C. A. McCAIN.

CUSHIONING MECHANISM FOR RECIPROCATING BEDS.

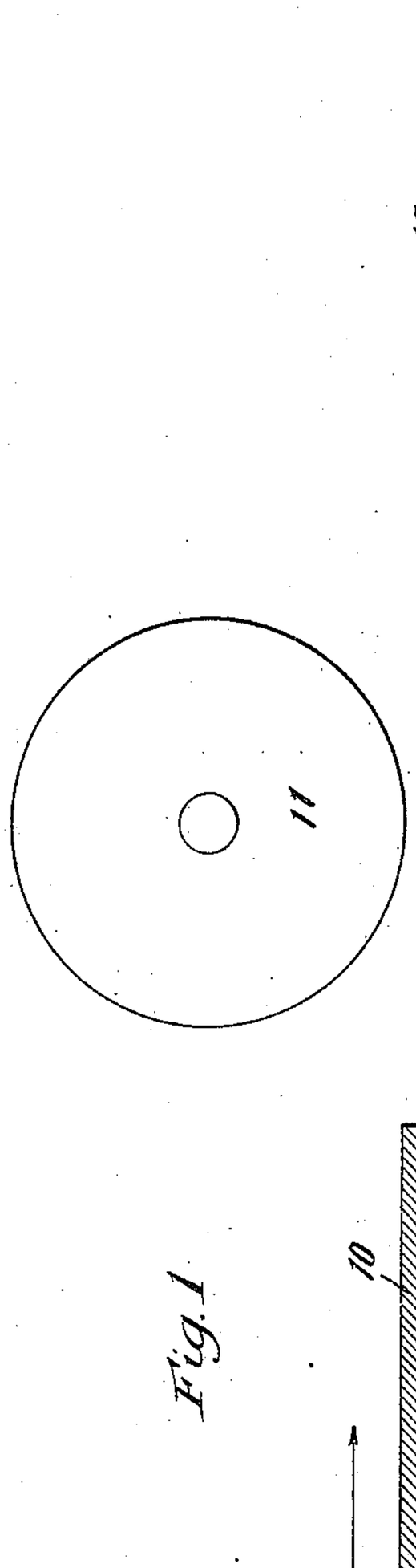
APPLICATION FILED MAR. 18, 1909.

944,492.

Patented Dec. 28, 1909.

3 SHEETS—SHEET 1.

Fig. 1



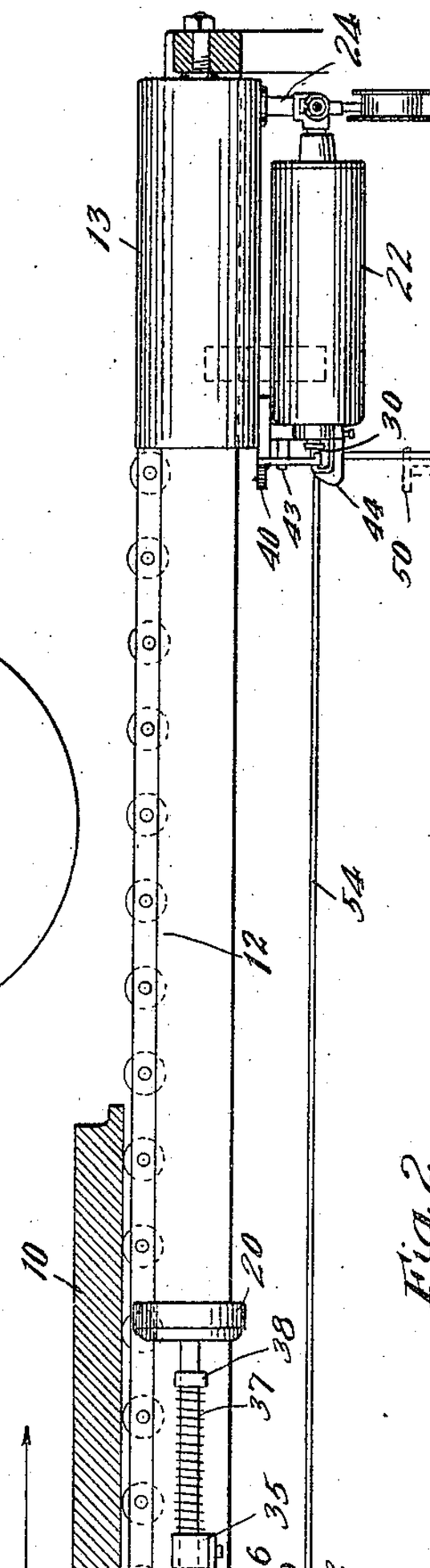
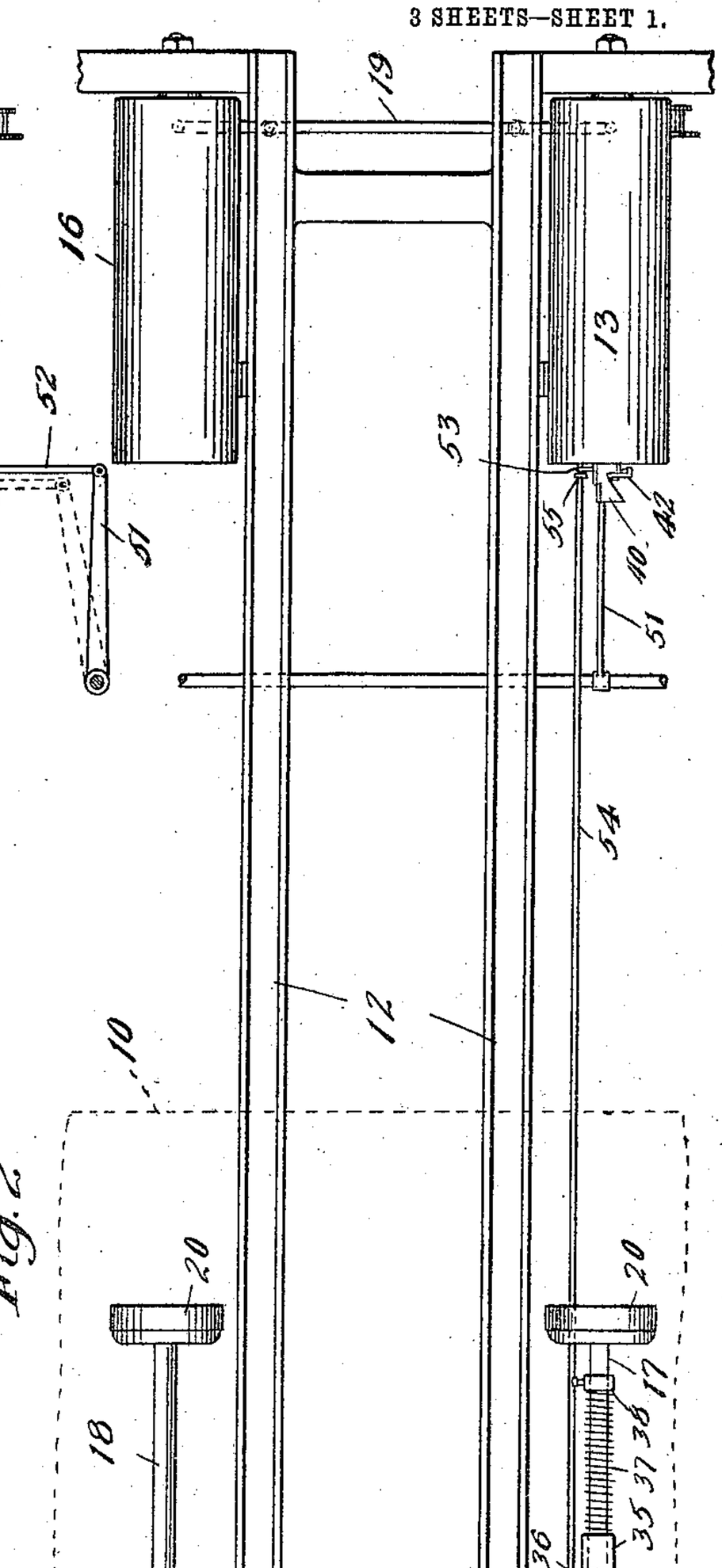


Fig. 2



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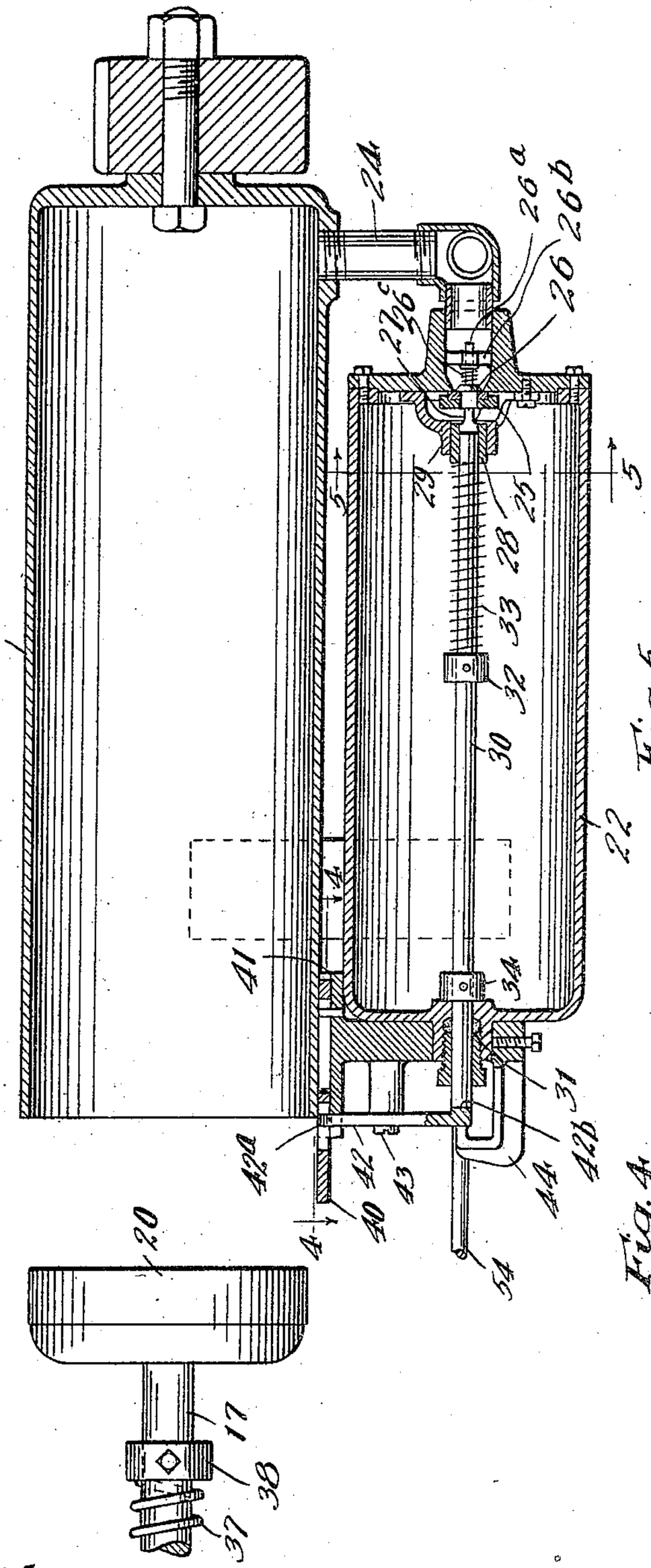

Fig. 3

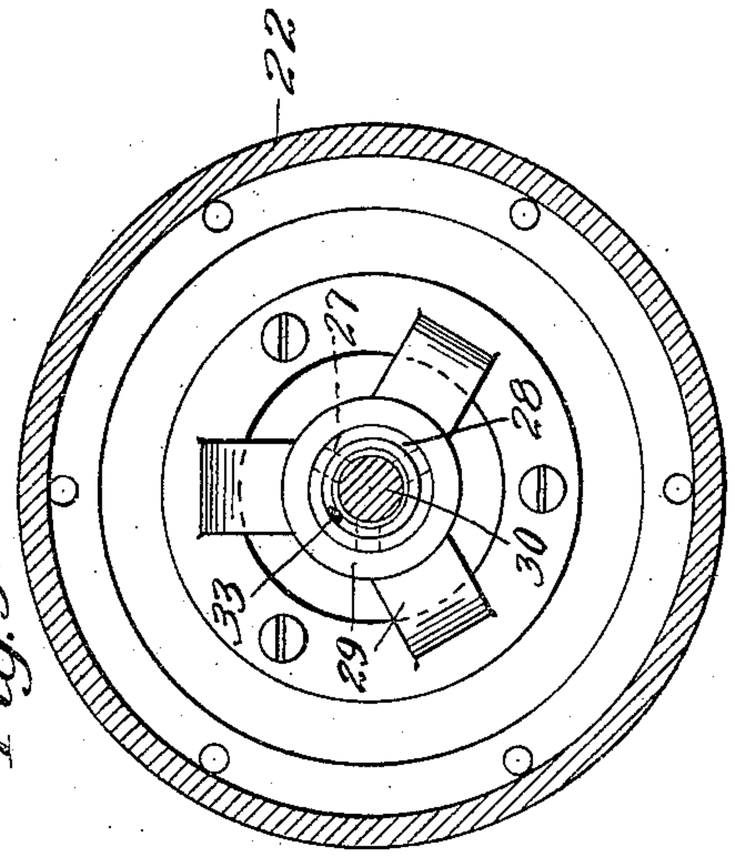

Fig. 5

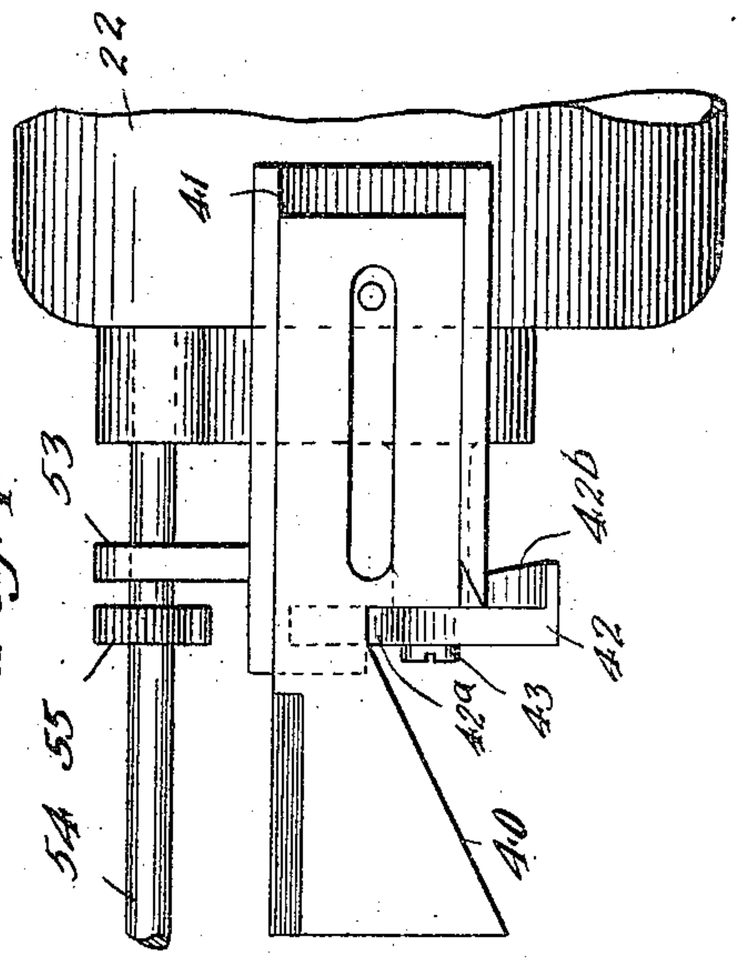

Fig. 4

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3 SHEETS—SHEET 3.

Fig. 6

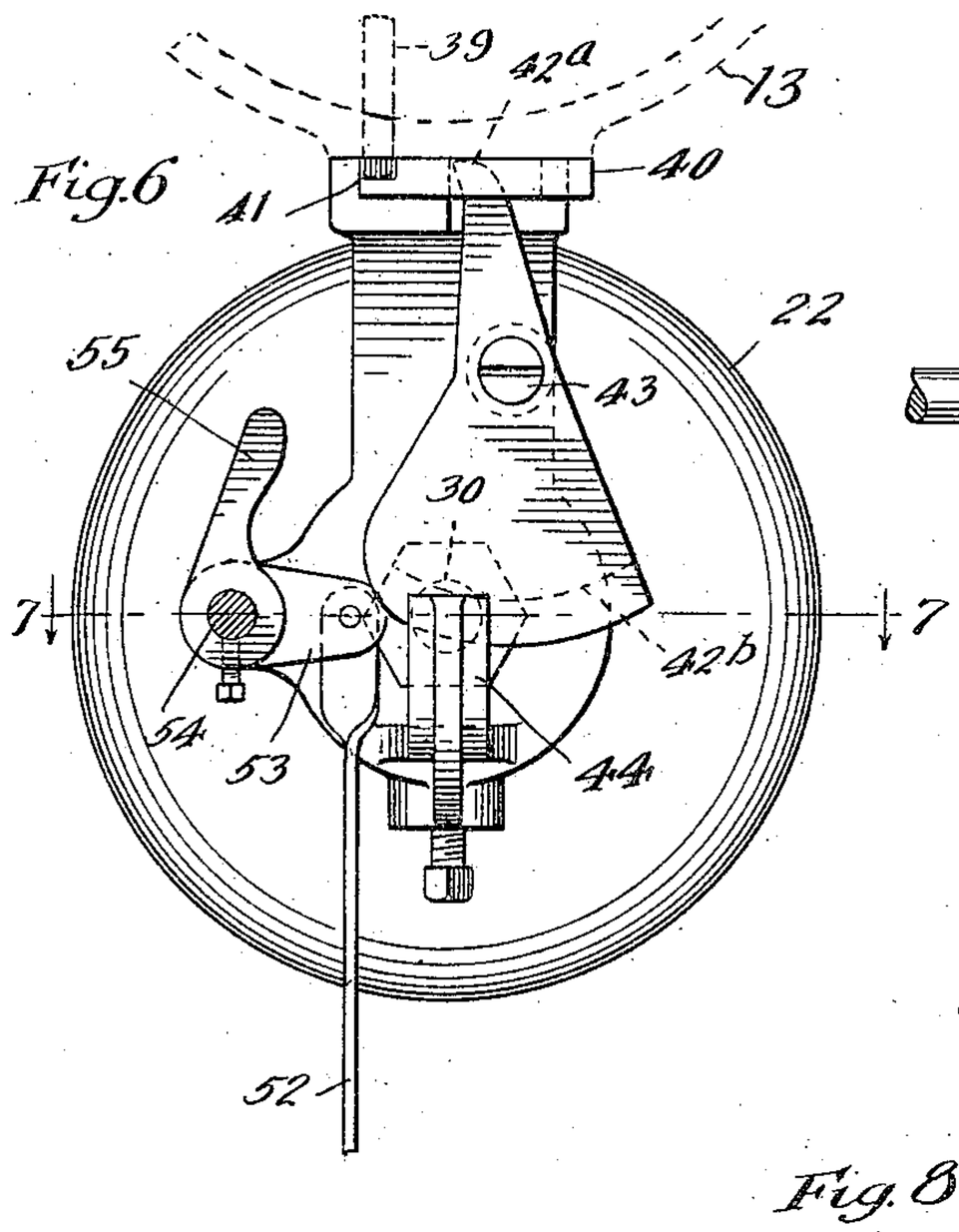


Fig. 7

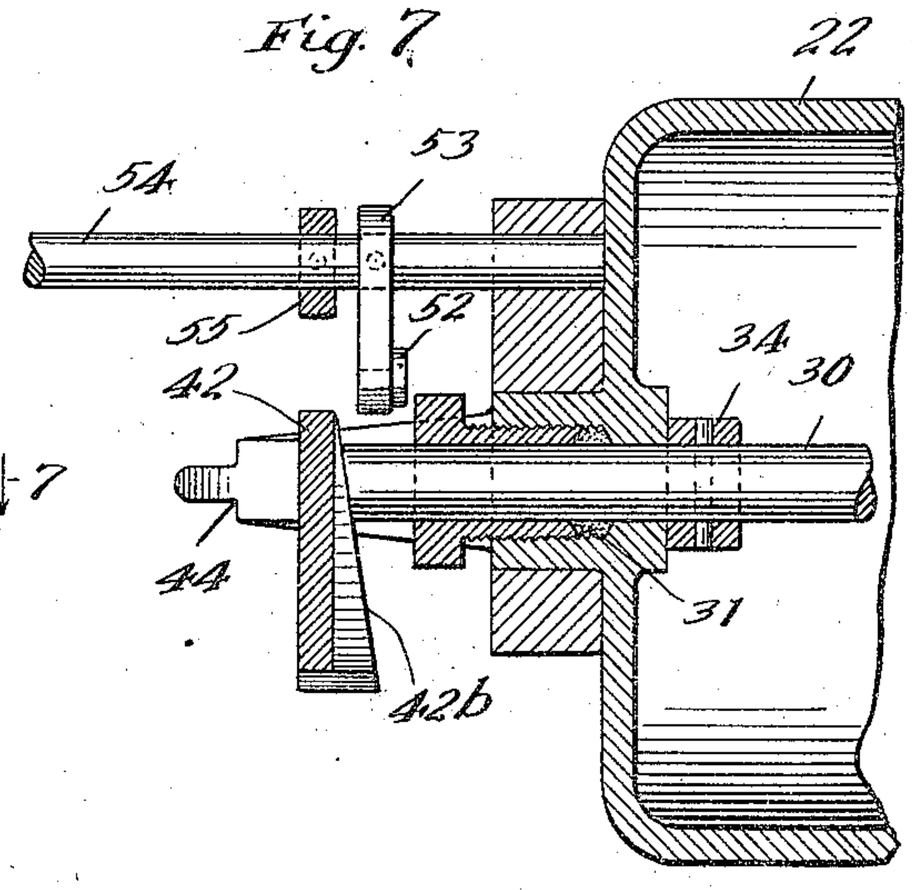
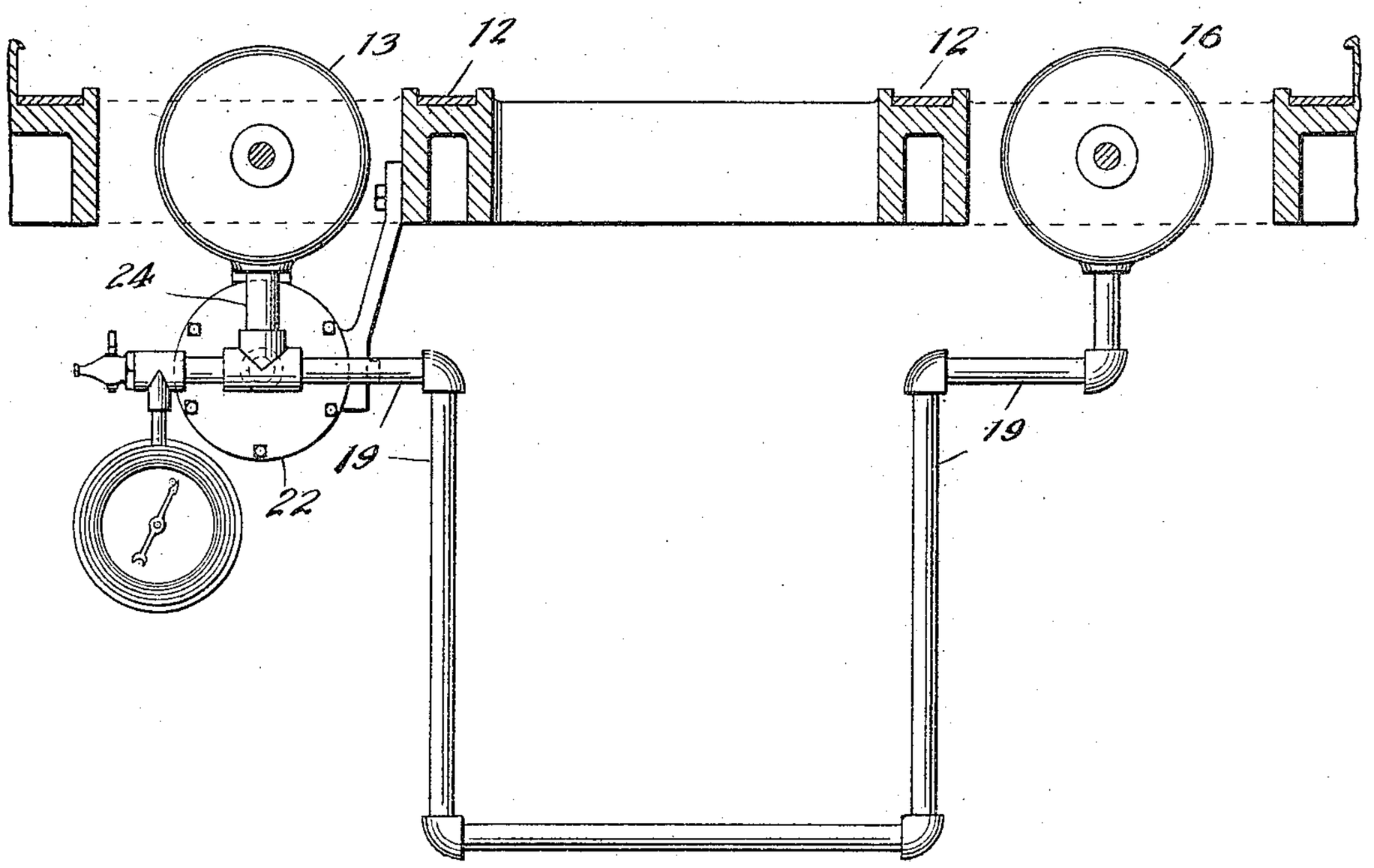


Fig. 8



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UNITED STATES PATENT OFFICE.

CYRUS A. McCAIN, OF OAK PARK, ILLINOIS, ASSIGNOR TO MIEHLE PRINTING PRESS & MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CUSHIONING MECHANISM FOR RECIPROCATING BEDS.

944,492. Specification of Letters Patent. Patented Dec. 28, 1909.

Application filed March 18, 1909. Serial No. 484,100.

To all whom it may concern:

Be it known that I, CYRUS A. McCAIN, a citizen of the United States, residing in Oak Park, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Cushioning Mechanism for Reciprocating Beds, of which the following is a specification.

This invention relates to the cushioning mechanism employed with reciprocating beds of printing presses, planing machines and the like, and is an improvement upon the construction shown in my U. S. Patent No. 788,931, of May 2nd, 1905. In the class of printing presses upon which these cushioning devices are customarily used, it is usual to have the air cylinders attached to each end of the frames or base, and also to apply air cushion rods to the bed, having heads or plungers mounted thereon, such heads or plungers being adapted to enter the air cylinders at the ends of the bed strokes and compress the air necessary to obviate the shock and strain coming on the mechanism as the bed is stopped and reversed. The difficulty heretofore met with in these cushioning devices has been to regulate the resistance automatically so as to enable the presses to be operated at the varying speeds necessary for different work, so that too much resistance will not be present when slow speed is being used, and not enough resistance be present when the press is running at high speed.

In the present invention, I utilize as the means for governing the resistance, the speed at which the bed is reciprocated, so that when the bed is being used at high speed, the resistance will be increased, and when it is used at low speed, the resistance will be diminished. The nature of these devices by which I accomplish these results is fully disclosed in the accompanying description, and illustrated in the drawing forming a part thereof.

In the drawing, Figure 1 is a longitudinal section of a printing press embodying my invention and Fig. 2 is a plan view of the cushioning mechanism, the press bed being omitted. Fig. 3 is an enlarged section of the cushioning devices at one end of the press. Figs. 4 and 5 are sections on the lines 4—4 and 5—5 respectively of Fig. 3. Fig. 6 is an end elevation of one of the auxiliary cylinders. Fig. 7 is a section on the line 7—7 of Fig. 6 and Fig. 8 is a transverse vertical section of the press.

In the drawing, 10 represents the reciprocating bed of the press, and 11 the impression cylinder. The bed travels upon runways 12, and its reversing movements are cushioned by air cylinders 13, 14, 15 and 16, two at each end of the press. There are air cushion rods for each pair of these cylinders, those indicated at 17 being employed with the cylinders having auxiliary cylinders attached, and those marked 18 being used with cylinders having no auxiliary cylinders. The pairs of cylinders at each end of the press are connected by pipes 19, so that the same air pressure will be present in both of each pair. The heads of the air cushion rods are indicated at 20 and are uniform in their construction. The rods are supported from the reciprocating type bed by brackets 21, and are rigidly held in such brackets so that the heads 20 are forced into the air cushion cylinders at each end of the bed stroke, imprisoning in so doing, the air in the cylinders and compressing the same.

The cylinders 13 and 14 are each accompanied by an auxiliary cylinder, that with cylinder 13 being shown at 22, and that accompanying cylinder 14 being shown at 23. These cylinders are exactly alike in construction, and I have illustrated one of them fully at Fig. 3. The cylinders 13 and 14 communicate with their respective auxiliary cylinders through pipes 24, the entrance to the auxiliary chamber being controlled by spring pressed valves 25 and 26. Upon the first of these, the burden of resisting the entrance of the air from the main to the auxiliary cylinder rests, and the other is adapted to yield to the pressure existing in the auxiliary cylinder wherein that pressure becomes greater than the pressure in the main cylinder, so that the air can then flow back into the latter from the auxiliary cylinder. The valve 25 is in ring form, supported by a spider or tripod 27, the arms of which converge and are united to a sleeve 28 sliding in the central opening of a stationary cap 29 attached to the end of the cylinder. The sleeve 28 is fitted upon the end of a longitudinally movable rod 30 extending through the farther end of the cylinder where it is surrounded by a stuffing box 31. This rod carries a collar 32 between which and the sleeve 28 is a spring 33, the

tension of which is exerted upon the sleeve and acts to keep the valve 25 pressed upon its seat. A second collar 34 upon the rod limits the movements of the rod 30 in one direction. The valve 26 is more fully described later on.

With the rod 30, I employ devices whereby it may be shifted longitudinally to increase the tension on the spring 33 when the speed of the press is augmented so as to require increased resistance from the cushioning devices. The construction which I have adopted for this purpose is that shown, and is as follows: Upon the air cushion rod 17 I place a sliding device which I call the knocker, and which preferably consists of two weights 35 one at each side of the bracket 21 by which the rod is attached to the bed, the weights being joined rigidly together by a metal strap 36. The weights are loosely fitted to the rod so they slide freely thereon, and at the outer side of each weight I place light springs 37, which are confined on the rods by collars 38. This knocker quickly acquires the momentum of the bed, and by reason thereof will continue to move under the power thereof at the high speed of the bed after the latter has been slowed down, so that it is peculiarly adapted to perform the function of governing the air cushions as hereinafter stated. As the speed of the press becomes rapid, the depending leg or striker 39 attached to the strap 36 midway between the ends or momentum movement of the knocker, strikes the end of a wedge 40, which is a horizontally movable plate sliding in a runway 41 attached to the top of one end of the cylinder 22. By this action of the striker, the wedge is caused to move against the top 42^a of a cam 42 pivoted at 43 and arranged at right angles to the wedge and having an inclined edge 42^b inserted between the end of the rod 30 and the stationary bracket 44 attached to the outside of cylinder 22. The wedge when thus actuated by the striker, turns the cam on its pivot so that its inclined edge forces the rod 30 back toward the valve 25. The tension of the spring 33 is thus increased, so that the valve 25 opens less freely, and the resistance to the entrance of air from the main cylinder is augmented. The extent to which the resistance may be thus increased, is dependent as will be understood upon the speed of the press, the higher the speed the greater the movements imparted to the knocker, the wedge and the cam, and the greater is the resistance caused by the air cushioning devices, the resistance being thus proportionate to the speed at all times. The knocker imparts repeated impulses to the wedge as the speed of the press increases, and consequently the action of the cam 42 increases the tension on spring 33 gradually, but it is adapted to hold the tension indefinitely and until released as hereinafter stated.

The auxiliary cylinder is relieved of its air whenever the pressure in the main cylinder becomes less than that in the former, the valve 26 then opening automatically and allowing the escape of the air into the main cylinder. The valve is located in the center of valve 25, and closes the opening in the latter. It is secured on a stem 26^a working in a bridge 26^b extending across the passage in the hub of the cylinder and a spring 26^c tends to keep it seated. It will be understood that when the air is moving from the main into the auxiliary cylinder, this valve 26 moves into the auxiliary cylinder in unison with valve 25, so as to open the passage between the cylinders.

When the press is slowed down or stopped the attendant releases the tension automatically put upon the spring 33 by the devices described, so that the wedge cam and rod 30 can all return to normal positions by the foot lever 50 of the brake of the press. When this lever is depressed it carries down a companion lever 51 and a rod 52 attached to the latter. The rod 52 is attached at its upper end to an arm 53 on shaft 54, and shaft 54 carries another arm 55 which acts on the cam 42 when the lever 50 is actuated, and forces the cam back to normal position, and in this movement the point 42^a of the cam acts against the incline of plate 40 and retracts the same.

The air connections between the two main cylinders at one end of the press are very plainly shown at Fig. 8 and I also sometimes apply a pressure indicator to these connections adapted to enable the operator to watch the variations in the air pressure.

I claim:—

1. The combination with the valves for relieving the pressure of the air cushioning cylinders of a printing press, of governing mechanism regulating the resistance of said valves, and a device for controlling said mechanism such device being freely attached to the bed and permitted to move independently by momentum at the ends of the bed strokes.

2. The combination with the valves for relieving the pressure of the air cushioning cylinders of a printing press, of governing mechanism regulating the resistance of said valves, and a device for controlling said mechanism, such device being attached to the bed and free to move independently by momentum at the ends of the strokes.

3. The combination with the valves for relieving the pressure of the air cushioning cylinder of a printing press, of a governing mechanism regulating the resistance of said valves, said governing mechanism acting in accordance with the speed of the press and embracing a device carried by the bed and

adapted to slide independently of the bed by momentum received from the bed.

4. The combination with the air cushion cylinders and plungers of a printing press, auxiliary cylinders communicating with the air cushion cylinders, valves controlling such communication, means for increasing the resistance to opening of such valves and governing mechanism determining the action of said means in accordance with the speed of the press, said governing mechanism embracing a device moving with the bed and also having freedom to continue its motion in obedience to momentum independently of the bed.

5. The combination with the air cushion cylinders and plungers of a printing press, of auxiliary cylinders communicating with the air cushion cylinders, valves controlling such communication, means for increasing the resistance to opening of such valves and governing mechanism determining the action of said means in accordance with the speed of the press, said governing mechanism embracing a device moving with the bed and having freedom to move also by momentum.

6. The combination with the air cushion cylinders and plungers of a printing press, of auxiliary cylinders communicating with the air cushion cylinders, valves controlling such communication, means for increasing the resistance to opening of such valves, a governing device moving with the bed of the press and also having freedom to move by momentum, and devices whereby the momentum of the governing device actuates the means for increasing the resistance of said valves.

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