

No. 810,624.

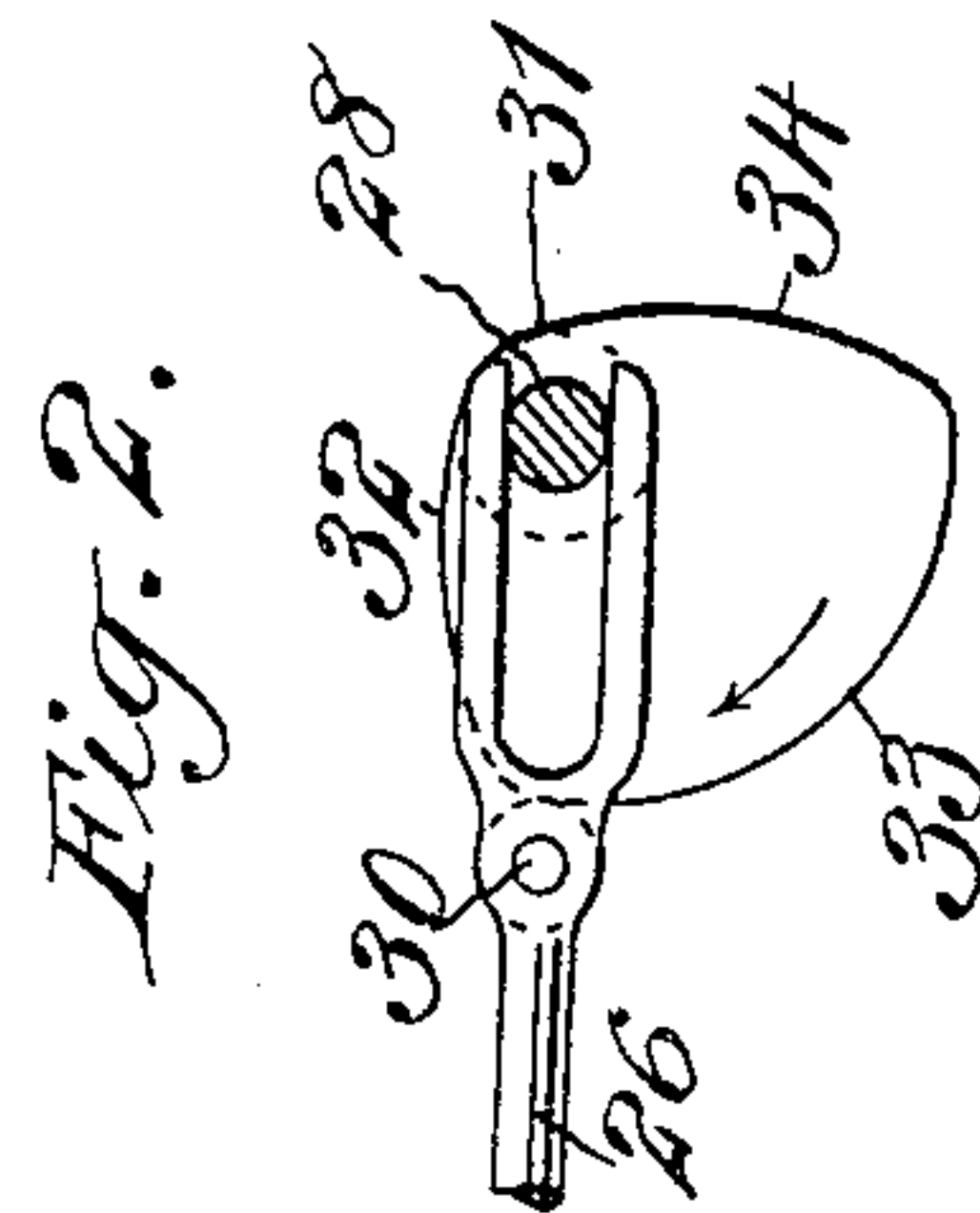
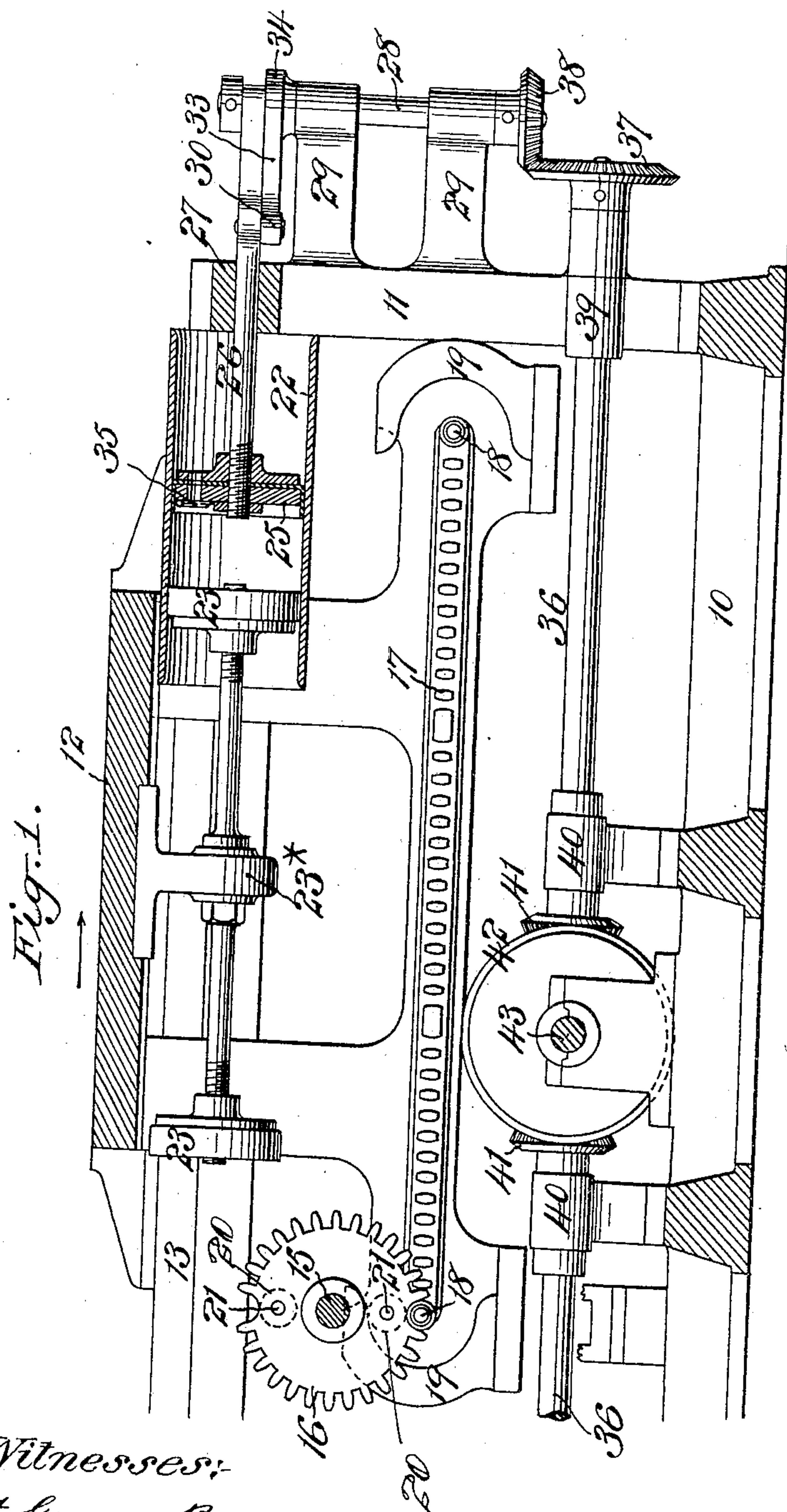
PATENTED JAN. 23, 1906.

C. P. COTTRELL.

PRESSURE CONTROLLING DEVICE FOR THE AIR SPRINGS OF PRINTING PRESSES.

APPLICATION FILED APR. 4, 1905.

2 SHEETS—SHEET 1.



Witnesses:
J. George Barry,
Henry Thiele.

Inventor:
Charles P. Cottrell
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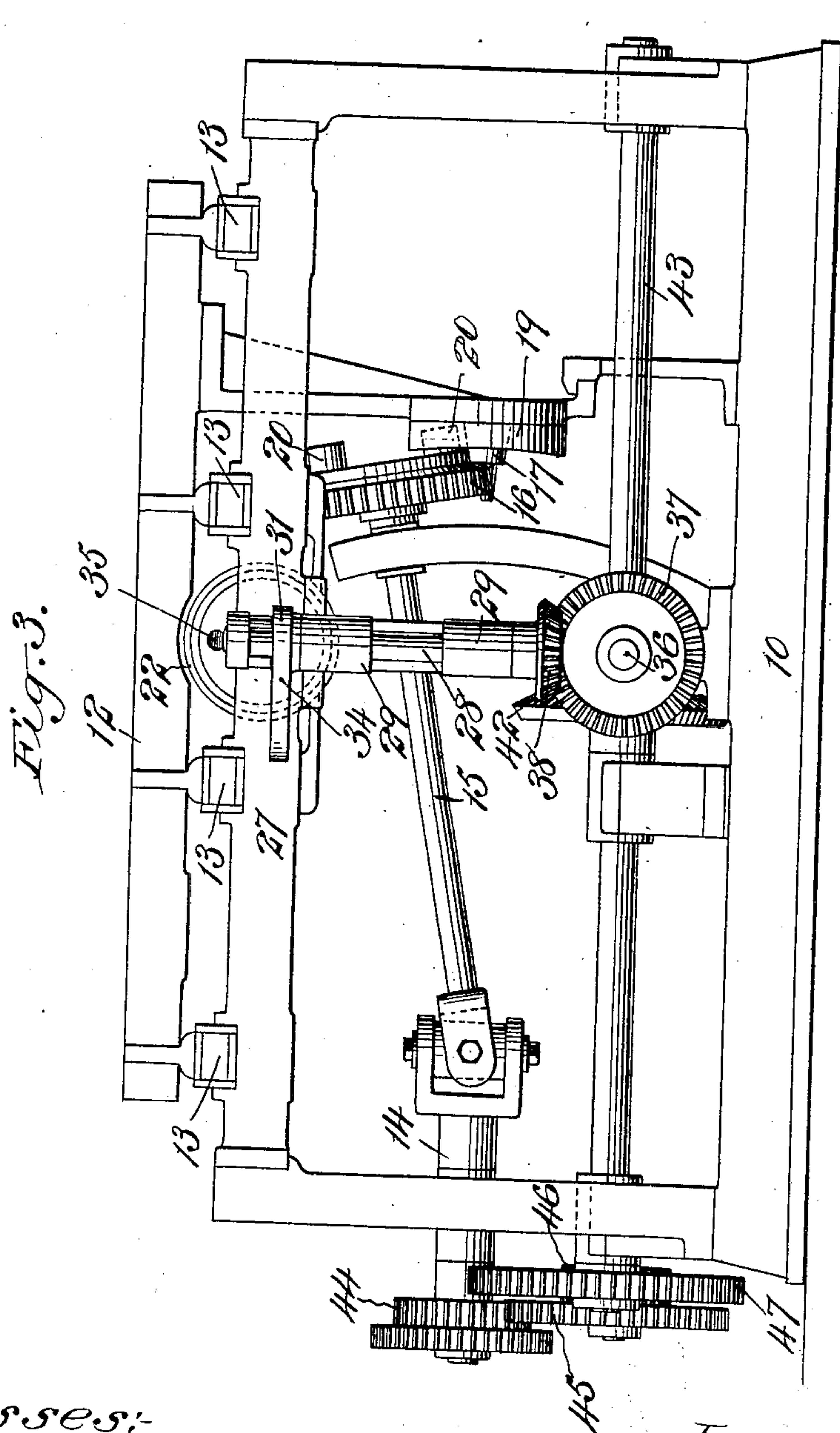
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2 SHEETS—SHEET 2.



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Henry Thieme.

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UNITED STATES PATENT OFFICE.

CHARLES P. COTTRELL, OF WESTERLY, RHODE ISLAND, ASSIGNOR TO
C. B. COTTRELL & SONS COMPANY, OF NEW YORK, N. Y., A CORPO-
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PRESSURE-CONTROLLING DEVICE FOR THE AIR-SPRINGS OF PRINTING-PRESSES.

No. 810,624.

Specification of Letters Patent.

Patented Jan. 23, 1906.

Application filed April 4, 1905. Serial No. 253,787.

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 Pressure-Controlling Devices for the Air-Springs of Printing-Presses, of which the following is a specification.

10 The object of this invention is to so control the action of the air springs or cushions of a reciprocating-bed printing-press that the requisite compression and resistance of the air in the said springs or cushions for coun-
15 teracting or reducing the momentum of the bed during a portion of the travel of the latter and up to a certain predetermined point in such travel in either direction are obtained and maintained, but that beyond said point
20 there shall be no seriously-increased compression of the air and consequent unnecessarily-increased resistance to the bed's travel, or, as may be determined upon, there shall be be-
25 yond that point a gradually-diminished resistance, yet, if desirable, there may be left in the spring at the still point or termination of the movement of the bed in either direc-
30 tion sufficient compression of the air to assist in starting the bed on its return; and the invention consists in means hereinafter de-
scribed and claimed, consisting principally in the combination with the air-spring cylinder and piston of a head fitted to and movable
35 within said cylinder lengthwise thereof and means for controlling such movement of said head relatively to the movement of said piston.

The invention is illustrated in the accompanying drawings, in which—

40 Figure 1 represents a longitudinal vertical sectional view showing parts of a printing-press necessary for the explanation of the improvement as applied to one end thereof; Fig. 2, a plan view of the cam and its attachment
45 for operating the movable cylinder-head; Fig. 3, an end view corresponding with Fig. 1.

10 designates the bed-plate; 11, the framing; 12, the reciprocating bed; 13, the ways on which the bed runs. The bed is repre-
50 sented as driven by the mangle-shaft 14 15, gear 16, and rack 17, commonly used for driving the reciprocating beds of printing-presses, said rack having, as usual, at each end a stud

18 and a semicircular shoe 19, in the latter of which run the rollers 20 on the crank-pins 21 55 of the mangle-gear 16 for directing said gear from the upper to the lower side of the rack, and vice versa.

22 designates the cylinder of the air-spring, represented as fixedly secured to the framing 60 and open at both ends to the atmosphere.

23 23 are the air-spring pistons, one for the cylinder 22 shown and the other for the corresponding cylinder (not shown) at the other end of the press. These pistons are or may 65 be like those commonly employed. They are attached fixedly to the bed by a rigid hanger 23*.

25 is the movable cylinder-head, which constitutes the principal feature of my inven- 70 tion. This head is fitted to the cylinder like a piston with air-tight packing of any suitable kind, and it has connected with it a rod 26, which projects through the open outer end of the cylinder and passes through a guide 27 in 75 the framing. The outer end of this rod is forked, as shown in Fig. 2, to embrace an upright rotary cam-shaft 28, which runs in bearings in brackets 29, formed on or affixed to the framing. The said rod is represented as 80 furnished with a roller 30, against which runs a cam 31 32 33 34 on said shaft 28, the said cam serving to move the cylinder-head 25 inward within the cylinder. The said head is repre-
85 sented as provided with a vacuum-valve 35, which opens to admit air between the cylinder-head 25 and piston while the head is moving outward within the cylinder or the piston 23 is moving away from the head.

The cam-shaft 28 is driven through one of 90 two horizontal shafts 36, one for each end of the press, by bevel-gears 37 38, one on said shaft 36 and the other on the cam-shaft. The shafts 36, which are supported in bearings 39 in the end framing of the press and in stands 95 40 on the bed-plate, are represented as driven through bevel-gears 41 on their inner ends by a bevel-gear 42 on a horizontal shaft 43. This shaft 43 is what is commonly known in re-
100 ciprocating-bed printing-presses as the "cam-shaft" and carries cams commonly employed in such printing-presses, but not necessary to be herein shown or described. The said shaft is represented as geared with and driven by the mangle-shaft through suitable 105 gearing 44 45 46 47, said gearing and the

gears 42 41 37 38 being so proportioned in this example that the shaft 28 and its cam make one revolution for every one of the mangle-shaft. The cam represented (see Fig. 2) is divided into four approximately equal parts, of which the parts 31 33 are approximately concentric with the shaft. The part 32 pushes the cylinder-head 25 forward or in a direction away from the outer end of the cylinder, and the part 34 controls the movement of the said head in the reverse direction.

In the operation of the press while the air-spring piston 23 is out of the cylinder the head 25 remains stationary at about the position shown in Fig. 1, where it is retained by the friction of its packing within the bore of the cylinder, and the cam, though in constant rotation, is inoperative upon it. This rotation of the cam is so timed to the movement of the bed by a proper relation of their respective driving-gearing that when the piston 23 is caused by its movement with the bed to enter the cylinder the cam has arrived in about the position shown in Figs. 1 and 2. Then while the piston is passing into the cylinder the head is kept stationary by the part 33 of the cam, and thus by the continued movement of the bed and piston, which in the example are supposed to be moving to the right, compression of the air in the cylinder is produced to counteract the momentum of the bed; but as the part 33 of the cam passes by the roller 30 on the rod 26 the part 34 of the cam allows the head 25 to yield to the pressure of the air between it and the piston 23 and to retire from the latter, and so to effect a diminution of or prevent the further increase of the resistance of the air to the movement of the bed until the part 31 of the cam arrives at the roller 30, and so prevents the further retirement of the head. If the cam be formed and timed in its operation to stop the head before the movement of the bed is quite completed, it permits such further compression of the air by the further movement of the piston with the bed as will give a desirable degree of tension to the air between the cylinder-head and the piston for assisting to start the bed on its return movement. As the bed returns the part 32 of the cam returns the cylinder-head to the position first described, where it remains until by the movement of the bed again to the right the operation described is repeated. A similar operation to that described of course takes place between the movable cylinder-head and piston at the opposite end of the press; but it has not been thought necessary to represent that end. In these operations the cam will make several revolutions while the piston 23 is out of the cylinder; but since there is no pressure on the head 25 at such times the latter will remain stationary.

It is obvious that by a proper form and timing arrangement of the cam the automatic operation of the movable cylinder-heads above described may be made to commence at any desired point in the travel of the bed; but I consider it desirable that when the bed is driven by such mechanism—for example, the mangle movement described—that a retardation takes place near the end of its travel in either direction the said operation shall commence at or about at the point where such retardation commences, as illustrated by Fig. 1 of the drawings.

What I claim as my invention is—

1. In a reciprocating-bed printing-press, the combination with an air-spring cylinder and piston, of a cylinder-head movable within said cylinder lengthwise thereof, the movement of the cylinder-head being timed with respect to the movement of the press-bed.
2. In a reciprocating-bed printing-press, the combination with an air-spring cylinder and piston, of a cylinder-head movable within said cylinder lengthwise thereof while the piston is in the cylinder, the movement of the cylinder-head being timed with respect to the movement of the press-bed.
3. In a reciprocating-bed printing-press, the combination with an air-spring cylinder and a piston fitted thereto the one stationary and the other carried by the press-bed, of a cylinder-head fitted to said cylinder and movable lengthwise thereof while the piston is in the cylinder, the movement of the cylinder-head being timed with respect to the movement of the press-bed.
4. In a reciprocating-bed printing-press, the combination with a stationary air-spring cylinder and a piston fitted thereto and carried by the bed, of a cylinder-head fitted to said cylinder and movable therein lengthwise thereof, the movement of the cylinder-head being timed with respect to the movement of the press-bed.
5. In a reciprocating-bed printing-press, the combination with an air-spring cylinder and piston, of a cylinder-head fitted to said cylinder, and automatically-operating mechanism for moving said cylinder-head within the cylinder relatively to the piston.
6. In a reciprocating-bed printing-press, the combination with an air-spring cylinder and piston, of a cylinder-head fitted to the said cylinder and movable therein lengthwise thereof and cam-actuated mechanism for controlling the movement of said cylinder-head away from the piston while the latter is moving within the cylinder.
7. In a reciprocating-bed printing-press, the combination with an air-spring cylinder and a piston fitted thereto the one stationary and the other carried by the press-bed, of a cylinder-head fitted to said cylinder and movable therein lengthwise thereof, and au-

tomatic means for controlling and changing the position of said head while the piston is in the cylinder.

8. In a reciprocating-bed printing-press, the combination with a stationary air-spring cylinder and an air-spring piston carried by the bed, of a cylinder-head fitted to said cylinder and movable therein lengthwise thereof, and means timed with respect to the movement of the press-bed for controlling and changing the position of said head relatively to said piston.

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 cylinder and piston, a cylinder-head movable in said cylinder lengthwise thereof and mechanism timed to the travel of the bed for controlling the movement of said cylinder-head within the cylinder during the retarded portion of said movement of the bed.

10. The combination with a printing-press bed and mechanism for giving said bed a reciprocating movement, of a stationary air-spring cylinder, a piston carried by the bed, a cylinder-head fitted to said cylinder and movable therein lengthwise thereof and mechanism timed to the travel of the bed for controlling the movement of the said cylinder-head away from the piston while the latter is moving within the cylinder.

11. The combination with a printing-press bed and mechanism for giving the bed a reciprocating movement, of a stationary air-spring cylinder, a piston carried by the press-bed, a cylinder-head fitted to the said cylinder and movable therein lengthwise thereof and mechanism for controlling the movement of the cylinder-head whereby the cylinder-head is held stationary during the first

part of the advance movement of the piston within the cylinder and then permitted to move in the same direction as the piston.

12. The combination with a printing-press bed and mechanism for giving said bed a reciprocating movement, of a stationary air-spring cylinder, a piston carried by the press-bed, a cylinder-head fitted to the said cylinder and movable therein lengthwise thereof and mechanism for controlling the movement of the said cylinder-head whereby the cylinder-head is held stationary during the first part of the advance movement of the piston within the cylinder, then permitted to move in the same direction as the piston and then held stationary while the piston starts on its reverse movement.

13. The combination with a printing-press bed and mechanism for giving said bed a reciprocating movement, of a stationary air-spring cylinder, a piston carried by the press-bed, a cylinder-head fitted to the said cylinder and movable therein lengthwise thereof and mechanism for controlling the movement of said cylinder-head whereby the cylinder-head is held stationary during the first part of the advance movement of the piston within the cylinder, then permitted to move in the same direction as the piston, then held stationary while the piston starts on its reverse movement and finally moved to its normal position within the cylinder.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 31st day of March, A. D. 1905.

CHARLES P. COTTRELL.

Witnesses:

A. R. STILLMAN,
ALLEN C. WHITFORD.