

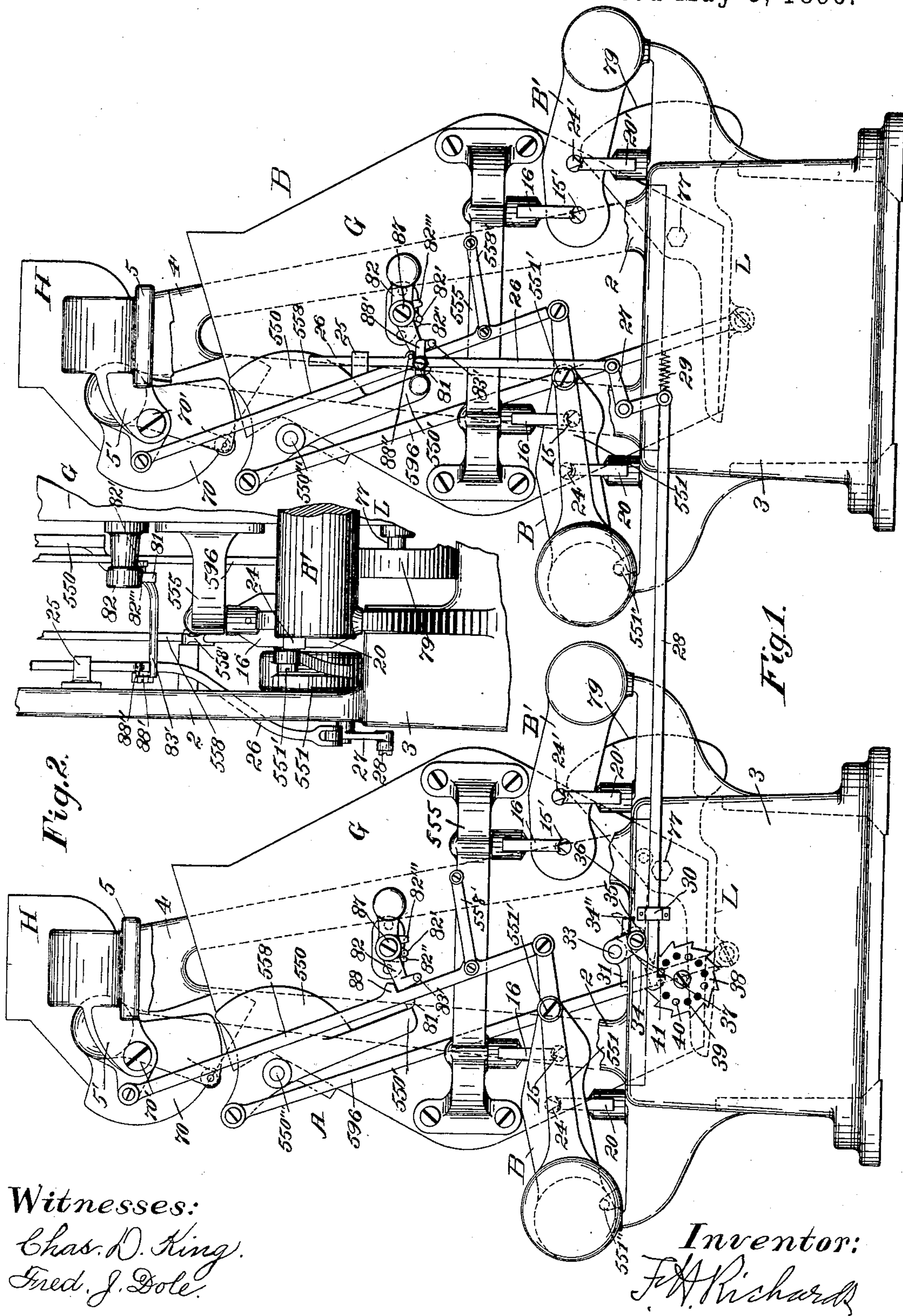
(No Model.)

3 Sheets—Sheet 1.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 559,749.

Patented May 5, 1896.



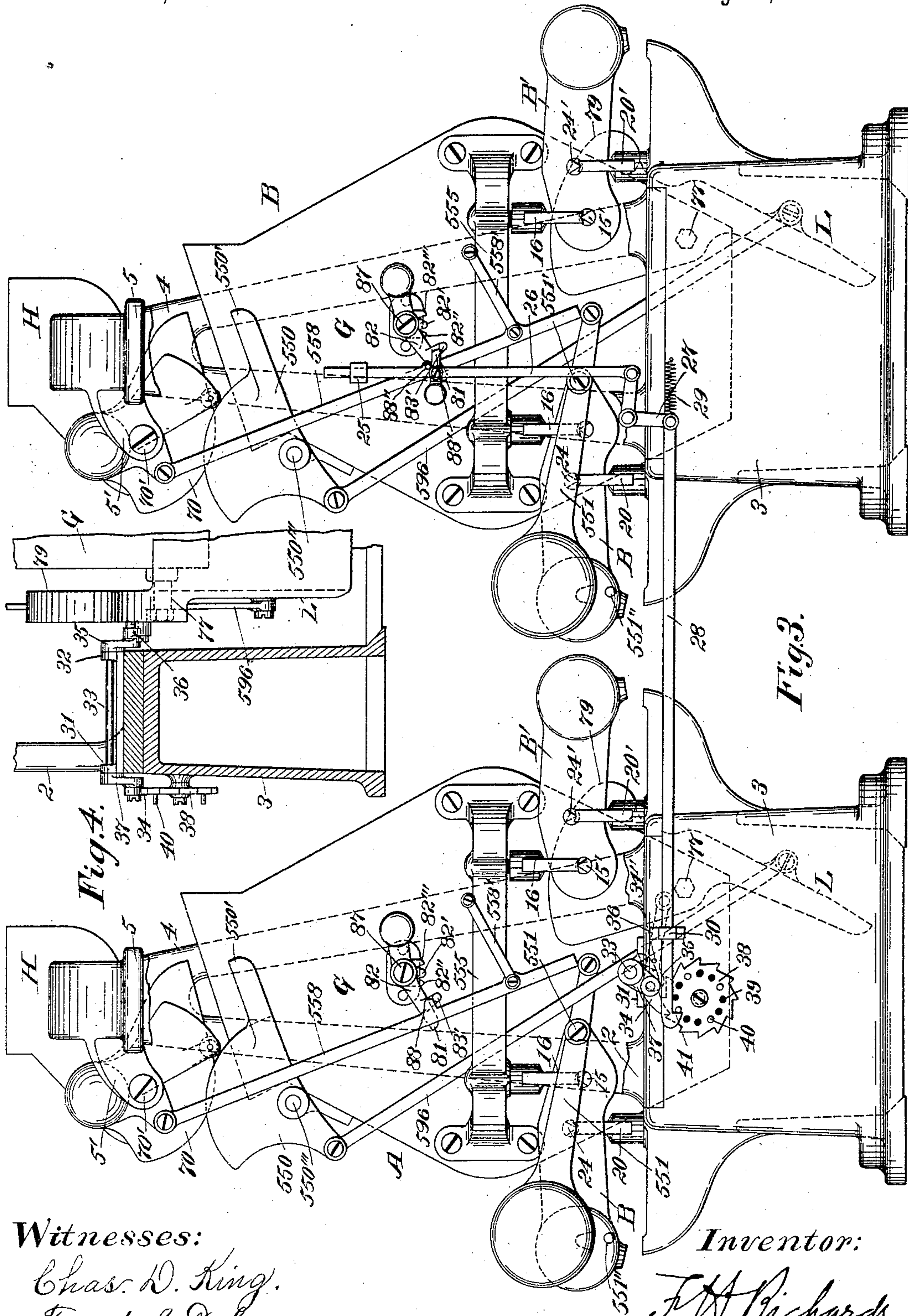
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Witnesses:

Chas. W. King.
Fred. J. Dole.

Inventor:

F. H. Richards.

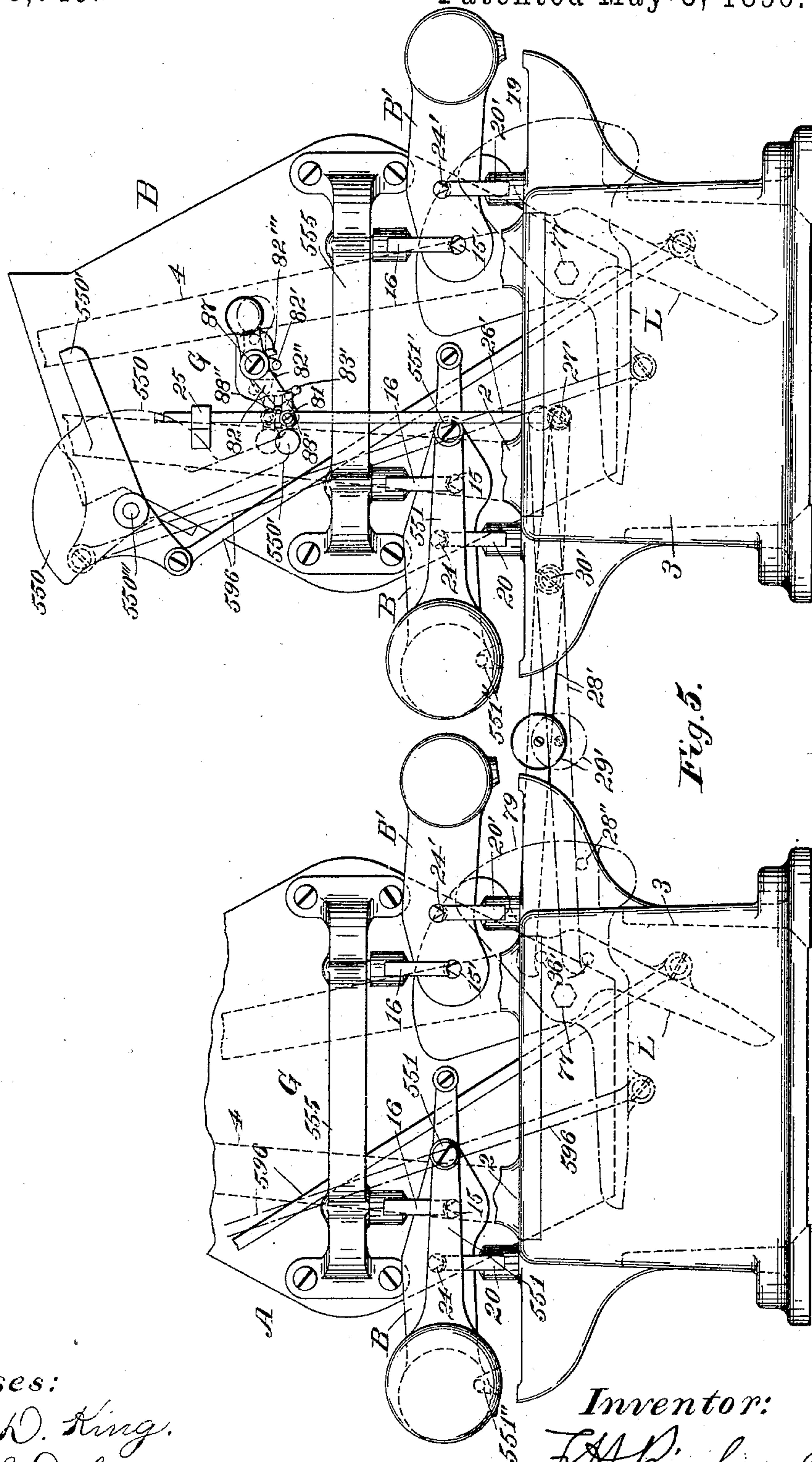
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 559,749, dated May 5, 1896.

Application filed January 13, 1896. Serial No. 575,220. (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 apparatuses particularly adapted for the automatic weighing, delivering, and subsequent mixing of different materials in equal or varying proportions, the object being to provide a pair of weighing-machines and means operated by one of said machines for discharging the bucket-load of the other machine.

In the drawings accompanying and forming part of this specification, Figure 1 is a right-hand elevation of a weighing apparatus embodying my present invention, the primary machine of the apparatus being designated by A and the secondary machine being designated by B, the valves in both machines being open to permit the flow of the supply-streams into the buckets and the bucket-closers thereof being closed. Fig. 2 is a detail view, in front elevation, of a portion of the secondary weighing-machine. Fig. 3 is a view of the apparatus similar to Fig. 1, the valves of both machines being closed and the bucket-closers opened for discharging the bucket-loads. Fig. 4 is a detail view, in front elevation, of a part of the primary weighing-machine, the base or bed being illustrated in transverse section. Fig. 5 is a right-hand end elevation of the apparatus, illustrating one modification of the invention, but portions of the machines being shown and the bucket-closers of said machines being illustrated in the two positions thereof by dotted lines.

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

My present invention embodies a pair of weighing-machines and means operated by one of said machines for discharging the bucket-load of the other machine.

It is to be distinctly understood that my invention is not limited to the employment of any particular weighing-machine; but for the purpose of illustrating the nature of my invention I have illustrated two weighing-machines, which are of the well-known "single-chambered" type or class and which are sub-

stantially similar to the improved weighing-machine disclosed and claimed in Letters Patent No. 548,840, granted to me October 29, 1895, and devices and mechanisms common to both of said machines will be designated by the same reference-characters. In a number of the arts it is essential that certain ingredients should be mixed in predetermined ratios or proportions. For example, in milling, it is customary in flour-making to mix a certain percentage of one grain with that of another, and in the manufacture of proprietary foods three and sometimes more materials are thus mixed. Again, in cement-making, predetermined and varying proportions of stone are mixed during the process of manufacture, the proportions varying, of course, with the different and peculiar characteristics sought for in the finished product or article. Again, it is usual to mix different qualities and sizes of coal for furnace use, the idea being to secure the most advantageous results therefrom. My improvement embodies as the basic idea thereof two weighing-machines, one of which operates to discharge the other, the material being supplied and discharged automatically by one machine and thus operating to automatically discharge the other, the last-mentioned function being performed by a "self-discharging" weighing-machine or what may be conveniently termed the "primary" weighing-machine, the other weighing-machine constituting a "secondary" machine.

My present improvements contemplate also the provision of means for securing a differential ratio of bucket-discharge—that is to say, the ratio of bucket-discharge may be varied at will by increasing or decreasing the number of bucket-discharges of one of such weighing-machines relatively to the other. Heretofore in mixing these various ingredients the presence of an attendant has been necessary to watch the operation of the machines, he merely guessing at or approximating the proportions to be mixed, and in only certain cases is such a course feasible, the very large capacity of machines for weighing certain materials rendering such a procedure entirely impracticable.

By my improvements the presence of an attendant is dispensed with, and, one machine

discharging the other, the proportion of ingredients composing a mixture may be effected automatically and with exactness and precision.

5 As the primary and secondary weighing-machines (designated hereinbefore, respectively, by A and B) are the same in all material respects it is deemed necessary to describe but the primary weighing-machine A.

10 The framework for carrying the operative parts of the weighing-machine may be of any suitable construction and is shown comprising two side frames or members 2 and 4, mounted upon the chambered supporting-
15 base and joined by the top plate 5, which latter is illustrated carrying the supply-chute H for containing the mass of material to be weighed and for directing a stream of material therefrom into the bucket of the machine.

20 The base 3 is illustrated carrying suitable beam-supports for supporting the beam mechanism, which carries the bucket mechanism, consisting of the bucket and its operative devices. These beam-supports are four in number, and two of them are shown as V-shaped
25 bearings 20 and 20'.

As a means for supporting the bucket, which is designated in a general way by G, the beam mechanism shown is preferably employed,
30 which consists of the oppositely-disposed counterweighted scale-beam B and B', respectively, which are pivotally mounted on the beam-supports 20 and 20', as by means of the pivots or knife-edges 24 and 24', which correspond in number and position with the beam-
35 supports 20 and 20'.

The beam-arms of the scale-beams B and B', intermediate of the beam-supports, are illustrated carrying bucket-supports, two of
40 which are shown at 15 and 15' as pivots or knife-edges. The bucket G in practice carries hangers at each end thereof, one of which is illustrated at 555 carrying V-shaped bearings 16, which are pivotally supported by the
45 pivots or knife-edges 15 and 15'.

The bucket mechanism embodies two members, one of which is shiftable relatively to the other for discharging the bucket-load, and which is normally held against movement,
50 and the bucket-closer L is shown constituting such shiftable bucket-discharge member. The bucket-closer L is shown having a counterweighted plate 79, preferably formed integral therewith, the closer being also illustrated as pivoted at 77 to the lower side of the
55 bucket G and adjacent to one side of the discharge-opening thereof.

As a means for supporting the bucket-closer L an inverted toggle connection is shown connecting the closer and the bucket, and this
60 toggle connection is so positioned as to be engaged by a closer-latch when the latch is in its operative position and the closer is shut or in its normal position. In the form shown
65 this toggle comprises a rocker 550, pivoted adjacent to the upper rearward side of the bucket and having a long connecting-rod 596,

pivoted to said rocker and also to the closer in such a manner that when the closer is shut the two pivots of said connecting-rod or toggle member will be nearly in line with and
70 the upper of said pivots will be above the locker-pivot, whereby, when the rocker is engaged by the bucket-closer latch and held in that position, the closer will be supported
75 with a minimum pressure on the latch, as practically all of the weight of the bucket contents will be carried on the pivot 550''' of the rocker 550.

The bucket-closer latch for locking the
80 rocker in position when the closer is shut is designated by 82, and is shown pivoted at 87 on the bucket G, and as having a detent or stop 81 in position for engaging a cooperating stop on the toggle connection when the parts
85 are in the closed position previously described. This cooperating stop of the toggle connection is illustrated at 550' carried on the rocker. The bucket-closer latch 82 is shown counterweighted and limited in its
90 movement toward the stop on the toggle connection by suitable stops, such as 82', 82'', and 82'''. In the embodiment illustrated in the present case the closer-latch 82 swings
95 upwardly to engage the detent on the rocker and is released from engagement therewith by a downward movement.

As a means for controlling the supply-stream, which flows from the supply-chute II into the bucket G, I prefer to employ a stream-
100 controlling valve, substantially similar to that shown in Letters Patent No. 535,727, granted to me March 12, 1895. Such a valve is shown at 70, pivoted at 70' for oscillatory movement beneath the mouth of the supply-chute II.
105 In practice said valve is pivotally supported within arms or brackets depending from the top plate 5 of the machine, one of these being shown at 5'.

As a means for actuating the valve 70 to
110 close the same any convenient valve-closing mechanism may be employed. For example, the valve-closing mechanism disclosed and claimed in Letters Patent No. 548,843, granted to me October 29, 1895, may be used.
115

As a means for actuating the valve to open the same I prefer to employ the mechanism disclosed and claimed in Letters Patent No. 548,839, granted to me October 29, 1895, which
120 will now be described.

The valve 70 is shown in the drawings having a long connecting rod or arm 558 pivotally secured to the upper rear portion thereof and having the lower end of said rod in position to be engaged by a valve-opening
125 actuator, said connecting-rod being also illustrated pivotally connected with a fixed part of the machine by the connecting-link 558', which operates to maintain the connecting-rod 558 in an operative position.
130

The connecting-rod 558 is illustrated constituting the means for transmitting to the valve the valve-opening movement of a valve-actuator, and that valve-actuator, which has

for its function the operation of opening the valve, is shown herein pivotally mounted on the scale-beam B. In the form shown this valve-opening actuator consists of a lever 551, 5 pivoted at 551' to the scale-beam B and counterweighted at its rear end. This actuator 551, which constitutes a supplemental counterpoise, normally forms a part of the bucket-counterpoising portion of the scale-beam B, 10 a stop 551'', carried by the scale-beam B, being employed for maintaining said shiftable member in its normal position, as indicated in Fig. 1. This actuator 551 is automatically shiftable from the counterpoising onto the 15 poising side of the scale-beam B, the last-mentioned position being illustrated in Fig. 2. On the return stroke of said actuator the latter engages the connecting-rod for imparting an upward thrust thereto for opening the 20 valve 70. On the descent of the bucket-and-beam mechanism this connecting-rod, by engaging the shiftable member 551, serves also to limit or check the closing movement of said valve by the valve-closing mechanism. 25 As hereinbefore described, the two weighing-machines, the primary machine A and the secondary machine B, are substantially the same.

The primary machine A, it is apparent, is 30 a self-discharging machine.

It will be remembered that a latch 82 has been described as normally holding the shiftable member or bucket-closer L against movement, this latch having a detent or stop 81 35 in position for engaging a cooperating stop 550' of the rocker or toggle member 550, which constitutes a part of the closer-supporting means. As a means for disengaging the latch from the rocker 550 I prefer to employ a 40 valve-operated actuator or releaser device. The connecting-rod 558, which is operative with the valve 70, has a descending movement on the closing of said valve and will carry a properly-positioned actuator or releaser device, such as 88, for tripping said latch. The 45 latch 82 is illustrated carrying a stop 83' to the rear of the pivot thereof, which is shown located in the path of movement of said actuator 88. It will be apparent that on the cut 50 off of the supply-stream by the valve 70, the latter in practice having an accelerated cut-off movement, the actuator 88 will be projected into engagement with the stop 83' of the latch 82, thereby depressing said latch 55 and disengaging the latch and rocker detents 81 and 550', respectively. The bucket-closer then being free of all restraint, the weight of the mass in the bucket resting on said closer will force the same open for discharging the 60 bucket-load.

The primary and secondary weighing-machines are operatively connected, and the secondary weighing-machine B carries on some part thereof a normally stationary actuator, 65 which is so connected as to be operated by the primary weighing-machine A, and this actuator, at a predetermined point in the opera-

tion of the machine, is carried into position for releasing the shiftable member or bucket-closer L of the secondary weighing-machine B. 70

The side frame 2 of the secondary weighing-machine B is illustrated carrying a guide-bracket 25, which supports for vertical movement the actuator-carrier or connecting-rod 26. The connecting-rod 26 at the lower end 75 thereof is shown operatively connected with one member of an angle-lever 27, the other member of said angle-lever 27 being operatively connected with the connector 28, said angle-lever being pivotally supported by the 80 side frame 2 of the secondary weighing-machine B. The connecting-rod 26 is illustrated carrying thereon, at a suitable point, the actuator or releaser device 88', which is illustrated as a by-pass actuator—that is, one hav- 85 ing alternate effective and ineffective strokes on the descent and ascent, respectively, of the connecting-rod 26. The actuator 88' is pivotally supported by the connecting-rod, and is shown counterweighted to the rear of the 90 pivot thereof, as indicated in Figs. 1, 3, and 5. The tendency of this actuator 88' is to move in an upward direction, but this will be prevented by the relatively-fixed stop 88'', carried by the connecting-rod 26. It is as- 95 sumed that this actuator is in its normal position—that is, (see dotted lines, Fig. 5,) above the stop-pin 83'. When the connecting-rod 26 is pulled downwardly, this actuator will engage the stop 83' of the latch 82, thereby 100 depressing said latch and releasing the shiftable member L, said actuator 88', when held against movement by the fixed stop 88'', being in the nature of a fixed abutment. Should said actuator pass below the stop-pin 83' of 105 the latch 82 on the descending movement thereof, on the ascending movement of said connecting-rod and actuator 88' said stop-pin 83' on the latch 82 would engage and depress said actuator 88, oscillating the same about 110 its pivot, whereby said actuator may be permitted to pass by said latch and then resume its normal position, as indicated in Fig. 1. When said actuator has passed by the stop-pin 83', it will drop to its normal position, as 115 indicated in said Fig. 1.

The means illustrated in Fig. 1 for maintaining the actuator 88' of the secondary weighing-machine in its normal or ineffective position is a retracting-spring 29, which is con- 120 nected with the lower member or arm of the angle-lever 27 and also with some fixed part of said machine, (herein illustrated as the base 3 thereof.) It will be remembered that a connector 28 has been described as operatively 125 connected with the angle-lever 27 and also with some movable part of the primary weighing-machine A, (herein illustrated as the bucket-closer L thereof.) It will be appar- 130 ent that when said connector 28 is operated or drawn in one direction (herein illustrated as the left) the connecting-rod 26, through the interposed angle-lever 27, will be pulled downwardly, and that the actuator 88' on said

connecting-rod 26 will be carried into position for releasing the shiftable member of the bucket mechanism of the secondary weighing-machine B by engaging the bucket-closer latch 82, thereby depressing the same, and disengaging the cooperating detents, respectively, of the latch 82 and toggle member or rocker 550, as indicated in Fig. 2; and it will be likewise apparent that when said connector is released the retracting-spring 29 will return the actuator 88' to its normal position, as indicated in Fig. 1.

The connector 28 is shown carried by a fixed part of the apparatus (herein illustrated as the primary machine A) and supported for horizontal movement by the guiding and supporting bracket 30, carried by the base 3 of said machine. This connector is in position to be operated on and by the opening movement of the bucket-closer of the primary weighing-machine, whereby when this operation occurs the bucket-closer of the secondary machine will be likewise released for discharging the bucket-load thereof. Hence it is evident that two operatively-connected weighing-machines are provided, one of which normally tends to discharge the other by operative connections between the shiftable members of the bucket mechanisms thereof.

My present invention also contemplates the provision of means for throwing one of these operatively-connected machines out of action if it should be desired to use but one of the two. The means shown for this purpose consists of a pawl and ratchet, said pawl being operatively connected with the closer and being adapted normally to rotate the ratchet one division or tooth on each movement of the bucket-closer. By simply raising the pawl (illustrated as a gravity-pawl) out of engagement with the cooperating ratchet it is apparent that said pawl will be ineffective for rotating said ratchet. The base 3 of the primary machine is illustrated carrying on its upper face the brackets 31 and 32, in which is shown supported for rocking movement the rock-shaft 33, which is operatively connected, respectively, with the bucket-closer L and with the pawl 34. The inner end of the rock-shaft is shown carrying the rock-arm 35, which is fixedly secured thereto, and to which is shown pivotally connected the connecting-link 36, the latter being also illustrated pivotally connected with the bucket-closer L at a point above the pivot or axis of movement thereof. The outer end of the rock-shaft 33 is illustrated carrying a second rock-arm 37, to which is shown pivotally connected the gravity-pawl 34, which is adapted for engaging the teeth of and thereby rotating the ratchet 38.

It is apparent that on the opening movement of the closer L of the primary weighing-machine A the connecting-link 36 is thrust to the left, and the rock-shaft 33 and rock-arms 35 and 37 carried thereby are moved in a coinciding direction, so that the pawl 34, carried

by the rock-arm 37, by engaging one of the teeth of the ratchet 38 rotates the latter one division or tooth.

The ratchet or rotatable member 38 carries suitable projections or pins for engaging and operating the connector 28, which on the rotation of the ratchet draws said connector to the left, and through the interposed angle-lever connected with the connecting-rod 26 pulls the actuator 88' downwardly into position for releasing the shiftable member of the bucket mechanism of the secondary weighing-machine B, whereby a predetermined ratio of bucket-discharge of the two machines is secured.

My invention also contemplates the provision of means for securing a differential ratio of bucket-discharge—that is to say, where the apparatus is weighing and discharging two loads by one machine to one load of the other machine this ratio may be varied and a ratio of three to one quickly secured, or these proportions may be varied at will by said means.

The rotatable member or ratchet 33 is illustrated as having formed therein the circular series of holes 39, which correspond in number and position with the divisions or teeth of said ratchet, into which may be set the removable pins 40.

On reference to Figs. 1 and 4 the ratio of bucket-discharge of the apparatus there shown is three discharges by the primary weighing-machine to one discharge of the secondary weighing-machine B—that is to say, the removable pins 40 are set in every fourth hole on the ratchet 38. The connector 28 at the free end thereof (see Figs. 1 and 2) is shown as having formed thereon a projection 41, which is in position to be engaged by the devices or pins 40, carried by the ratchet 38 on the rotation thereof.

In Fig. 1, which illustrates the normal position of the pawl and ratchet, it is observed that the uppermost pin 40 is in engagement with the projection 41 of the connector 28, and it is likewise apparent that on the opening movement of the bucket-closer said connector 28 will be operated or drawn to the left, this action pulling down the connecting-rod 26, which latter carries the actuator 88', and the latter, at a predetermined point in the descent of said rod 26, will engage the latch 82, and on the continued movement of said actuator the latch will be depressed by said actuator 88', thereby releasing the bucket-closer L of the second weighing-machine B. On the rotation of the ratchet 38 the trip-pin 40, which operates the connector 28, will be carried beyond the plane of movement of the connector 28, thereby releasing the latter, at which time the retracting-spring 29 will immediately return said connector to the normal position thereof, whereby the projection 41 thereof may be engaged by a succeeding pin 40 of the ratchet 38. To secure any other ratio than a three-to-one ratio, as shown in

Fig. 1, the removable pins are set in the proper holes 39 to secure such a desired ratio of bucket-discharge.

When it is desired to use but one of the normally-connected machines, the gravity-pawl 34 is raised from engagement with the teeth of the ratchet 38 and thrown over a vertical line passing through the center of movement of said pawl, where it may rest on the stop 34' on some fixed part of the machine A, thus of course throwing the machine B out of action, as said pawl will be in operation on the opening movement of the closer L of the primary machine.

In Fig. 5 I have shown one modification of the apparatus for securing a predetermined ratio of bucket-discharge thereof, and in which the connector 28' is shown pivotally supported at 30' by the base 3 of the secondary machine B. The connector 28' is shown provided with a weight 29', which is preferably adjustable along said connector. The right-hand end of the connector is shown directly and pivotally connected at 27' with the connecting-rod 26', which carries the actuator 88' for releasing the latch 82. The weight 29', exerting a downward force on the connector 28', tends, naturally, to maintain the actuator 88' in its uppermost or inoperative position, as indicated by the dotted lines in Fig. 5. The free end of the connector 28' is in position to be actuated by means carried by the closer, the means shown for this purpose being a projection of a pin 36', carried by the bucket-closer L of the primary weighing-machine A. The free end of the connector 28' rests on said pin or projection 36' and on the descent of the bucket of said machine A has a descending movement therewith. As that part of the connector 28' to the left of its pivot, as just stated, has a descending movement with the bucket—this in practice being quite limited—it is apparent that the part of the connector 28' to the right of the pivot thereof has an ascending movement, and it is apparent that the actuator 88' thereon will be thrust in an upward direction, through the upward movement of the actuator-carrier 26', and away from the latch 82, which normally holds the bucket-closer L of the secondary weighing-machine B against opening movement.

It will be observed that the actuator projection 36', carried by the bucket-closer L of the primary weighing-machine A, is located at a point below the pivot thereof when said closer is in its closed position, as indicated by the dot-and-dash lines in Fig. 5. On the opening movement of the bucket-closer L of said primary weighing-machine it is observed that the actuator 36' thereon moves in an upward plane, which is of relatively considerable extent, and it is likewise apparent that said actuator or pin 36', being in engagement with the free end of the connector 28', will thrust the latter in an upward direction, so that that part of the connector 28' to the right

of the pivot thereof will be pulled downwardly, this action exerting a downward pull on the connecting-rod 26', whereby at a predetermined point in the descent of the latter said actuator 88' engages the latch 82, thereby depressing the same and disengaging the latch and toggle detents 81 and 550', respectively, and freeing the bucket-closer L of the secondary weighing-machine B for discharging the bucket-load thereof.

The bucket-closer L of the primary machine A is illustrated carrying a stop-pin or projection 28'' for supporting the connector 28', thereby maintaining the latter in an operative position where it may be engaged by the actuator 36' on the opening movement of the bucket-closer L of the primary weighing-machine A.

The operation of my weighing apparatus, briefly described, is as follows: The supply-streams are flowing simultaneously into the buckets of both the primary and secondary weighing-machines, the valves thereof being in the open positions, as indicated in Fig. 1. It will be assumed that the bucket-loads are complete in both machines, the valves thereof each having cut off its proper supply-stream. (See Fig. 3.) Succeeding the cut off of the supply-stream by the valve 70 of the primary weighing-machine A the actuator 88, which is operative with said valve, will engage the stop-pin 83' of the latch, and thereby depress the same, disengaging the latch-detent 81 from the detent 550' of the rocker 550. When these detents are disengaged, the bucket-closer L of the primary weighing-machine, being free of all restraint, the weight of the mass in the bucket, pressing against the bucket-closer L, forces the same open for discharging the bucket-load therein. On the opening movement of the bucket-closer L the connecting-rod 36 will be thrust to the left, thereby rocking the rock-shaft 33 and rock-arms 35 and 37 in a coinciding direction, this action thrusting the pawl 34 to the left, the latter rotating the ratchet 38 one division or tooth. On the rotation of the ratchet 38, one of the pins 40 thereof being in engagement with the projection 41 of the connector 28, the connector will be drawn to the left. On the movement of the connector 28 in the direction indicated, said connector, through the interposed angle-lever 27, pulls the connecting-rod 26 downwardly, so that the actuator 88' thereon will be carried into engagement with the stop-pin 83', carried by the latch 82 of the secondary weighing-machine B. On the depression of the latch 82 the latch and rocker detents 81 and 550' are disengaged, whereby the weight of material, pressing against the bucket-closer L of the secondary weighing-machine, forces the same open, as in the primary weighing-machine A, for discharging the bucket-load of the former.

Having thus described my invention, what I claim is—

1. In a weighing-machine, the combination

with a pair of operatively-connected weighing-machines, one of which is operable for discharging the bucket-load of the other machine; of means for throwing one of said machines out of action.

2. In an apparatus of the class specified, the combination with a pair of coacting weighing-machines, one of which embodies two members, one of which is shiftable relatively to the other for discharging the bucket-load and is normally held against shifting movement; of means operated by the other machine for releasing said shiftable member.

3. In an apparatus of the class specified, the combination with a pair of weighing-machines, each of which has a member which is shiftable for discharging the bucket-load; of means for holding said shiftable members against movement; means for releasing one of said members; and means, operated by said released member, for releasing the shiftable member of the other machine.

4. In an apparatus of the class specified, the combination with a pair of weighing-machines, each having a bucket provided with a closer normally held against movement; and means operated by one closer for releasing the other closer, on the opening movement of said first-mentioned closer.

5. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which embodies a shiftable member normally held against movement; of an actuator operable for releasing said shiftable member; means operated by the other machine for operating said actuator; and means for maintaining said actuator normally in an inoperative position.

6. In an apparatus of the class specified, the combination with a pair of weighing-machines, each provided with a bucket having a closer normally held against movement; of a connector operable for releasing the closer of one of said machines, and also in position for operation by the closer of the other machine.

7. In an apparatus of the class specified, the combination with a pair of operatively-connected weighing-machines, one of which is self-discharging; of means operated by said self-discharging machine for discharging the bucket-load of the other machine.

8. In an apparatus of the class specified, the combination with a pair of coacting weighing-machines, each having a bucket mechanism embodying two members, one of which is shiftable relatively to the other for discharging the bucket-load; of means for holding said members against movement; and means for releasing one of said members, and for releasing the other member on the release of said first-mentioned member.

9. In an apparatus of the class specified, the combination with a pair of weighing-machines; of a connector supported by a fixed part of said apparatus, and operable for dis-

charging the bucket-load of one of said machines; and means, operated by the other machine, for operating said connector.

10. In an apparatus of the class specified, the combination with a pair of weighing-machines, of a connector between said machines and having said connector operable for discharging the bucket-load of one of said machines; and means, operated by a moving part of the other machine, for operating said connector.

11. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which embodies a member which is shiftable for discharging the bucket-load thereof; of a connector operable for discharging the bucket-load of the other machine; and means, operative with said shiftable member, for operating said connector.

12. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a shiftable member; of a latch normally holding said member against movement; and means, operated by the other machine, for tripping said latch.

13. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a shiftable member; of a latch for holding said member against movement; an actuator, operated by the other machine, for tripping said latch; and means for maintaining said actuator in an ineffective position.

14. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a shiftable member; of a latch for holding said member against movement; and a by-pass actuator, operated by the other machine, for tripping said latch.

15. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a shiftable member; of a latch for holding said member against movement; a connector between said machines, and adapted to be operated by one of said machines; a rod operatively connected with said connector; and an actuator on said rod operable for tripping said latch.

16. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a shiftable member; of a latch for holding said member against movement; a connector between said machines, and having a projection thereon to be engaged by means operative with one of said machines to thereby operate said connector; and an actuator operative with said connector, and operable for tripping said latch.

17. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a shiftable member; of a latch for holding said shiftable member against movement; a connector between said machines, and in position to be operated by one of said machines; a connecting-rod carrying an actuator operable for tripping said

latch; and an angle-lever operatively connected, respectively, with said connecting-rod and connector.

18. In an apparatus of the class specified, 5 the combination with a pair of weighing-machines, one of which has a shiftable member; of a latch for holding said shiftable member against movement; a connector between said machines, and in position to be operated by 10 one of said machines; a connecting-rod carrying an actuator operable for tripping said latch; an angle-lever operatively connected, respectively, with said connecting-rod and connector; and a spring connecting said an- 15 gle-lever with a fixed part of the apparatus.

19. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a member which is shiftable for discharging the bucket-load 20 thereof; of means for holding said shiftable member against movement; a connector in position to be operated by the other machine; and connections between said connector and the first-mentioned machine, for releasing the 25 shiftable member thereof on the operation of said connector.

20. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a member which is shiftable for discharging the bucket-load 30 thereof; of a connector; connections between said connector and said machine, for releasing the shiftable member thereof on the operation of said connector; and a rotative member operative with the other machine, 35 and having means for engaging said connector and operating the same.

21. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a member which is shiftable for discharging the bucket-load 40 thereof; of a connector between said machines; connections between said connector and said machine, for releasing said shiftable member; a rotative member operative by the 45 other machine; and a removable pin or pins, carried by said rotative member, for engaging said connector.

22. In an apparatus of the class specified, 50 the combination with a pair of weighing-machines, one of which has a member which is shiftable for discharging the bucket-load thereof; of a connector between said machines; connections between said connector 55 and said shiftable member for releasing the same; a rotative member operative with the other machine and having a series of openings; and a pin or pins adapted to be set in said openings, for engaging and operating 60 said connector.

23. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a member which is shiftable for discharging the bucket-load 65 thereof; of a connector between said machines; connections between said connector

and said machine, for releasing the shiftable member thereof; a ratchet; a pawl operative with the other machine for rotating said ratchet; and a device carried by said ratchet, 70 for engaging and operating said connector on the rotation of said ratchet.

24. In an apparatus of the class specified, the combination with a pair of weighing-machines, each having a bucket provided with 75 a closer normally held against movement; of a connector between said machines; connections between said connector and one of the machines, for releasing the closer thereof; a rotative member; a device, carried by said 80 rotative member, for operating said connector; and means, operative with the closer of the other machine, for rotating said rotative member.

25. In an apparatus of the class specified, 85 the combination with a pair of weighing-machines, each having a bucket provided with a closer normally held against movement; of a connector between said machines; connections between said connector and one of the 90 machines, for releasing the closer thereof; a ratchet; a device carried by said ratchet for operating said connector; and a pawl, operative with the closer of the other machine, for rotating said ratchet. 95

26. In an apparatus of the class specified, the combination with a pair of weighing-machines, one of which has a shiftable member normally held against movement; of a rota- 100 tively-supported member; means operated by the other machine for rotating said member; and connections between said rotative member and the first-mentioned machine, for releasing said shiftable member.

27. In an apparatus of the class specified, 105 the combination with a pair of weighing-machines, each of which has a shiftable member normally held against movement; of means for releasing one of said members; a rotatively-supported member; connections 110 operated by the shiftable member of one of said machines, for rotating said rotative member; and connections between the latter and the other machine, for releasing the shiftable member thereof. 115

28. In an apparatus of the class specified, the combination with a pair of weighing-machines, constituting, respectively, a primary weighing-machine and a secondary weighing- 120 machine; of a connector between said weighing-machines; connections between said connector and the secondary weighing-machine for discharging the bucket-load thereof; a ratchet having means for operating said con- 125 nector; a pawl for rotating said ratchet; and connections between said pawl and a moving part of the primary weighing-machine.

FRANCIS H. RICHARDS.

Witnesses:

FRED. J. DOLE,
GEO. A. HOFFMAN.