

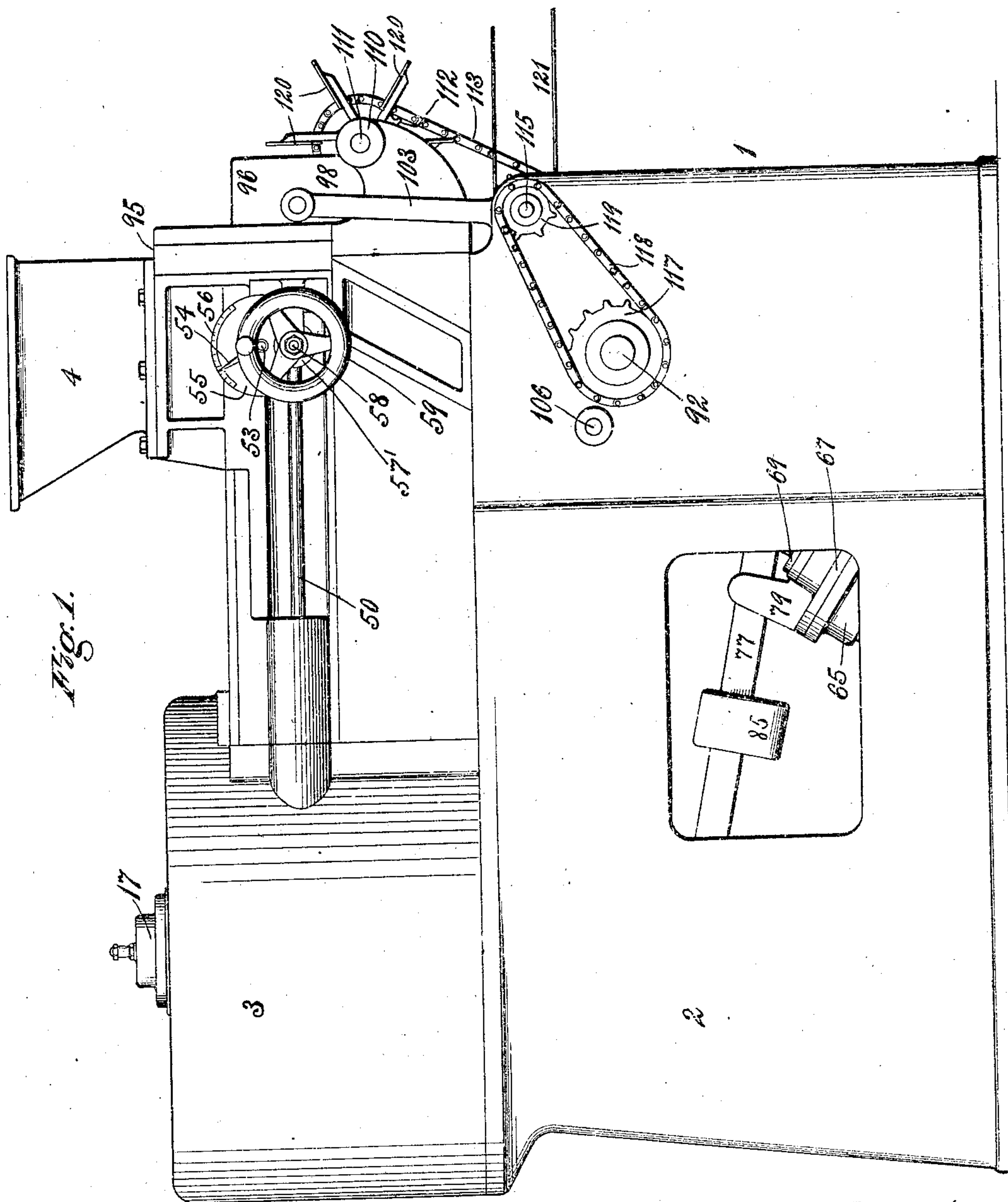
No. 836,787.

PATENTED NOV. 27, 1906.

C. A. THOMSON & V. PENNINGTON, JR.  
MACHINE FOR DIVIDING MEASURED CHARGES FROM A MASS OF MATERIAL.

APPLICATION FILED MAY 22, 1906.

5 SHEETS—SHEET 1.



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6 SHEETS—SHEET 2.

Fig. 2.

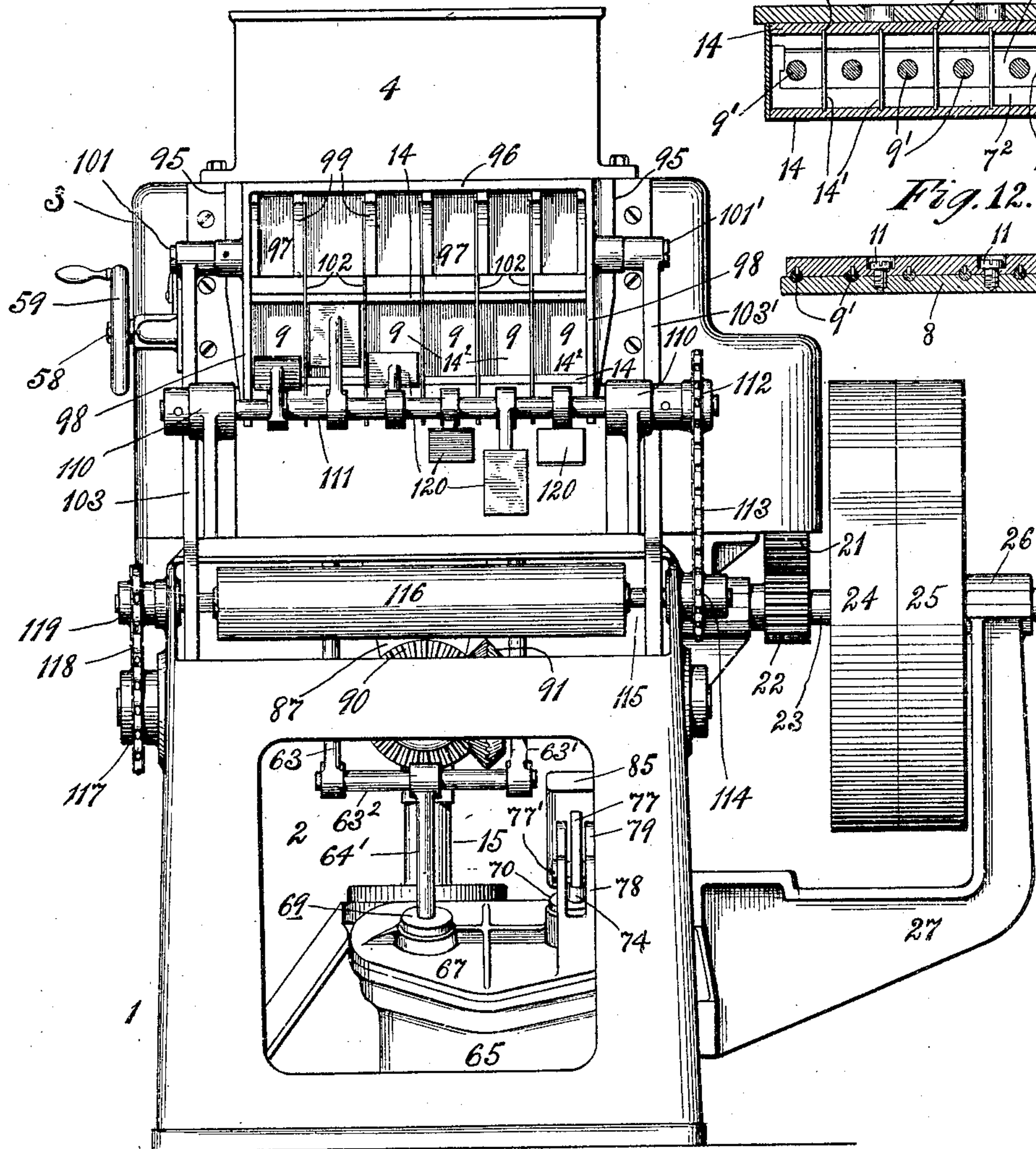


Fig. 11.

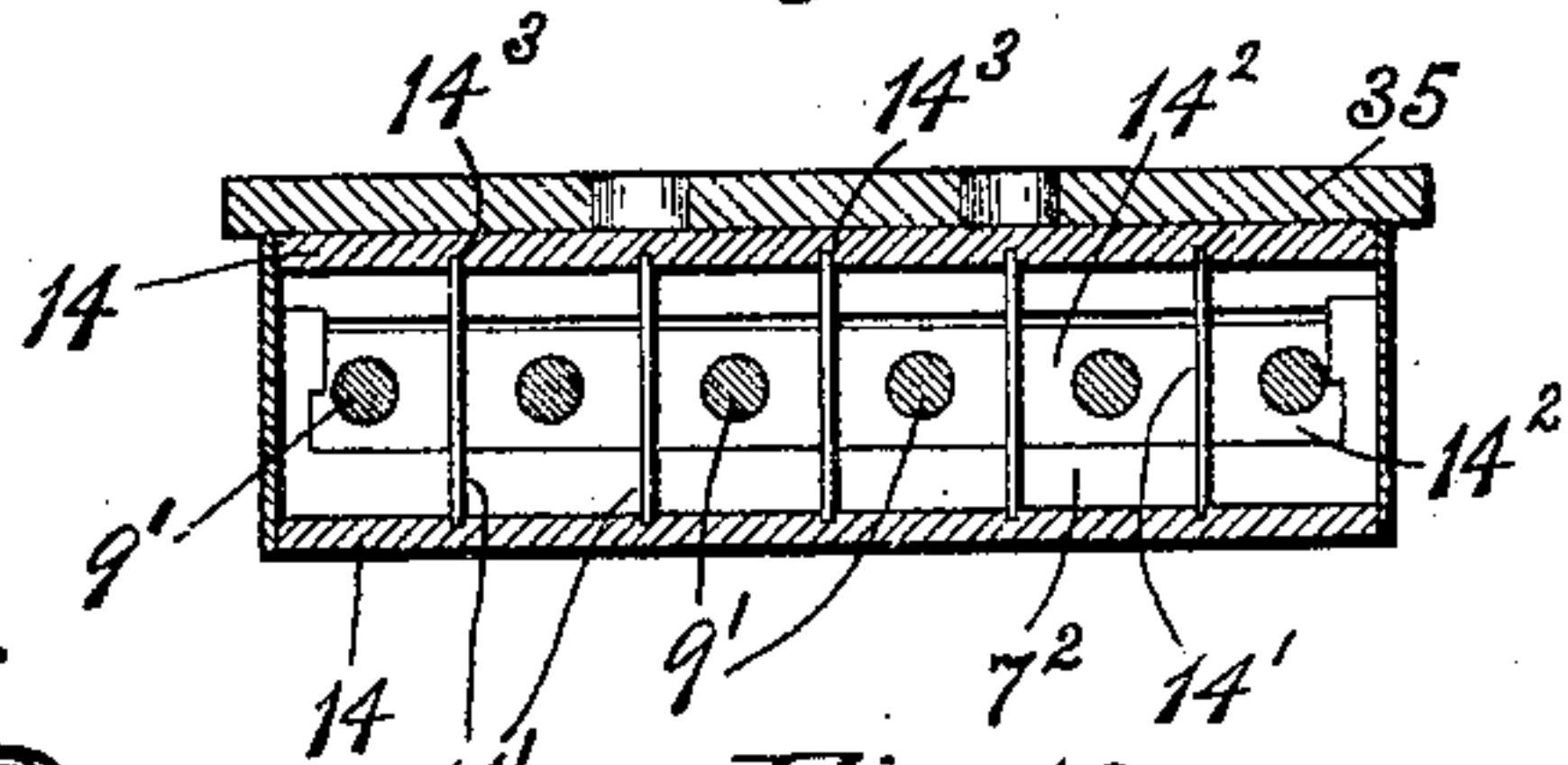
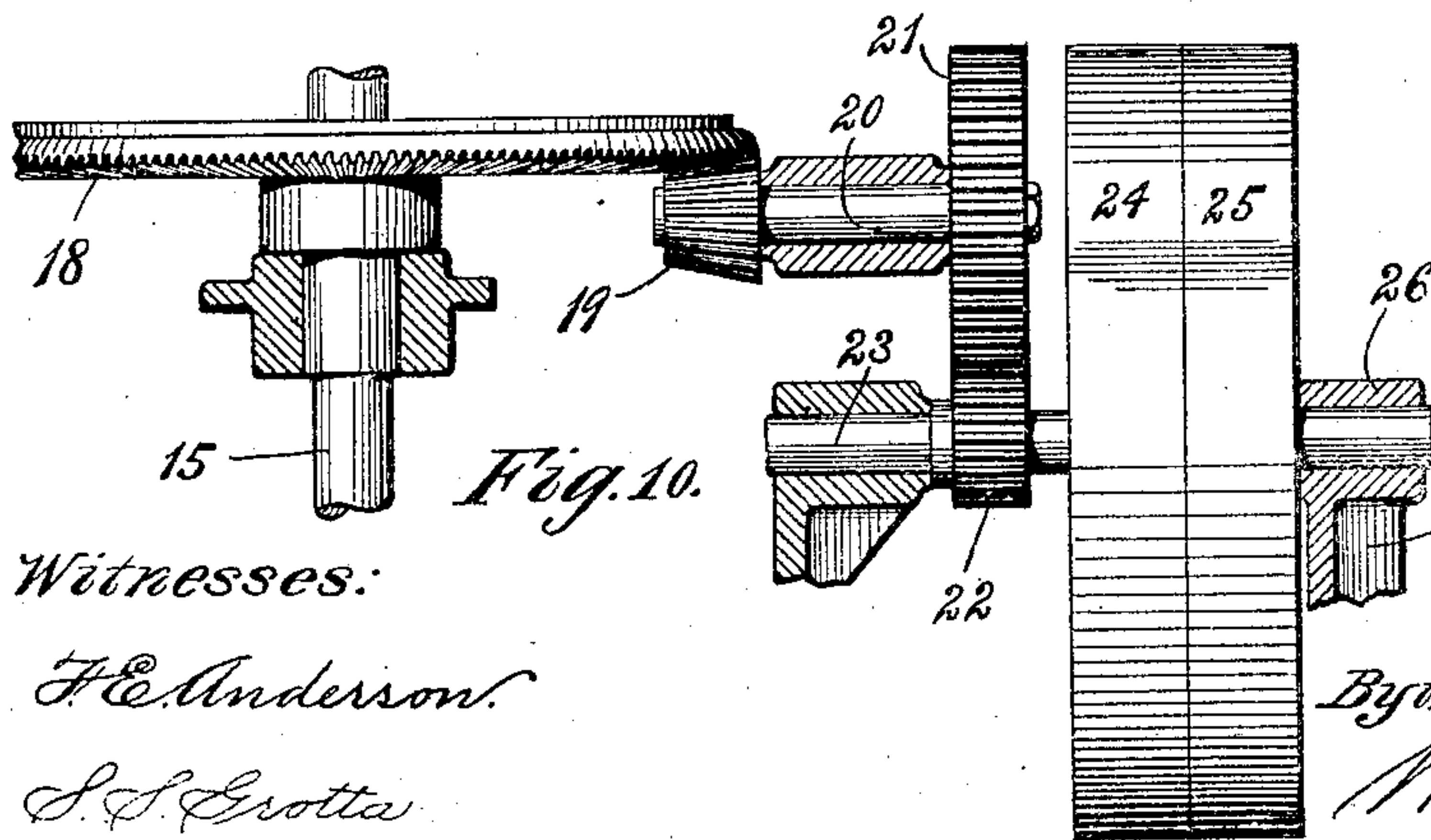
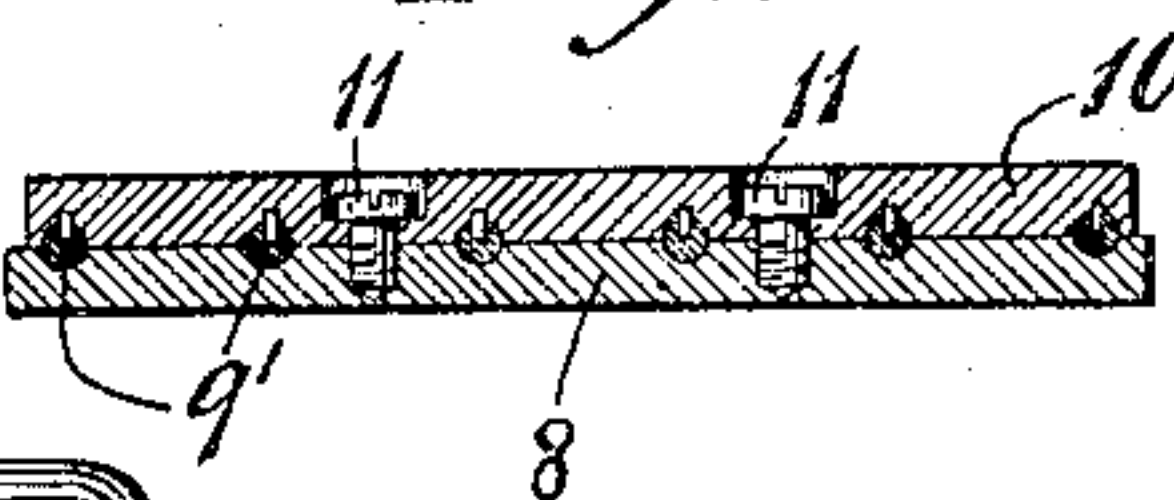


Fig. 12.



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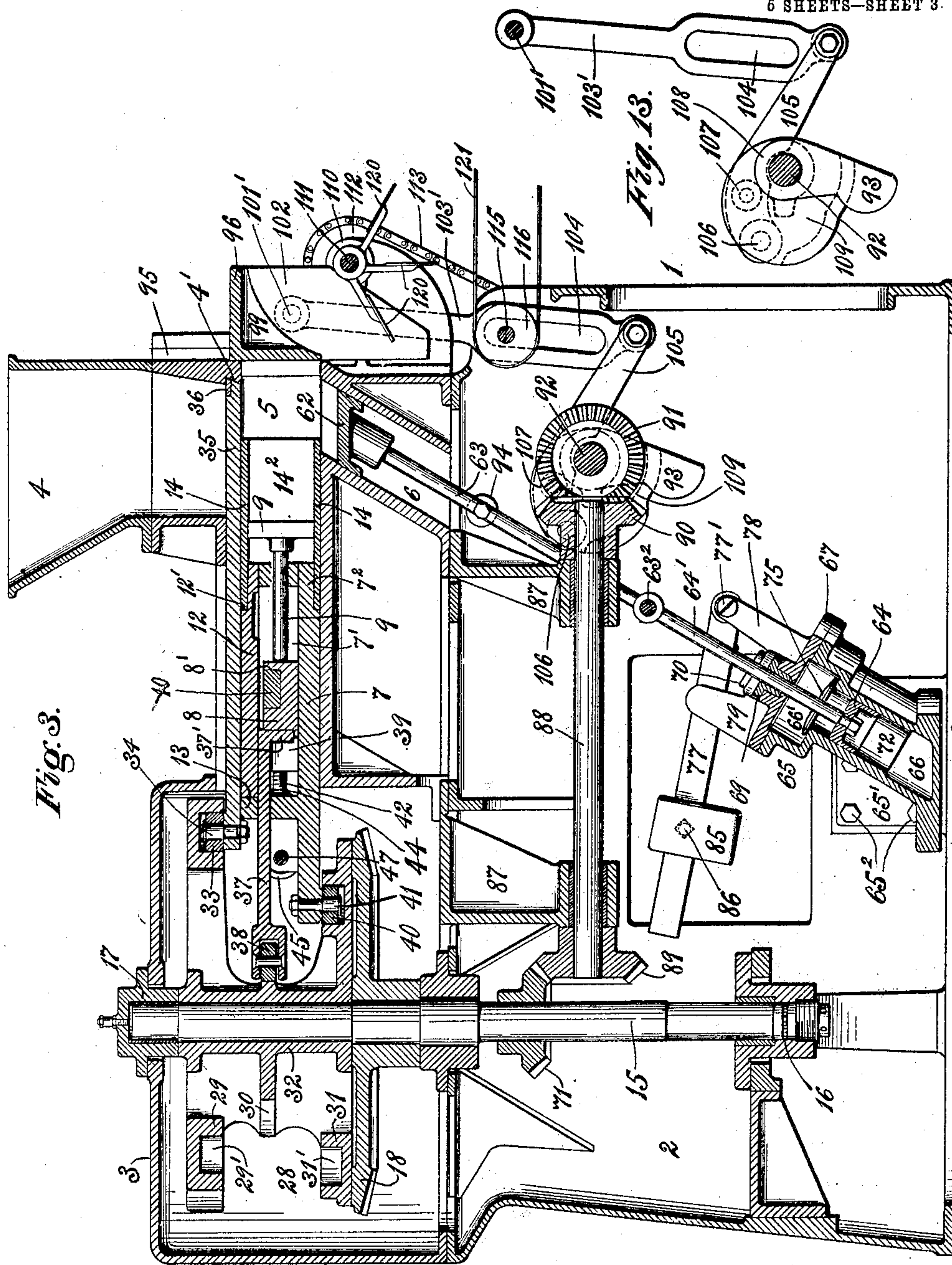
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5 SHEETS—SHEET 3.



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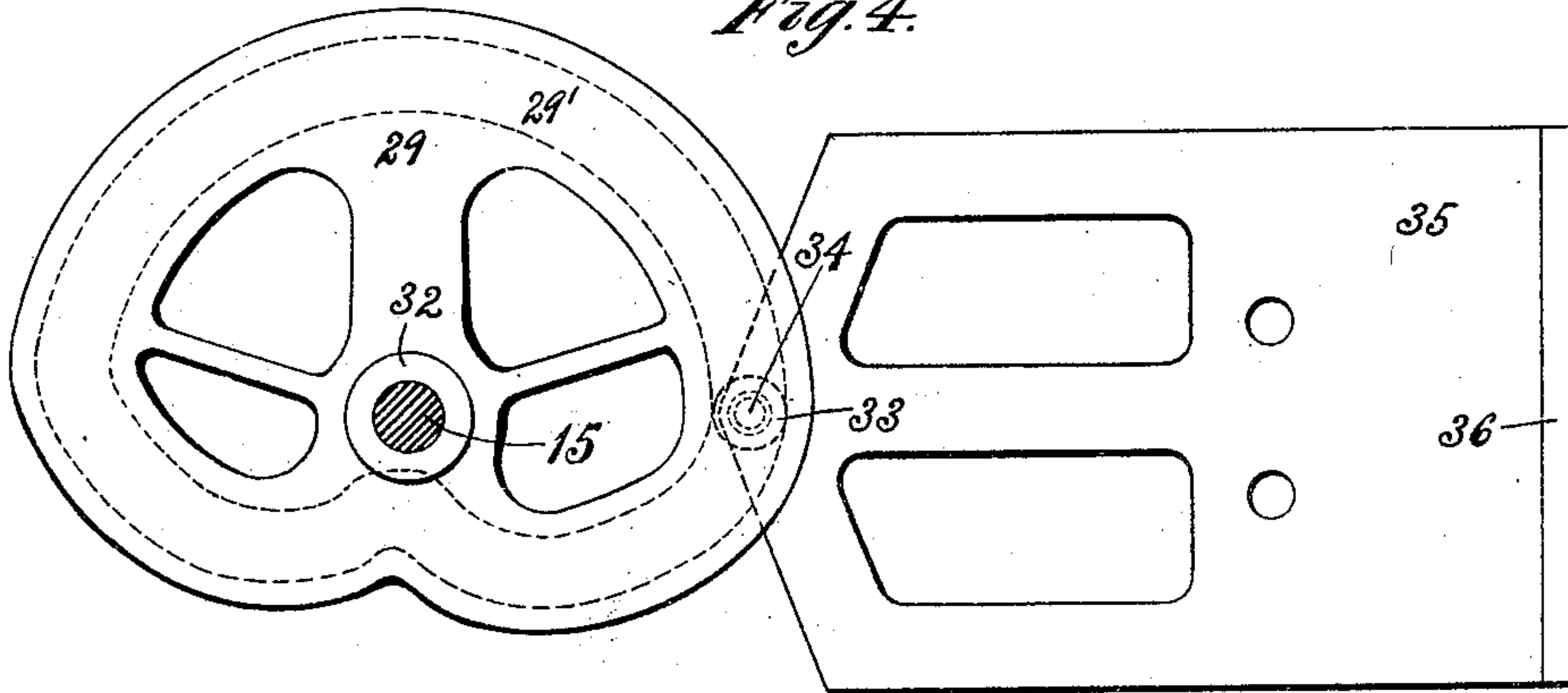
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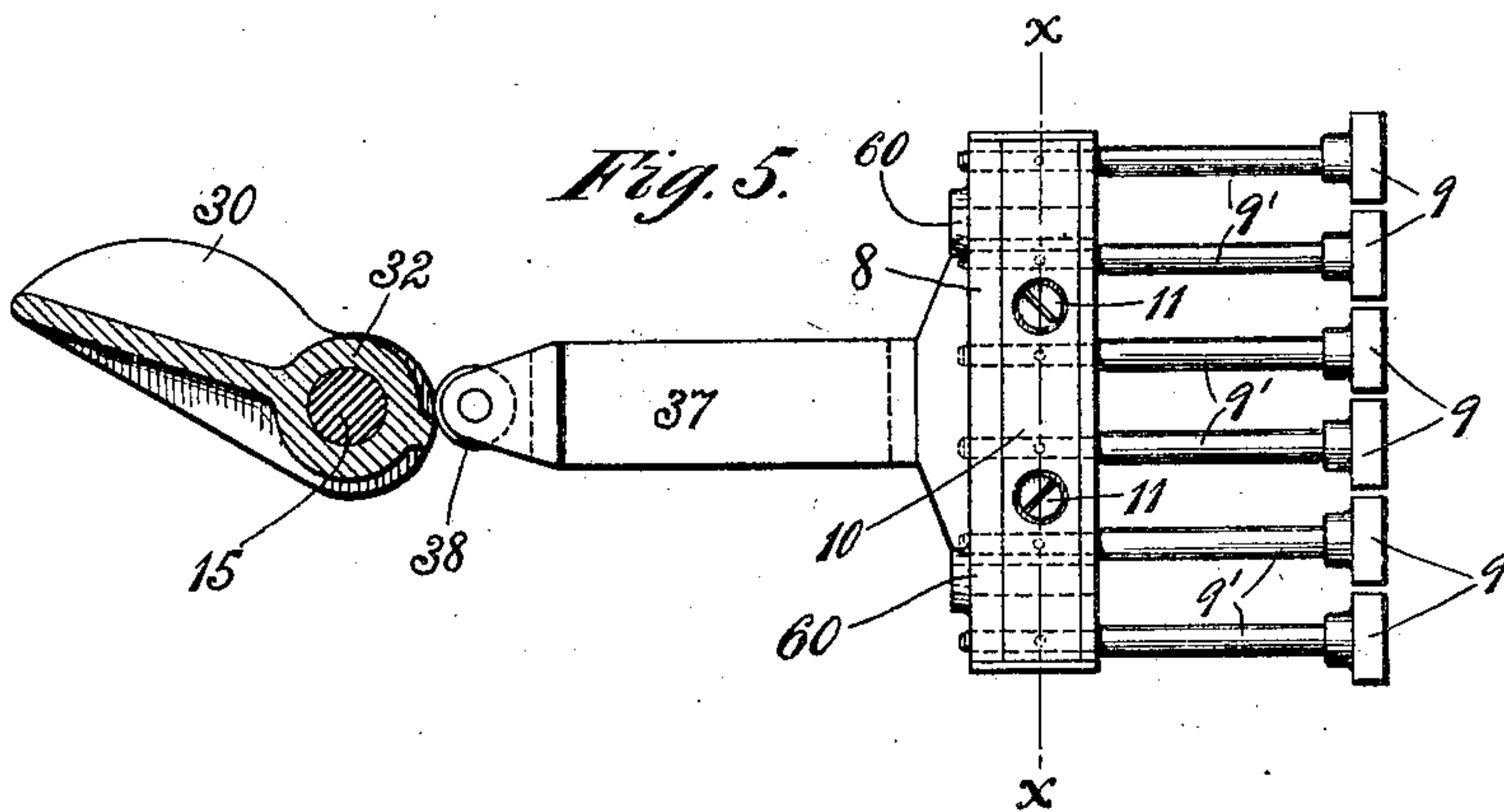
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5 SHEETS—SHEET 4.

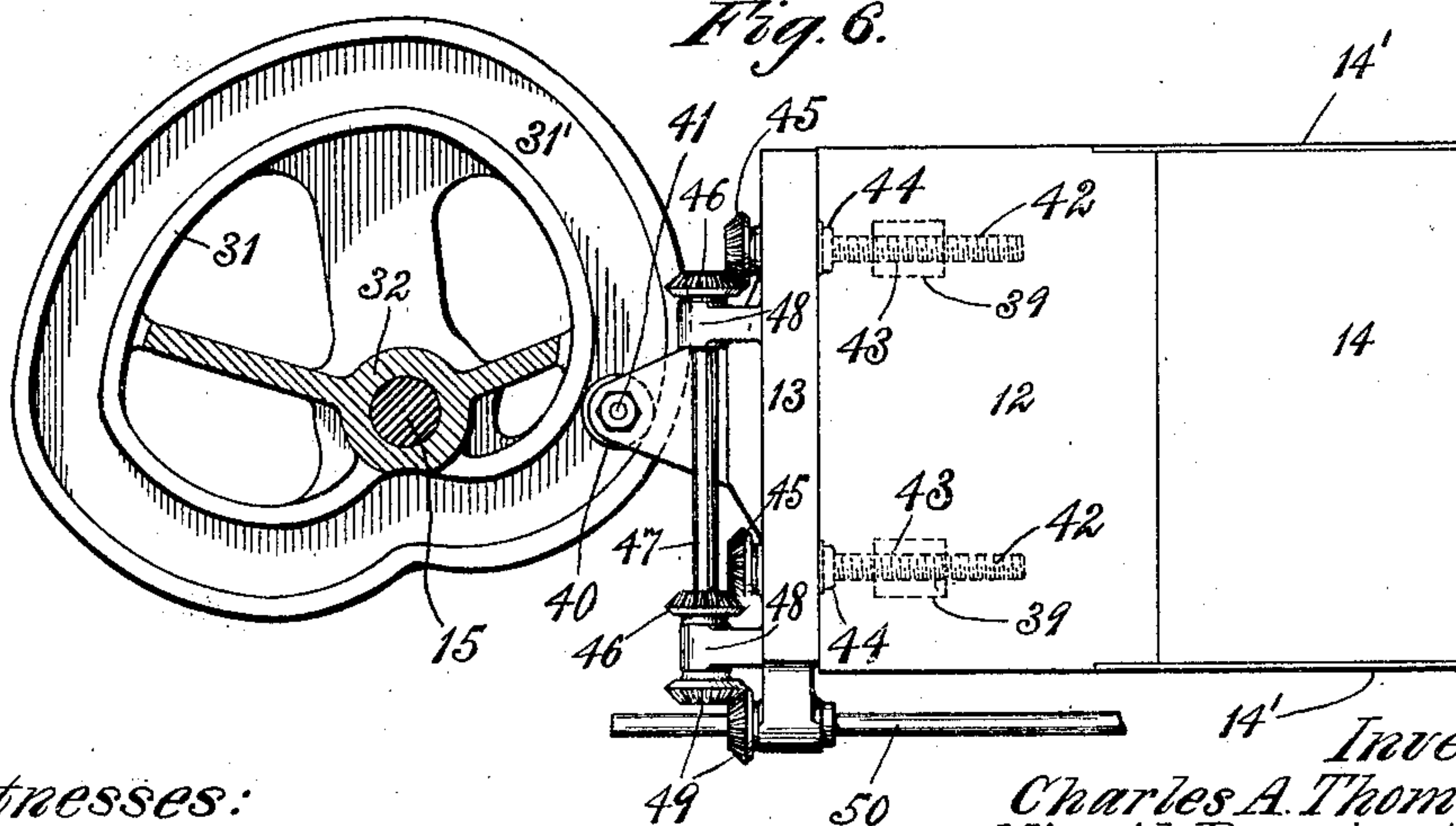
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



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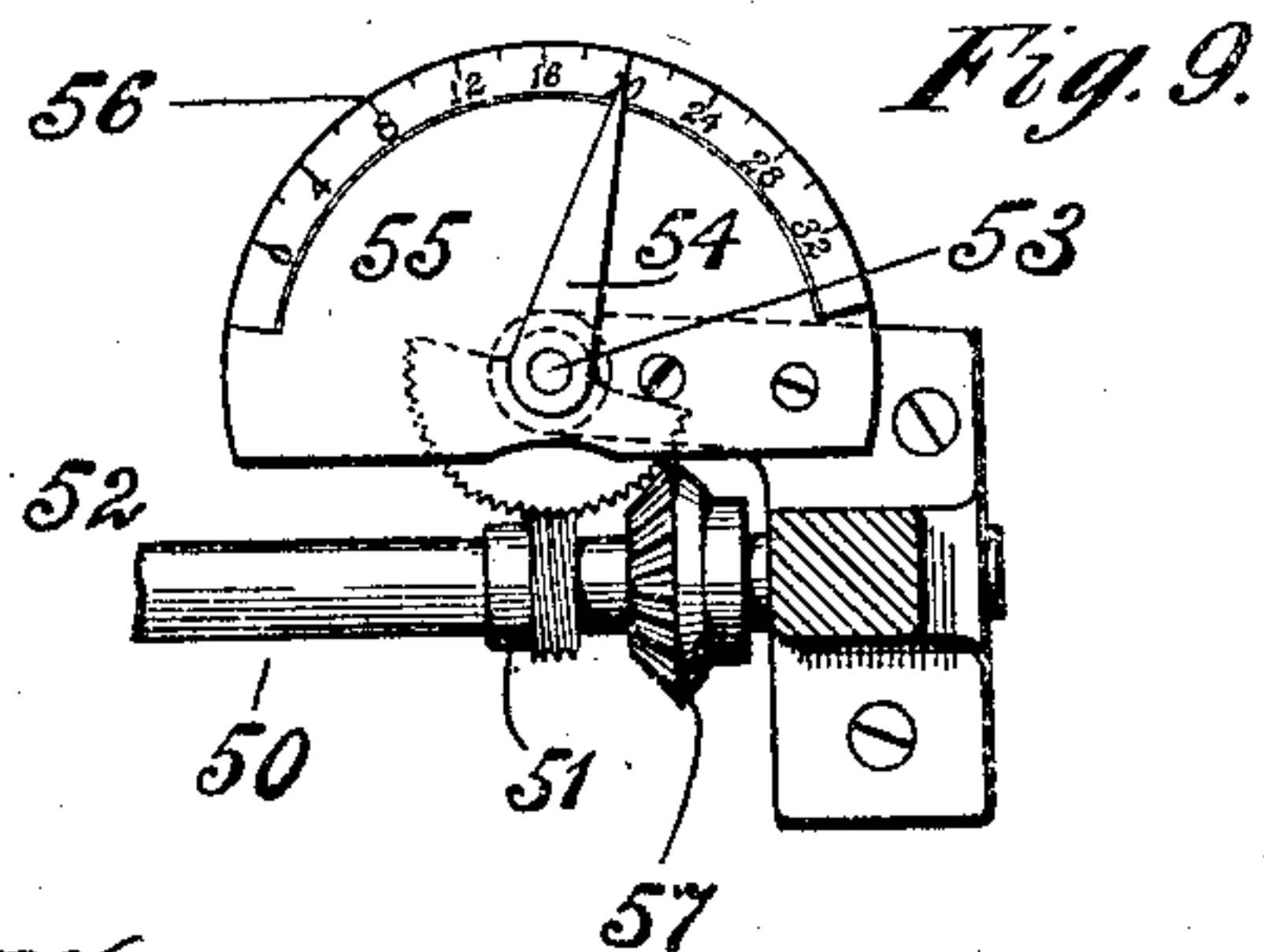
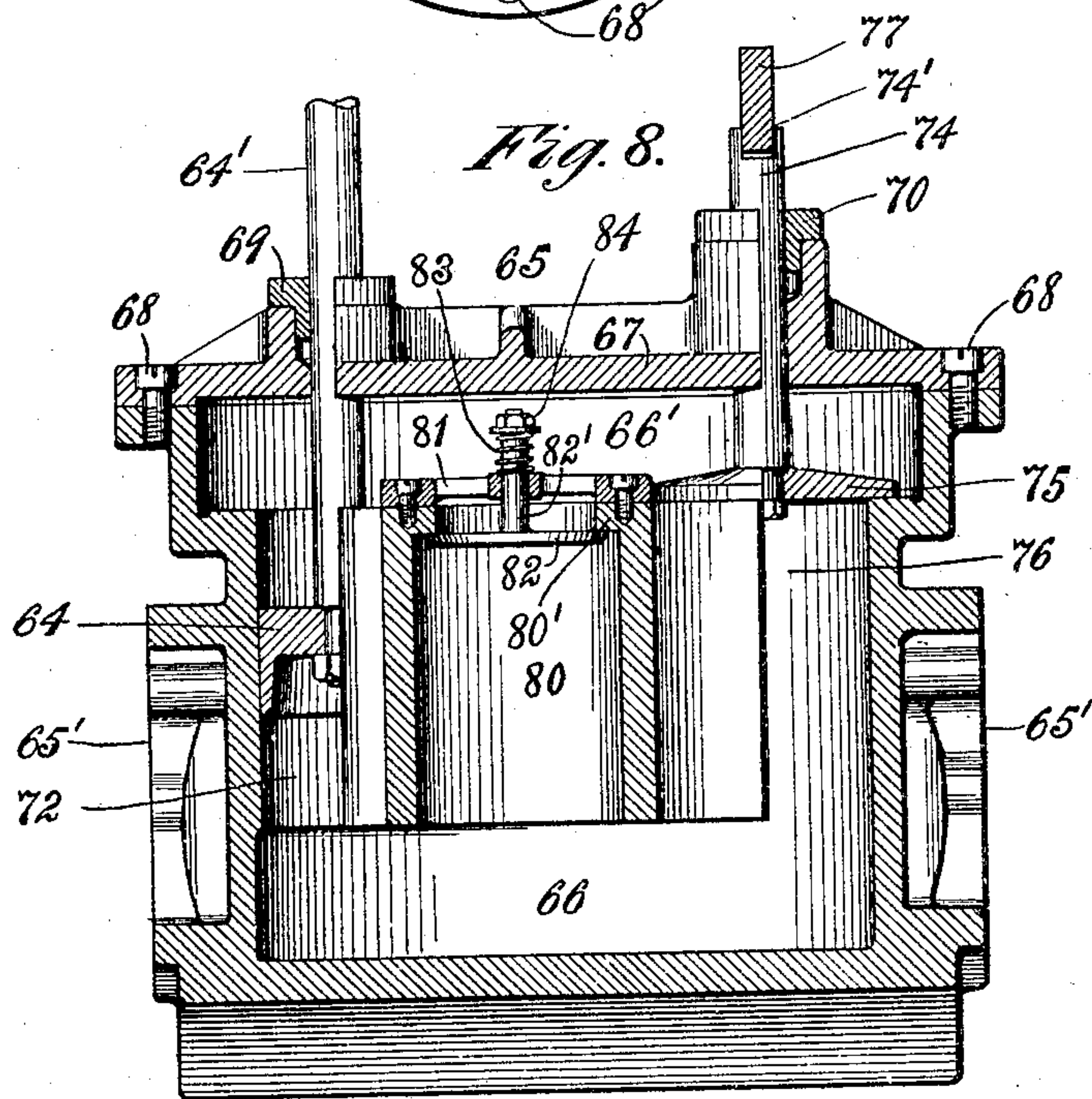
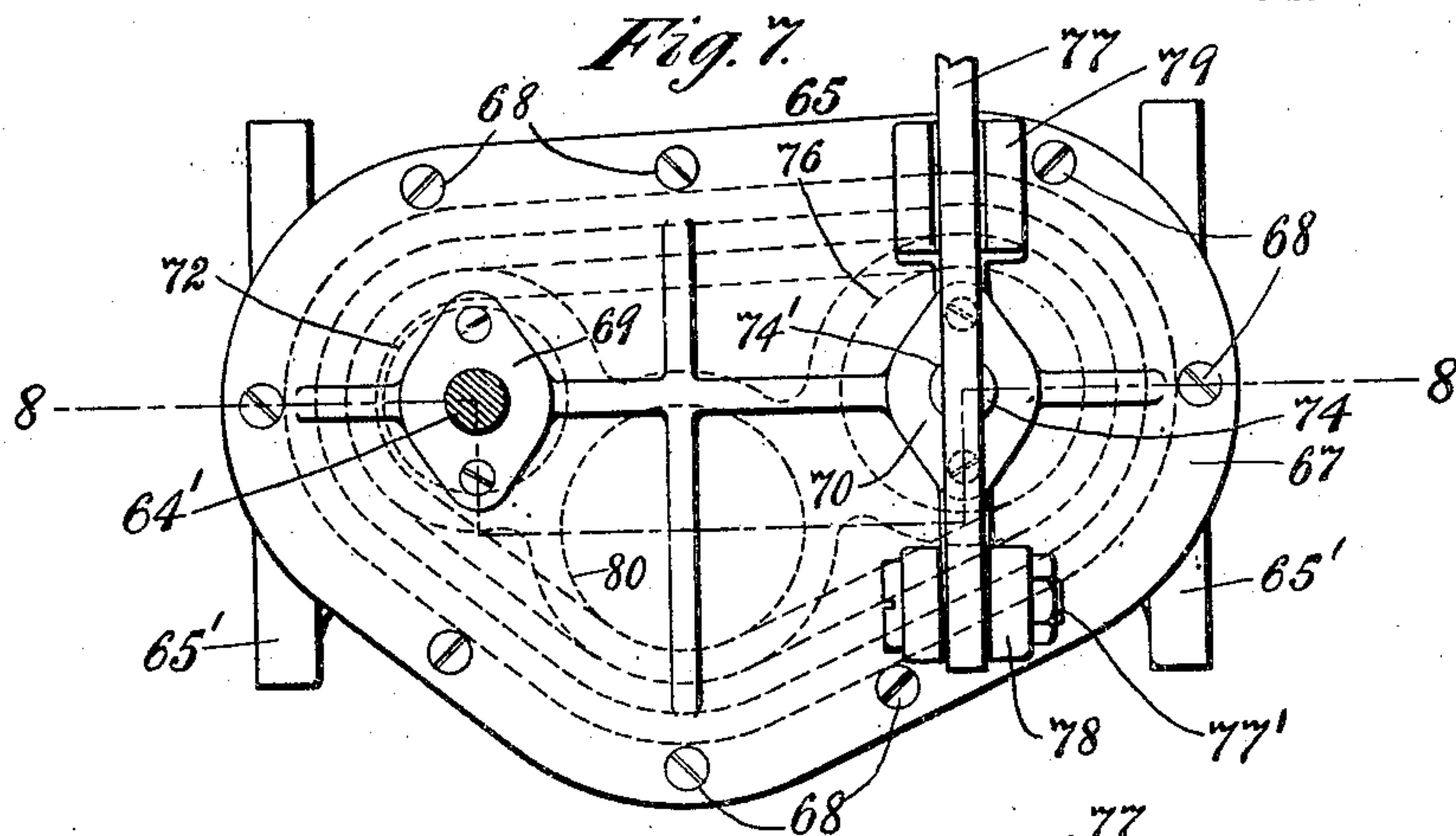
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MACHINE FOR DIVIDING MEASURED CHARGES FROM A MASS OF MATERIAL.

APPLICATION FILED MAY 22, 1905.

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# UNITED STATES PATENT OFFICE.

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MACHINE FOR DIVIDING MEASURED CHARGES FROM A MASS OF MATERIAL.

No. 836,787.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed May 22, 1905. Serial No. 261,688.

*To all whom it may concern:*

Be it known that we, CHARLES ALLEN THOMSON, a citizen of Scotland, residing at Belleville, and VIRGIL PENNINGTON, Jr., a citizen of the Dominion of Canada, residing at Newark, in the county of Essex, State of New Jersey, have jointly invented certain new and useful Improvements in Machines for Dividing Measured Charges from a Mass of Material, of which the following is a specification.

This invention relates to machines for dividing measured charges from a mass of material contained in a hopper or other receptacle, and while the machine is designed more particularly for separating charges each of the same quantity from a mass of plastic material—for instance, dough—the invention is not limited to any specific use.

One of the salient objects of the invention is the provision of a reciprocatory tube open at its end where it enters a chamber containing material divided from the mass by a cut-off slide and in connection with said chamber the provision of an overflow-passage into which superfluous material may escape when the tube is filled with the exact quantity desired, thereby preventing compression of the charge.

A further object of the invention is the provision of a plunger in the overflow-passage and of devices for permitting a regulatable descent of said plunger and for returning the material in the passage to the chamber from which it issued, so that it may constitute an increment of the next charge or charges.

A further object of the invention is the provision of improved devices for regulating the descent of the plunger in the overflow-passage.

A further object of the invention is the provision, in connection with a series of tubes, each open at its forward end, of improved mechanism for simultaneously reciprocating said tubes.

A further object of the invention is the provision, in connection with a movable gate for closing and opening the end of the receiving-chamber, of doffers adjustably secured to a rotatable shaft.

A further object of the invention is the provision, in connection with the tubes set forth,

of discharge-plungers and improved means for adjusting and actuating said discharge-plungers.

Other objects of the invention will be set forth in the general description.

In the accompanying drawings, Figure 1 is a side elevation of a machine embodying our invention. Fig. 2 is a front end elevation. Fig. 3 is a longitudinal vertical section of the improved machine, taken on the line of the cam-shaft hereinafter described. Fig. 4 is a plan view of the cut-off slide and its cam, the cam-shaft being in section. Fig. 5 is a plan view of a battery of discharge-plungers, the cam for actuating the same being in horizontal section. Fig. 6 is a plan view of the tube-carrying slide and its actuating-cam, the latter being partially in section. Fig. 7 is a plan view of the fluid-containing cylinder or dash-pot which coöperates with the plunger in the overflow-passage. Fig. 8 is a longitudinal vertical section on line 8 8 of Fig. 7. Fig. 9 is a detail view of an indicator hereinafter described. Fig. 10 is a view of means for actuating the main shaft of the machine. Fig. 11 is a detail in section, showing the manner in which the tubes are formed. Fig. 12 is a section on line *x x* of Fig. 5, and Fig. 13 is a detail view hereinafter mentioned.

Like numerals designate similar parts throughout the several views.

Referring to the drawings, the numeral 1 designates the frame of the machine, which frame may be of any suitable kind and is shown having a hollow base part 2 for the reception of part of the operating mechanism and other details of the machine. This base part is closed at the top by a hollow cap-frame 3, shown as an integral casting, although it may be made in sections, if desired.

Designated by the numeral 4 is a hopper for containing the material from which it is desired to separate measured charges of the required size and weight, said hopper being bolted to an extension of the cap-frame 3. In the cap-frame a comparatively wide chamber 5 is formed, and leading therefrom is an overflow passage or chamber 6, (see Fig. 3,) the purpose of which will hereinafter appear.

Mounted in the chamber 5 is a slide 7, recessed at its top at 7' to receive a head 8 in a



channel 8', of which the stems 9' of discharge-plungers 9 are clamped by a plate 10, held in place by screws 11. A plate 12 covers the slide 7, said plate having a rabbeted forward end 12' and being secured in place with its rear portion abutting against a flange 13 of the slide 7 by any suitable means. Plates 14 are secured upon the rabbeted forward ends 7<sup>2</sup> and 12' of the plate 12 and slide 7, and between these plates the plungers 9 are mounted, as illustrated in Fig. 3. Separators 14' divide the plates 14 into a series of compartments or tubes 14<sup>2</sup>, open at their forward ends, and said separators are inserted in longitudinal grooves 14<sup>3</sup> of the plates 14. These tubes 14<sup>2</sup> are shown as of rectangular form, but they may be of any desired configuration without departure from the invention. For reciprocating the tube-carrying slide 7 and the head 8 any suitable means may be employed, and in the embodiment shown these results are accomplished by a vertical main shaft 15, journaled at its ends in bearings 16 and 17, respectively, of the base portion 2 of the frame and of the cap-frame 3. Rigid with the main shaft 15 is a bevel-gear 18, and in mesh with said bevel-gear is a bevel-pinion 19, carried by a shaft 20, having at its end opposite said pinion a spur-gear 21, driven by a spur-gear 22 on a driving-shaft 23, the latter carrying fast and loose pulleys 24 and 25 and being supported at its end in a bearing 26 of a bracket 27, extending from the frame. (See Fig. 10.)

Designated in a general way by 28 is a casting in which are formed cams 29, 30, and 31, the hub 32 of said casting being keyed to the main shaft 15. In the groove 29' of cam 29 is fitted a roller 33, mounted on a bolt 34, carried by a cut-off slide 35, mounted in grooves of the cap-frame 3 in line with the bottom of the hopper 4, said cut-off slide being rabbeted at its forward end to receive a knife 36, which when the slide reaches the limit of its forward stroke will enter a rabbet 4' in the wall of the hopper, as shown in Fig. 3. Below the cam 29 on hub 32 is the cam 30, and designated by 37 is a bar carried by the slide 7 and provided with a roller 38 to be engaged by said cam 30. At its forward end the bar 37 is provided with a depending flange 37', by which it is secured to the head 8. Cam 31 on hub 32 is below the cam 30 and is provided with a cam-groove 31' for the reception of a roller 40 on a bolt 41, depending from the slide 7.

For adjusting the blocks or abutments 39, and thereby regulating the position of the head 8 and its plungers 9 in the recess 7' of slide 7, any desired means may be employed, and we have shown for this purpose screws 42 working in nuts 43 of the blocks 39. Each screw is secured by collars 44 against displacement longitudinally in a bore of the flange 13 of slide 7, and each carries a bevel-

gear 45 in mesh with similar gears 46 on a transverse shaft 47, journaled in bearings 48 of said slide. For rotating the shaft 47 and the screws controlled thereby bevel-gearing 49 is employed, one element of said gearing being rigid with a shaft 50, journaled in the slide 7 and provided with a worm 51 in mesh with a segment 52, carried by a short shaft 53. A pointer 54 is carried by the shaft 53 and coöperates with a dial 55, upon which is a row of numerals 56 for indicating the position to which the discharge-plungers are set. A bevel-gear 57, rigid with the shaft 50, is driven by a like gear 57' on a shaft 58, the latter being actuated by a hand-wheel 59, as shown in Figs. 1 and 2. By the means described the plungers 9 are so regulated that charges each containing an exact weight of material may be received by the tubes 14<sup>2</sup>. As said tubes advance into the material the discharge-plungers will be forced back by said material, and the limit of their rearward movement is determined by the position of the blocks 39. Perforations 60 in the head 8 (see dotted lines, Fig. 5) receive the screws 42 and permit said head to be forced against the blocks 43. In this manner the capacity of the tubes can either be enlarged or diminished, and charges of the desired weight indicated by the pointer 54 and dial 55 may be separated from the mass in the chamber 5.

Designated by 6 is an overflow passage or chamber into which material in excess of the quantity necessary to fill the pockets in tubes 14<sup>2</sup>, the dimensions of which pockets have been determined by the adjustment of the plungers 9 in said tubes, may escape. This passage or chamber is in the nature of a transverse slot formed in and extending across the forward end of the cap-frame 3 and opening into the chamber 5. In Fig. 3 the overflow-passage is shown inclined, although this is immaterial, and in said passage is mounted a transverse plate 62 in the nature of a plunger, upon the top of which the material escaping from the chamber 5 will be received. Depending from the plunger 62 are rods 63 63', united at their lower ends by a cross-rod 63<sup>2</sup>, carrying the piston-rod 64' of a piston 64.

Referring now to Figs. 3, 7, and 8, the numeral 65 designates a dash-pot, shown as a hollow casting having flanges 65' secured to the frame by bolts 65<sup>2</sup> and also having a chamber 66 enlarged at the top at 66', where it is closed by a cover 67, the latter being secured in place by screws 68 and being provided with stuffing-boxes 69 and 70. Through the stuffing-box 69 the piston-rod 64' passes, and it carries the piston 64, fitting in a cylinder 72 of the casting, and through the stuffing-box 70 passes a rod 74, carrying at its lower end a disk valve 75, normally seated on the upper walls of the chamber 66, and of a cylinder 76 of the dash-pot, as shown in said figures. At its upper end the valve-rod 74 is



slotted at 74' to receive a lever 77, pivoted at 77' to a bifurcated standard 78 of the cover 67, and guided in its movements by a slotted standard 79, also rising from said cover. Intermediate the cylinders 72 and 76 of the dash-pot is a third cylinder 80, having an inwardly-extending flange 80' at its inner end, and upon the top of cylinder 80 is secured a grid 81. A disk valve 82, fitting against the flange 80', is provided with a rod 82', and said rod passes through the grid 81 and above the same is surrounded by a spring 83, held in place by a nut 84. A weight 85 is adjustably secured to the lever 77 by a screw 86 and serves to regulate the pressure applied to the valve 75.

Rigid with vertical shaft 15 is a bevel-gear 71, and journaled in hangers 87 of the frame is a shaft 88, carrying at one end a bevel-gear 89, in mesh with the gear 71, and at the opposite end a bevel-gear 90, engaging a bevel-gear 91, said gear 91 being rigid with a transverse shaft 92, journaled in bearings of the frame. On the shaft 92 are cams or wipers 93, and carried by the rods 63' are rollers 94, with which the cams engage when in the sequential operations of the various elements of the machine it is necessary to raise the plunger 62 in the overflow passage or chamber 6.

Adjacent to the front of the hopper are guideways 95 for the reception of a gate 96 for closing and opening the end of the chamber 5. This gate is chambered at its front at 97, is provided with depending sides 98, with curved ribs 99, and carries pins 101 101' on its sides, as illustrated in Fig. 2. Secured to the ribs 99 are separating-plates 102, which extend from below the gate and form a series of compartments, into which the charges from the tubes are expelled by the plungers 9. Sleeved upon pins 101 101' are rods 103 103', slotted, respectively, at their lower ends at 104. To the lower end of each rod is articulated a lever 105, pivoted at 106 to the frame and carrying a roller 107. Hubs 108, carrying cams 93 for operating the rods 63 63', and grooved cams 109 are keyed to the shaft 82, adjacent to each end thereof, and these cams 109 serve to act upon the rollers 107 of the levers 105, and to thus reciprocate the gate 96. In Fig. 3 said gate is closed, and to uncover the chamber 5 it is raised by the cams described, which, being alike, are designated by the same numerals, to carry the separating-plates 102 into line with the mouths of the tubes 14<sup>2</sup>.

Journaled in bearings 110 is a shaft 111, carrying a sprocket-wheel 112, said sprocket-wheel being actuated by a sprocket-chain 113, driven by a sprocket-wheel 114, secured to a shaft 115, and said shaft passing through the slots in rods 103 103' and being mounted in bearings in the front of the frame and carrying a wide roller 116, for a purpose hereinafter

described. On the shaft 92, exterior of the frame, is a sprocket-wheel 117, which drives by a chain 118 a sprocket-wheel 119, rigid with the shaft 115, as shown in Fig. 1 and Fig. 2.

Adjustably mounted on the shaft 111 are doffer blades or paddles 120, arranged in staggered relation to each other and operating to engage the charges expelled from the tubes 14<sup>2</sup> by plungers 9 and to force them to fall in an uneven line upon an endless belt or conveyer 121, by which they are carried to the point desired.

In the operation of the machine, assuming that charges are to be divided from plastic material—for instance, dough—said material is placed in the hopper 4 and the cut-off slide 35 being withdrawn fills the chamber 5 in advance of the tubes 14<sup>2</sup>. By now manipulating the hand-wheel 59 the pointer 54 is set on the dial 55 to indicate the weight of the charge required, and through the gearing described the blocks 39 are adjusted to so limit the rearward movement of the head 8 that the plungers 9, carried thereby, will occupy the required place in the tubes to insure the entrance of only an exact amount of material in each tube, so that a series of charges each of the same weight and dimensions will be divided from the mass. To divide the mass in chamber 5 from that in the hopper, the cut-off slide 35 is now advanced by the cam 29 to the position illustrated in Fig. 3, and following this the slide 7 is moved forward by cam 31 to cause the tubes 14<sup>2</sup> to enter the mass in the chamber 5. At this stage of the operation the gate 96 is down and closes the mouth of the chamber to form a backing for the material.

Should there be an excess of material in the chamber 5 and no outlet for the escape of such excess, too great compression of the charges in the tubes will take place, and if plastic material, such as dough, is being worked the charges are apt to be hardened or compressed, so that they will be in an unfit condition when molded into loaves for the baking operation. As the tubes advance more or less pressure is of course applied to the mass confined in the chamber 5 after said tubes are filled, and as this pressure increases overflow of the excess will take place into the passage or chamber 6, thereby forcing the plunger 62 downward and also forcing the piston 64 into the liquid—for instance, oil—in the dash-pot 65. Resistance to the descent of said piston 64 is caused by the valve 75 and weighted lever 77; but after the pressure exceeds a certain point, determined by the position of the weight on the arm of said lever, the valve 75 will be forced upward and the liquid will flow into the chamber above said valve. As the piston 64 moves upward the liquid will force the valve 82 downward, relief taking place through the chamber 80 as said valve 82 is forced away



from its seat on the under side of flange 80' thereof. After the piston 64 has been moved upward and equilibrium of the liquid has been restored the spring 83 causes the valve 5 82 immediately to resume its seat, against which it was held as piston 94 descended by the pressure of the liquid against its inner face. By adjusting the weight 85 along the lever-arm the valve 75 can be set to yield 10 under any exact predetermined pressure required. After the excess material has been received in the chamber 6 it is returned to the chamber 5 by an upward movement of the plunger 62, caused at the proper time by the 15 cams 93, which engage the rollers 94 of rods 63 63', as above described, in readiness to be received by the tubes 14<sup>2</sup> as they again advance into the material in chamber 5. When the tubes 14<sup>2</sup> advance in the chamber 20 5, the gate 96 is down or in the position illustrated in Fig. 3, and as the tubes reach the limit of their forward stroke in said chamber the gate is raised, the cam 30 actuates the head 8, and the plungers 9, carried by said 25 head, are caused to expel the charges from said tubes, said charges passing from the chamber between the separating-plates 102, from between which they are removed by the doffers 120. These doffers are so mounted 30 on the shaft 111 that they dislodge the blocks or charges one after the other from the tubes, and therefore cause them to fall sequentially upon the conveyer 121, thus avoiding contact of the charges upon said conveyer and their 35 consequent liability of adherence and also depositing them in a more convenient manner for removal upon said conveyer.

No claim is made in the present case to the open-mouthed tubes and mechanism broadly 40 for actuating said tubes, for such subject-matter is covered by the joint application of E. T. Parsons and Virgil Pennington, Jr., filed February 17, 1905, Serial No. 246,033.

Changes may be made in the many details 45 of the machine and in the cams, gearing, &c., for operating the various parts, and the machine may be employed in various arts without departure from the invention. Furthermore, the dash-pot described may be re- 50 placed by substitute devices capable of accomplishing the same result.

Having thus described our invention, what we claim is—

1. The combination, with a hopper, and 55 with a chamber below said hopper, of a cut-off slide; means for actuating said slide; a movable gate; an open-mouthed tube; means for reciprocating said tube in the chamber; a discharge-piston within the tube; and an 60 overflow-chamber into which excessive material is forced by the tube.

2. The combination, with a hopper, and with a chamber below said hopper, of a cut-off slide; means for actuating said slide; a

movable gate; an open-mouthed tube; means 65 for reciprocating said tube in the chamber; a discharge-piston within the tube; an overflow-chamber into which excessive material is forced by the tube; a plunger within the overflow-chamber; a dash-pot; means con- 70 necting the plunger with the dash-pot; and means for returning the plunger in the overflow-chamber to eject material therein into the chamber in which the tube works.

3. The combination, with a hopper, and 75 with a cut-off slide coöperating with the same, of a frame having a chamber; a series of open-mouthed tubes working in said chamber; means for actuating said tubes; a reciprocating gate; means for actuating said 80 gate to close and open the mouth of the chamber in which the tubes work; a series of plungers in said tubes; means for actuating said plungers; an overflow-chamber; a plun- 85 ger within said overflow-chamber; a dash-pot; means for connecting the plunger in the overflow-chamber with the dash-pot; and means for actuating said plunger to cause it to return surplus material to the chamber in 90 the frame.

4. In a machine for dividing charges from a mass of material, the combination, with a hopper, of a movable cut-off; a chamber in communication with the hopper, and closed 95 when the cut-off advances; an overflow-passage communicating with said chamber; open-mouthed tubes; means for advancing and withdrawing said tubes; a series of discharge-plungers in the tubes; means for actu- 100 ating said discharge-plungers; a movable gate at the mouth of the chamber; and means in the overflow-passage for returning material overflowing therein to said chamber when the tubes are withdrawn.

5. The combination, with a recessed body, 105 having a perforated front wall, of a plunger, the stem of which passes through the perforation in said front wall; a chambered device slotted in its wall to receive the stem of said plunger; and a block secured in the chamber 110 of said device, and serving to clamp said stem in place.

6. The combination, with a recessed slide having openings in its end, of plungers, the stems of which enter said openings; a cham- 115 bered head mounted in the recess of the slide, and having slots to receive the plungers; and a clamping-plate secured in said chamber, and fitting upon said stems.

7. In a machine for producing measured 120 charges, the combination, with a frame having a chamber and an overflow-passage leading from said chamber, of a cut-off movable between the hopper and chamber, a series of tubes open at their ends; a slide carrying 125 said tubes; discharge-plungers in the tubes; means for actuating said plungers; means for adjusting said plungers to vary the capacity



of the tubes; a closure for the end of the chamber; and means for actuating said closure.

8. In a machine of the class described, the combination, with a chamber for receiving material, said chamber having an overflow-passage, of a gate for opening and closing said chamber; means for actuating the gate; means for removing charges from the material in the chamber; a plunger in the overflow-passage; a dash-pot for restraining the descent of said plunger; and means for actuating the plunger to cause it to return surplus material to said chamber.

9. In a machine of the class described, the combination, with a chamber for receiving material, said chamber having an overflow-passage, of a gate for opening and closing the end of said chamber; means for actuating the gate; means for removing measured charges from the material in said chamber, and for discharging them when the gate is actuated to open the end of the chamber; and means in the overflow-passage for returning the overflow material to said chamber.

10. In a machine of the class described, the combination, with a hopper, of a cut-off slide; a chamber for receiving material divided from the mass by the cut-off slide, said chamber having an overflow-passage; means for removing measured charges from said chamber; a gate movable across the delivery end of the chamber; means for actuating said gate; a plunger in the overflow-passage; and a cam for actuating said plunger to return surplus material to said chamber.

11. The combination, with a receptacle having an overflow-passage, of means for removing measured charges therefrom; a device for opening and closing the delivery end of the receptacle; means in the overflow-passage for returning surplus material to the receptacle; and a rotary shaft having doffer-blades.

12. The combination, with a receptacle having an overflow-passage, of means for removing measured charges therefrom; a device for opening and closing the delivery end of the receptacle; means in the overflow-passage for returning surplus material to the receptacle; a rotary shaft having doffer-blades; and a conveyer upon which the charges are deposited.

13. The combination, with framework having a chamber and an inclined overflow-passage communicating with said chamber, of a hopper; a cut-off; means for removing measured charges from the chamber; a gate closing the delivery end of said chamber; means for actuating said gate; a plunger in the inclined overflow-passage; means for preventing the descent of said plunger except under predetermined pressure; and means for actuating the plunger to return surplus material to said chamber.

14. The combination, with a hopper, and with a receptacle below said hopper for receiving material therefrom, of a cut-off slide between the hopper and said receptacle; means for reciprocating said cut-off slide; means for removing measured charges of material from said receptacle; a gate cooperating with the receptacle; means for actuating said gate; and a rotary shaft having a series of doffers arranged in staggered relation to each other.

15. The combination, with a receptacle for material, of framework having an overflow-passage communicating with said receptacle; means for removing charges of material from the receptacle; a plunger in the overflow-passage; a plunger-rod; a dash-pot, the plunger of which is connected with said plunger-rod; and a rotary cam adapted to act upon a stud of said plunger-rod and to return the plunger to normal position in said overflow-passage.

16. The combination, with a hopper, and with a receptacle below said hopper, of a cut-off slide; a slide mounted in the receptacle; open-mouthed tubes carried by said slide; discharge-plungers carried by said slide; a rotary shaft; and cams on said shaft for actuating the cut-off slide, the slide in the receptacle, and the discharge-plungers carried by said slide in the receptacle.

17. The combination, with a hopper, and with a receptacle below said hopper, of a cut-off slide; a slide mounted in the receptacle; open-mouthed tubes carried by said slide; discharge-plungers carried by said slide; a rotary shaft; cams on said shaft for actuating the cut-off slide, the slide in the receptacle and the discharge-plungers carried by said slide in the receptacle; a gate movable in front of the discharge-opening of the receptacle; and means for actuating said gate.

18. The combination, with a receptacle, of means for removing charges of material therefrom; a gate for covering and uncovering the discharge-opening of said receptacle; and separators carried by said gate, and brought into line with said discharge-opening when the charges are expelled from the receptacle.

19. The combination, with a receptacle having a discharge-opening, and with means for removing charges of material therefrom; of a gate, one side of which closes said discharge-opening when the gate is in one position; separators depending from the gate; and means for actuating the gate.

20. The combination, with a receptacle having a discharge-opening, and with means for removing charges of material therefrom; of a gate, one side of which closes said discharge-opening when the gate is in one position; separators depending from the gate; a shaft; and doffer-blades carried by the shaft, and working between the separators.



21. The combination, with a receptacle having a discharge-opening, and with means for removing charges of material therefrom; of a gate, one side of which closes said discharge-opening when the gate is in one position; separators depending from the gate; a shaft; and doffer-blades arranged in staggered relation to each other upon said shaft, and working between the separators.
22. The combination, with a receptacle having a discharge-opening, and with means for removing charges of material therefrom; of a gate, one side of which closes said discharge-opening when the gate is in one position; separators depending from the gate; a shaft; doffer-blades arranged in staggered relation to each other upon said shaft, and working between the separators; and an endless conveyer upon which the charges are deposited by said doffer-blades.
23. The combination, with a receptacle for containing material, of a chambered slide in said receptacle, a head fitted in the chamber of the slide; discharge-plungers, the stems of which are secured to said head; tubes in which said plungers work; a bar carried by the chambered slide, and having an arm fitting against the rear wall of the head; a rotary shaft; a cam on said shaft for actuating said bar; and an adjustable abutment between the arm of the bar and the head.
24. In machinery of the class described, the combination, with a reciprocatory tube, of a discharge-plunger mounted in said tube; means for actuating said discharge-plunger; means for limiting the rearward movement of said discharge-plunger, and thereby adjusting it at the point desired in said tube; a chamber in which the tube works; a movable gate at the end of said chamber; and separators carried by said gate.
25. The combination, with a carrier, and with a tube secured to said carrier, said tube being open at its forward end, of a discharge-plunger mounted in the tube; a head to which said plunger is secured; means for actuating said head; an adjustable abutment with which said means engages on the rearward movement of the head; a screw for adjusting said abutment; and gearing for actuating the screw.
26. The combination, with a carrier, and with a tube secured to said carrier, said tube being open at its forward end, of a discharge-plunger mounted in the tube; a head to which the stem of said plunger is secured; a flanged bar in engagement with the rear side of said head; an adjustable abutment with which said bar engages on the rearward movement of the head; a screw for adjusting said abutment; gearing for actuating the screw; and an indicator actuated by a part of said gearing.
27. The combination, with a receptacle, of a gate located at the discharge end thereof; separator-plates carried by the gate; means for removing charges from material in the receptacle, and for forcing said charges between the separator-plates; and rotary doffer-blades working between the separator-plates.
28. The combination, with a receptacle, of a slide; a series of plates carried by said slide, and the spaces between which constitute tubes for entering material in the receptacle and dividing charges therefrom; discharge-plungers located between the plates; and means for actuating said discharge-plungers.
29. The combination, with a slide, and with a cover therefor, of plates carried by the slide and cover; partitions for dividing the space between the plates into compartments; discharge-plungers in the compartments; and means for actuating said discharge-plungers to expel the contents of the compartments.
30. The combination, with a chambered slide and its cover, both being rabbeted at their forward ends, of grooved plates fitted in the rabbets; partitions inserted in the grooves of the plates; discharge-plungers in the compartments formed by the partitions; and means for actuating said discharge-plungers.
31. The combination with a vertical shaft, and with means for rotating said shaft, of a chambered frame; a slide movable in the chamber of the frame; a series of tubes carried by the slide; a head carried by the slide; a series of discharge-plungers carried by the head; a cam on the vertical shaft; means operated by said cam for actuating the head; a cut-off slide; a cam on the vertical shaft for actuating said cut-off slide; and a hopper, between which and said chamber the cut-off slide operates.
32. The combination, with a chamber for receiving material, said chamber having an overflow-passage, of a plunger in the overflow-passage; a dash-pot having a series of chambers; valves for opening and closing two of the chambers; a piston in the other chamber; and means connecting said piston with the plunger in the overflow-passage.
33. The combination, with a receptacle for material, of a sliding gate for said receptacle; means for raising and lowering said gate; a series of separator-plates depending from the gate; a series of tubes; means for forcing the tubes into material in said receptacle; and means for expelling the charges from the tubes when the gate is raised.
34. The combination, with a receptacle for material, of a sliding gate for said receptacle; means for raising and lowering said gate; a series of separator-plates depending from the gate; a series of tubes; means for forcing the tubes into material in said receptacle; means for expelling the charges from the tubes



when the gate is raised; a series of doffers operating in the spaces between said depending plates; and a conveyer for receiving the charges dislodged by the doffers.

5 35. The combination, with a series of tubes, and with means for reciprocating said tubes, of a series of discharge-plungers; means for actuating said plungers; inter-  
10 nally-threaded abutments; screws entering said abutments; gears on said screws; a transverse shaft having gears meshing with those of the screws; a shaft having a gear in mesh with a gear on the transverse shaft; a worm on said shaft; a segment in mesh with  
15 the worm; a pointer actuated by the segment; a dial coöperating with the pointer; and means for actuating the worm-shaft.

36. The combination, with a series of tubes, and with means for reciprocating said  
20 tubes, of a series of discharge-plungers; means for actuating said plungers; inter- nally-threaded abutments; screws entering said abutments; gears on said screws; a transverse shaft having gears meshing with  
25 those of the screws; a shaft having a gear in mesh with a gear on the transverse shaft; a worm on said shaft; a segment in mesh with the worm; a pointer actuated by the segment; a dial coöperating with the pointer; a gear  
30 on the worm-shaft; a hand-wheel; and means actuated by said hand-wheel for operating the worm-shaft.

37. The combination, with a receptacle, of a slide; tubes carried by the slide; discharge-  
35 plungers in the tubes; a vertical shaft; a grooved cam rigid with said shaft, and serving to operate the slide; a cam on said shaft for actuating the discharge-plungers; a cut-off above the slide; a cam on the shaft for  
40 actuating said cut-off; and a hopper communicating with the receptacle.

38. The combination, with a receptacle, of a gate for opening and closing the delivery part thereof; links connected to the gate;  
45 levers pivoted to the frame, and articulated to the links; a rotary shaft; and cams on said shaft for actuating said levers.

39. The combination, with a receptacle, of a gate for opening and closing the delivery  
50 end thereof; links articulated to the ends of the gate; levers pivoted to the frame, and articulated to the ends of the links; and cams for raising and lowering said levers.

40. The combination, with a shaft, of a  
55 cam-sleeve rigid therewith; a series of cams carried by the cam-sleeve; a slide actuated by one of the cams; tubes carried by the slide; a head carried by the slide, and actuated by another of said cams; a series of discharge-  
60 plungers carried by said head; a hopper; a receptacle below said hopper; and a cut-off slide actuated by the other cam, and passing between the delivery end of the hopper and said receptacle.

65 41. The combination, with a shaft, of a

cam-sleeve rigid therewith; a series of cams carried by the cam-sleeve; a slide actuated by one of the cams; tubes carried by the slide; a head carried by the slide, and actuated by another of said cams; a series of  
70 discharge-plungers carried by said head; a hopper; a receptacle below said hopper; a cut-off slide actuated by the other cam, and passing between the delivery end of the hopper and said receptacle; a gate for open-  
75 ing and closing the discharge end of the receptacle; and means for actuating said gate.

42. The combination, with a receptacle, of a gate; means for reciprocating the gate in front of the discharge-opening of said recep-  
80 tacle; a series of separators depending from the gate, and being in line with the discharge-opening of the receptacle when the gate is raised; a series of open tubes; means for re-  
85 ciprocating said tubes; a series of discharge-plungers in the tubes; means for adjusting said discharge-plungers, and thus varying the capacity of the tubes; and means for ad-  
90 vancing the discharge-plungers when the gate is raised.

43. The combination, with a receptacle, of a gate; means for reciprocating the gate in front of the discharge-opening of said recep-  
95 tacle; a series of separators depending from the gate, and being in line with said discharge-opening when the gate is raised; a series of open tubes; means for reciprocating said tubes; a series of discharge-plungers in the tubes; means for adjusting said discharge-  
100 plungers, and thus varying the capacity of the tubes; means for advancing the discharge-plungers when the gate is raised; a series of doffers working in the passage between the separators; and means for actu-  
105 ating said doffers.

44. The combination, with a receptacle, of a gate; means for reciprocating the gate in front of the discharge-opening of said recep-  
110 tacle; a series of separators depending from the gate, and being in line with the discharge-opening of the receptacle when the gate is raised; a series of open tubes; means for re-  
115 ciprocating said tubes; a series of discharge-plungers in the tubes; means for adjusting said discharge-plungers, and thus varying the capacity of the tubes; means for ad-  
120 vancing the discharge-plungers when the gate is raised; a series of doffers working in the passages between the separators; means for actuating said doffers; an endless con-  
veyer; and means for actuating said con-  
veyer.

45. The combination, with a receptacle having an overflow-passage, of means for forcing material into said passage; a plunger  
125 in said overflow-passage; rods depending from the plunger; a cross-rod uniting said depending rods; a piston-rod connected to the cross-rod; a piston carried by said  
130 piston-rod; a dash-pot coöperating with



said piston; and cams for raising the plunger in the overflow-chamber.

46. The combination, with a shaft, and with means for rotating said shaft, of a frame  
5 having a chamber; a hopper communicating with said chamber; a cut-off slide between the hopper and chamber; a grooved cam on the shaft for actuating said cut-off slide; a  
10 recessed slide in the chamber of the frame; a grooved cam for actuating said slide; a head mounted in the recessed slide; a bar having a depending flange in contact with the rear side of said head; open tubes carried by the  
15 head; discharge-plungers, the stems of which are secured to the head; a cam for actuating said bar; a gate for opening and closing the discharge end of the chamber; and means actuated by the shaft for operating said gate.

47. The combination, with a shaft, and  
20 with means for rotating said shaft, of a frame having a chamber; a hopper communicating with said chamber; a cut-off slide between the hopper and chamber; a grooved cam on the shaft for actuating said cut-off slide; a

recessed slide in the chamber of the frame; 25  
a grooved cam for actuating said slide; a bar having a depending flange in contact with the rear side of said head; open tubes carried by the slide; discharge-plungers, the stems of which are secured to the head; a cam for 30  
actuating said bar; a gate for opening and closing the discharge end of the chamber; means actuated by the shaft for operating said gate; an overflow-chamber in the frame; 35  
a plunger in said overflow-chamber; a dash-pot, the piston of which is connected with the plunger in the overflow-chamber; and means actuated by said shaft for returning the plunger in the overflow-chamber to normal position. 40

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES ALLEN THOMSON.  
VIRGIL PENNINGTON, JR.

Witnesses:

JNO. J. HOPPER,  
REBECCA LORD.