms or brackets 5', depending from the top plate of the machine, and being adapted for maintaining said valve against swinging movement when closed.

As a means for actuating the valves to close the same valve-closing mechanism of the im-

proved type shown and described in Letters Patent No. 548,843, granted to me October 29, 1895, to which reference may be had, may be employed.

The main valve 70 is shown provided with the valve-closing cam 500, suitably secured to the valve-shaft 71, said cam having the cam-face 501, the peculiar function of which will now be described. A main-valve-closing lever is illustrated at 504, pivoted to the side frame 4, the rear arm of said lever being shown provided with an antifriction-roll 506, and the forward arm of said lever being counterweighted. When the main valve 70 is in its full-open position, the antifriction-roll 506 will be at a point near the lower front end of the cam 500 and in contact with the cam-face 501, and as said counterweighted arm of the lever 504 descends the rear arm of said lever will be thereby moved in an upward direction, the antifriction-roll 506 riding along the cam-face 501, and hence rocking the cam 500 to the left, whereby the valve 70 will be closed through the medium of the interposed shaft 71, to which said valve and cam are respectively connected. The closing mechanism for the supplemental valve 60 being the same in construction and mode of operation as that for the main valve, it is deemed unnecessary to describe said supplemental-valve-closing mechanism in detail. The supplemental-valve-closing cam is shown at 500', its cam-face at 501', and the valve-closing lever at 504'.

For actuating the valves to open the same the mechanism shown will be preferably employed, said mechanism embodying means for effecting the opening movement of one of said valves (herein illustrated as the supplemental valve) through the medium and by the power of the other or main valve on the opening movement of the latter.

The shaft 71 is illustrated carrying at a point adjacent to the outer end thereof the hub 72, secured thereto in some suitable manner, and hence movable therewith, said hub being provided with the rock-arm 72', to the outer end of which latter is illustrated pivotally connected the downwardly-projecting rod or depending member 558, which depending member, it will be evident, is also operative with the valve 70, and is herein illustrated as constituting part of the valve-opening mechanism—that is to say, when an upward thrust is imparted to said rod 558 the rock-arm 72', and hence the shaft 71, carrying said rock-arm, will be moved in a coinciding direction, and the valve 70 moved in an opposite direction, or opened, to cause the main stream from the spout 6 to flow into the bucket G. For effecting such upward thrust of the depending member 558 to open said valve a shiftable two-stroke member 551 is illustrated.

The weighing-machine embodies the usual poising and counterpoising mechanisms, all that part of the beam mechanism located out-

side of the beam-supports constituting the counterpoising mechanism, and all that part of the beam mechanism intermediate of said supports, including the bucket mechanism, which is supported thereby for ascending and descending movements therewith, constituting the poising mechanism.

The scale-beam B is illustrated carrying the counterpoised lever 551, which is pivotally supported on the poising side thereof, said lever normally exerting its force on the counterpoising side of said scale-beam, and suitable stops being employed for maintaining said lever in such position. This counterpoised lever is also shiftable from said normal position and onto the poising mechanism, as indicated in Fig. 4, and it is operable on its return stroke for imparting an upward thrust to the rod 558 sufficient for opening the main valve 70 through the operative connections between said rod and valve, as hereinbefore described.

The supplemental valve has been described as opened by the power of the opening main valve. A supplemental-valve-opening cam is illustrated at 30, operative with the main valve 70, it being suitably secured to the main-valve-supporting shaft 71. The supplemental valve is illustrated provided with the inwardly-projecting bifurcated rock-arm 31, between the branches of which an antifriction-roll 31' is illustrated supported. The two valves being in the closed positions indicated in Fig. 4, the main valve, on being opened by its actuator 551, will move the arm 30 in an upward direction, and said arm engaging the antifriction-roll 31' of the rock-arm 31 of the supplemental valve said last-named valve will be tilted or opened in an obvious manner to permit the flow of the drip-stream into the bucket.

The supplemental valve 60 will be normally maintained in an open position, and will be closed at a point succeeding the closure and cutoff of the main stream by the main valve 70. For thus maintaining said supplemental valve 60 in its open position a movably-supported stop (herein illustrated as a by-pass 570) is employed, being pivotally supported at the upper end of the rod or arm 32, the lower end of the latter being shown pivotally connected with the scale-beam B, a guide in the form of a connecting-link 33 (illustrated pivotally connected with said rod 32 and with the framework) being also employed for maintaining said by-pass 570 in its operative position.

The supplemental valve 60 is illustrated carrying the depending stop-arm 569, which, on the opening movement of said valve, will engage the upper or vertical arm of the by-pass, swinging said by-pass about its pivot by the force of the opening valve, the latter being thereby permitted to assume its normal or full-open position. (See Fig. 5.)

It will be evident that when the by-pass

570 has passed below or intersected the arc of movement of the valve-stop arm 569 the latter, and hence the supplemental valve 60, will be released, whereby the counterweighted lever 504' may close said supplemental valve for cutting off the drip-stream. By reason of the connection of the by-pass stop 570 with the scale-beam B the latter, as it goes below the poising-line, will draw said by-pass downward in the manner just described.

My present invention also contemplates the provision of an effective organization of stops peculiarly adapted to weighing-machines of relatively large capacities.

The bucket G is illustrated carrying the reciprocally-effective stop member 80 in the form of a bifurcated lever pivotally supported by a bracket 81, secured to the bucket near the upper edge thereof. The shaft 71 is illustrated carrying the two stop members 412 and 413, movable about a common axis, and operative, respectively, with the main and the supplemental valves, the first-mentioned member being secured to said shaft and the other movable about said shaft and operatively connected, by means of the link 90, with the supplemental valve 60. The main stop member 412 is illustrated having the connected stops or stop-faces 412' and 412'', respectively, the first mentioned of which is defined by an arc struck from the center of movement of said stop member 412, and the other of which is a curved stop-face departing therefrom. The stop member 413 is provided with a similar pair of stops or stop-faces, (designated, respectively, by 413' and 413'').

It will be remembered that a toggle mechanism embodying a rocker has been described for supporting the two bucket-closers L and L', the normal position of said rocker being indicated in Fig. 2, where the several toggle-pivots are approximately in line and the bucket-closers are shut.

The stop member 80 is illustrated constituting part of the means for engaging said rocker and for maintaining the same in its normal position. The upper arm of the stop member is illustrated as bifurcated, the branches or members of which are shown provided with the antifriction-rolls 83 and 82, which constitute stops for maintaining the successively-closing valves in the stream-cut-off positions thereof, said stops cooperating with the stop members 412 and 413. The stop member 80 at a point below the pivot thereof is illustrated provided with the laterally-projecting arm or portion 85, which also constitutes a stop, and is adapted for maintaining the two closers in the closed positions thereof, while either or both of the valves are open, by engaging the rocker 550, or a stop-face thereon, said rocker constituting a closer-operative or bucket-discharge stop, as will now be described. The stop 550 is also illustrated having the two connected stops 414

and 414', the first mentioned of which is a curved face concentric with the axis of movement of said stop.

The operation of these stops is as follows:

5 As the main valve 70 closes, the stop member 412 will move in unison therewith and in an upward direction. During this movement the roll 83 will be in contact with the curved stop-face 412' of said stop member and the
10 stop 85 in engagement with the stop 414' on the stop member 550, so that any tendency of the stop member 80 to oscillate about its pivot will be effectually resisted by the stop member 412, the roll 83 of the stop member
15 80 engaging the stop 412 so long as said parts are in contact. When the stop-face 412' and roll 83 have passed out of contact, the stop member 80 is free to oscillate, so far as the stop 412 is concerned; but, however, addi-
20 tional means in the form of the stop 413 are provided for preventing the opening movement of the two closers subsequent to the cutoff of the main stream by the main valve. During the closing movement of the main
25 valve the supplemental valve will be maintained in its full-open position to permit the flow of an undiminished drip-stream into the bucket, and when the beam mechanism has reached and passed below the poising-line (in-
30 dicating the completion of the bucket-load) the supplemental valve 60 will be released, and the lever 504' will be instantly effective for closing said valve. As the supplemental valve closes, the link 90 will be drawn down-
35 ward, and this action moves the stop member 413 in an upward direction through its connection with said link, the stop-face 413' of said stop member 413 being in contact with the roll or stop 82, so that the opening move-
40 ment of the two closers will be prevented so long as this contact continues, as in the case of the stop 412. A pivotally-supported counterweighted latch is illustrated at 82', having a detent or stop 82'', adapted for engaging a
45 coöperating stop 80' of the lever 80 when the two closers are shut, said latch being depressible for releasing the two stops 82'' and 80'. When said latch is depressed by suitable means, the stop-lever 80, it will be apparent,
50 is free to oscillate, the stops 412' and 413' at this point in the operation of the machine having passed out of contact with the two rolls 82 and 83, such action being caused by the closing of the two valves 60 and 70. At this
55 point it will be evident that the two bucket-closers L and L' are free of all restraint, and the weight of the bucket contents pressing thereagainst will force the same open for discharging the bucket-load. As the two clos-
60 ers open, the stop 550 will be drawn downward through the medium of the connecting-rods 596 and 596', and will thrust the lower arm of the stop-lever to the right, the upper arm thereof moving in an opposite direction,
65 so that the rolls 82 and 83 may be projected under the two stop members 413 and 412 and

into contact with the stop-faces 413'' and 412'', and so that any tendency of the two stops 412 and 413 to lower and permit the two valves 70 and 60 to be opened will be prevented by
70 the stop 550, with the curved face 414 of which the stop 85 of the lever 80 is in contact, this peculiar relation continuing while the two bucket-closers are in their open positions.

It will be remembered that a latch 82' has
75 been described for maintaining the lever 80 against shifting movement and that said latch is depressible for releasing the two bucket-closers. For thus effecting the release of the two closers an actuator operative with the
80 supplemental valve 60 is shown. The supplemental valve 60 is illustrated provided at a point to the rear of the pivot thereof with the depending rod 558', which carries the properly-positioned actuator 88 for engaging
85 a coöperating stop-pin 83' on the latch 82', said actuator having a descending movement away from the supplemental valve 60 during the closure thereof and engaging the pin 83' for depressing the latch at a point subsequent
90 to the cut off of the drip-stream.

The operation of the hereinbefore-described weighing-machine briefly is as follows: Fig. 2 represents the positions of the mechanisms
95 at the commencement of the operation of the machine, the two closers L and L' being locked in the closed positions thereof, and the two valves 70 and 60 open to permit the simultaneous flow of the two streams of material into the empty bucket. When a certain portion
100 of the mass has been received by the bucket, the latter and the beam mechanism descend, the shiftable member 551 descending therewith and falling from under the connecting-rod 558, permitting the closing of the main
105 valve 70 by the valve-closing lever 504. At the commencement of the poising period the main valve is closed, as illustrated in Fig. 3, but the supplemental valve 60 is in its full-open position, being so held by the stop 570,
110 which engages the stop-arm 569. The drip-stream will then flow into the bucket for a limited period of time, the bucket slowly descending, and the beam mechanism descending therewith, and when the latter has passed
115 below the poising-line the scale-beam B will pull the by-pass 570 downward and out of engagement with the supplemental-valve-stop arm 569, this action releasing the supplemental valve 60, so that the same may be instantly
120 closed by its closing-lever 504'. During the closing movement of said supplemental valve the actuator 88 will be projected downward into contact with the stop-pin 83' on the latch 82', depressing said latch and disengaging the
125 detents 82'' and 80' of the latch and stop-lever, respectively, thereby freeing the two closers L and L', so that these may be opened by the weight of the mass in the bucket, which is then discharged.

Having described my invention, I claim—

1. In a weighing-machine, the combination

with a valve, for regulating the supply of material to the bucket and with a bucket; of a stop member operative with said valve and connected thereto by a link; and a shiftable stop member adapted for engaging said first-mentioned stop member during the load-discharging period of the bucket, to thereby hold the valve closed.

2. In a weighing-machine, the combination with a bucket, and with a pair of successively-closing valves; of a bifurcated stop member adapted for maintaining said valves in the closed positions thereof during the load-discharging period of the bucket.

3. In a weighing-machine, the combination with a bucket having a closer, and with a pair of successively-closing valves; of a bifurcated stop member adapted for maintaining said valves in the closed positions thereof while the bucket-closer is open, and for also preventing the opening movement of the bucket-closer while said valves are open.

4. In a weighing-machine, the combination with a bucket having a closer, and with a pair of successively-closing valves; of a stop member operative with each of said valves, and each of said stop members having two stops; a shiftable bifurcated stop member, each of the stops of which is alternately adapted for engaging one of the stops of the valve stop members, and having also a laterally-projecting arm constituting a stop; and a stop member operatively connected with the closer, and having also two stops adapted, alternately, to be engaged by said stop-arm.

5. In a weighing-machine, the combination with a bucket having a closer, and with a pair of successively-closing valves; of a stop member operative with each of said valves, and each of said stop members having two stops; a shiftable bifurcated stop member, each of the stops of which is alternately adapted for engaging one of the stops of the valve stop members, and having also a laterally-projecting arm constituting a stop; a stop member operatively connected with the closer, and having also two stops adapted, alternately, to

be engaged by said stop-arm; and a latch for said shiftable stop member.

6. In a weighing-machine, the combination with a bucket having a closer, and with a pair of successively-closing valves; of a stop member operative with each of said valves, and each of said stop members having two stops; a shiftable bifurcated stop member, each of the stops of which are alternately adapted for engaging one of the stops of the valve stop members, and having also a laterally-projecting arm constituting a stop; a stop member operatively connected with the closer, and having also two stops adapted, alternately, to be engaged by said stop-arm; a latch for said shiftable stop member; and a depending rod carried by one of the said valves, and having thereon a projection constituting a latch-actuator for engaging and depressing said latch.

7. In a weighing-machine, the combination with a pair of successively-closing valves, one of which is supported by a shaft; of two stop members; one of which is movable about said shaft, and operative, respectively, with said valves; a bucket; and a reciprocally-effective stop member adapted for preventing the opening movement of the valves during the load-discharging period, and for also preventing the discharge movement of said bucket while the valves are open.

8. In a weighing-machine, the combination with a pair of successively-closing valves, one of which is supported by a shaft; of two stop members, one of which is movable about said shaft, and connected to one of said valves by a link, and the other of which is connected with the other valve; a bucket; and a reciprocally-effective stop member adapted for preventing the opening movement of the valves during the load-discharging period, and for also preventing the discharge movement of said bucket while the valves are open.

FRANCIS H. RICHARDS.

Witnesses:

FRED. J. DOLE,
HENRY BISSELL.