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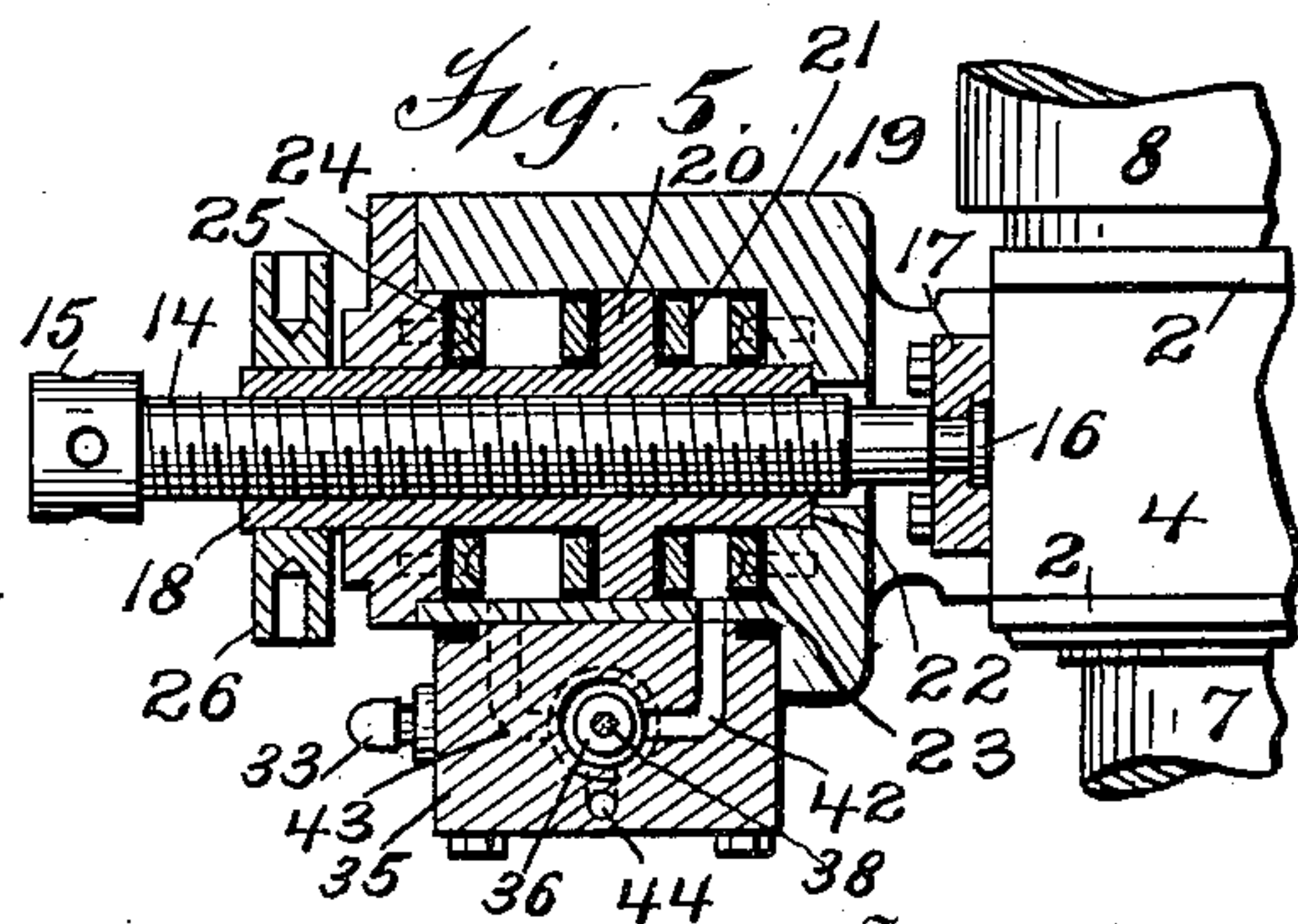
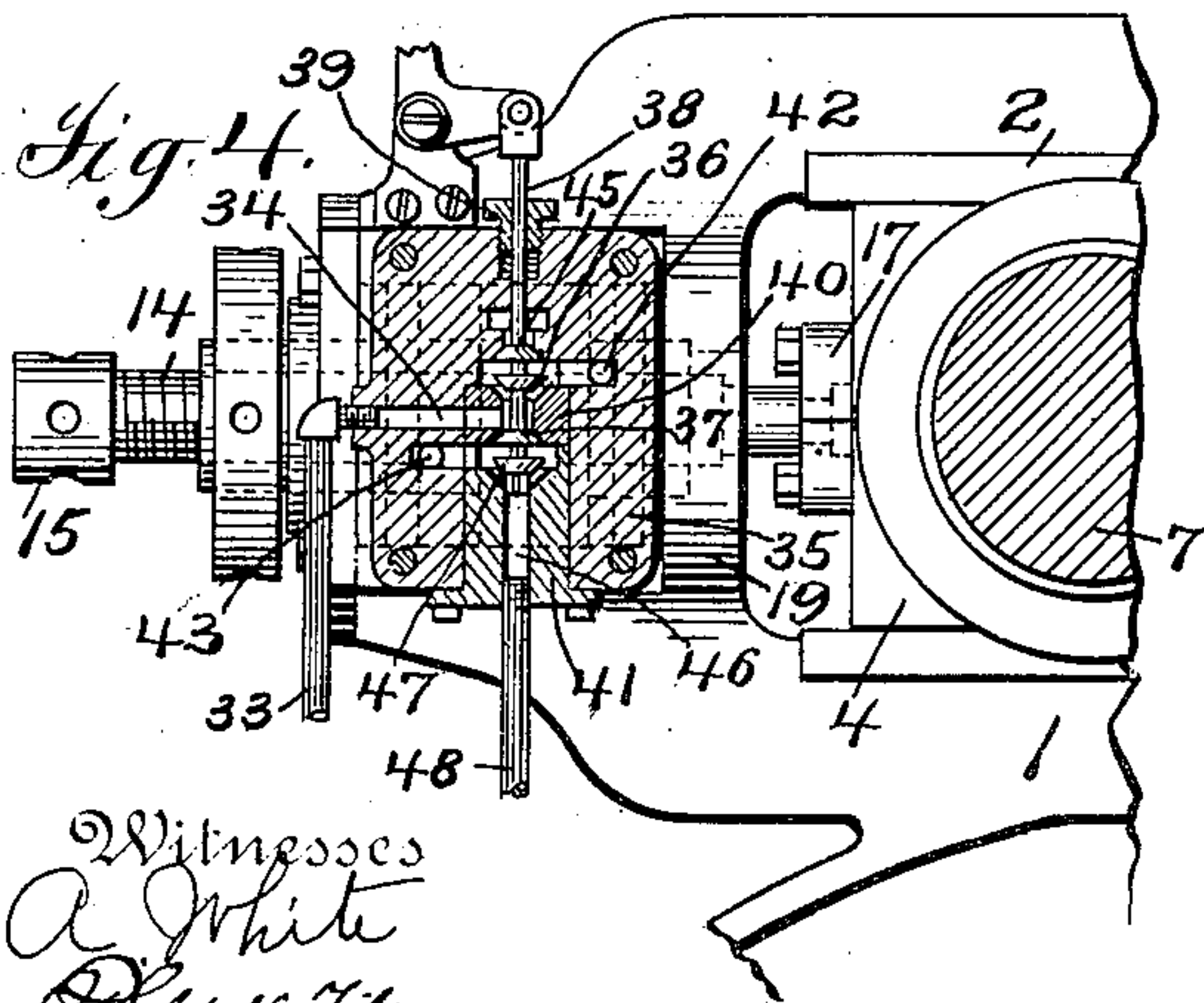
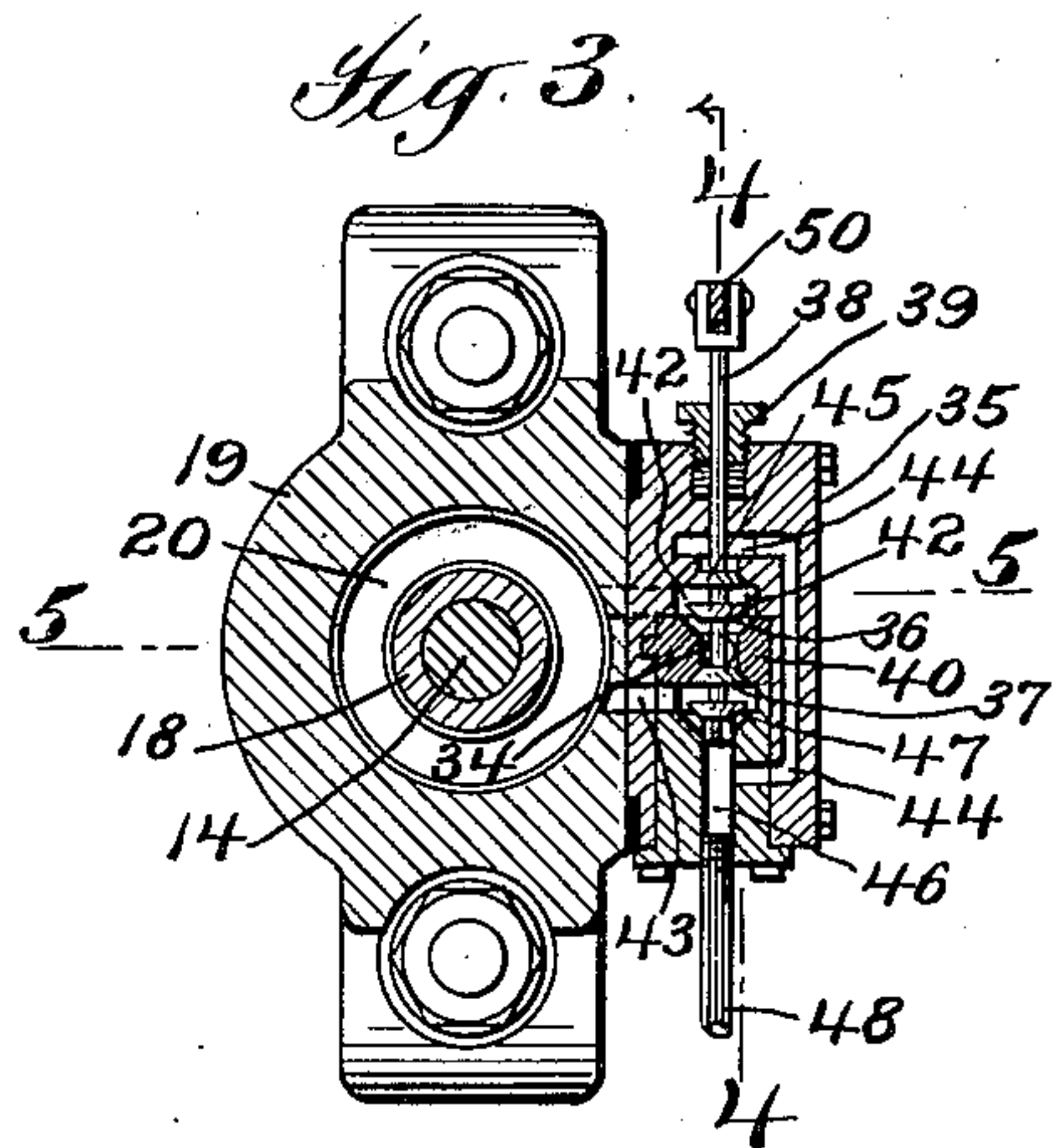
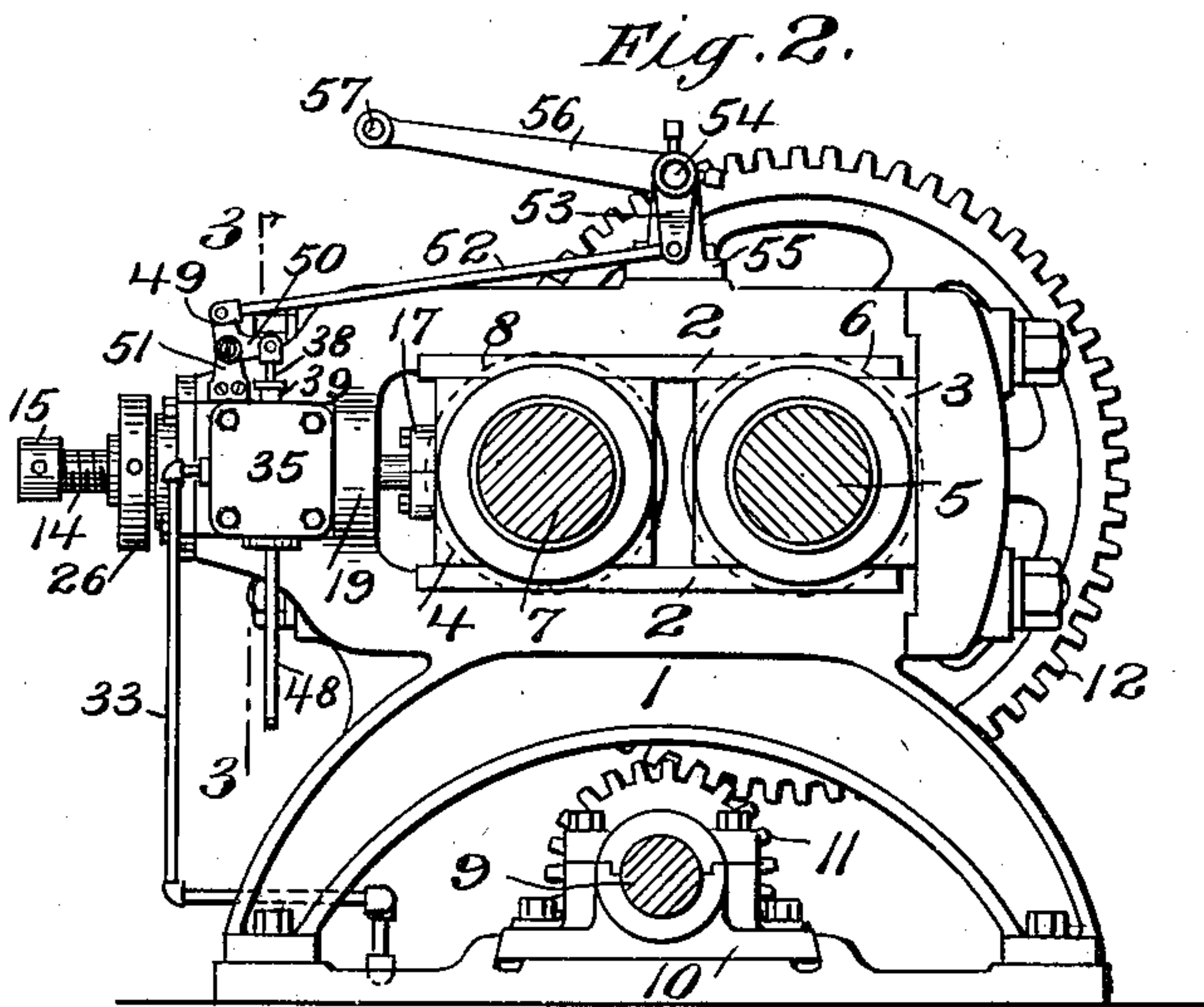
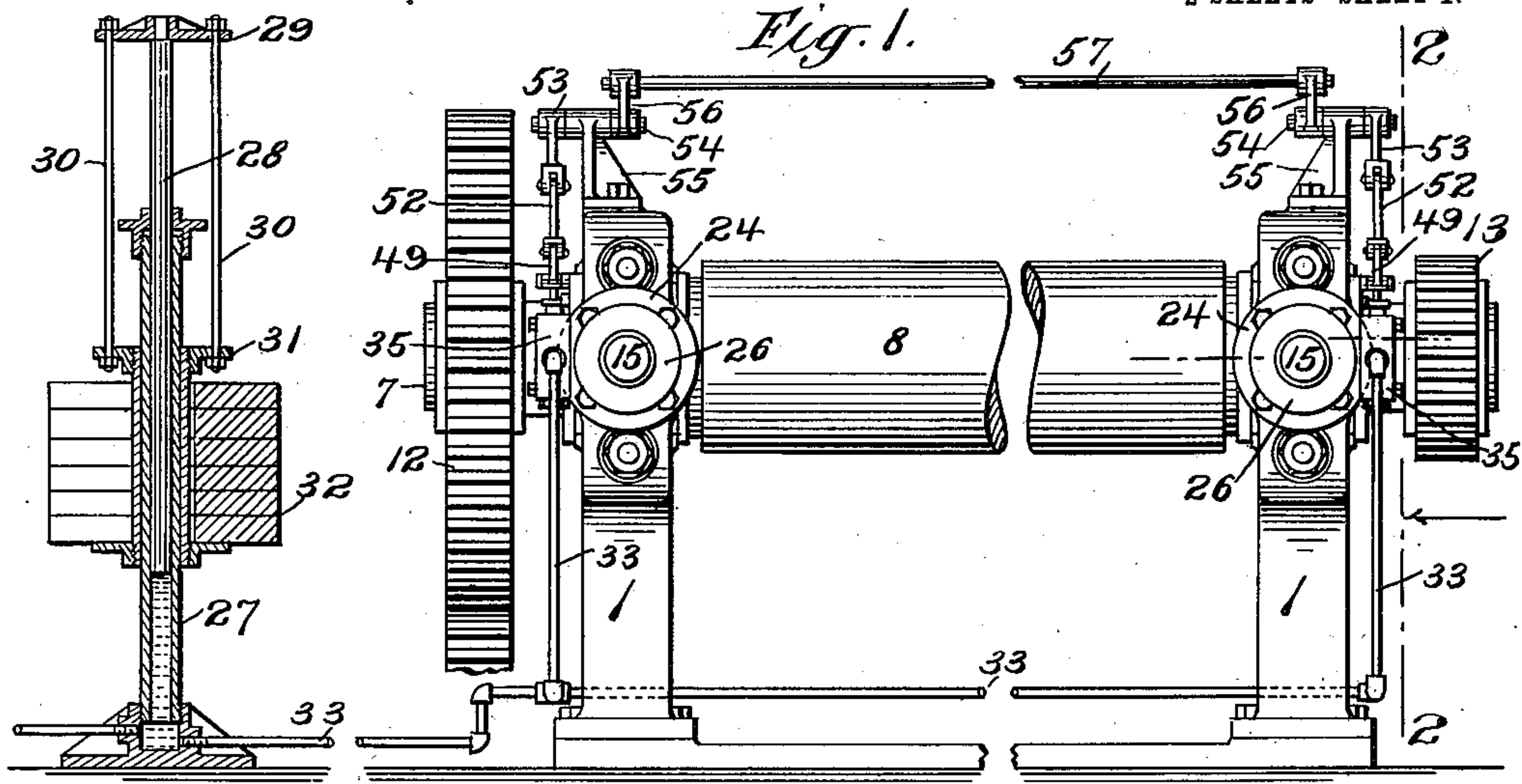
PATENTED FEB. 19, 1907.

B. O. HALE.

MILL ROLL CONTROLLING AND POSITIONING DEVICE.

APPLICATION FILED JUNE 14, 1906.

2 SHEETS—SHEET 1.



Witnesses  
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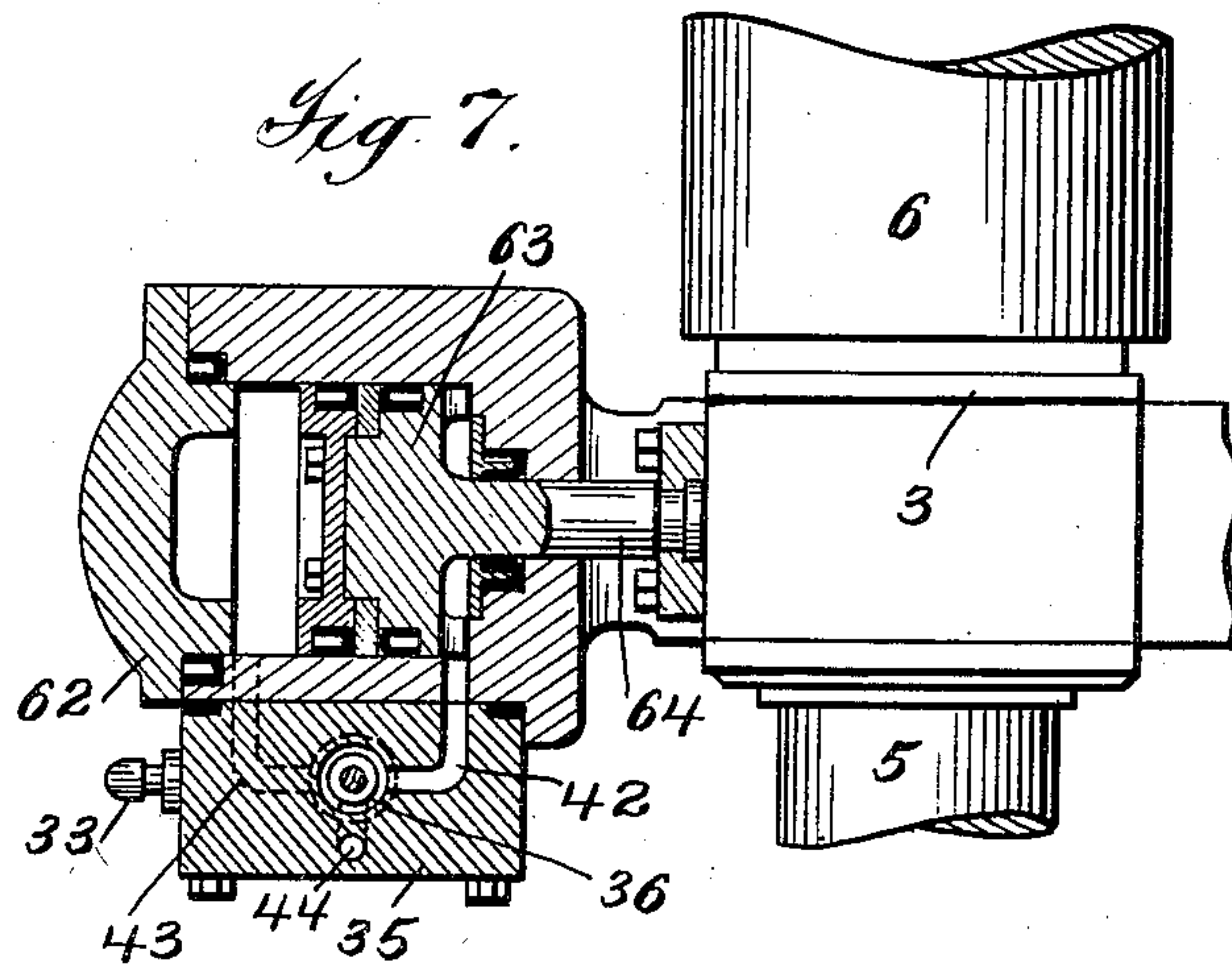
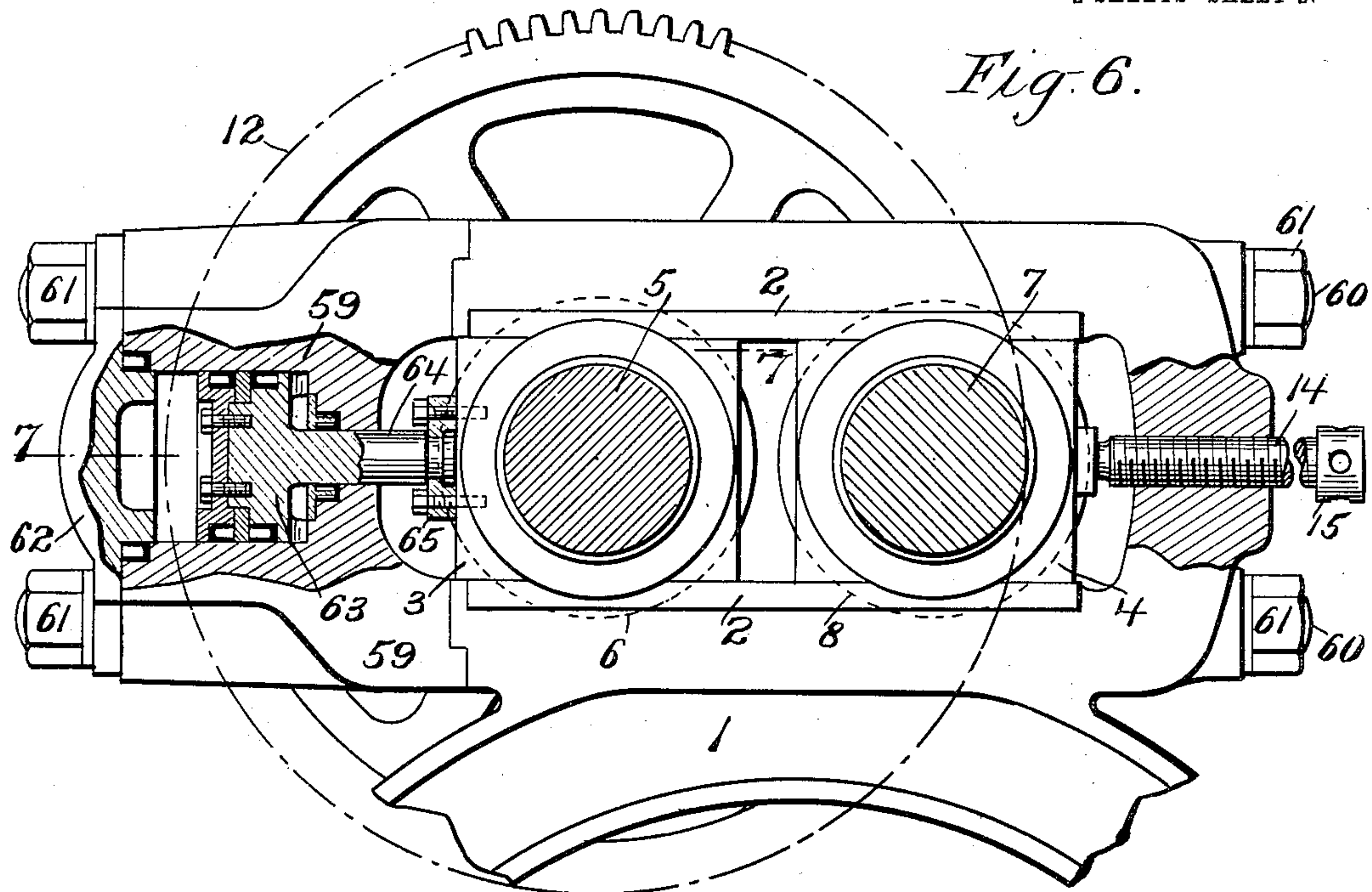
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Witnesses  
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# UNITED STATES PATENT OFFICE.

BERNARD O. HALE, OF DERBY, CONNECTICUT, ASSIGNOR TO FARREL FOUNDRY & MACHINE COMPANY, OF NEW HAVEN, CONNECTICUT, A CORPORATION OF CONNECTICUT.

## MILL ROLL CONTROLLING AND POSITIONING DEVICE.

No. 844,349.

Specification of Letters Patent.

Patented Feb. 19, 1907.

Application filed June 14, 1906. Serial No. 321,710.

*To all whom it may concern:*

Be it known that I, BERNARD O. HALE, a citizen of the United States, residing at Derby, county of New Haven, and State of Connecticut, have invented certain new and useful Improvements in Mill Roll Controlling and Positioning Devices, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in roll controlling and positioning devices for mills, and more particularly to those classes of mills in which large and heavy rolls are employed.

In mills of the character referred to, in which large and heavy rolls are employed—such, for instance, as mills for grinding rubber composition and similar material—the grinding operation is performed by a pair of rolls, one of which is mounted in sliding bearings. Screws or similar adjusting devices are employed in connection with these sliding bearings, the working relation of the rolls being determined by adjusting the screws. Should foreign objects—such, for instance, as a stone or a bolt—be present in the material to be ground, the rolls being firmly held by the adjusting devices there is liability that the mill will be broken, or if this is to be prevented the rolls must be separated by operating the adjusting-screws. This makes it necessary to either slow down or stop the operation of the mill, and after the foreign body has been removed or it has passed it is necessary to readjust the rolls to bring them into working position. This of course consumes valuable time and decreases the output of the mill.

It is one of the objects of this invention to produce an improved roll controlling and positioning device for the rolls of mills employing large and heavy rolls, in which the working position of the rolls may be determined with accuracy and in which it shall be possible to move the rolls quickly out of and into the working position, this movement of the rolls taking place without disturbing the adjusting devices which determine the working relation of the rolls.

A further object of the invention is to produce an improved roll positioning and controlling device for mills employing large and

heavy rolls, in which means shall be employed for adjusting the working relation of the rolls, means being also provided for maintaining the rolls in working relation under a cushioned pressure in excess of the normal load on the rolls, whereby the rolls may be allowed to separate to avoid breakage of the mill in case a foreign body gets between the rolls, the devices for maintaining the cushioned pressure including means whereby the rolls may be positively separated, if desired.

With these and other objects in view the invention consists in certain constructions and in certain parts, improvements, and combinations, as will be hereinafter fully described, and then specifically pointed out.

In the accompanying drawings, Figure 1 represents in elevation a mill containing the improved roll controlling and positioning devices. Fig. 2 is a sectional elevation on the line 2 2 of Fig. 1. Fig. 3 is a detail sectional view on the line 3 3 of Fig. 2. Fig. 4 is a detail sectional view on the line 4 4 of Fig. 3. Fig. 5 is a sectional view on the line 5 5 of Fig. 3. Fig. 6 is a detail sectional elevation, on a large scale, of the mill-rolls with a different form of adjusting device. Fig. 7 is a section on the line 7 7 of Fig. 6.

Referring to the drawings, the machine selected for the purpose of illustrating the invention is a grinding-mill for grinding rubber composition and similar material. The frame of the mill may comprise two side frames or standards, (marked 1,) provided with recesses at their upper ends, in which may be located ways 2. These ways may serve to support sliding bearings 3 4 of the usual construction. The bearings 3 may support a shaft 5, on which is mounted a grinding-roll 6, this roll being ordinarily referred to as the "back" roll. The bearings 4 may serve to support a shaft 7, on which is mounted a roll 8, this roll being ordinarily known as the "front" roll. These grinding-rolls, which serve to macerate and reduce the rubber composition or other material introduced between them, may be driven in any suitable way. In the construction illustrated there is provided a power-shaft 9, mounted in suitable bearings in a pillow-block 10 on the frame, this shaft being driven from any suitable source of power. As shown, this shaft is provided with a pinion



11, which meshes with or drives a large gear 12, mounted on the shaft 5 of the back roll. The other end of the shaft 5 may be provided with one of a pair of intermeshing gears 13, there being a similar gear on the shaft 7. With this construction the back roll is directly driven from the power-shaft and serves to drive the front roll.

Means are provided for adjusting the rolls so as to bring them into proper working relation. While these means may be varied, in the best constructions they will include screws, there being one screw for each end of the roll to be adjusted, these screws being marked 14. Each of the screws is provided with an apertured head 15, in the apertures of which a bar or other tool may be inserted to turn the screws in order to adjust the roll. The adjusting-screws may work in connection with either the back or the front roll. In the construction illustrated the screws operate in connection with the front roll.

Referring to Figs. 2 and 5, inclusive, the inner end of each screw is headed, as shown at 16 in Fig. 5, and these headed ends take into sockets 17 on the sliding bearings 4. The screws are threaded into sleeves 18, which are supported in chambered castings 19, which will be hereinafter referred to, these castings forming in the constructions shown in Figs. 2 to 5 extensions of the side frames.

In the construction shown in Fig. 6 the screws are tapped directly through the ends of the side frames, the construction being in other respects the same. Means are provided for so controlling the rolls as to enable them to be put into or out of working relation when required, these means being of such a character that when the rolls after they have been separated to put out them of working relation may be restored to the working relation without interfering with the adjustment produced by the screws before described. In the best constructions, furthermore, the controlling means will be of such a character as to maintain a cushioned pressure on the material between the rolls which is greater than the normal load on the rolls, so that in case any foreign body is introduced between the rolls the rolls may separate to prevent breakage of the machine. The controlling device or devices may operate in connection with either or, if desired, in connection with both of the rolls. Constructions are illustrated in which the controlling devices operate in connection with the front roll and with the back roll. While the particular construction of the controlling device or devices may be varied within wide limits, in the best constructions these devices will be operated by means of fluid-pressure.

In the construction shown in Figs. 2 to 5, inclusive, the chambers in the castings 19, before referred to, are utilized as fluid-cham-

bers, and the sleeves 18 referred to are provided with piston-heads 20, packing-rings 21 being provided to make tight joints between the piston-heads and the walls of the chambers. In the construction shown in the figures referred to the inner ends of the sleeves 18 rest in sockets 22 in the inner ends of the chambers, packing-rings 23 being provided, if desired, to make fluid-tight joints at these points. The outer ends of the chambers are provided with covers 24, through openings in which the sleeves pass, packing-rings 25 being provided, if desired, at these points to make tight joints. The outer ends of the sleeves may be threaded and provided with nuts 26, which will be hereinafter referred to.

The fluid by which the operation to be hereinafter described is effected may be obtained from any desired source; but in the best constructions, and particularly where a cushioned pressure is to be used, it will be obtained from a suitable accumulator. An ordinary type of accumulator is illustrated in Fig. 1, this accumulator including a chamber or reservoir 27, in which works a piston 28. The upper end of this piston is provided with a cross-bar 29, to which are secured rods 30, these rods supporting a long collar 31, which works on the outside of the chamber 27. This collar supports a series of weights 32, by which the necessary pressure in the accumulator is obtained. Leading from the lower part of the accumulator-reservoir is a pipe 33, this pipe dividing into two branches, one carrying fluid to one of the chambered castings and the other to the other casting. Each of these branches communicates (see Fig. 4) with an inlet-port 34 in a valve-casing 35. There are two of these valve-casings 35, one being secured to each of the chambered castings 19. The port 34 of each of the valve-casings 35 is controlled by two valves 36 37, these valves being carried on a stem 38, working through a stuffing-box 39 in the top of the casing. The seats for these valves are formed in a block 40, introduced into an opening in the casing, this opening being closed by a plug 41. The valve 36 controls the flow of the fluid into a port 42 formed in the casing, this port leading into the chamber on the inner side of the casting 19. The valve 37 controls the flow of fluid into a port 43 formed in the casing, this port (see dotted lines in Fig. 5) registering with an opening in the casting, which leads into the chamber on the outer side of the piston 20. It will be understood, therefore, that when the valve-stems 38 are moved in one direction fluid from the accumulator under pressure is admitted to one side of the pistons, and when it is moved in the opposite direction fluid will be admitted to the other side of the pistons. By properly operating the valves through the stems 38, therefore, the sleeves 18 and the screws 14, which are



threaded into them, can be moved outward to carry the roll 8 away from the roll 6 or can be moved in the opposite direction to bring the rolls into working relation. When the sleeves are moved inward, the nuts 26, before referred to, strike against the bosses on the covers 24 and limit the inward movement of the roll, so that the roll, no matter what the pressure in the accumulator is, comes back to the given point of adjustment which was determined by the setting of the screws 14.

Each of the casings 35 is provided with a discharge-port 44, there being a communication between each port 42 and a discharge-port 44, which is closed by a valve 45, mounted on the stem 38, before referred to. Each of these discharge-ports 44 leads into another discharge-port 46 in each plug 41, there being a communication between each discharge-port 46 and a port 43, which is closed by a valve 47 on the stem 38. The several valves on the stems 38 are so arranged that when the valves 36 are closed the valves 45 are opened, so as to allow the fluid which has been introduced on the inner side of the pistons 20 to escape. So, also, when the valves 37 are closed the valves 47 are opened, allowing the escape of the fluid from the other side of the pistons into the discharge-ports. The discharge-ports 46 communicate with suitable discharge-pipes 48.

The operating means for the stems 38 may be of any suitable character. As shown, there are provided bell-cranks 49 50, these bell-cranks being pivoted in brackets 51, secured to the frame. The arms 50 of these bell-cranks are connected to the valve-stems 38, and the arms 49 are connected by means of rods 52 to arms 53, to short shafts 54, mounted in brackets 55 on the frame. These short shafts have arms 56 extending up therefrom, the arms on the two brackets being connected by a tie-rod 57, which may be used as a handle to operate both shafts and the valves.

In the construction shown in Figs. 6 and 7 the back roll is moved to throw the rolls into and out of working relation instead of the front roll, as in the construction just described. In this construction, which is particularly advantageous for certain types of machines, each side frame is provided with a removable cap 59, these caps being held in place by rods 60, extending through the frame, these rods being provided with nuts 61. These removable caps are chambered out to form castings, the chambers being closed by covers 62. Located in each of these chambers are pistons 63, these pistons being provided with headed stems 64, which take into collars 65, secured to the bearings 3 of the back roll. The casing 35 is the same as that shown in the construction heretofore described and the manner of controlling the admission of the fluid the same. The con-

struction shown in Figs. 6 and 7 is simpler in some respects than the construction shown in the other figures, and is therefore cheaper to make. It also adapts itself very readily to the reconstruction of machines already built, it being possible to readily apply to such machines the removable caps with the valve construction attached thereto.

The operation of the machine will be readily understood from the preceding description. Should any foreign body start to pass between the rolls, it will be seen that they can be instantly separated by a proper manipulation of the tie-rod 57 and then brought back again into working position. Further, it will be understood that the construction lends itself readily to maintaining a cushioned pressure on the rolls, so that the rolls can readily separate automatically if foreign bodies are introduced between them before the operator sees them.

Changes and variations may be made in the constructions by which the invention is carried into effect. The invention is not, therefore, to be limited to the specific constructions hereinbefore shown and described.

What is claimed is—

1. The combination with a pair of rolls, of adjusting means for determining the working position of the rolls, a fluid-pressure controlling device, and means for operating said device to cause the rolls to be in or out of working position.
2. The combination with a pair of rolls, of adjusting means for determining the working position of the rolls, a fluid-pressure controlling device, means whereby said device is caused to maintain a cushioned pressure on the rolls in excess of the normal load thereon, and means for operating said device to cause the rolls to be in or out of working position.
3. The combination with a pair of rolls, of adjusting means for determining the working position of the rolls, a fluid-pressure controlling device, connections from said device to one of the rolls, and means for operating said device to move the roll out of and into its working position.
4. The combination with a pair of rolls, of adjusting means for determining the position of the rolls, a fluid-pressure controlling device, connections from said device to one of the rolls, means whereby said device is caused to maintain a cushioned pressure on the rolls in excess of the normal load thereon, and means for operating said device to move the roll into and out of working position.
5. The combination with a pair of rolls, of means including an adjusting-screw for determining the working position of the rolls, a controlling device, and means for operating said device to cause the rolls to be in or out of the working position determined by the screw.
6. The combination with a pair of rolls, of



means including an adjusting-screw for determining the working position of the rolls, a fluid-pressure controlling device, and means for operating said device to cause the rolls to be in or out of the working position determined by the screw.

7. The combination with a pair of rolls, of means including an adjusting-screw for determining the working position of the rolls, a fluid-pressure controlling device, means for causing said device to maintain a cushioned pressure on the roll in excess of the normal load thereon, and means for operating said device to cause the rolls to be in or out of the working position determined by the screw.

8. The combination with a pair of rolls, of means including a screw for adjusting one of the rolls to determine the working position of the rolls, a fluid-pressure controlling device, connections from said device to the other roll, and means for operating said device to move said roll into or out of the determined working position.

9. The combination with a pair of rolls, of means for adjusting one of the rolls to determine the working position thereof, a pair of fluid-operated pistons, said pistons being located at opposite ends of the other roll, chambers in which said pistons work, and means for admitting fluid under pressure to the chambers on opposite sides of the pistons to move the rolls into and out of the determined working position.

10. The combination with a pair of rolls, of means for adjusting one of the rolls to determine the working position thereof, a pair of fluid-pistons, said pistons being located at opposite ends of the other roll, chambers in which said pistons work, means for maintaining the fluid under pressure, and valves for admitting fluid to the chambers on opposite sides of the pistons to move said roll into and out of working position.

11. The combination with a pair of rolls, of means for adjusting one of the rolls to determine the working position thereof, a pair of fluid-operated pistons, said pistons being located at opposite ends of the other roll, chambers in which said pistons work, an accumulator, connections leading from the accumulator to both sides of each piston in the chamber, and means whereby the flow from the accumulator may be directed into either chamber.

12. The combination with a frame, of a pair of rolls, bearings in which said rolls are mounted, adjusting means for determining the working position of the rolls, a pair of removable cap-pieces, controlling devices carried by the cap-pieces, and means for operating said devices to cause the rolls to be in or out of working position.

13. The combination with a frame, of a pair of rolls, mounted in the frame, adjusting means for determining the working position

of the rolls, a pair of removable cap-pieces adjacent to the bearings of one of the rolls, a fluid-containing chamber in each cap-piece, a piston in each chamber, connections from the pistons to the bearings of one of the rolls, and means for admitting fluid under pressure to said chambers on each side of the pistons.

14. The combination with a frame, of a pair of rolls, sliding bearings in which the rolls are mounted, a screw adjustment operating in connection with the bearings of one of the rolls to determine the working position of the rolls, a pair of removable cap-pieces adjacent the bearings of the other roll, each cap-piece being formed to provide a fluid-chamber, pistons working in said chambers, connections from the pistons to the adjacent roll-bearings, and means for admitting fluid under pressure to either side of the piston in each chamber.

15. The combination with a frame, of a pair of rolls, sliding bearings in which the rolls are mounted, a screw adjustment operating in connection with the bearings of one of the rolls to determine the working position of the rolls, a pair of removable cap-pieces adjacent the bearings of the other roll, each cap-piece being formed to provide a fluid-chamber, pistons working in said chambers, connections from the pistons to the adjacent roll-bearings, an accumulator for maintaining the fluid under pressure, and means for controlling the flow of the fluid so that it may pass to either side of the piston in each chamber.

16. The combination with a frame, of a pair of rolls, shafts on which the rolls are mounted, driving-gear on the shaft of one of the rolls, intermittent gearing between the shafts whereby the second roll is driven from the first roll, adjusting means for determining the working position of the rolls, and means for moving the roll having the driving-gearing into and out of working relation with the other roll without disturbing the adjustment.

17. The combination with a frame, of a back roll, a shaft on which said roll is mounted, sliding bearings for the shaft, a driving-gear on one end of the shaft, a pinion on the other end of the shaft, a front roll, a shaft on which said roll is mounted, a pinion on said shaft meshing with the pinion on the back-roll shaft and driven thereby, adjusting means operating in connection with the front roll for determining the working position of the rolls, a controlling device, and means for operating said device to cause the rolls to be in or out of working position without disturbing the adjustment.

18. The combination with a frame, of a back roll, a shaft on which said roll is mounted, sliding bearings for the shaft, a driving-gearing on one end of the shaft, a pinion on the other end of the shaft, a front roll, a shaft



in which said roll is mounted, a pinion on said shaft meshing with the pinion on the back-roll shaft and driven thereby, adjusting means operating in connection with the front roll for determining the working position of the rolls, a fluid-operated controlling device, and means for operating said device to cause the rolls to be in or out of working position without disturbing the adjustment.

19. The combination with a frame, of a front roll, a shaft on which said roll is mounted, sliding bearings for the shaft, a back roll, a shaft on which said roll is mounted, sliding bearings for that shaft, gearing between the roll-shafts, a screw adjustment operating in connection with the bearings of the front roll to determine the working position of the rolls, a controlling device, operating connections between said device and the bearings of the back roll, and means for operating said device to move the back roll into and out of working position without disturbing the adjustment.

20. The combination with a frame, of a front roll, a shaft on which said roll is mounted, sliding bearings for the shaft, a back roll, a shaft on which said roll is mounted, sliding bearings for that shaft, gearing between the roll-shafts, a screw adjustment operating in connection with the bearings of the front roll to determine the working position of the rolls, a fluid-operated controlling device, operating connections between said device and the bearings of the back roll, and means for operating said device to move the back roll into and out of working position without disturbing the adjustment.

21. The combination with a frame, of a front roll, a shaft on which said roll is mounted, sliding bearings for the shaft, a pair of adjusting-screws operating in connection with said bearings, a back roll, a shaft for that roll, bearings in which the shaft is mounted, a driving-gear on the shaft of the back roll, intermeshing gears between the shafts of the rolls whereby the back roll drives the front roll, fluid-operated controlling devices connected to the bearings of the back roll, and means for operating said devices to cause the

rolls to be thrown into and out of working position.

22. The combination with a frame, of a front roll, a shaft on which said roll is mounted, sliding bearings for said shaft, a pair of adjusting-screws operating in connection with said bearings, a back roll, a shaft for that roll, bearings in which the shaft is mounted, a driving-gear on the shaft of the back roll, intermeshing gears between the shafts of the rolls whereby the back roll drives the front roll, a pair of removable cap-pieces adjacent to the bearings of the back roll, fluid-operated controlling devices mounted in said removable cap-pieces, connections from said devices to the bearings of the back-roll shaft, and means for operating said devices for moving the back roll into and out of working position with respect to the front roll.

23. The combination with a frame, of a front roll, a shaft on which said roll is mounted, sliding bearings for said shaft, a pair of adjusting-screws operating in connection with said bearings, a back roll, a shaft for that roll, bearings in which the shaft is mounted, a driving-gear on the shaft of the back roll, intermeshing gears between the shafts of the rolls whereby the back roll drives the front roll, a pair of removable cap-pieces adjacent to the bearings of the back roll, fluid-operated controlling devices mounted in said removable cap-pieces, connections from said devices to the bearings of the back-roll shaft, an accumulator for maintaining fluid under pressure, connections between said accumulator and said controlling devices, and means for operating said devices for moving the back roll into and out of working position with respect to the front roll.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

BERNARD O. HALE.

Witnesses:

LAWRENCE K. BLACKMAN,  
H. J. DEVENPORT.