

No. 785,862.

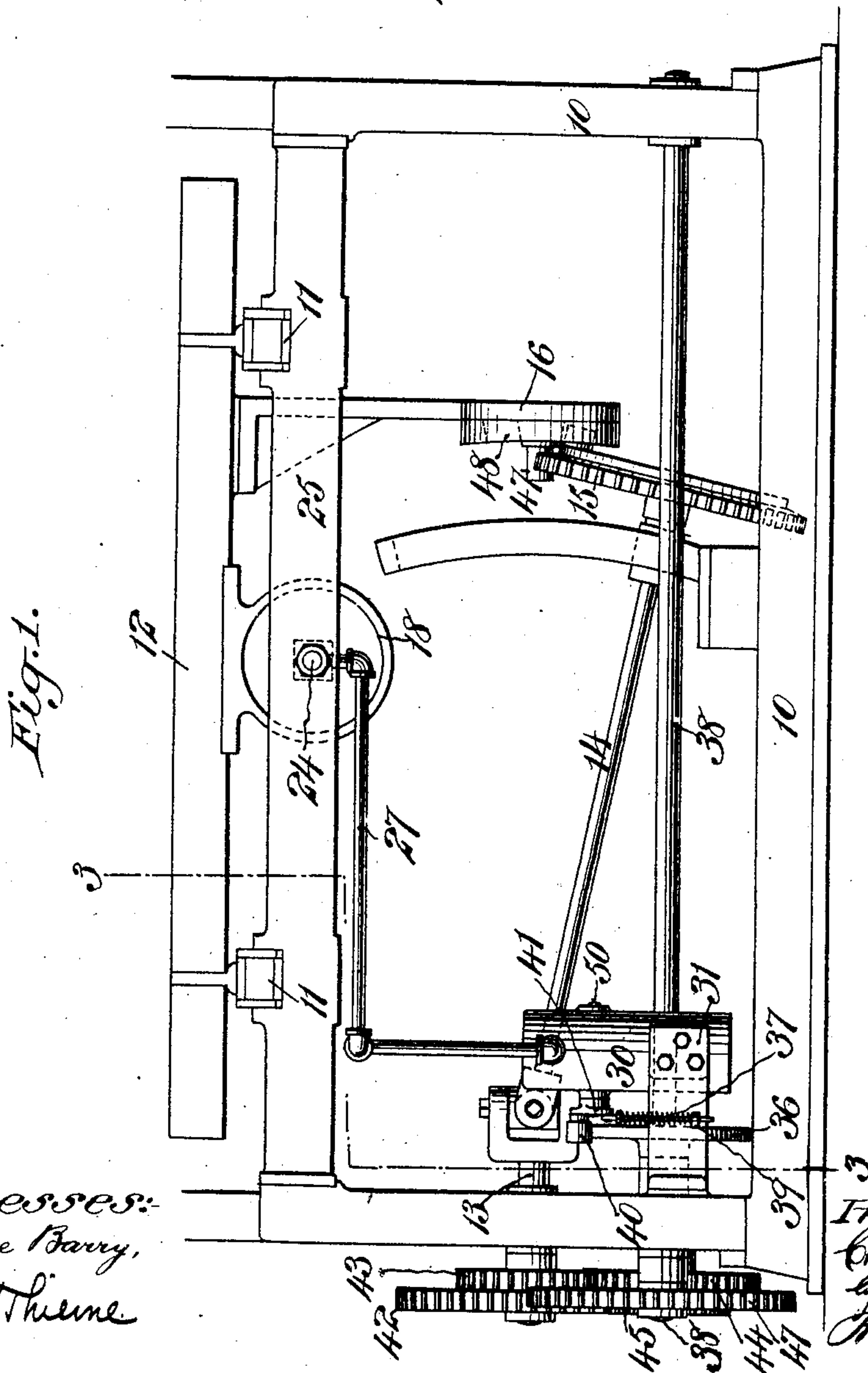
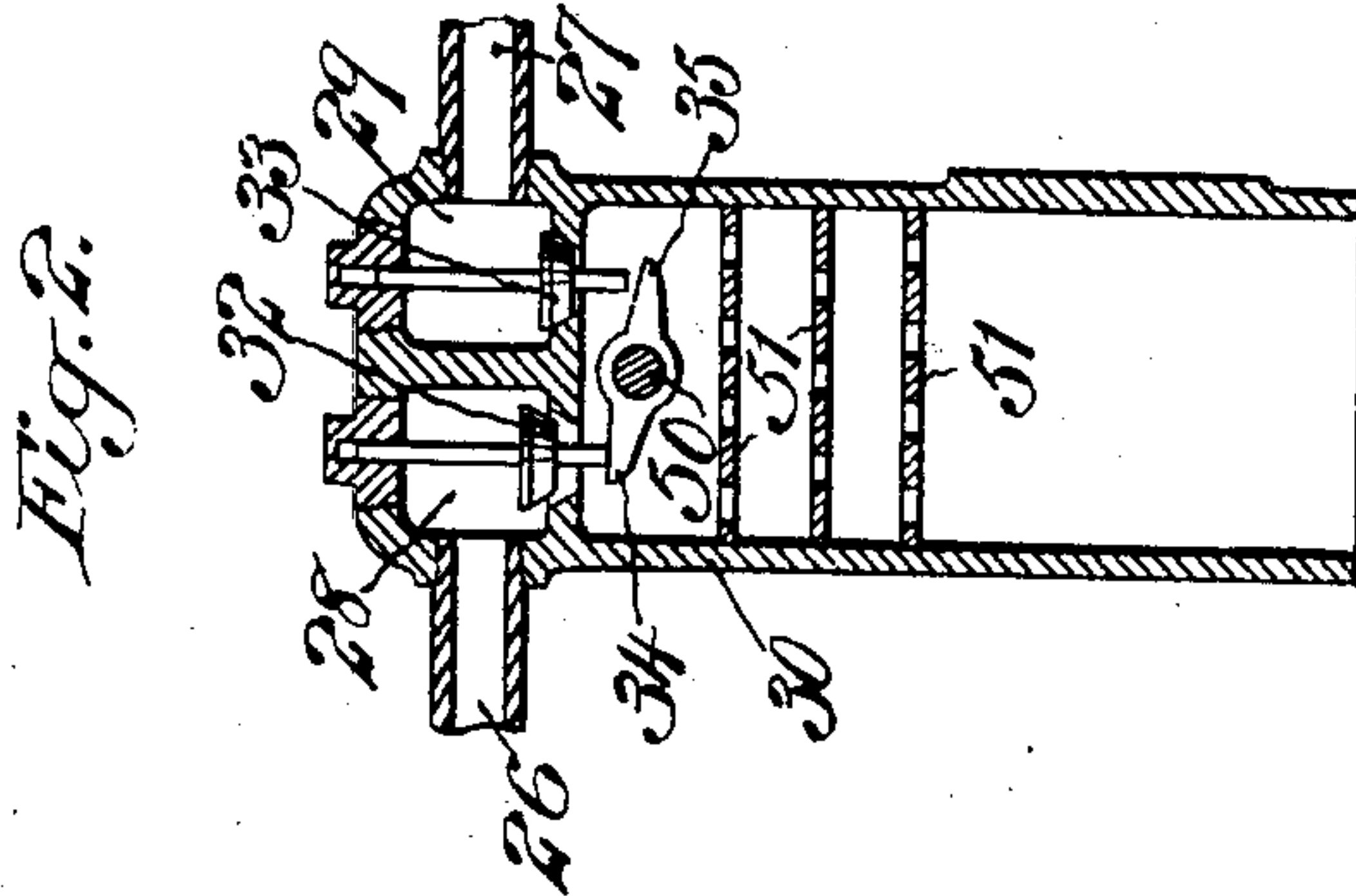
PATENTED MAR. 28, 1905.

C. P. COTTRELL.

SPRING CONTROLLING MECHANISM FOR THE BEDS OF PRINTING PRESSES.

APPLICATION FILED FEB. 27, 1904.

3 SHEETS—SHEET 1.



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Fig. 3.

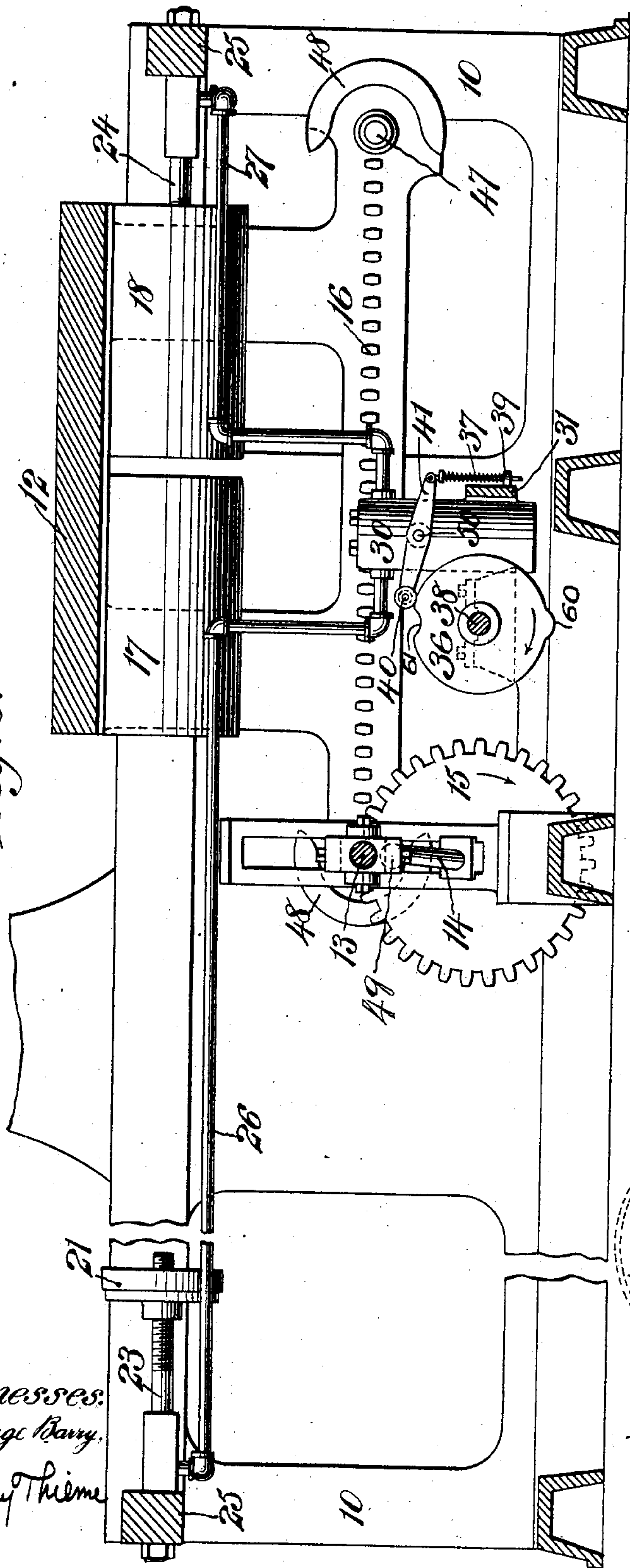


Fig. 4.

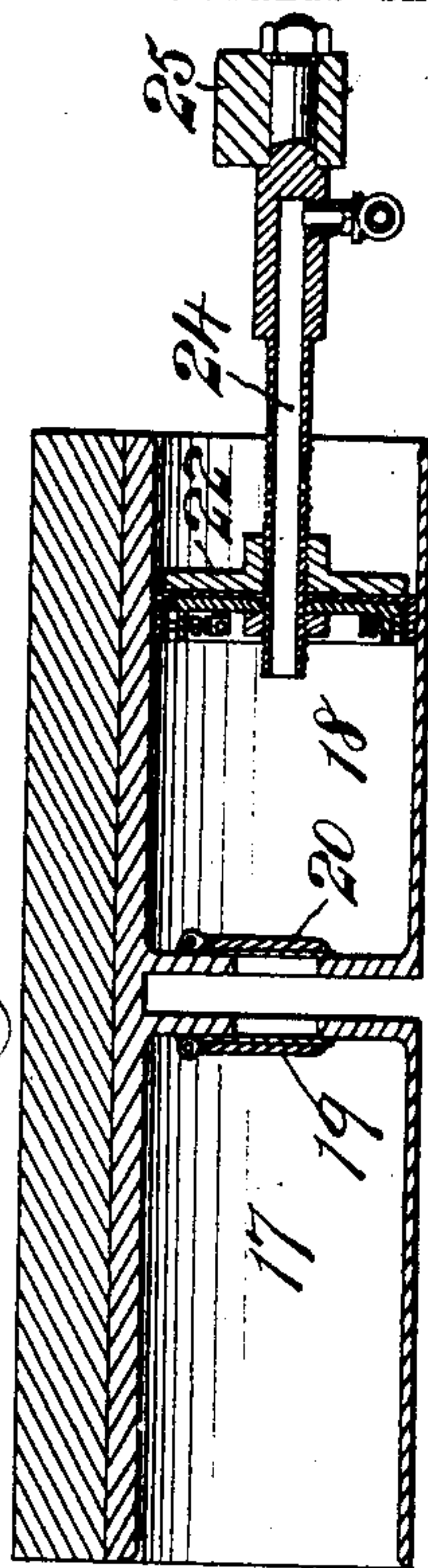
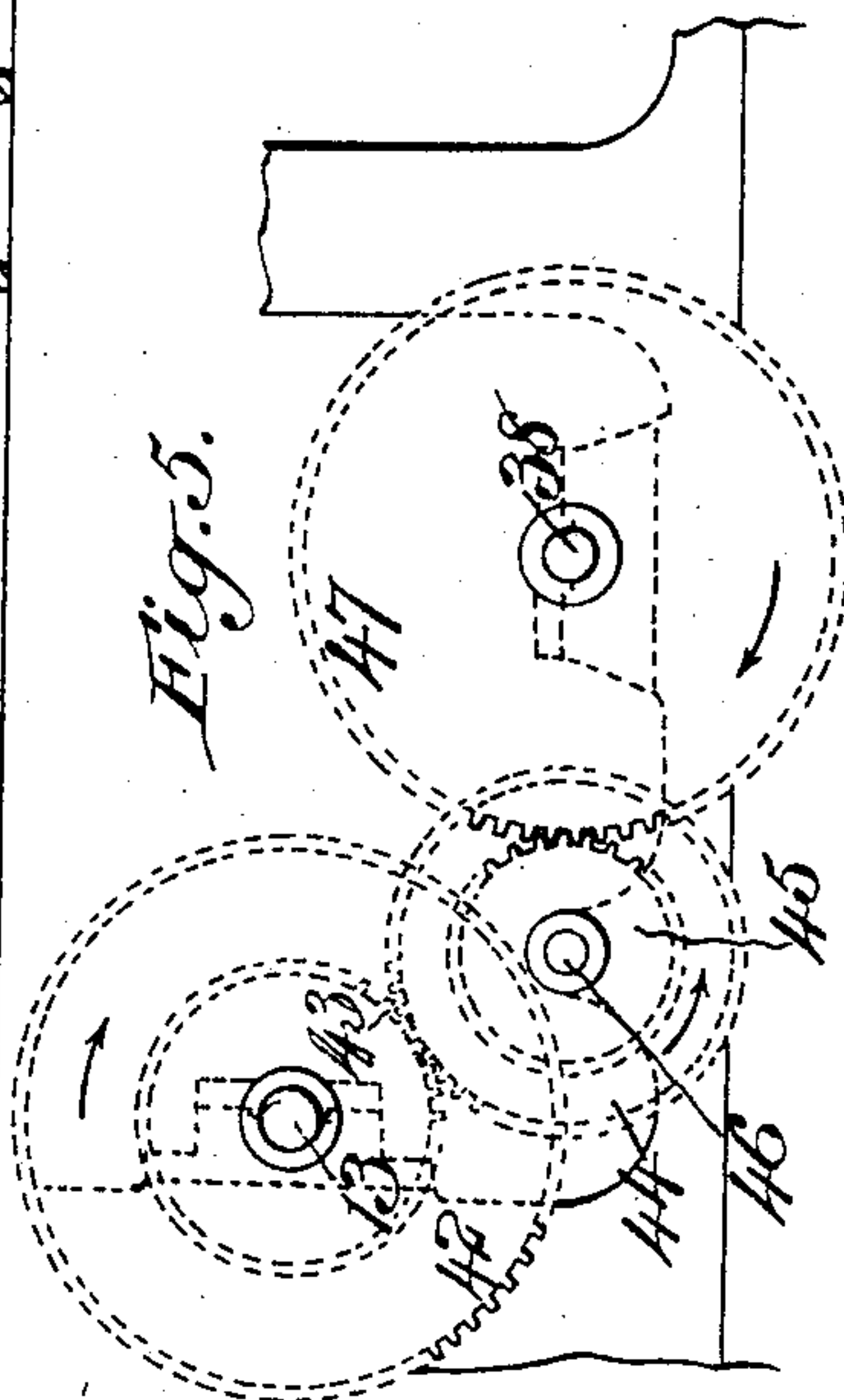


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 7.

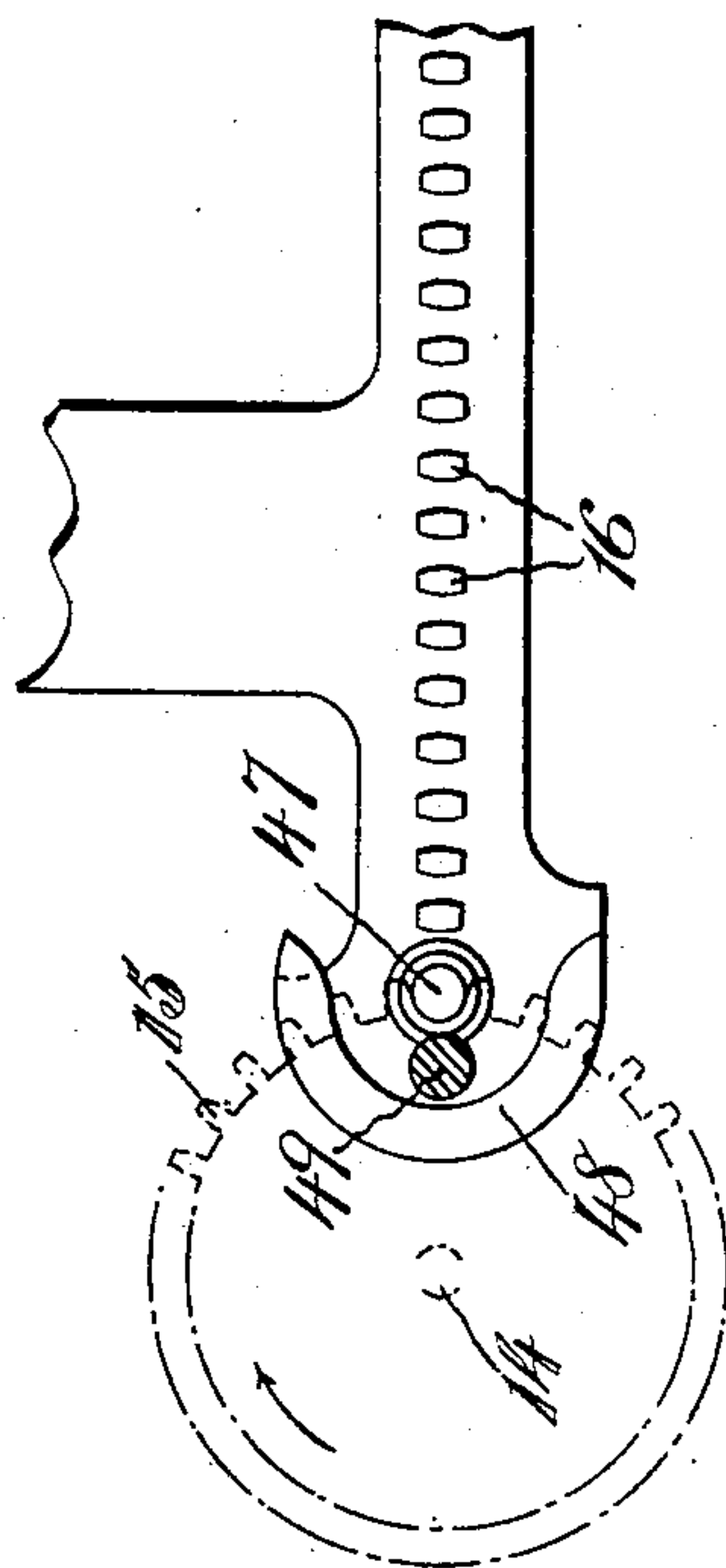
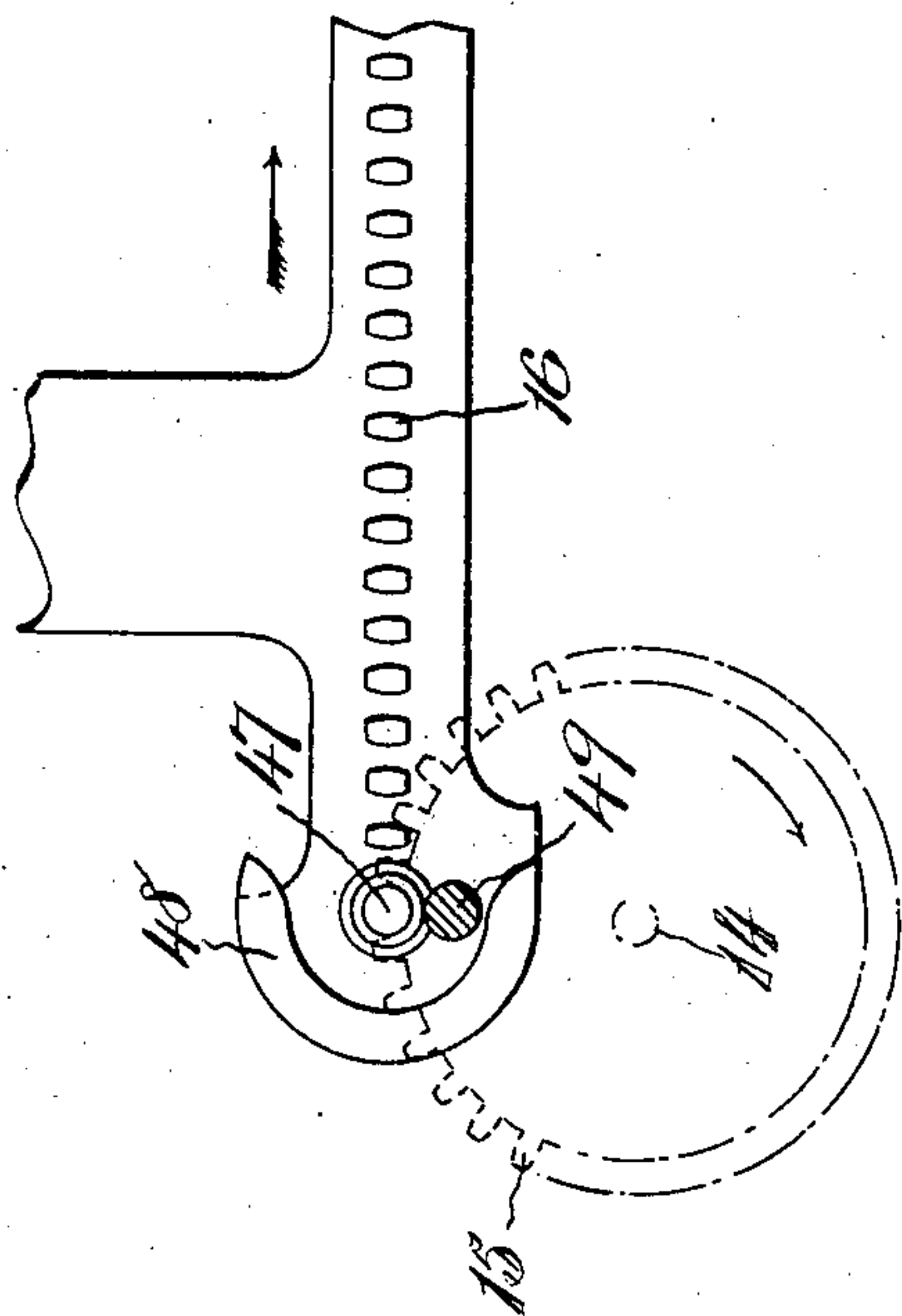


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES P. COTTRELL, OF WESTERLY, RHODE ISLAND, ASSIGNOR TO
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SPRING-CONTROLLING MECHANISM FOR THE BEDS OF PRINTING-PRESSES.

SPECIFICATION forming part of Letters Patent No. 785,862, dated March 28, 1905.

Application filed February 27, 1904. Serial No. 195,526.

To all whom it may concern:

Be it known that I, CHARLES P. COTTRELL, a citizen of the United States, and a resident of Westerly, in the county of Washington and State of Rhode Island, have invented a new and useful Improvement in Spring-Controlling Mechanism for the Beds of Printing-Presses, of which the following is a specification.

10 In reciprocating - bed printing - presses springs or cushions are employed for counteracting, overcoming, or reducing the momentum of the bed before reversing the direction of its travel. The springs or cushions com-
15 monly employed consist of air-cylinders attached to the bed and pistons attached to the press-framing. The heads of said pistons are adjusted or set to get such an amount or degree of compression of air in the cylinder as
20 will overcome, counteract, or sufficiently reduce the momentum of the bed before or at the time the driving mechanism of the press begins to retard or reduce the speed of the bed before reversing the direction of its travel.
25 The spring - pressure thus acquired in the travel of the bed needs to be all that but no more than is necessary to counteract or sufficiently reduce the momentum of the bed; but the bed has to further travel the distance from
30 that point at which this counteraction or reduction of momentum takes place to the still point before reversing, and the piston-heads are thus caused to travel that distance farther into the cylinders, thus further compressing
35 the air in the latter until the driving mechanism has brought the bed to the still point. It will thus be understood that when the least spring-pressure is required—that is, when the press-driving mechanism has brought the bed to the
40 still point—there is the greatest degree of compression in the air-cylinders. The further compression of the air thus described not only causes extra strain on the driving mechanism, but extra and useless power is wasted in producing such compression, the press becoming
45 nothing but an air-compressor during the said further travel. If instead of air-springs or-

dinary metal coil or other springs should be used, the compression of such other springs would be increased in the same manner as
50 hereinabove explained with reference to air-springs between that point in the travel of the bed at which its retardation commences and the still point.

The object of this invention is to so control
55 the action of the springs that the requisite compression is obtained for counteracting or reducing the momentum of the bed up to a certain predetermined point in its travel in either direction at or near which the driving
60 mechanism begins to reduce its speed and that afterward during the further travel of the bed there shall at most be no serious further increased compression and consequent increased
65 resistance to the movement of the bed or that, as may be determined upon, there shall be when the bed arrives at the still point either no compression at all or only what may be
70 considered desirable to assist in starting the bed on its return; and the invention consists in means for thus controlling the compression of the springs.

The accompanying drawings illustrate the application of my invention in connection with air-springs and represent as much of a
75 printing-press as is necessary for such illustration.

Figure 1 is an end elevation of the framing and bed of the press, the bed-driving mechanism, and the air-spring-controlling devices;
80 Fig. 2, a vertical section of parts of the air-spring-controlling devices on a larger scale than Fig. 1. Fig. 3 represents a vertical longitudinal section corresponding with Fig. 1 on the line 3 3 of the latter; Fig. 4, a longi-
85 tudinal vertical section of the bed and air-springs corresponding with Fig. 3; Fig. 5, a side view of the gearing for actuating the spring-controlling devices. Figs. 6 and 7 are
90 side views illustrating the retardation or reduction of the speed of the bed at one end of its travel in one direction.

10 designates the press-frame, on which are the ways 11, on which runs the bed 12, which

may be and is represented as driven by the mangle-shaft 13 14, gear 15, and rack 16, commonly used for driving the reciprocating beds of printing-presses, the said rack being furnished, as usual, at each end with a fixed stud 47 and a semicircular shoe 48, between which the crank-pin 49 on the mangle-gear 15 is directed for carrying said gear from the upper to the lower side of the rack, and vice versa.

Attached to the bed 12 are the air-spring cylinders 17 18, provided at their inner ends with the inwardly-opening vacuum-valves 19 20 and fitted with the pistons 21 22, the rods 23 24 of which are secured to the cross-bars 25 at the ends of the framing. The said cylinders and their respective pistons and any air inclosed in said cylinders between their pistons and vacuum-valves constitute air-springs of well-known character. The piston-rods 23 24 are hollow and open at their inner ends to their respective cylinders, and their outer ends are in constant communication through pipes 26 27, respectively, with the two chambers 28 29, Fig. 2, provided in the upper part of a stationary cylinder 30, supported in a bracket 31 on the press-framing and having an open bottom. In the bottom of each of said chambers 28 29 there is the seat for one of two upwardly and inwardly opening outlet-valves 32 33, which may be termed "pressure-relief" valves and which with said chambers and the pipes 26 27 constitute parts of the spring-controlling devices by which the compressed air is permitted to escape from the respective cylinder 17 or 18 after the bed in its travel in either direction as far as the point at which the driving mechanism begins to reduce its speed before reversing its direction. Under the chambers 28 29 there is arranged in bearings in the cylinder 30 a short rock-shaft 50, on which are toes 34 35 for lifting and opening said outlet-valves 32 33, the said rock-shaft being represented as operated at proper times for opening one and the other of said valves by means of a properly-timed cam 36 and a spring 37, the said cam being carried by a constantly-rotating shaft 38, which runs in fixed bearings on the press-framing and acting on a roller 40 on one end of a lever 41 on the said rock-shaft and the spring 37, exerting pressure between the other end of said lever and an abutment 39 on the cylinder 30. The rotary cam 36 is of such form and the number of its revolutions relative to the movements of the bed and its adjustment upon its shaft 38 are such that the operation of said cam on the rock-shaft 50 to open one or other of the relief-valves 32 or 33 of the air-spring cylinder 17 or 18 belonging to either end of the press is so timed relatively to the travel of the bed itself as to take place at such point in said travel toward that end as may be predetermined, preferably at or about at the

point in such travel when the driving mechanism of the bed begins to reduce the speed of the latter—that is, when the pin 49 of the mangle-gear 15 passes directly over or under one of the studs 47 of the rack during the travel of the rack in that direction. The said shaft 38 may be driven by any suitable means. It is represented as driven from a gear 43 on that member 13 of the mangle-shaft which carries the gear 42, through which that shaft is driven, the said shaft 13 carrying a second gear 43, which gears with one, 44, of two intermediate gears 44 45, running on a fixed stud 46 on the press-framing, the said gear 44 carrying the gear 45, which gears with a gear 47 on the cam-shaft. The cam in the example represented being constructed to operate twice—that is, once on each relief-valve during each revolution—its gearing with the mangle-shaft is such that it makes one revolution for two of the mangle-shaft. In Figs. 3, 4, and 6 of the drawings the rack and bed are represented as traveling to the right and as having arrived at the point at which its movement is about to be retarded—that is to say, when the crank-pin 49 is directly under the stud 47 at the left-hand end of the rack and just entering the shoe 48 at that end; but the rack continues to move farther in the same direction until the crank-pin is on its center at the middle of the shoe, as illustrated by Fig. 7, when the bed is at the end of its travel. The compression of the air in the spring, which commenced when the air-cylinder 18 received the piston 22 and was increased up to the point of commencement of retardation, (illustrated in Fig. 6,) would continue to be further increased until the arrival of the bed at the end of its travel; but just as the rack and bed arrive in the position first above mentioned the cam 36 and spring 37 produce the lifting and opening of the pressure-relief valve 33, and so permit the escape of air from the cylinder 18 through the pipe 24 and said relief-valve, and so prevents or restricts such further compression of the air in said cylinder as without such escape would take place in the said cylinder during the remainder of the travel of the bed. When the bed is nearing the other end of its travel, the valve 32 is opened in like manner to permit the air to escape from the cylinder 17.

The cam 36 may be so formed or set that it may produce the opening of the relief-valves when the bed has arrived at any desirable distance from the end of its travel and that it may give any desirable amount of opening and may continue the opening during any desirable portion of the length of the travel of the bed, so that the escape of air might be entirely free during the final stage in the travel or that it may be so restricted as simply to reduce the compression which has been

produced during an earlier stage in the travel or only to prevent or restrict any further increase of compression and to retain in the spring sufficient force to assist in starting the bed in the reverse direction. The cam represented in Fig. 3 has its active portions consisting of the offset 60 and inset 61 included in such very small portions of the circumference, with their rise and fall so abrupt, that they effect both the opening and closing movements of the valves during a very small portion of the movement of the bed, and if the cam be properly set on the shaft it produces the opening of the valves and the escape of air at the proper point in the movements of the bed to reduce the resistance to its further movement and yet produces or permits the closing of the valves before the movements of the bed terminate, thereby retaining in the cylinders at the termination of said movements sufficient compressed air to assist in starting the bed for its return.

In the lower part of the cylinder 30 below the relief-valve chambers 28 29 there is a muffler represented as consisting of any suitable number of perforated horizontal partitions or plates 51, through which the air escaping from the springs through the relief-valves has to pass on its way to the atmosphere.

What I claim as my invention is—

1. In combination with a spring for counteracting or reducing the momentum of the reciprocating bed of a printing-press, means timed to the travel of the bed for first retaining the resistance of the spring during a certain portion of said travel and for afterward from a predetermined point in said travel so controlling said resistance as to restrict the further increase thereof during a further travel.

2. In combination with a spring for counteracting or reducing the momentum of the reciprocating bed of a printing-press, means timed to the travel of the bed for first retaining the resistance of the spring to counteract or overcome the momentum acquired by the bed during a portion of said travel and for afterward, while reducing such resistance during a further travel beyond a predetermined point, retaining sufficient resistance at the end of the travel to assist in starting the bed in the reverse direction.

3. In combination with a spring for counteracting or reducing the momentum of the reciprocating bed of a printing-press, means for first retaining the resistance of the spring to counteract or reduce the momentum acquired by the bed in its travel, and cam-actuated mechanism deriving motion from the press for afterward so controlling such resistance as to restrict the further increase thereof during the further travel.

4. The combination with the cylinder and piston of an air-spring for a reciprocating printing-press bed, of an outlet-valve and mechanism timed to the travel of the bed for opening said valve at a predetermined point in said travel for releasing air from said cylinder to prevent a further increase of compression during the further travel.

5. The combination with the cylinder and piston of an air-spring for a reciprocating printing-press bed, of an outlet-valve and mechanism timed to the travel of the bed for keeping said valve closed to retain the air in the cylinder to a predetermined point in said travel and afterward opening said valve to restrict the further compression of air in the cylinder during the further travel.

6. The combination with the cylinder and piston of an air-spring for a reciprocating printing-press bed, of an outlet-valve and cam-actuated mechanism timed to the travel of the bed for keeping the valve closed during an earlier stage of the entering movement of the piston into the cylinder and afterward opening said valve at a predetermined point in the travel of the bed and thereby providing for the escape of air from said cylinder during a further portion of said travel.

7. The combination with the cylinder and piston of an air-spring for a reciprocating printing-press bed, of an outlet-valve and cam-actuated mechanism timed to the travel of the bed for first keeping the valve closed during an earlier stage of the entering movement of the piston into the cylinder, then opening said valve at a predetermined point in said travel in one direction and afterward closing said valve before the termination of said travel in the same direction.

8. The combination with a printing-press bed and mechanism for giving said bed a reciprocating movement retarded at a certain stage of its progress, of a spring for counteracting the momentum of the bed and means for restricting the resistance of said spring from and beyond that point in said movement at or near which the retardation takes place.

9. The combination with a printing-press bed and mechanism for giving said bed a reciprocating movement retarded at a certain stage of its progress, of an air-spring comprising a cylinder and piston for counteracting the momentum of the bed, an outlet-valve to said cylinder, and mechanism deriving motion from the press for opening said valve at or near that point in said movement in either direction at which the retardation takes place.

10. The combination with a printing-press bed and mechanism for giving said bed a reciprocating movement retarded at a certain stage of its progress, of an air-spring comprising a cylinder and piston for counteracting the momentum of the bed, an outlet-valve

to said cylinder and mechanism deriving motion from the press for opening said valve at or near that point in said movement in either direction at which the retardation commences
5 and closing it before the termination of the movement.

In testimony that I claim the foregoing as

my invention I have signed my name, in presence of two witnesses, this 23d day of February, 1904.

CHARLES P. COTTRELL.

Witnesses:

ALIDA M. EGBERT,
FREDK. HAYNES.