

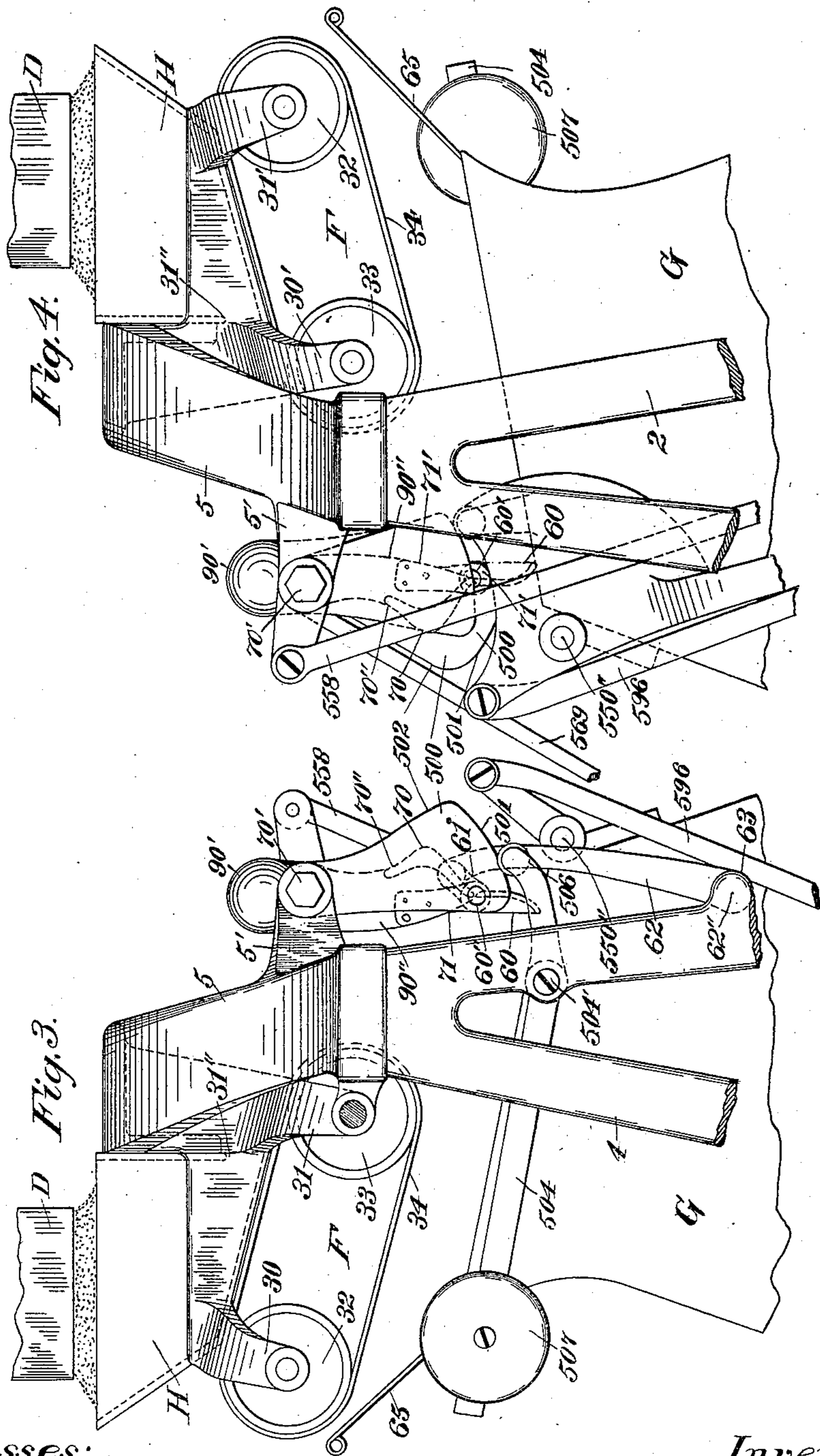
(No Model.)

5 Sheets—Sheet 2.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 565,221.

Patented Aug. 4, 1896.



Witnesses:

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

Inventor:

F. A. Richards.

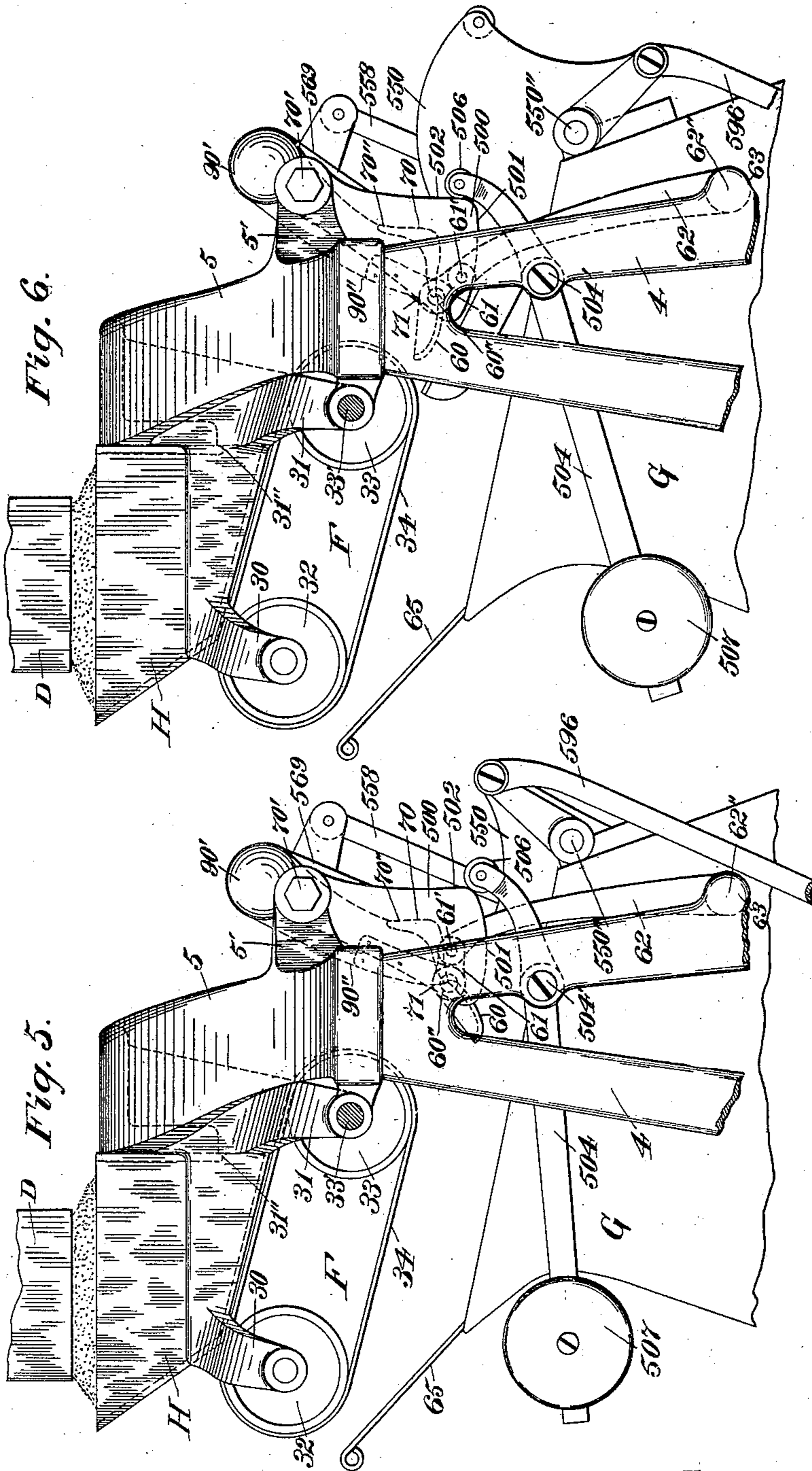
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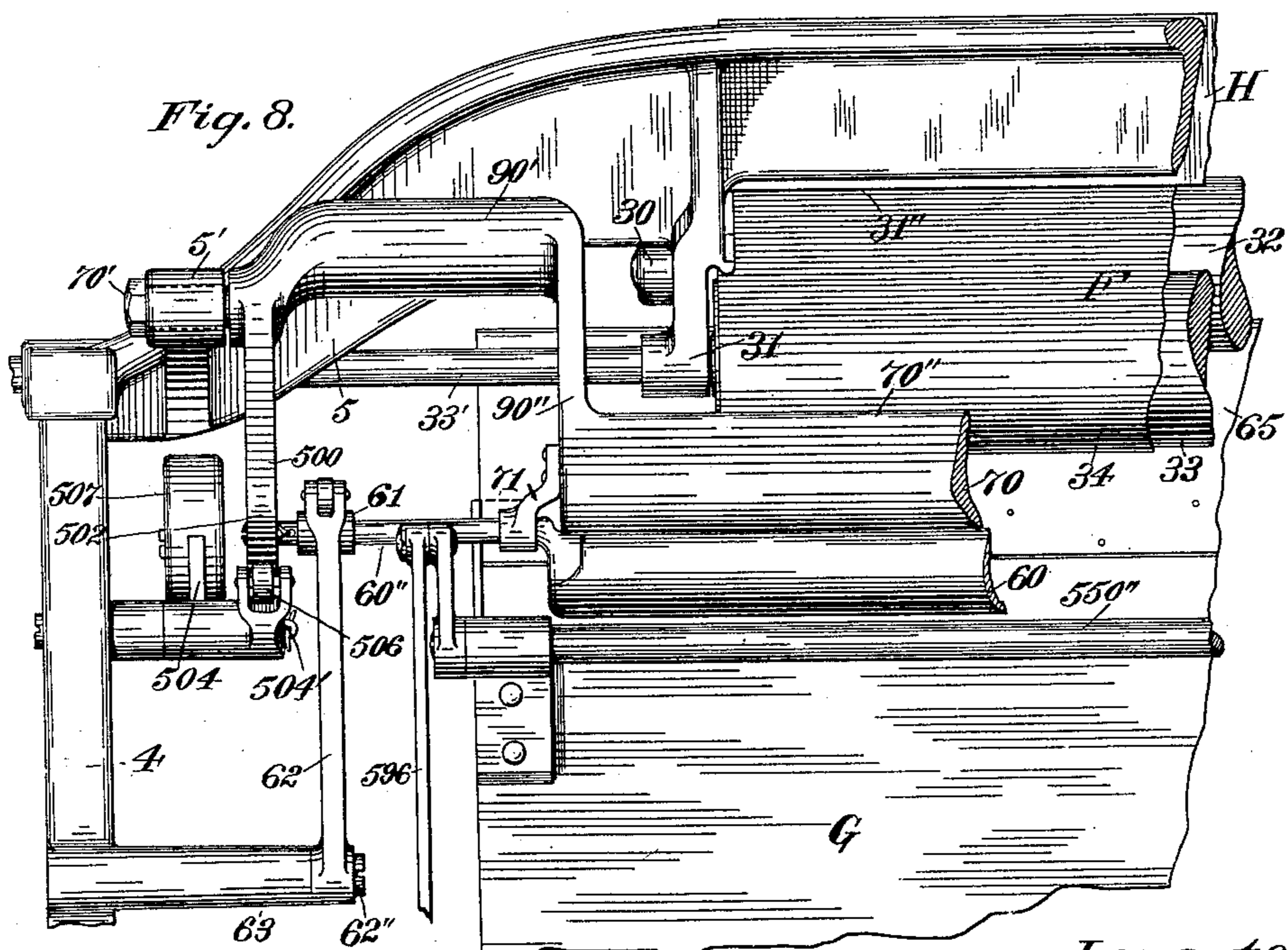
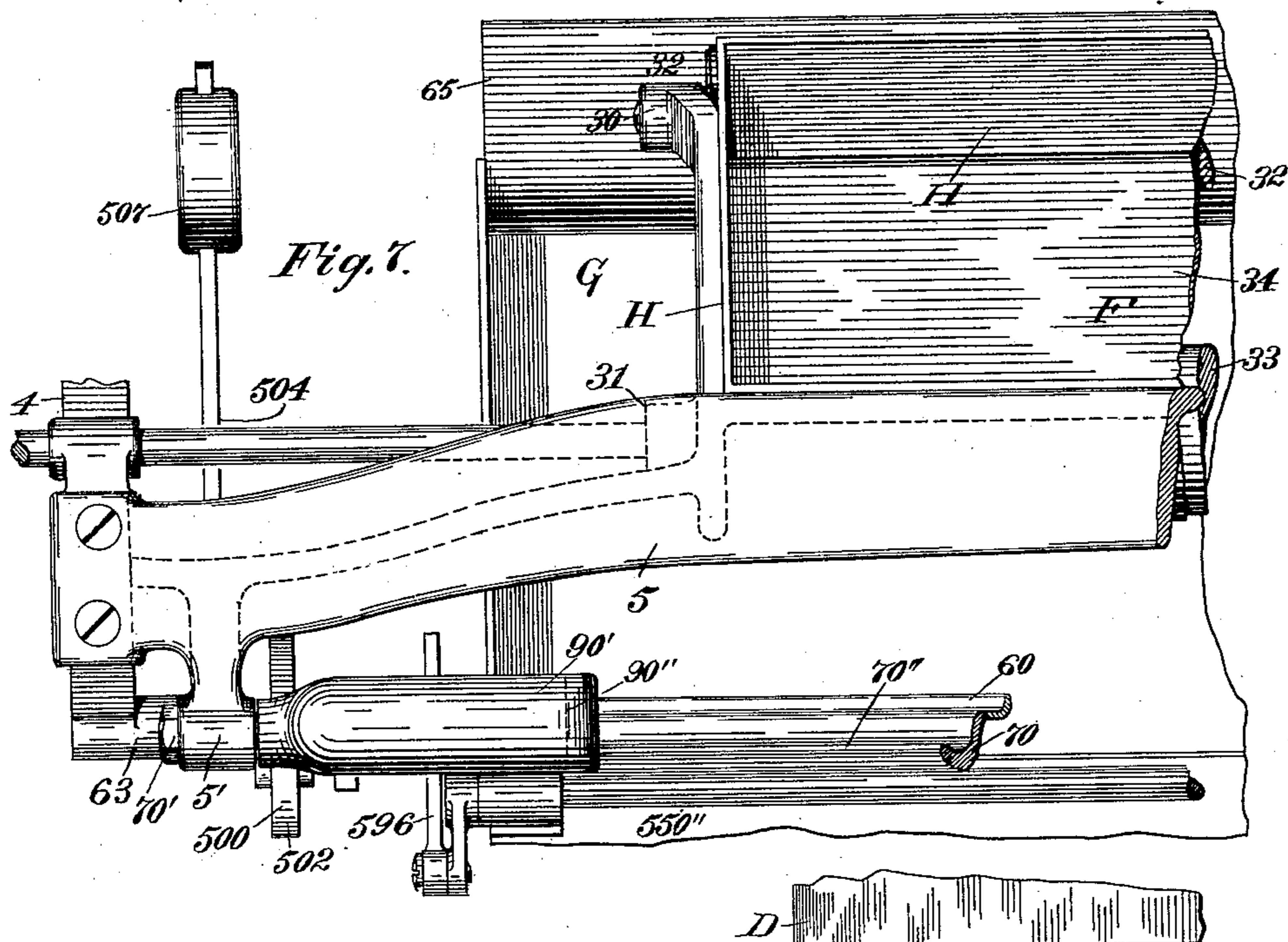
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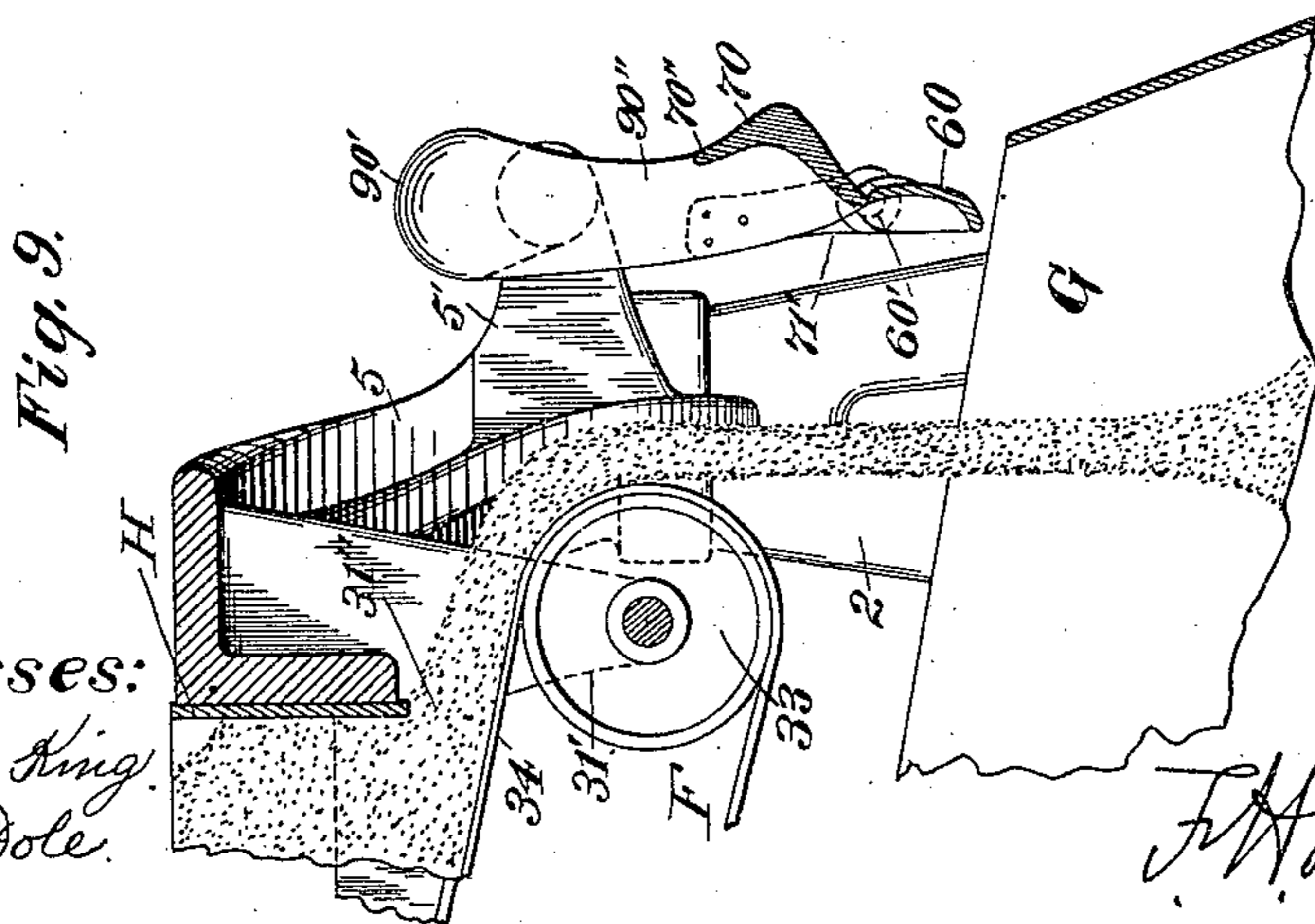
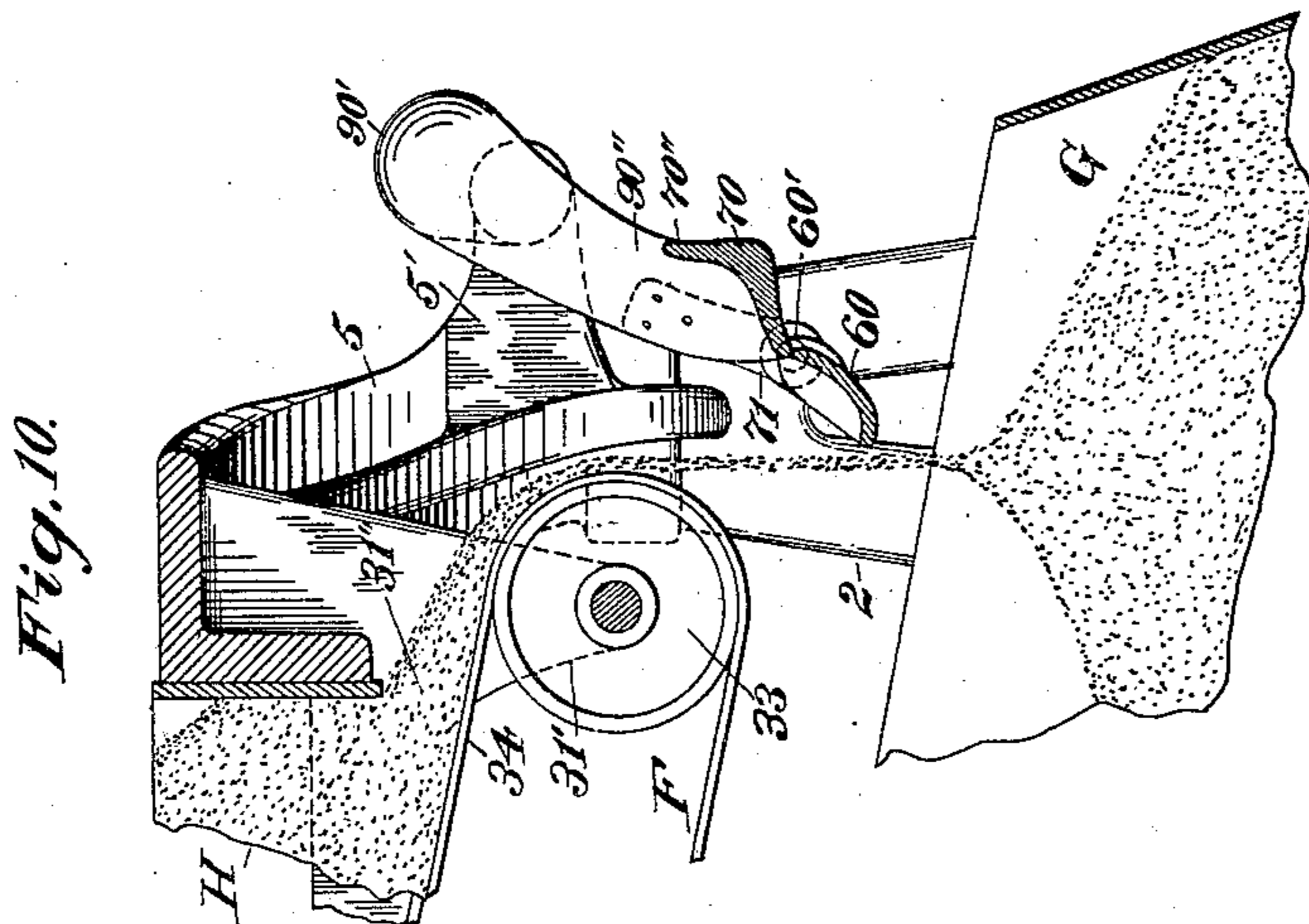
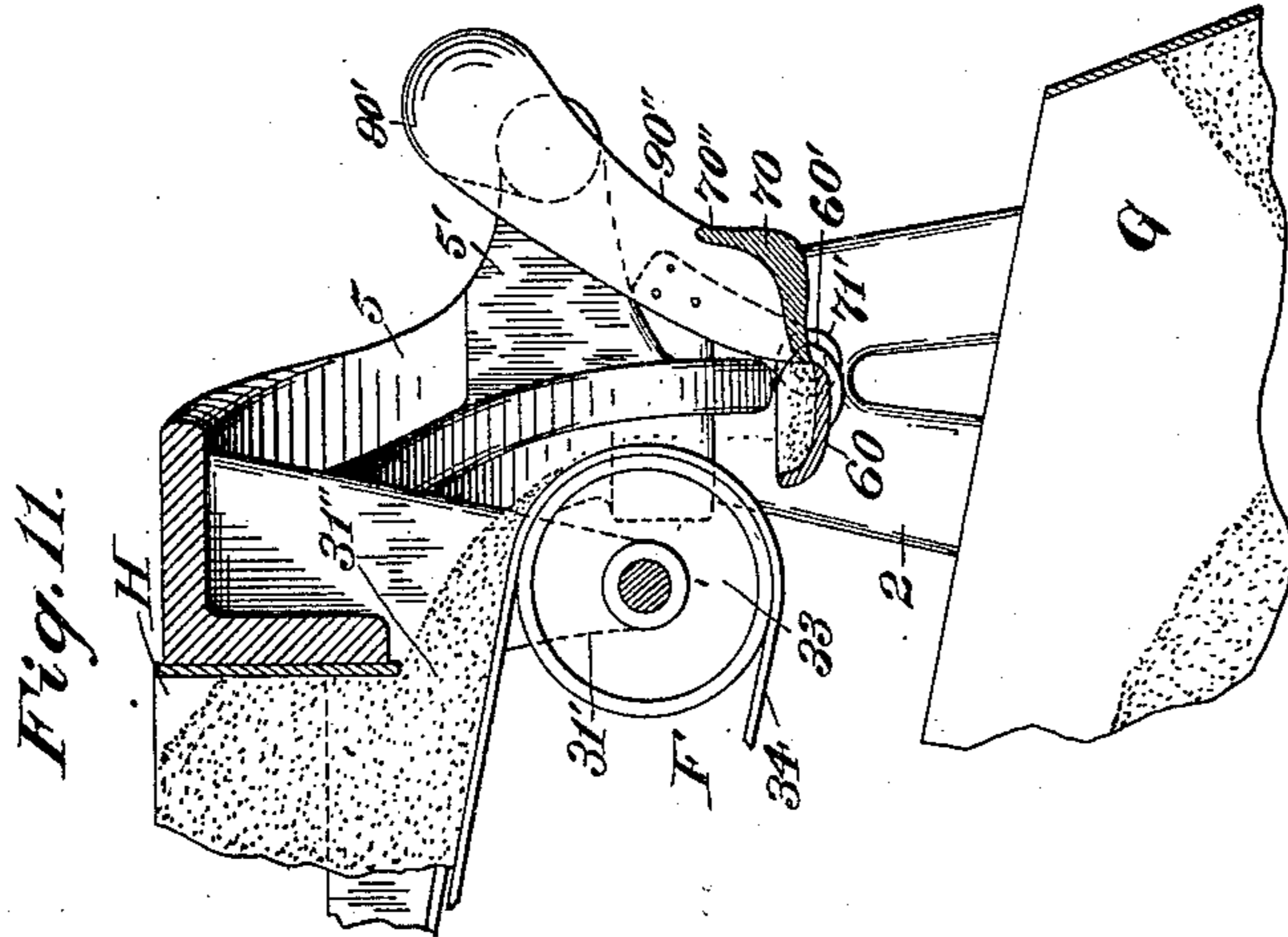
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 565,221, dated August 4, 1896.

Application filed December 9, 1895. Serial No. 571,523. (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 an improved organization of valve and valve-actuating mechanisms particularly adapted for use in connection with weighing-machines for weighing sluggish, lumpy, and other similar materials.

In the drawings accompanying and forming part of this specification, Figure 1 is an end elevation of a weighing-machine embodying my present improvements as seen from the left in Fig. 2, the valves being in a position to permit the flow of the full supply-stream into the bucket of the machine and the bucket-closer being illustrated closed. Fig. 2 is a rear elevation of the machine. Fig. 3 is an enlarged end elevation of the upper part of the machine as seen from the left in Fig. 2, the valves being in a position corresponding with Fig. 1. Fig. 4 is an enlarged end elevation of the upper part of the machine as seen from the right in Fig. 2, the valves being in a position corresponding, respectively, with Figs. 1 and 2. Figs. 5 and 6 are views similar to Fig. 3 and show two successive positions of the valves. Fig. 7 is a plan view of the left-hand portion of the machine. Fig. 8 is a rear elevation of the upper and left-hand ends of the machine. Figs. 9, 10, and 11 are detail views of the valves and certain adjacent parts of the machine, the valves being illustrated in cross-section and in three successive positions.

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

For convenience in illustrating the purpose and nature of my present improvements, these are shown embodied in a weighing-machine constructed in accordance with several Letters Patent granted to me, certain of which will be hereinafter specifically referred to by date and number, and said machine will be briefly described in connection with said improvements.

The framework for carrying the operative

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

The discharge-chute of an elevator apparatus is shown at D, delivering the material in the form of a stream to the supply-chute H, from whence it is directed to the bucket of the machine.

The base 3 is shown carrying suitable beam-supports—such as the V-shaped bearings 20 and 20'—for supporting the beam mechanism which supports 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 scale-beams are shown at B and B', respectively, pivotally mounted on the beam-supports 20 and 20'—as, for instance, by means of the pivots or knife-edges 24 and 24'. The scale-beams B and B', intermediate of said beam-supports, are illustrated carrying the bucket-supporting knife-edges 15 and 17, and the bucket G is shown carrying on each end thereof the hangers 555, which latter carry the V-shaped bearings 16, which are adapted to be pivotally supported by the pivots or knife-edges 15 and 17, carried by the beam mechanism.

The machine will have the usual poising and counterpoising mechanisms, all that part of the beam mechanism intermediate of the beam-supports, including the bucket mechanism, constituting the poising mechanism and all that part of the beam mechanism located outside of said beam-supports constituting the counterpoising mechanism.

The bucket mechanism will have alternate ascending and descending movements with the beam mechanism, for the purpose of receiving and discharging bucket-loads, and is shown consisting of two members, one of which is shiftable relatively to the other for discharging the bucket-load. The bucket-closer L, which controls the discharge of the bucket-load, is shown constituting the shift-

able member of the bucket mechanism, and is shown pivoted at 77, adjacent to one side of the discharge-opening of the bucket, and as having formed, preferably integral therewith, the counterweighted arm 79, which tends to return the bucket-closer to its closed position.

As a means for supporting the bucket-closer L, an inverted toggle is shown in the drawings operatively connecting the bucket-closer L with the bucket G. (See dotted lines, Fig. 1, and partially illustrated by the full lines in detail views, Figs. 3, 4, 5, and 6.) In the form shown this toggle comprises a rocker 550, pivoted adjacent to the upper rearward side of the bucket, the pivot being shown at 550'', and 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 596 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 the 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 contents will be carried 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 by 82, is shown herein pivoted on one end of the bucket G (see dotted lines, Fig. 1) and having a detent in position for engaging a cooperating detent carried by the rocker. In the form shown the closer-latch 82 swings upward to engage the detent on the rocker 550, and is released from engagement therewith by a downward movement or pressure thereon.

In weighing free-running materials in weighing-machines the valve which controls the flow of the supply-stream into the bucket is simply opened, when the material will gravitate into the bucket.

In weighing sluggish and lumpy materials considerable difficulty is encountered, owing to the inherent tendency of such materials to block and clog at the stream-controlling point, rendering it impossible to obtain a satisfactory drip-stream, which is a very important factor. To overcome these and other difficulties, I have devised several different forms of feeders, which feed or force the material to be weighed in a stream from the supply-chute and direct it into the bucket of the machine.

The form of feeder shown in the accompanying drawings, and which is designated by F, is substantially similar to the feeder disclosed and claimed in a concurrently-pending application filed by me November 21, 1895, Serial No. 569,627. The feeder shown in said application has a feeding movement of variable efficiency. Commencing with each operation of the machine said feeder will have a relatively rapid or accelerated movement,

which is progressively decreased as the bucket descends, the result being at first the forcing or feeding into the bucket of a stream of relatively large volume, which is progressively diminished as the bucket descends. On the completion of the bucket-load the feeder movement will be stopped, the consequence being a stoppage of the fed or forced stream. Any suitable means for securing this variable movement of the feeder may be employed.

The supply-chute H is illustrated carrying bearings 30 and 30' and 31 and 31', in which are shown journaled, for rotative movement, the shafts 32' and 33' of the rolls 32 and 33, which are connected by a belt 34, underlying the supply-chute and preferably in close relation therewith. The rolls 32 and 33 and connecting-belt 34, which may be of canvas, leather, or other suitable material, constitute the feeder. The direction of movement of the belt 34 is indicated by the arrow in Fig. 1, and on the movement of the belt 34 in the direction indicated a stream of material will be fed or forced from the supply-chute H through the supply orifice or opening 31'' and into the bucket G. The shaft 33' of the roll 33 is shown extending beyond the frame of the machine, and this shaft may be operated by any suitable speed-modifying apparatus, as above set forth. On the stoppage of the feeder, which is at the close of the poising period—that is, on the completion of the bucket-load—there will remain on the feeder, between the supply-chute and the outer edge of the former, a relatively small quantity of the mass, which, in practice, is projected into the already-loaded bucket, the consequence being an overloading of the machine. For catching this last part of the supply-stream, or what is termed the "drizzle" or "spray," my invention contemplates the employment of a drizzle-catcher, which is supported by a suitable carrier and which is normally located away from the line of flow of the supply-stream, but which is, at the proper point in the operation of the machine, by proper mechanism, so projected as to intersect the line of flow of the supply-stream, thereby catching the drizzle or spray mentioned and preventing its flow into the bucket.

The drizzle-catcher carrier is designated by 70.

The top plate 5 of the machine is shown carrying the projecting arms 5', between which is illustrated, pivoted for oscillatory movement, the balance-weight 90' of the carrier 70, and said balance-weight 90' is shown carrying the hangers 90'', which latter support the carrier 70, these parts being preferably formed integral, the balance-weight 90' tending normally to maintain said carrier 70 in a vertical position, as indicated in Fig. 9, so that the same will have no tendency in itself to move in either direction.

It will be observed that the pivot or center of motion 70' of the carrier is located rela-

tively remote from the supply-chute, so that the same will be thereby normally held away or at some distance from the supply-stream.

The drizzle-catcher is shown at 60, and is in the nature of a valve, and will be shiftably supported by the carrier 70 for a purpose to be hereinafter described. The carrier 70 is illustrated carrying on the end walls thereof the bearings 71 and 71', (shown most clearly in Fig. 2,) in which are shown journaled the laterally-extending arms 60' and 60'', carried by the drizzle catcher or valve 60, the latter of said arms being extended for some distance and shown also as journaled in the cam 500.

As a means for moving the carrier 70 toward the supply-stream, also termed the "closing movement" thereof, I prefer to employ mechanism substantially similar to that disclosed in Letters Patent No. 548,843, granted to me October 29, 1895, to which reference may be had for a more particular description thereof, and which will now be briefly described. A depending cam is shown at 500, operative with the carrier 70, being illustrated as carried by the balance-weight 90'. The cam 500 is illustrated having formed thereon the connected cam-faces 501 and 502, the latter being of relatively greater power or efficiency than the former, which cam-faces are in position to be engaged by an actuator 504. This actuator is shown as a counter-weighted lever pivoted at 504' to the side frame 4 and having the weight 507 thereon forward of the pivot thereof, said weight being preferably adjustable along said lever to adapt the same to varying conditions. The lever 504, to the rear of the pivot thereof, is shown carrying an antifriction-roll 506, adapted to engage one or the other of the cam-faces 501 and 502 of the cam 500.

During the first part of each operation of the machine the antifriction-roll will ride along the cam-face 501, thereby moving the carrier 70 slowly toward the supply-stream. At the close of the poising period the roll 506 will be at about the intersection of the cam-faces 501 and 502, the carrier 70 being held against further movement at this time to permit the flow of the drip-stream into the bucket G. At the close of the poising period the carrier 70 will be released and the antifriction-roll 506, leaving the cam-face 501, will engage the cam-face 502 of relatively greater efficiency, thereby quickly projecting said carrier toward the line of flow of the supply-stream.

It will be remembered that my present improvements embody, in part, a carrier and a drizzle-catcher, which is shiftably supported thereby. The drizzle-catcher 60, which is shown concaved, is normally located out of line with and below the carrier 70, but at the close of the poising period—that is to say, when the feeder has been stopped on the completion of the bucket-load—the former will be quickly shifted relatively to the carrier 70 for the purpose of catching the drizzle or spray

from the feeder and for preventing its entrance into the bucket G.

As a means for shifting the drizzle-catcher relatively to the carrier 70, a toggle or toggle connection, independent of the latter, will connect the former with some part of the machine, (herein illustrated as a fixed part thereof,) so that when the carrier is shifted the drizzle-catcher 60 will have a shifting movement relatively thereto. It will be remembered that one of the supports of the said drizzle-catcher has been described as an extended arm 60'', said arm 60'' being journaled in the cam 500. The arm 60'' is illustrated carrying at a suitable point thereon the crank-arm 61, which constitutes one member of a toggle. The other member of the toggle is shown as the connecting-link 62, which is pivotally connected with the arm 61 at 61' and at 62'' with the projection 63, carried by the side frame 4 of the machine. During the reducing period (see Fig. 3) the antifriction-roll 506 of the actuating-lever 504 will be in engagement with the cam-face 501, and it will be observed on reference to said figure that at this point the toggle-pivot 61' is located above the toggle-pivots 60'' and 62''.

As the carrier 70 closes or moves toward the line of flow of the supply-stream the drizzle-catcher valve 60 is of course carried therewith. During the reducing period the volume of the supply-stream will be progressively decreased as the speed of the feeder is likewise reduced, and the drizzle catcher or valve 60 will be located transversely of and below the carrier 70. As hereinbefore stated, both of said members will be located away from the line of flow of the supply-stream, to thereby permit the vertical descent of said stream without obstruction into the bucket. As the carrier 70 moves toward the supply-stream, the drizzle-catcher 60 will have a slow shifting upward movement relatively thereto, due to the resistance of the toggle member 62, which is in the nature of an actuator independent of the actuating mechanism for the carrier 70, and, as hereinbefore stated, is pivotally supported by a fixed part of the machine. This slow movement is imparted by the actuator 504, the antifriction-roll 506 of which is on the cam-face 501 of the cam 500. At the commencement of the poising period (see Fig. 5) the roll 506 will be at the intersection of the two cam-faces of the cam 500, and though the two members 70 and 60 have not yet intersected the line of flow of the supply-stream the latter is then relatively reduced—being in the form of a drip-stream—and is relatively adjacent to but not in contact with said stream. This drip-stream will flow into the bucket for a short period of time for the purpose of completing the bucket-load. On the completion of the bucket-load the bucket will descend below the poising-line, this action releasing the carrier 70. When the said carrier 70 is released, the actuator 504, through the roll 506, leaving the cam-face

501 and engaging the cam-face 502, quickly closes the same and simultaneously therewith the drizzle catcher or valve 60 is projected upwardly by the actuator or toggle member 62, this action throwing the toggle-pivots 60'', 61', and 62'' approximately into line. (See Fig. 6.) On the projection of the drizzle catcher or valve 60 in the manner indicated said drizzle-catcher valve catches the drizzle or spray which drops from the feeder succeeding the stoppage thereof.

In weighing coal it sometimes happens that several lumps drop into the drizzle-catcher 60. In such event these will be directed away from the discharge edge thereof, and by the latter into the carrier 70. On the other hand, if the machine is weighing materials of a finer nature, but more sluggish than coal, the spray is caught by the valve 60 and directed toward the carrier 70, the latter acting in the nature of a scatter-guard, and being provided with a transverse wall 70'' to further prevent the entrance of the spray or drizzle into the bucket G.

To prevent wasting and scattering of the material, a scatter-guard is provided, and such a guard is shown at 65 obliquely disposed relatively to the bucket and carried by the front wall thereof, being secured thereto in some suitable manner. This guard 65 is also shown projecting a slight distance beyond the feeder, so that if any of the material falls from the feeder it will drop on said guard and therefrom into the bucket on the mass already therein.

As a means for actuating the carrier 70 to move the same away from the line of flow of the supply-stream I prefer to employ valve-actuating mechanism substantially similar to that disclosed in Letters Patent No. 548,839, granted to me October 29, 1895, to which reference may be had, and which will now be described.

The carrier 70, which is also in the nature of a valve, is shown having a connecting-rod 558 pivotally secured to the upper rearward portion thereof, and having the lower end of said rod in position to be engaged by an actuator, which will now be described, said connecting-rod 558 being also shown having a pivotal connection by means of a guide-link 559 with a relatively-fixed portion of the machine.

The scale-beam B is illustrated carrying a counterpoised lever 551, pivoted at 551' between the bucket-supports. (See dotted lines, Fig. 1, and full lines, Fig. 2.) This counterpoised lever exerts its force on the counterpoising mechanism, being held in its normal position by the stop 551'' engaging the beam B. This counterpoised lever 551 is adapted, at a predetermined point in the operation of the machine, to have the effective force transferred from the counterpoising to the poising mechanism of the machine, and is also adapted, on the return stroke thereof, for engaging the connecting-rod 558, to thereby impart an

upward thrust to the same, whereby the carrier 70 and thereby the drizzle-catcher or valve 60 will be moved away from the line of flow of the supply-stream to again permit the unobstructed flow of the same into the bucket. Hence it will be evident that for actuating these members to open the same a two-stroke actuator is provided, which is effective on one of said strokes for actuating the same. On the return stroke of the shiftable member 551 an upward thrust is imparted to the connecting-rod 558, and these members 60 and 70 will thereby be moved away from the line of flow of the supply-stream. As the carrier 70 is thus moved the valve 60, which is in line therewith when these are closed, will also be carried therewith. On the first movement of the carrier 70 the toggle-pivots 61', 60'', and 62'' are thrown out of line to the position indicated in Fig. 5, and on the continued movement of the carrier the toggle member 62, serving as a valve-actuator and acting as a fixed resistant, tends to rock the crank-arm or toggle member 61, thereby shifting or moving the drizzle-catcher valve 60 out of line with the carrier 70, this action continuing until the latter is in its normal position, as indicated in Fig. 3.

At a predetermined point in the closing movement of the carrier 70 or at the commencement of the poising period the roll 506 of the lever 504 will be at the intersection of the cam-faces 501 and 502. At this point the carrier 70 and valve 60 will be held against further movement to permit the unobstructed flow of the drip-stream into the bucket for the purpose of completing the bucket-load therein. A stop-arm is illustrated at 569, carried by the carrier 70. This stop-arm 569, which is oscillatory with said carrier 70, is in position to be engaged by a cooperating stop carried by the poising mechanism. (Herein illustrated as the bucket-hanger 555.) The cooperating stop for this purpose is shown as a by-pass stop, supported for oscillatory movement, a suitable stop being employed for maintaining the same in operative position. The length of the vertical arm of the by-pass 570 is such, relative to the stop-arm 569, that the former will, at the commencement of the poising period, engage said stop-arm 569, and at the close thereof, due to the descent of the bucket below the poising line, said stop-arm 569 will be released, this action also releasing the carrier 70, whereby the latter may be moved toward the line of flow of the supply-stream. On the return stroke of the stop-arm 569 this will engage the vertical arm of the by-pass 570 and oscillate the by-pass about its pivot, and will be thereby permitted to resume its normal position, as indicated in Fig. 1. When the stop-arm 569 has passed said by-pass 570, the latter, being counterweighted, will drop to its normal position.

As a means for releasing the shiftable member of the bucket mechanism, which has been hereinbefore described as the "bucket-closer"

L, I prefer to employ an actuator or releaser device operative by the power of the moving carrier 70.

It will be remembered that a latch 82 has been described as normally holding the bucket-closer L against opening movement by engaging the toggle member 550 of the bucket-supporting means, and it will also be remembered that said latch has been described as having a downward movement for disengaging the same from said toggle member. Said latch is shown (see dotted lines, Fig. 1, and full lines, Fig. 2) provided at the rear of the pivot thereof with a stop-pin 82', the purpose of which will now be described.

It will be remembered that the carrier 70 has been described as carrying a long connecting-rod 558. This connecting-rod is shown provided at a proper point thereon with a latch actuator or releaser device 88. The connecting-rod 558 on the closing movement of the carrier 70 will have a descending movement therefrom. At the commencement of the poising period the carrier 70 will be held against further movement in the manner hereinbefore described. When said carrier 70 is so held, the releaser device 88 will be adjacent to the stop-pin 82', carried by the latch 82. When said carrier has been released and is closing, the releaser device 88 will be projected downward into contact with the stop-pin 82', thereby depressing the latch 82 and disengaging the same from the toggle member 550, at which time the bucket-closer L will be free of all restraint, and the mass of material in the bucket pressing against the same will open the latter for discharging the bucket-load.

The operation of a weighing-machine embodying my present improvements, briefly described, is as follows: With the parts in their normal positions, as indicated in Figs. 1, 2, 3, and 9, the carrier 70 and drizzle-catcher 60 are located at some distance away from the supply-stream, to thereby permit the unobstructed flow of the same into the bucket G. When a certain proportion of the bucket-load has been received by the bucket, this tends to descend, the beam mechanism, of course, descending therewith, the shiftable member 551 thereon also falling slowly from under the connecting-rod 558, permitting a slow-closing movement of the carrier 70 and the supported drizzle-catcher 60 by the actuator 504, engaging and riding over the cam-face 501 of the valve-closing cam 500. During this period of the operation of the machine the volume of the supply-stream is being gradually reduced by the slackening in speed of the feeder. At the commencement of the poising period the supply-stream will have been materially reduced, but the members 60 and 70 will not be in contact therewith. At this point in the operation of the machine the antifriction-roll 506 of the lever 504 will be at the intersection of the cam-faces 501 and 502 of the cam 500, and

the carrier 70, and thereby the drizzle-catcher 60, will be held against further movement by the engagement of the by-pass stop 570 with the stop-arm 569, which is operative with said carrier 70. The drip or reduced stream will then flow unhindered into the bucket for the purpose of completing the bucket-load therein. On the completion of the bucket-load the bucket will descend below the poising-line, this action releasing the stop-arm 569 and thereby the valve-carrier 70. When the latter is released, the roll 506 of the valve-closing lever 504, leaving the cam-face 501, will engage the cam-face 502 with relatively greater efficiency, thereby projecting the carrier 70 in a forward direction; and during this operation the drizzle-catcher 60 will be shifted relatively to the carrier 70 and into line therewith by the straightening of the toggle members 61 and 62, so that said drizzle catcher or valve 60 may catch the drizzle or drip from the feeder F on the stoppage thereof, thereby preventing the same from dropping into the loaded bucket. On the closing movement of the carrier 70 the connecting-rod, and also the actuator 88, will have a descending movement therefrom. At the commencement of the poising period the actuator 88 will be adjacent to the stop-pin 82', carried by the latch 82. When the carrier 70 is released, this actuator is thereby projected downwardly, and succeeding the catching of the drizzle by the drizzle catcher or valve 60 depresses said latch 82 and disengages the same from the toggle member 550, thereby freeing the closer L of all restraint. At this point in the operation of the machine the mass of material in the bucket, resting against the bucket-closer L, will force the same open for discharging the bucket-load.

Having thus described my invention, I claim—

1. The combination with a bucket and with a power-driven feeder for supplying a stream of material thereto, of a carrier; a drizzle-catcher shiftable supported by said carrier; mechanism for actuating the latter; and an independent, movably-supported device directly connected to said drizzle-catcher and to a fixed part of the machine for effecting a shifting movement of said drizzle-catcher.

2. In a weighing-machine, the combination with a pair of connected members, one of which constitutes a carrier, and the other a drizzle-catcher shiftable supported thereon; of a toggle for actuating the drizzle-catcher, one arm of said toggle being supported by a fixed part of the frame, substantially as and for the purpose specified.

3. In a weighing-machine, the combination with a pair of connected members, one of which constitutes a carrier, and the other a drizzle-catcher shiftable supported thereon; of a toggle connected to the drizzle-catcher and with a fixed part of the machine; and mechanism for actuating the carrier.

4. In a weighing-machine, the combination with a bucket, and with a power-driven feeder for supplying a stream of material thereto; of two connected members, one of which constitutes a carrier and the other a drizzle-catcher, and which are both normally located away from the line of out of the path of, and away from flow of said stream of material; and mechanism for actuating said members for moving them toward the line of flow of said stream.

5. In a weighing-machine, the combination with a bucket, and with a power-driven feeder for supplying a stream of material thereto, of a carrier and a drizzle-catcher supported thereby, both of which are normally located out of the path of, and away from the line of flow of said stream; mechanism for moving the same toward the line of flow of said stream; and means operating to hold said carrier and thereby the drizzle-catcher adjacent to, but not in contact with, said stream at a predetermined point during said movement; and an actuator for shifting said drizzle-catcher relatively to the carrier.

6. The combination with a power-driven feeder, of a carrier having a cam operative therewith; means for engaging said cam to thereby actuate said carrier; a drizzle-catcher shiftably supported by said carrier and having an extended arm supported by said cam; and a direct connection between said drizzle-catcher and a fixed part of the machine for shifting said drizzle-catcher relatively to the carrier.

7. The combination with the machine-frame having projecting arms, of a bucket, a power-driven feeder for supplying material thereto;

a carrier mounted for oscillatory movement between said arms, and thereby normally held away from, and out of the path of, the line of flow of the supply-stream; a drizzle-catcher movably connected to said carrier and also located out of the path of and away from the line of movement of said supply-stream; and means for actuating said members to throw them toward the line of flow of said supply-stream.

8. The combination with a bucket, of a power-driven feeder operable for feeding a stream of material into said bucket; a suitably-supported carrier having a drizzle-catcher movably connected thereto, both of which members are normally held relatively remote from said feeder; and means for operating said carrier and drizzle-catcher, whereby the last-mentioned member is caused to intersect the line of flow of said stream to catch the dropping particles from the feeder.

9. The combination with a bucket and with a power-driven feeder for supplying a stream of material thereto, of a carrier normally held away from, and out of the path of flow of, said stream and having a transverse wall, said carrier also constituting a scatter-guard; a drizzle-catcher movably connected to said carrier and also held in such position; and means for simultaneously operating said carrier and drizzle-catcher, whereby the latter is caused to intersect the line of flow of said stream to catch the dropping particles from the feeder and to also direct the same to said carrier.

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