(No Model.) 5 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 559,209. Patented Apr. 28, 1896.

Fig. 1.

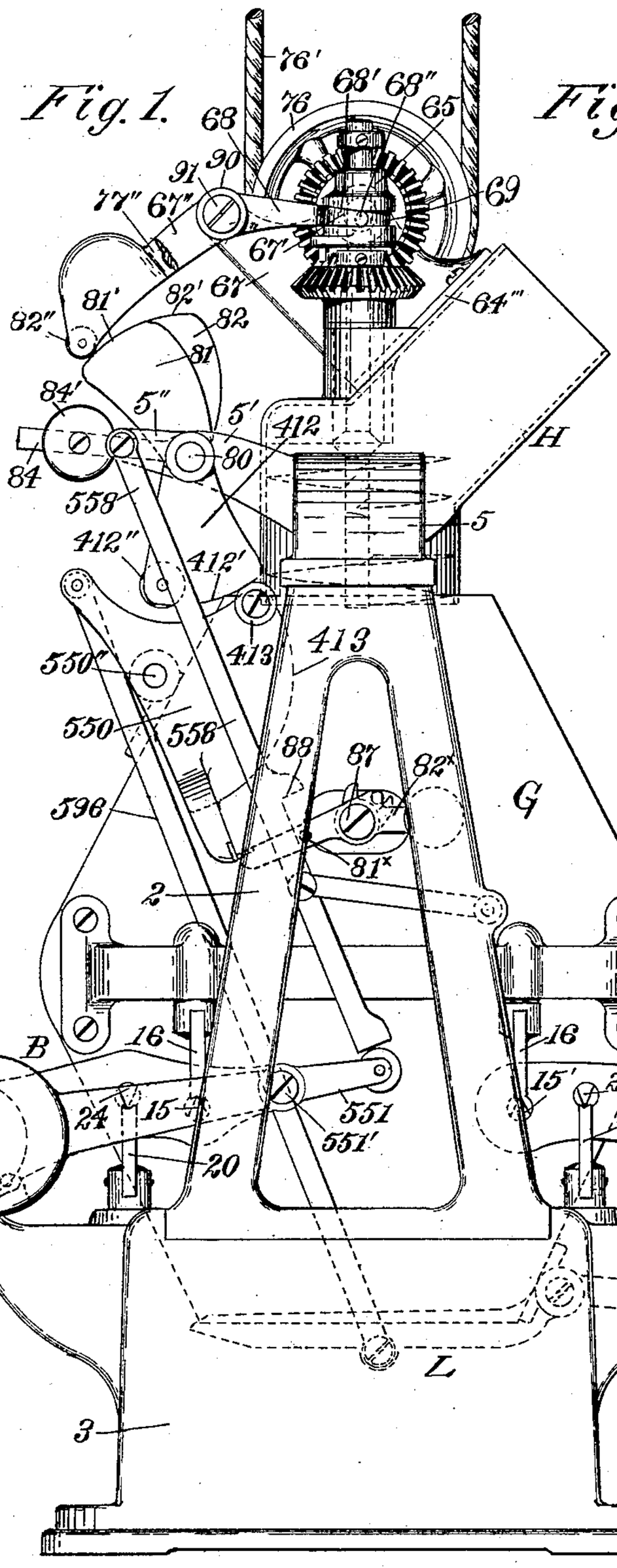

Fig. 6.

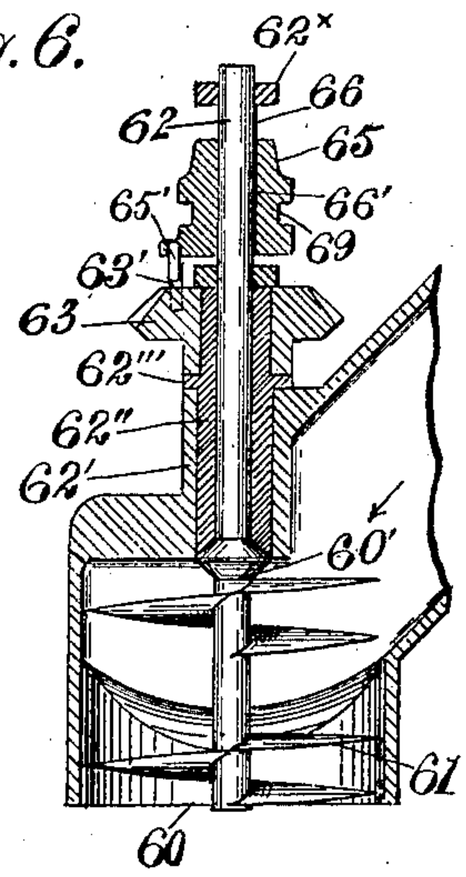

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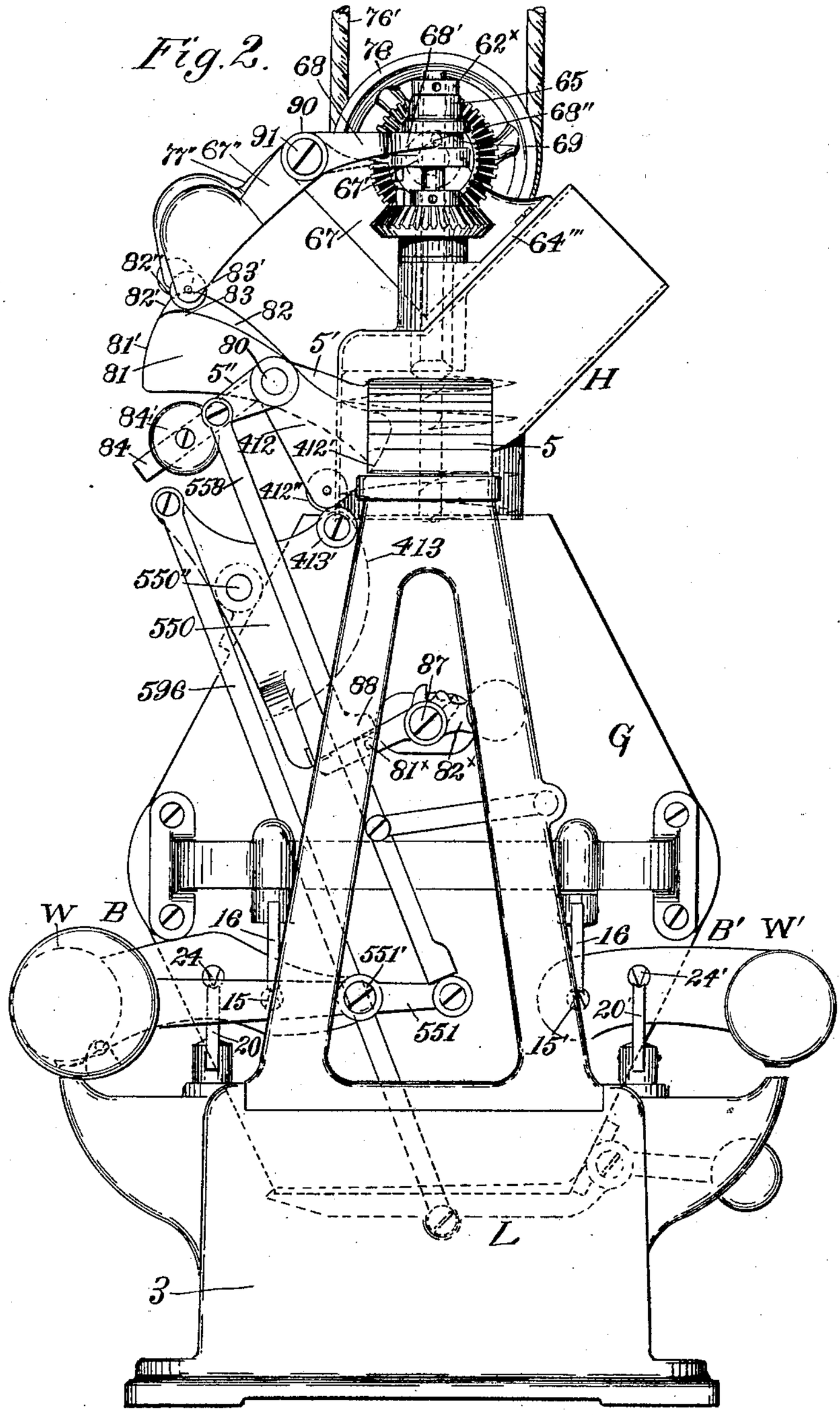
Fig. 2.



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(No Model.) 5 Sheets—Sheet 3.

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WEIGHING MACHINE.

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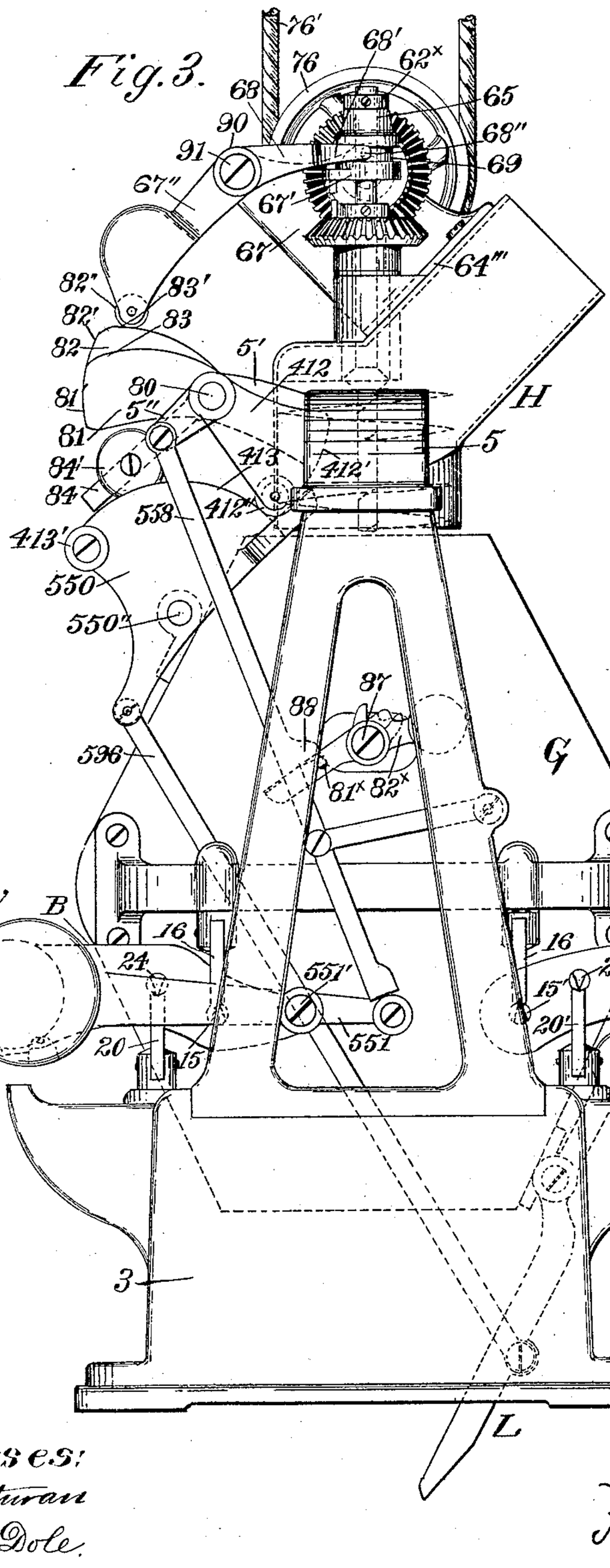
Fig. 3.



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5 Sheets—Sheet 4.

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WEIGHING MACHINE.

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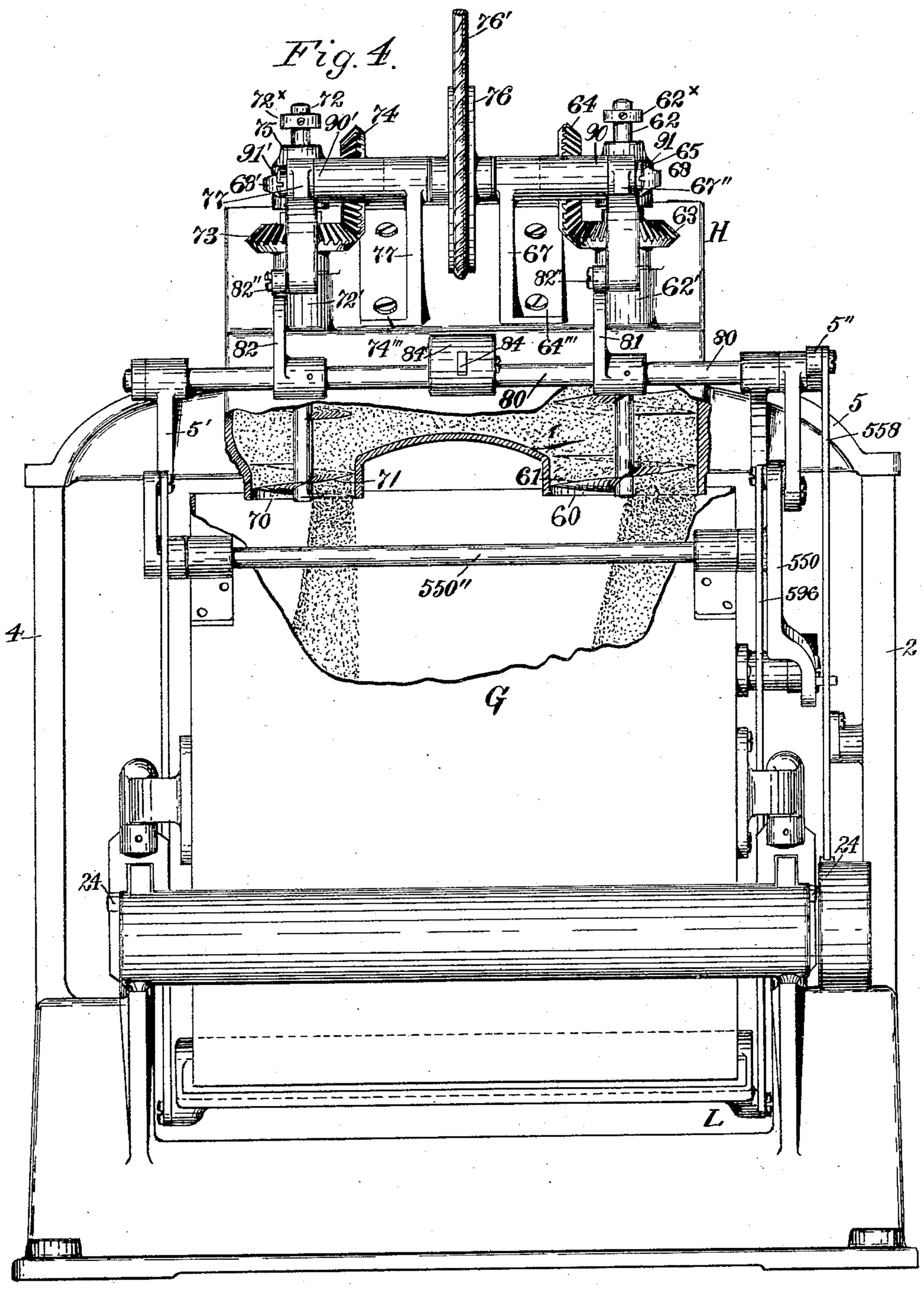
Fig. 4.



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5 Sheets—Sheet 5.

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WEIGHING MACHINE.

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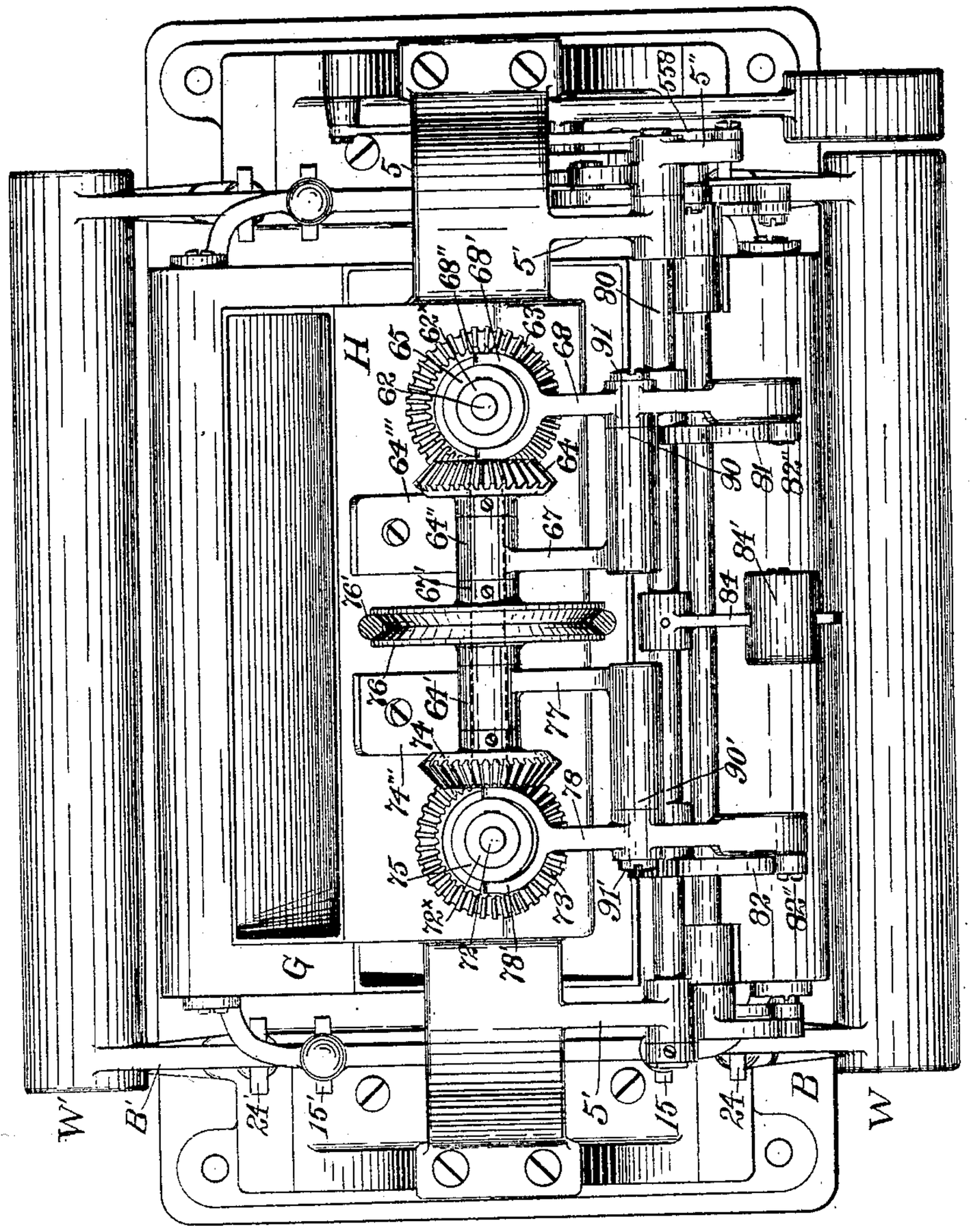
Fig. 5.



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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. 559,209, dated April 28, 1896.

Application filed July 5, 1895. Serial No. 554,944. (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, the object being to provide a feeding mechanism having an intermittent movement for feeding to the bucket or load-carrying receptacle of the machine the material to be weighed in the form of a supply-stream; and it is particularly adapted for use in connection with machines for weighing dense and sluggish materials, that ordinarily have an inherent tendency to pack and clog at the stream-controlling point or in the supply-chute, whereby a continuous uninterrupted flow of the supply-stream is insured during the making up of the bucket-load; and the feeding mechanism is also further adapted during the period of rest thereof to serve as an effective medium for cutting off the supply-stream.

In the drawings accompanying and forming part of this specification, Figure 1 is a right-hand end elevation of a weighing-machine embodying the present improvements, the bucket being shown in the position it occupies when the full supply-stream is flowing thereinto. Fig. 2 is a similar view showing the position occupied by the bucket when the main stream has been cut off. Fig. 3 is a like view showing the bucket as having descended for discharging the load and the supply-stream as having been wholly cut off. Fig. 4 is a rear elevation of the machine, showing portions thereof in section. Fig. 5 is a plan view of the machine, and Fig. 6 is a sectional detail illustrating a supply-spout and a feeder for feeding a stream.

For convenience in illustrating the nature of the present improvements these are shown applied to the improved weighing-machine described and claimed in my concurrently-pending application, Serial No. 541,087, filed March 9, 1895.

The framework for carrying the operative parts of the machine may be of any suitable construction and is shown as comprising two side frames or uprights mounted upon a chambered supporting-base 3. The side frames 2 and 4 are illustrated as supporting a top plate 5, which in turn supports a supply-chute, such as H, which latter is adapted for containing the mass of material to be weighed.

The base 3 is shown as carrying some suitable beam-supports, such as the V-shaped bearings 20 and 20′, for supporting the scale-beams which carry the bucket mechanism, consisting of the bucket and its operative devices.

As a means for supporting the bucket or load-carrying receptacle, which is designated in a general way by G, a pair of oppositely-disposed counterweighted beams are shown at B and B′, respectively, as pivotally mounted upon the beam-supports—as, for instance, by means of a pair of pivots or knife-edges 24 and the oppositely-disposed pair of pivots or knife-edges 24′—and as having bucket-supports located intermediate of said beam-supports and adjacent to corresponding beam-supports, these bucket-supports being shown as two remotely-disposed pairs of pivots or knife-edges 15 and 15′.

The bucket or load-carrying receptacle G is shown as pivotally supported upon the oppositely-disposed scale-beams B and B′ and as having V-shaped bearings 16, suitably carried by the bucket and corresponding in number and position with the knife-edges 15 and 15′.

Each of the scale-beams B and B′ is shown as having a pair of beam-arms joined by a combined connecting-shaft and counterpoise, the counterpoise for the beam B being designated by W and that for the beam B′ being designated by W′. Each of the scale-beams therefore has the usual bucket-poising and bucket-counterpoising portions. The bucket-poising portions of said scale-beams comprise all those parts thereof lying within or between the pivots 15 and 15′, and the bucket-counterpoising portions of said scale-beams comprise all those portions thereof lying outside of said pivots 15 and 15′.

The bucket-closer, which is designated in a general way by L, is shown as consisting of a suitably-formed plate or closer proper, having a counterweighted arm, preferably formed integral therewith, the closer being also illustrated as pivoted to the lower side of the

bucket and adjacent to one side of the discharge-opening thereof.

As a means for supporting the bucket-closer an inverted toggle connection is shown in the drawings as connecting the closer and the bucket, and this toggle connection is so positioned as to be engaged by a closer-latch and held at about the angle of repose of the connection when the latch is in its operative position and the closer is shut. In the form thereof illustrated this toggle comprises some suitable rocker, such as 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 the upper of said pivots will be above, the rocker-pivot, whereby, when the rocker is engaged by a bucket-closer latch and held in that position, the closer will be supported with a minimum pressure on the latch, as practically all of the weight of the bucket will be supported on the pivot 550″ of the rocker.

The closer-latch for locking the rocker in position when the closer is shut, and which is designated as 82×, is shown herein as pivoted at 87 to the bucket and as having a suitable detent or stop adapted to engage a cooperating detent or stop formed on the rocker when the parts are in the closed position previously described. Suitable stops for limiting the movements of the closer-latch will be employed, the latter having a movement in an upward direction for engagement with the detent on the rocker 550. It will be obvious, then, that the said latch will be released from engagement with the rocker 550 by a downward movement.

A supply-chute is employed for containing the mass of material to be weighed and for feeding the stream of material to the bucket. I prefer to employ the feeding means shown in the accompanying drawings. The feeding means shown has an intermittent movement adapted for feeding the stream of material to the bucket, and is also adapted, during the period of rest thereof, for serving as a positive means for cutting off and supporting the descending mass or column of material in the supply-chute. The feeding means shown comprises a pair of feeders each having an intermittent movement. These feeders constitute, respectively, a main feeder and a supplemental feeder, adapted, respectively, for feeding the main and the drip streams which constitute the supply-stream to the bucket and as a means for positively and successively cutting off the main and the drip streams and for supporting the descending mass or column in the supply-chute. Hence it will be evident that the members just described are in the nature of a combined feeder and cut-off device for alternately effecting these results.

It is a well-known fact in this art that dense and sluggish materials—such as flour, meal, and other closely-packed and sticky substances—have an inherent tendency to pack and clog in the supply-chute and at the stream-controlling point, which causes considerable delay and bother in the making up of bucket-loads, the time varying, of course, with the peculiar character of the particular material being weighed. By the present improvements these obstacles are removed, and it is possible to secure in a remarkably brief space of time a complete and accurate load of a predetermined quantity by insuring, through the agency of the feeding means, a free and uninterrupted flow of the supply-stream, and on the completion of the bucket-load positively cutting off said stream.

On reference to Fig. 4 it will be observed that the feeders are shown as rotative and each located in a supply-spout, and that such rotation is on a vertical axis, whereby the material will be fed or caused to flow downwardly and directly into the bucket.

The main supply-spout or main-stream spout is shown at 60, and the supplemental supply-spout or drip-stream spout is shown at 70, and the main-feeder or main-stream feeder at 61, and the supplemental feeder or drip-stream feeder at 71, and as located within their respective supply-spouts. The supply-stream leaves the supply-chute H and is divided into two streams by the two spouts—the main stream and the drip stream. The two feeders have a synchronous rotary movement for feeding the supply-stream to the bucket and having successive periods of rest—that is to say, the two streams are simultaneously fed into the bucket until the load therein is nearly completed, when the main-stream feeder will be rendered ineffective by means of suitable mechanism, and on the completion of the bucket-load the supplemental feeder will be rendered ineffective. Hence it will be evident that one of said stream-feeders has a period of rest in advance of the other.

The feeders are shown as in the nature of a pair of feed-screws, and each of these is shown, in turn, as comprising two separated blades or parts, one vertically disposed above the other and rotative about a common axis. These feed-screws are shown located in the supply-spouts upon a vertical axis. The general plane of the upper face or pitch of the lower screw of each of the feeders is preferably non-coincident with or at a less angle than the angle of repose of the material being weighed, whereby when the feeder is at rest it will not be possible for any of the material composing the stream to flow into the bucket. The feed-screws should be of such relative size as to permit free rotary movement thereof within the two spouts, and also to prevent the escape of material or wedging of granules in the mass between the feeder or feed-screw and the inner walls of the supply-spouts.

The feeders are shown supported by spin-

dles or shafts which receive rotative power from some suitable gearing, which in turn receives its power from some form of motor or driving mechanism, which latter embodies a suitable clutch. The upper portion or member of each of the feed-screws serves as an effective means for thoroughly loosening the mass in the supply-chute and the supply-spout, also breaking up lumps and feeding the stream of material to the lower of the two screws, which serves as a valve to cut off the stream and as a column-supporting medium, or the means for supporting the mass in the chute. It will be obvious that effective results will also be obtained by joining or making the two screws or screw members continuous.

The supporting shafts or spindles for the main and the supplemental feeders are shown at 62 and 72 as mounted for rotative movement in the bearings 62′ and 72′, formed on each of the supply-spouts. (See Fig. 6, which shows the main feeder, its supporting spindle or shaft, and a portion of the driving mechanism.)

There is shown seated in the bearing 62′ of the main-feeder spindle a bushing 62″, which has formed thereon an annular flange 62‴, which rests on the upper edge of the bearing. The bushing is shown as having formed in the lower extremity thereof a bearing or seat for the double conoidal annular flange or bulge 60′, which is formed on the spindle. The bushing 62″ will preferably be set tightly in place in the bearing 62′ for non-rotative movement, the spindle rotating in the bushing. It will be obvious that by this means free rotative movement of the spindle will be insured, but that the flange 60′ will serve as a positive stop for limiting the vertical play or movement of the spindle.

The construction of the main feeder and its mounting, as just described, is clearly shown in Fig. 6 and partially in Fig. 4, and the supplemental feeder will be similarly equipped.

The flange 62‴ of the bushing is shown as supporting a bevel-gear 63, which constitutes a part of the driving mechanism for imparting to the spindle or shaft 62 a rotary motion for actuating the feeder. The bevel-gear for the supplemental-feeder spindle or shaft is shown at 73. Some suitable clutch mechanism will be employed for shifting the bevel-gearing or actuating mechanism into and out of operative relation with the feeder-spindles, and hence with the feeders themselves.

The supply-chute H is shown as having secured thereto, by suitable fastening means, two plates 64‴ and 74‴, which have transverse uprights 67 and 77 formed thereon and each of which has also formed, at the extremity thereof, a bearing for a driving-shaft. The driving-shaft is shown at 67′ by the dotted lines, Fig. 5, as extending transversely of the machine, and is mounted in the bearings 64′ and 74′. At its ends this driving-shaft is shown provided with bevel-gears 64 and 74, respectively, which mesh with the gears 63 and 73 for driving the feeder spindles or shafts 62 and 72. The bevel-gears 64 and 74 will be secured to the shaft 67′ in some suitable manner, as by pins. The driving-shaft 67′ is shown as having fixed thereto the pulley or belt-wheel 76, over which is shown passed the belt or rope 76′, which communicates with some suitable motor for driving the shaft 67′, and through this the gearing hereinbefore described and the feeders. The movements of the driving mechanism and the gearing are preferably continuous.

As hereinbefore stated, some suitable mechanism will be employed for rendering ineffective the two feeders by shifting the actuating mechanism out of operative relation with said feeder, and for this purpose I prefer to employ the clutch mechanism shown.

Each of the feeder-spindles is shown as having a slidable or clutch member, that for the main spindle being designated by 65 and that for the supplemental spindle being designated by 75. These clutch members are slidable on the spindles and are adapted for alternately imparting motion to the spindles through the gearing or actuating mechanisms previously described.

The mechanism for rendering the feeders effective and non-effective or for throwing said feeders into and out of action being the same, it is merely necessary to describe that for the main feeder.

The main spindle is shown as having formed near the upper end thereof a key 66, and the slidable clutch member 65 is shown as having formed therein a keyway 66′, adapted for receiving the key 66 of the spindle. It will be obvious that when these are in engagement the spindle, and hence the feeder, may be rotated through the described actuating mechanism for feeding the stream. Suitable shifting mechanism will be employed for unclutching the clutch or for sliding said slidable member 65 on the spindle, whereby the slidable member will be carried out of engagement with the gearing on the spindle to thereby render ineffective the feeding movement of the feeder. The bevel-gear 63 is shown as having formed thereon and on the upper face thereof a pin 63′, and the slidable member 65 is shown as having formed on its lower face a coöperating-pin 65′, which will be in engagement with the pin 63′ when said slidable member is in its lowest position or driving position, at which time the key 66 will be seated in the keyway 66′, formed in said slidable member 65. By means of the two described pins motion will be communicated or imparted to the spindle for rotating the screw, and when the slidable member is slid out of engagement with the gearing it will be obvious that these pins will be, at a predetermined period, out of the path of each other, at which time the key and the keyway will also be ineffective, thereby preventing

rotation of the spindle by the driving mechanism. Stops are shown at 62× and 72× for limiting the sliding movement of the clutch members 65 and 75.

As hereinbefore stated, the two feeders have an intermittent movement in synchronism, and one of said feeders has a period of rest in advance of the other.

Means are shown in the drawings for successively sliding or shifting the slidable members 65 and 75 out of operative engagement with the operative mechanism, whereby the rotation of these spindles and their feeders will be successively prevented. The means shown for this purpose consists of a shipper or shifter, which normally exerts an upward thrust for unclutching the clutch.

The uprights or standards 67 and 77 are shown provided with bearings 90 and 90′, which are adapted for receiving the short transverse shafts of a pair of shifters or shippers 67″ and 77″. (See Figs. 1 and 4.) These shippers 67″ and 77″ are shown as oscillatory and as counterweighted at the rear of their pivots or centers of movements. Forward of their pivots these shippers or shifters are shown provided with shipping or shifting levers 68 and 78, which are shown as terminating in yokes or bifurcations 68′ and 78′, the purpose of which will now be described. These shipping-levers being the same in construction and operation, I deem it necessary to describe with preciseness but one of them, and that one is shown clearly in Fig. 1. The arms of the yoke or bifurcation 68′ are shown provided with a pin or pins 68″, which are adapted to engage a channel or groove 69 of the slidable member. The shippers 67″ and 77″, it will be remembered, have been described as counterweighted at the rear of the pivots thereof. Hence it will be evident that these are self-active, and that there is a constant tendency on the part of such shippers or shifters to shift the slidable members out of operative engagement with the bevel-gearing, whereby the rotation of these spindles or shafts of the two feeders will be prevented.

Some limiting means will be employed for limiting the shifting movement of the shippers or shifters during the making up of the bucket-load, successively preventing this limiting action until the partial completion of the bucket-load by both feeders and full completion of the bucket-load by the supplemental feeder.

The top plate 5 is shown as provided with rearwardly-extending arms 5′, having bearings formed therein for the reception of a relatively long shaft 80. This shaft 80 is shown as carrying a pair of shifter-movement limiters, in position and adapted for successively limiting the shifting movement of the shifters. These limiters or stops are shown at 81 and 82 as secured to the shaft, and it will be observed on reference to Figs. 1, 2, and 3 that the limit for the shifter for the main feeder is shown in advance of the other, and it will be evident that one of said limiters will have a limiting action in advance of the other. Each of these limiters is shown provided with two faces—a limiting-face and a locking face or stop. The limiting-faces of these limiters are shown at 81′ and 82′ as in the nature of cam-faces. Each of the counterweights of the shippers is shown provided with a limiting-stop 82″, (shown as a friction-wheel,) which serves its well-known function.

The two limiters have a rotative or oscillatory movement, and the stops 82″ of the shippers or shifters are in constant engagement with one or the other of the faces of the limiters 81 and 82. The two limiters have an oscillatory movement with the shaft 80, and it will be evident that as the limiters oscillate the friction-wheels of the stops of the shippers will thereby be permitted to ride over or be in contact with the limiting-faces 81′ and 82′ of the two limiters, and which will permit a slow shifting movement of the shifters or shippers so long as these friction-wheels are in engagement with the limiting-faces 81′ and 82′. When these friction-wheels pass beyond these limiting-faces and are opposite the locking-faces 83 and 83′, the friction wheels or stops 82″ will be thrown by the counterweights into locked engagement with the locking-stops 83 and 83′ to thereby prevent return movement of the shifters. When the two friction-wheels have passed beyond the limiting-faces, the slidable members 65 and 75 will then have been successively shifted out of operative relation with the driving mechanism, thereby successively preventing the feeding movement of the feeders.

The shaft 80 is shown provided with a rearwardly-extending lever or arm 84, which is shown as carrying an adjustable counterweight 84′, which tends to rotate said shaft, and hence permits the shifting action previously described; but the rotation of this shaft 80 is in turn limited.

The main shaft 80 is shown as provided with a limiter or limiting-stop 412, oscillatory with said shaft, which limits the shifting movements of the shifting mechanism, and hence the feeding movement of the feeders. This stop 412 is termed a "main" stop and coacts with a bucket-discharge stop oscillatory on the bucket for limiting the movements of the closer.

The main stop is shown provided with a limiting-face 412′ and a locking-stop 412″. The bucket-discharge stop 550 is also shown as provided with a limiting-face 413 and a locking-stop 413′. The stops 412 and 550 are intended for reciprocally limiting the opening movement of the closer during the feeding movement of the feeders and the feeding movement of the feeders by the non-closing of the closer.

When the limiting-face 412′ of the stop 412 is in engagement with the stop 413′ of the bucket-discharge stop 550, the bucket of course descending, the limiting-face 412′ will

be permitted to ride over the stop 413′, which is shown as a friction-wheel, thereby permitting an oscillation of the limiters 81 and 82, and through these a slow shifting movement of the shifting mechanism. At a predetermined period in the operation of the machine or on the opening movement of the closer the stop 412″ will be in locked engagement with the bucket-discharge stop, thereby preventing return oscillatory movement of the stop 412 during the bucket-discharge period or while the closer is open.

A suitable stop or stop mechanism will be employed for retarding the oscillatory movement of the shaft 80 during the descent of the bucket, and that shown will now be described. The shaft 80 is shown as having a rearwardly-extending short arm 5″. A connecting-rod 558 is shown as pivoted to the short arm 5″ of the shaft 80 and constitutes the means for transmitting to the shaft 80 the movement for shifting the limiters 81 and 82 out of locked engagement with the shifter-limiters, whereby the gearing may transmit its motion to the feeders for rotating the same. The connecting-rod 558 is illustrated as being in operative relation with an actuator, which is adapted for rendering the two feeders effective for feeding the main and the drip streams of material to the bucket. The connecting-rod is illustrated as extending downwardly and is adapted to be engaged by the actuator 551 for transmitting motion to the shaft 80, necessary to render effective the feeding mechanism. This actuator 551, which constitutes a supplemental counterpoise or supplemental balancing means, normally forms a part of the bucket-counterpoising portion of the scale-beam B and is automatically shiftable onto the bucket-poising portion of the beam. It will be noticed that the pivot 551′ of this actuator is shown located between the bucket-supports, so that any downward pressure exerted upon the inner end of the actuator will oscillate the same, and it will be obvious that a very slight oscillatory movement will be necessary to shift the counterpoise from the counterpoising to the poising side.

When free for actuating the shaft 80, the connecting-rod constitutes in part the means for transmitting to said shaft the movement necessary to start the feeding action of the feeders, and during the reverse oscillation of said shaft the connecting-rod 558 serves as a stop device for limiting or checking such movement of said shaft 80, whereby this cut-off of the supply of material will be retarded during the making up of the load. The connecting-rod 558 is also shown as having a latch-actuator 88, which is movable therewith, and at a predetermined point in the descent of the bucket will be brought into contact with a stop or stop-arm 81 on the closer-latch, thereby tripping said latch for permitting an opening of the closer L for discharging the bucket-load. Hence it will be evident that means are employed for intercepting the movement of the driving mechanism at successive and predetermined points in the descent of the bucket, whereby the feeders will be successively stopped or rendered ineffective for feeding the main and the drip streams into the bucket.

The operation of the machine will now be briefly described.

Fig. 1 shows the parts in the positions they occupy when the full stream is flowing onto the bucket. Motion being imparted to the driving mechanism described, the feeders 61 and 71 will be rotated quickly through the bevel-gears and members 65 and 75 of the clutch mechanism. As the feeders rotate the screws will feed downwardly from the supply-chute H into the bucket a stream of the material to be weighed, the supply-chute receiving the material from some suitable source of supply. As the stream flows into the bucket this bucket descends, and in descending the stop-face 412′ of the main stop 412 tends to ride over the stop or friction wheel 413 of the bucket-discharge stop 550. This oscillation of the main stop 412 permits an oscillation of the limiters 81 and 82, and as these latter oscillate they in turn permit an upward oscillatory or shifting movement of the two shifters on their pivots. As hereinbefore described, one of these limiters is in advance or has a limiting action of the other. When the load is nearly completed, the friction-wheel or locking-stop of the counterweighted shifter will have passed beyond the limiting-face of the limiter 81, and the counterweight tends to carry the friction-wheel or locking-stop when this has passed out of engagement with the limiting-face of the limiter 81 into locked engagement with the locking-stop 83 of said limiter, and thereby locks said shifter against downward or return movement, as shown in Fig. 2. While the locking-stop or friction-wheel of the shifter 67″ is riding over the limiting-face, the shifting-arm thereof tends to slide or shift the slidable clutch member 65 out of operative relation with the feeder, whereby the rotation or feeding movement of said feeder will be prevented. When the rotary movement of said feeder is prevented, the bucket will have nearly received the complete bucket-load. The bucket in the meantime has descended nearly to the poising-line, and as the bucket further descends the limiting-face 412″ of the main stop 412 is riding over the friction-wheel 413′ of the bucket-discharge stop 550.

It will be assumed that the main feeder has stopped in its feeding or rotative movement. The supplemental feeder continues its feeding or rotative movement—feeding the drip-stream to the bucket—until the completion of the bucket-load. When the locking-stop of the main-feeder shifter is in locked engagement with the limiter 81, the friction-wheel or locking-stop of the supplemental-feeder shifter will have nearly passed beyond the

limiting-face of the second limiter 81. When these have passed out of engagement, the other locking-stop will be carried by the counterweight into locked engagement with the limiting locking-stop, thereby rendering ineffective the supplemental feeder. During the oscillation of the limiters and the supporting-shaft therefor the main stop, as stated hereinbefore, is also oscillating, and the stop-face thereof will be riding over the stop 413 of the bucket-discharge stop 550.

It will be remembered that the shaft 80, which is shown as carrying the two limiters and the main stop 412, also has movable therewith a rod which has thereon a latch-actuator 88. At the proper time this latch will be brought into contact with the latch 82, thereby tripping said latch. Just prior to the tripping of said latch the limiters will be in locked engagement with the two shifters, whereby these will be rendered ineffective. Immediately on the tripping of the latch 82 the closer, by reason of the weight of the mass resting thereon, will be opened, and on the first opening movement thereof the bucket-discharge stop 550 will be given a rapid oscillation and the face 413 thereon will impart to the stop 412″ further movement, which absolutely locks the main stop 412 against return movement during the bucket-discharge period, and hence renders the two feeders ineffective for feeding the supply-stream to the bucket while this locked engagement with the two stops is maintained.

Having thus described my invention, I claim—

1. In a weighing-machine, the combination with beam mechanism, and with bucket mechanism supported thereon for ascending and descending movements; of a hopper having a pair of independent, vertically-disposed spouts; mechanically-driven feeders for feeding streams of material from the hopper and into the bucket; and successively-effecting means for stopping the movements of said feeders at predetermined points in the descent of the bucket, whereby when the movement of one of said feeders is stopped, the other feeder is effective for feeding a stream of material into the bucket for completing the bucket-load therein.

2. In a weighing-machine, the combination with a bucket; of a supply-chute adapted for containing a mass of material; and a pair of feeders having intermittent movements adapted for feeding the supply-stream to the bucket, and also adapted, when at rest, for cutting off the supply-stream, and one of said feeders having its period of rest in advance of the other feeder, substantially as specified.

3. In a weighing-machine, the combination with a beam mechanism, and with a bucket supported thereon for ascending and descending movements, of a supply-chute; a pair of feeders each comprising two separated blades and operative for feeding streams of material from the supply-chute; driving mechanism for said feeders; and means for successively intercepting the feeder movements at predetermined points in the descent of the bucket.

4. In a weighing-machine, the combination with beam mechanism, and with bucket mechanism supported thereon; of a hopper; a mechanically-driven feeder operative for feeding a stream of material therefrom and into the bucket, said feeder consisting of a pair of separated blades rotative about a vertical axis; and means for stopping the feeder at a predetermined point in the descent of the bucket, whereby the same will, when stopped, cut off the fed stream of material.

5. In a weighing-machine, the combination with beam mechanism, and with bucket mechanism supported thereon for ascending and descending movements; of a hopper; a mechanically-driven feeder consisting of a pair of separated blades rotative about a vertical axis and one located above the other, the lower blade having a pitch less than the other blade; and means for stopping the movement of said feeder at a predetermined point in the descent of the bucket, whereby when the feeder is stopped the last-mentioned blade thereof will cut off said fed stream of material.

6. In a weighing-machine, the combination with a hopper, of a pair of feeders for positively feeding streams of material therefrom; means for throwing said feeders out of action; and a pair of cams for engaging and limiting the movement of said means, and having the face of one of said cams located in advance of the other.

7. In a weighing-machine, the combination with a hopper, of a pair of feeders for positively feeding streams of material therefrom; self-acting devices operable for successively throwing the feeders out of action; and means for limiting the movement of said devices.

8. In a weighing-machine, the combination with beam mechanism, and with a supply-spout; of a pair of mechanically-operated stream-feeders, constituting, respectively, a main-stream feeder and a drip-stream feeder; a pair of shifters for successively throwing the main and the drip stream feeders out of action; and limiters operative for limiting the shifting movements of said shifters during the descent of the bucket, substantially as specified.

9. In a weighing-machine, the combination with a bucket; of a supply-chute adapted for containing a mass of material; a pair of feeders having an intermittent feeding movement for feeding the supply-stream to the bucket, and also adapted, when at rest, for cutting off the supply-stream; actuating mechanism for actuating said feeders; a pair of shifters for shifting the actuating mechanism out of operative relation with the feeders; and a pair of limiters for limiting the shifting movements of said shifters, and one of said limiters having a limiting action in advance of the other limiter, whereby one of said feeders will be

rendered ineffective in advance of the other, substantially as specified.

10. In a weighing-machine, the combination with a bucket; of a supply-chute adapted for containing a mass of material; a feeder having an intermittent feeding movement for feeding a stream of material to the bucket, and also adapted when at rest, for cutting off the stream; actuating mechanism for actuating said feeder; a shifter for shifting the actuating mechanism out of operative relation with the feeder, and having a stop; and a limiter having a limiting-face adapted for limiting the shifting movement of said shifter by the contact of the shifter-stop with said limiting-face, and having also a stop-face adapted to receive the stop on the shifter for locking said shifter against return movement, and synchronously therewith rendering said feeder ineffective, for feeding said stream, substantially as specified.

11. In a weighing-machine, the combination with beam mechanism, and with a bucket supported thereon for ascending and descending movements, of a supply-chute; a feeder operative for feeding a stream of material from said chute and into the bucket; driving mechanism for said feeder; a slidable clutch member normally coöperative with said feeder and with the driving mechanism; a self-active shifter for engaging said slidable clutch member and normally effective for shifting said slidable member into an ineffective position; and means for limiting said shifting movement during the descent of the bucket.

12. In a weighing-machine, the combination with a bucket mechanism embodying two members, one of which is shiftable relatively to the other for discharging the bucket-load, of a hopper; a feeder for feeding therefrom a stream of material; a device for throwing said feeder out of action; a limiter supported independently of the feeder and shiftable member of the bucket mechanism for limiting the movement of said device; a shaft carrying said limiter; and a releaser device also carried by said shaft, and for releasing the shiftable member of the bucket mechanism.

13. In a weighing-machine, the combination with a bucket; of a supply-chute adapted for containing a mass of material; a feeder in position and adapted for feeding a stream of the material to the bucket; and means operative, respectively, with the feeder and with the closer for limiting the opening movement of the closer during the feeding movement of the feeder, and the feeding movement of the feeder during the bucket-discharge period, substantially as specified.

14. In a weighing-machine, the combination with a bucket having a closer; of a supply-chute adapted for containing a mass of material; a feeder in position and adapted for feeding a stream of material to the bucket; and two coacting stops, one operative with the feeder and the other operative with the closer, and each adapted to serve as a stop device for the other, substantially as specified.

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Witnesses:
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