

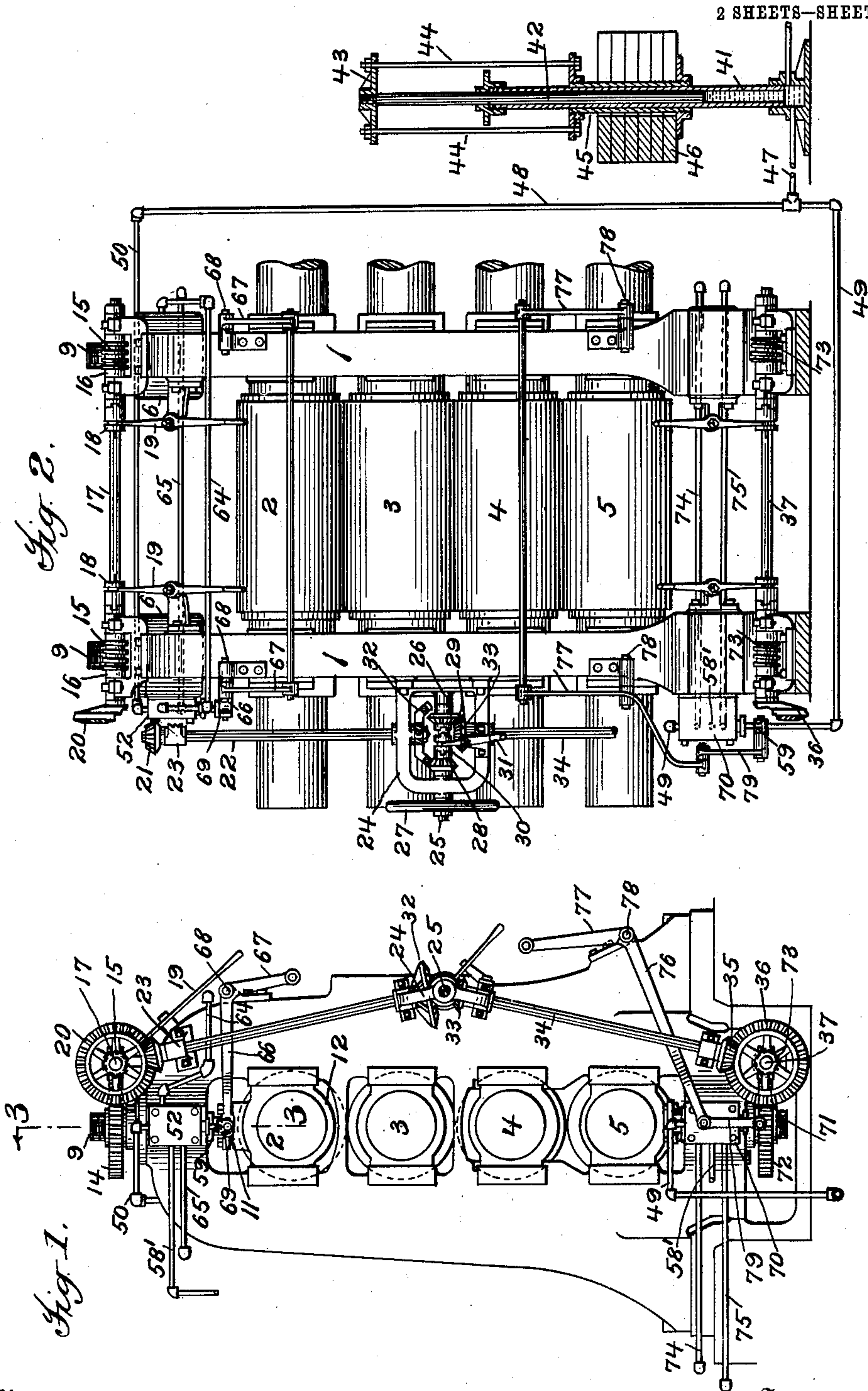
No. 844,350.

PATENTED FEB. 19, 1907.

B. O. HALE.
CONTROLLING AND POSITIONING DEVICE.

APPLICATION FILED JUNE 14, 1906.

2 SHEETS—SHEET 1.



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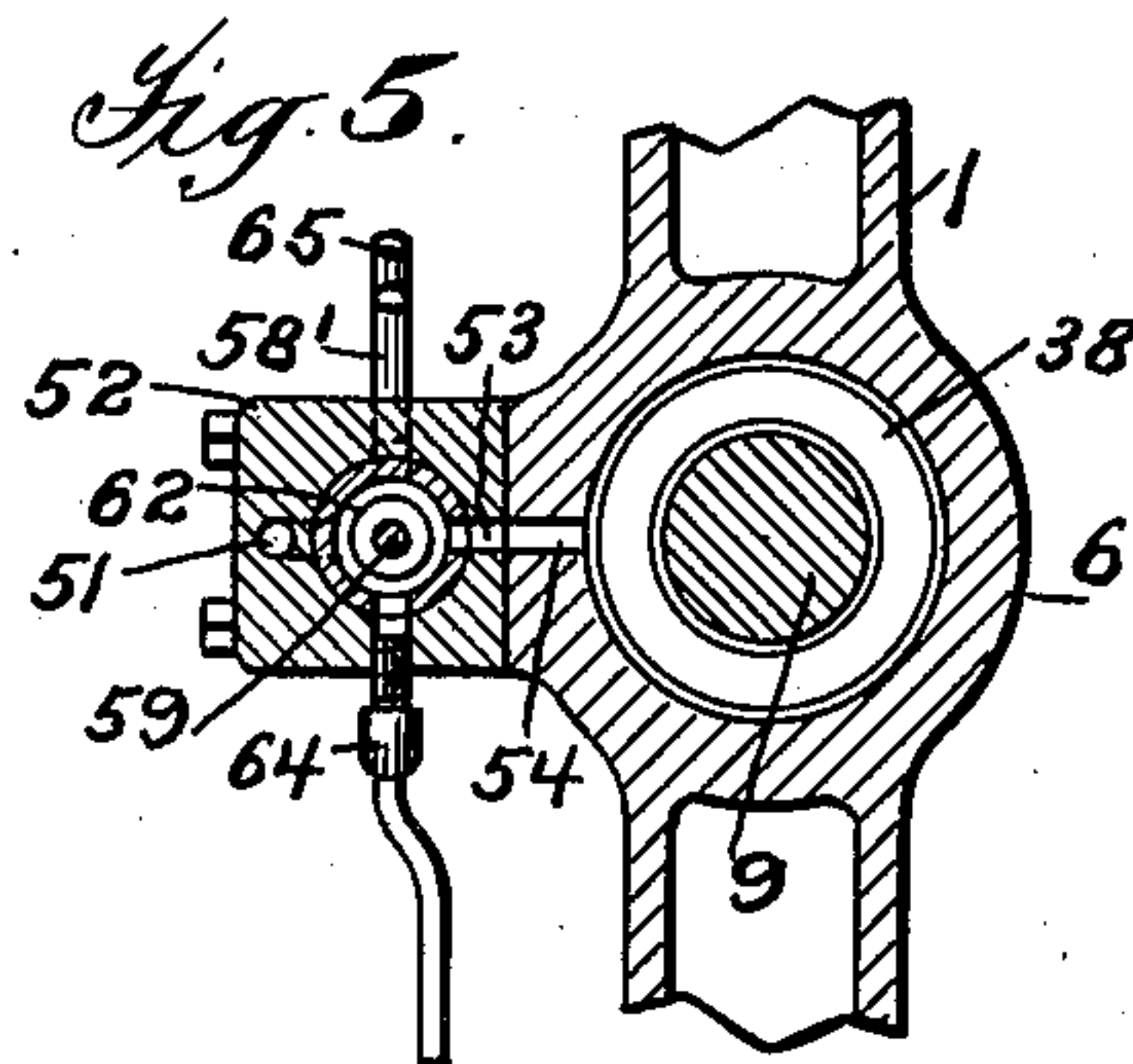
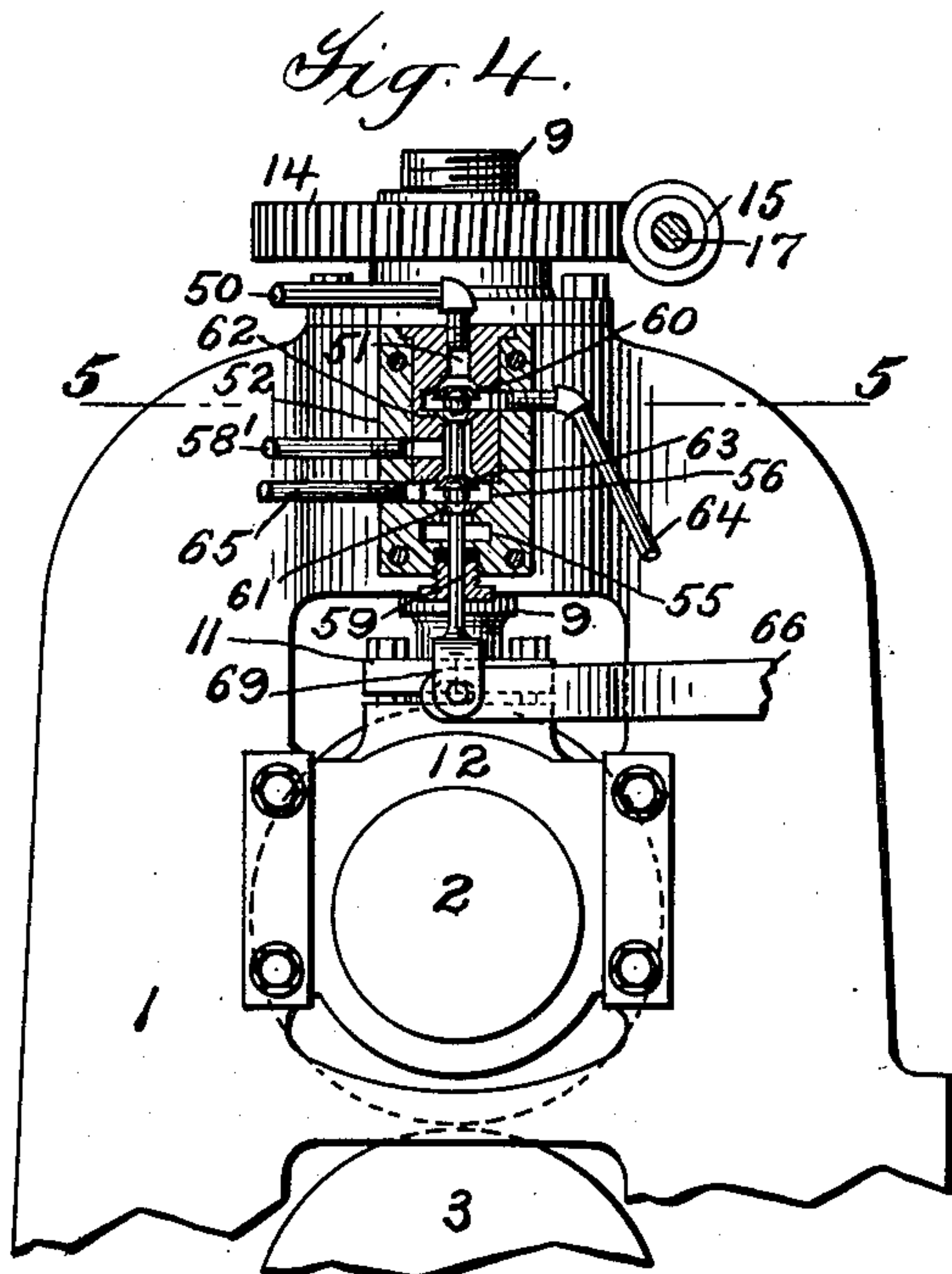
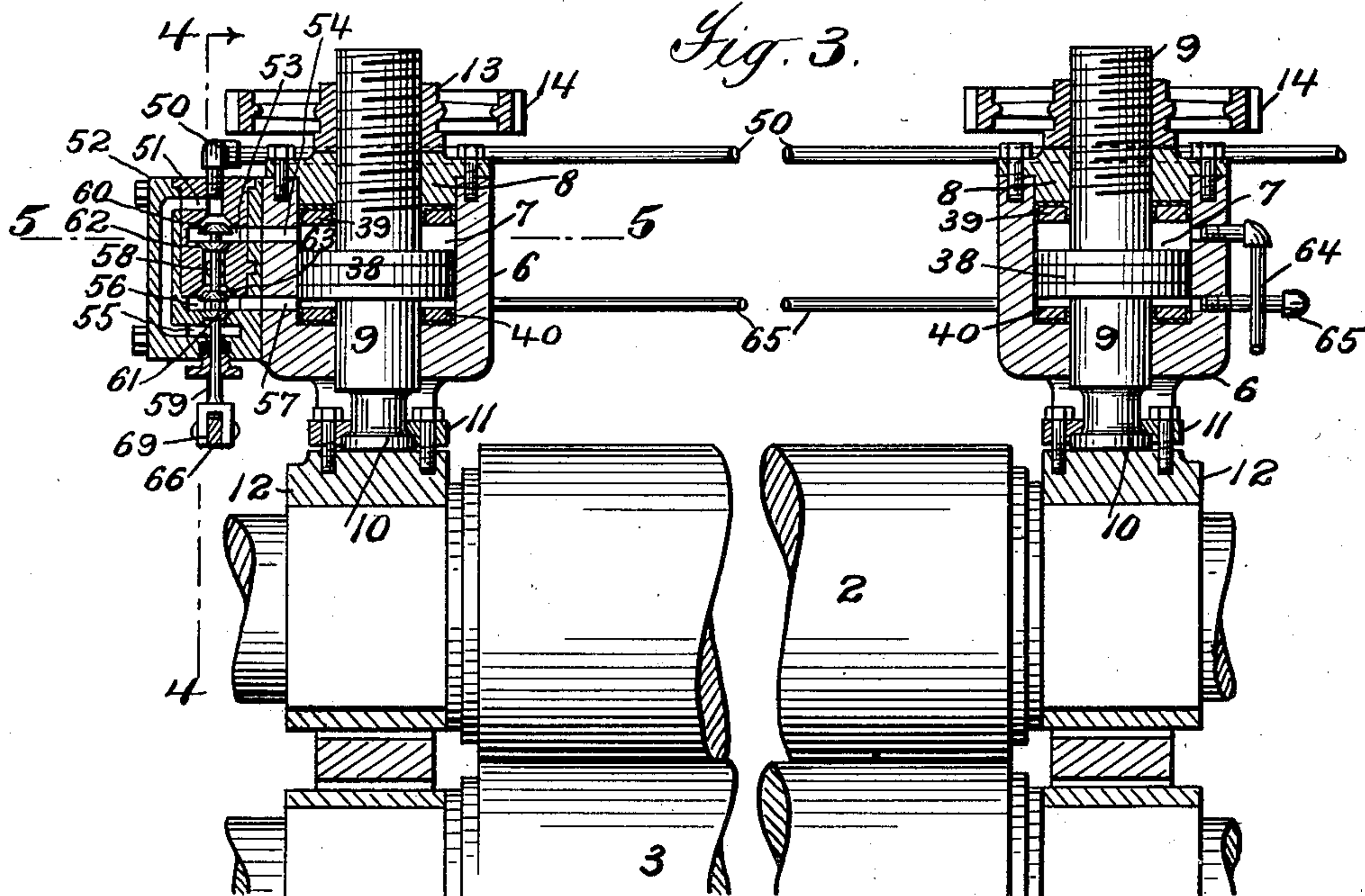
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UNITED STATES PATENT OFFICE.

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CONTROLLING AND POSITIONING DEVICE.

No. 844,350.

Specification of Letters Patent.

Patented Feb. 19, 1907.

Application filed June 14, 1906. Serial No. 321,711.

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 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, the devices being particularly applicable to constructions in which large and heavy rolls are employed.

In constructions of the character referred to—such, for instance, as calender-rolls, mills, &c., in which large and heavy rolls are employed—the rolls are made adjustable to determine their working relation in various ways. A common mode of adjustment is by employing screws which are connected to the sliding bearings in which the rolls are mounted. If, however, foreign bodies—such, for instance, as stones or bolts—happen to get in the material passing between the rolls it is necessary to prevent breakage to separate the rolls. Where the screw adjustment is employed, the separation of the rolls is necessarily slow and requires considerable time to effect, so that a slowing down or stoppage of the rolls is necessary. This of course consumes valuable time and decreases the output of the rolls.

It is one of the objects of this invention to produce an improved roll controlling and positioning device for constructions in which large and heavy rolls are employed in which one of a pair or series of rolls shall be provided with means for adjusting it to determine its working position, means being further provided for moving the adjusted roll into and out of working position without disturbing the adjustment.

A further object of the invention is to produce an improved roll controlling and positioning device for constructions in which large and heavy rolls are employed in which devices are provided for adjusting one or more of the rolls with accuracy, the construction being, further, of such a character that the rolls are maintained in working relation by a cushioned pressure in excess of the nor-

mal load on the rolls and being also provided with means to enable the rolls to be quickly separated, if desired, and then moved back into the adjusted position without disturbing the adjustment.

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.

Referring to the accompanying drawings, Figure 1 represents in side elevation a calendering-machine embodying the invention. Fig. 2 is a front elevation of the construction shown in Fig. 1. Fig. 3 is a detail section, on an enlarged scale, of the upper part of the calender-roll, the plane of section being indicated by the line 3 3 in Fig. 1. Fig. 4 is a section on the line 4 4 of Fig. 3. Fig. 5 is a section on the line 5 5 of Fig. 3.

The machine which has been selected to illustrate the invention is a calendering-machine of the four-roll type, although it will be understood that the invention may be embodied in other machines.

In the drawings the frame consists of two uprights or side frames 1, these frames serving to support in suitable bearings calender-rolls 2, 3, 4, and 5. In machines constructed in accordance with the invention one or more of the rolls will be provided with means whereby the working position of the rolls will be determined and also with means for moving the adjusted roll into and out of working position without disturbing the adjustment. In the construction illustrated the upper and lower rolls are thus made movable and adjustable.

The means for adjusting the position of the rolls may be varied within wide limits. In the particular construction illustrated the upper end of each side frame is provided with a casting 6, which is cored out to form a chamber 7, these chambers being closed by covers 8 or in any other suitable manner. Working through the chambers and through openings in the bottoms of the castings and the covers are headed rods or plungers 9, the heads 10 of these rods being secured by collars 11 to sliding bearings 12, in which the roll 2 is mounted. The adjustment of the rolls to determine their working relation is effected by the movement of these rods or

plungers. The particular means by which these rods or plungers are moved may be widely varied. As shown, the outer ends of the plungers are threaded, as indicated in the
 5 drawings, and are engaged by threaded hubs 13 of worm-gears 14, these hubs 13 working close to bosses on the covers 8. The worm-gears when this form of adjusting devices is employed may be operated in any suitable
 10 manner. As illustrated, they are operated from worms 15, these worms being formed on sleeves 16. These sleeves 16 are supported on a cross-shaft 17, the sleeves being connected to the shaft and disconnected there-
 15 from by means of clutch-collars 18, feathered to the shafts and operated by levers 19.

The shaft 17 may be operated in any suitable manner. As shown, it is provided with a bevel-gear 20, which meshes with a bevel-
 20 pinion 21, this pinion being mounted on a standing shaft 22. The upper end of this standing shaft is secured in a bearing 23, secured to the frame, the lower end of the shaft being mounted in a yoke-shaped frame
 25 24, secured to the side frame. This yoke-shaped frame is provided with a bearing in which is mounted a short shaft 25, the other end of this shaft being stepped in a bearing 26, secured to the main frame. This shaft
 30 25 may be provided with any suitable operating means—as, for instance, a handle 27. This shaft 25 is provided with two bevel-pinions 28 29, either of which may be clutched to the shaft by means of a clutch-collar 30,
 35 operated from a suitable handle 31. The bevel-pinion 28 drives a bevel-gear 32 on the lower end of the standing shaft 22. The pinion 29 drives a bevel-gear 33 on a standing shaft 34. This standing shaft 34 is pro-
 40 vided with a bevel-gear 35, which meshes with a bevel-gear 36 on a shaft 37, this being the shaft by which the lower roll 5 is adjusted. The connections by which this shaft 37 adjusts the bearings of the roll are duplicates
 45 of the connections already described in connection with the roll 2, and therefore need not be further described. It will be apparent that by means of these connections just described a very exact adjustment may be
 50 obtained between the two upper and the two lower rolls of the calender.

Machines constructed in accordance with the invention will include means for moving the adjusted roll toward and away from the
 55 other roll, and this means will be of such a character that this movement will be effected without disturbing the adjustment of the adjusted roll. While the particular means for effecting the movement referred to may
 60 be varied, as shown, the chambers 7 are utilized as fluid-containing chambers and the plungers 9 are provided with pistons 38, which work in these chambers, suitable packing-rings, as 39 40, being provided to make
 65 the chambers fluid-tight. The means for

effecting the flow of fluid into the chambers and for controlling the flow may be widely varied; but in the best constructions, and as shown, they will be such as to enable the rolls to be held in their adjusted position by
 70 cushioned pressure. In the construction illustrated an accumulator is provided for maintaining the fluid under pressure, an ordinary form of accumulator being illus-
 75 trated in Fig. 2. This accumulator includes a chamber 41, in which works a piston 42, the upper end of this piston being provided with a cross-bar 43, to which are secured rods 44, these rods supporting a long
 80 collar 45, which works on the outside of the chamber 41. This collar supports a series of weights 46, by which the pressure in the accumulator is obtained. Leading from the lower part of the accumulator-reservoir is a
 85 pipe 47, this pipe dividing into two branches 48 49. The branch 48 terminates in a cross-pipe 50, which is connected to an inlet-port 51, formed in a valve-casing 52, which is bolted or otherwise secured to one of the cast-
 90 ings 6. This port communicates through a suitable opening with a port 53, this port 53 being in register with a port 54 in the casting 6. The port 51 is also in communication with a port 55, this port being arranged to com-
 95 municate through a suitable opening with a port 56, which is in register with a port 57. The port 54 opens into the chamber 7 above or on one side of the piston 38, and the port 57 opens into the chamber 7 below or on the
 100 other side of the piston 38, reference being now had to that casting 6 to which the valve-casing 52 is secured. The ports 53 56, further, are arranged to communicate through suitable openings with a port 58, which is in
 105 communication with a discharge-pipe 58'. The various openings with which communication is established between the ports may be controlled by any suitable arrangement of valves. In the construction illustrated a
 110 valve-stem 59 is provided, this stem working through a suitable stuffing-box. This stem carries a valve 60, which controls the opening between the ports 51 and 53 and a valve 61, which controls the opening between the
 115 ports 55 and 56. The stem carries two other valves 62 and 63, the valve 62 controlling the opening between the port 53 and the port 58 and the valve 63 controlling the opening between the port 56 and the port 58.
 120 With this construction it will be apparent that when the valve 60 is closed the valve 61 is open, thus establishing communication between the accumulator and the chamber 7 through the pipes, the ports 51, 55, 56, and
 125 57, so that the fluid under pressure in the accumulator will raise the piston 38 on that side of the machine which is provided with the valve-casing. When, furthermore, the valve 61 is closed, the valve 60 is opened, thus
 130 establishing communication between the ac-

cumulator and the chamber 7 and the upper part of the piston 38, this communication being through the pipes and the ports 51, 53, and 54. It will be further understood that when the valve 60 is closed the valve 62 is opened, establishing communication between the upper side of the chamber 7 and the discharge-pipe, and that when the valve 61 is closed the valve 63 is opened, establishing communication between the lower side of the chamber 7 and the discharge-pipe. It is of course apparent that the other end of the roll should be raised simultaneously. This may be accomplished in various ways. In the best constructions it will be accomplished by pipes controlled by the valves before referred to. In the construction illustrated there is provided a pipe 64, which leads from the port 53 to the other side of the machine, this pipe entering the other casting 7 above the other piston 38. There is also provided another pipe 65, this pipe leading from the port 56 to the chamber on the other side of the machine, this pipe communicating with the chamber below it on the other side of the piston 38. It is apparent, therefore, that by the manipulation of the valves before referred to the pistons 9 on both sides of the chamber may be simultaneously raised or lowered. It is further apparent that when the upper chambers are placed in communication with the accumulator the lower chambers will be in open communication with the exhaust-pipe, and vice versa.

The valves may be manipulated in any suitable way. In the construction illustrated there is provided a bell-crank lever 66 67, this lever being pivoted at 68 to the frame of the machine. The arm 66 of this lever is connected to a yoke 69 on the end of the valve-stem. The arm 67 forms a suitable handle within easy reach of the operator, by which the valve may be manipulated.

The connections by which the lower roll is operated may be variously arranged; but they may conveniently be duplicates of those already described. As shown, the pipe 49 leads into a valve-casing 70, mounted on the frame, and the frame on each side will be provided with chambers similar to the chambers 7, in which plungers 71, similar to the plungers 9, are located, these plungers being provided with piston-heads similar to the heads 38. These plungers may be connected to the bearings of the lower roll 5 in the same manner as the pistons 9 are connected to the bearings of the upper roll. The position of these pistons may be controlled to effect the adjustment of the rolls by means of gears 72, operated by worms 73 on the shaft 37, before referred to. The pipe 49 enters the valve-casing 70 at its top in the same manner in which the pipe 50 enters the upper valve-casing. Cross-pipes 74 75 connect the chambers on the two sides of the frame in the same

manner as the upper casings are connected by the pipes 64 and 65. The valves and ports in the casing 70 may be duplicates of the valves and ports in the casing 52, and these valves may be operated from a bell-crank lever 76 77, pivoted to the frame at 78, the arm 76 of this lever being connected to the valve-stem by a link 79. It will be understood that the pressure maintained by the accumulator will be greater than the normal load between the rolls and that when the machine is running the valve 60 in the upper valve-casing and the corresponding valve in the lower valve-casing will be open. The rolls 2 and 5 are therefore held in position by a cushioned pressure which is in excess of the normal load between the rolls, the position in which the rolls are held being determined by the adjustment of the plungers 9 through the worm-wheels before referred to. Should, therefore, any foreign body pass between the rolls unseen by the operator, the rolls can yield and would yield against the pressure of the accumulator. If, however, the presence of a foreign body is detected by the operator, the rolls can be immediately separated and then thrown back into working relation, and this may be accomplished without disturbing the adjustment of the rolls, inasmuch as after either roll has been separated from its companion roll it will be moved back by the proper operation of the valves into the position of adjustment it occupied before the separating movement occurred.

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

What is claimed is—

1. The combination with a pair of rolls, of sliding bearings in which one of the rolls is mounted, a pair of plungers connected with the bearings, means for adjusting the plungers to determine the working position of the rolls, and means for operating the plungers to move the roll mounted in the sliding bearing into and out of working position without disturbing the adjustment.

2. The combination with a pair of rolls, of sliding bearings in which one of the rolls is mounted, a pair of threaded plungers connected to the bearings, adjusting-nuts whereby the working position of the rolls may be determined, and means for operating the plungers to move the roll mounted in the sliding bearings into and out of working position without disturbing the adjustment.

3. The combination with a pair of rolls, of means for adjusting one of the rolls to determine the working position of the rolls, and fluid-operated means for moving the adjusted roll into and out of working position without disturbing the adjustment.

4. The combination with a pair of rolls, of

sliding bearings in which one of the rolls is mounted, a pair of plungers connected with the bearings, means for adjusting the plungers to determine the working position of the rolls, and fluid-operated means for operating the plungers to move the roll mounted in the sliding bearings into and out of working position without disturbing the adjustment.

5. The combination with a pair of rolls, of sliding bearings in which one of the rolls is mounted, a pair of threaded plungers connected to the bearings, adjusting-nuts whereby the working position of the rolls may be determined, and fluid-operated means for operating the plungers to move the roll mounted in the sliding bearings into and out of working position without disturbing the adjustment.

6. The combination with a pair of rolls, of sliding bearings in which one of the rolls is mounted, plungers connected to the bearings, means for adjusting the plungers to determine the working position of the rolls, fluid-containing chambers through which the plungers move, piston-heads mounted on the plungers, and means for admitting fluid under pressure on either side of the piston-heads in the chambers, whereby the roll in the sliding bearings may be moved into and out of working position without disturbing the position of the adjustment.

7. The combination with a pair or rolls, of sliding bearings in which one of the rolls is mounted, threaded plungers connected to the bearings, mechanically-operated nuts for adjusting the working position of the rolls, fluid-containing chambers through which the plungers move, piston-heads mounted on the plungers, and means for admitting fluid under pressure to the chambers on either side of the heads.

8. The combination with a pair of rolls, of sliding bearings in which one of the rolls is mounted, threaded plungers connected to the bearings, mechanically-operated nuts, fluid-containing chambers through which the plungers move, piston-heads mounted on the plungers, an accumulator for maintaining fluid under pressure, and means for delivering the fluid from the accumulator to the chambers on either side of the piston-heads.

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.