

(No Model.)

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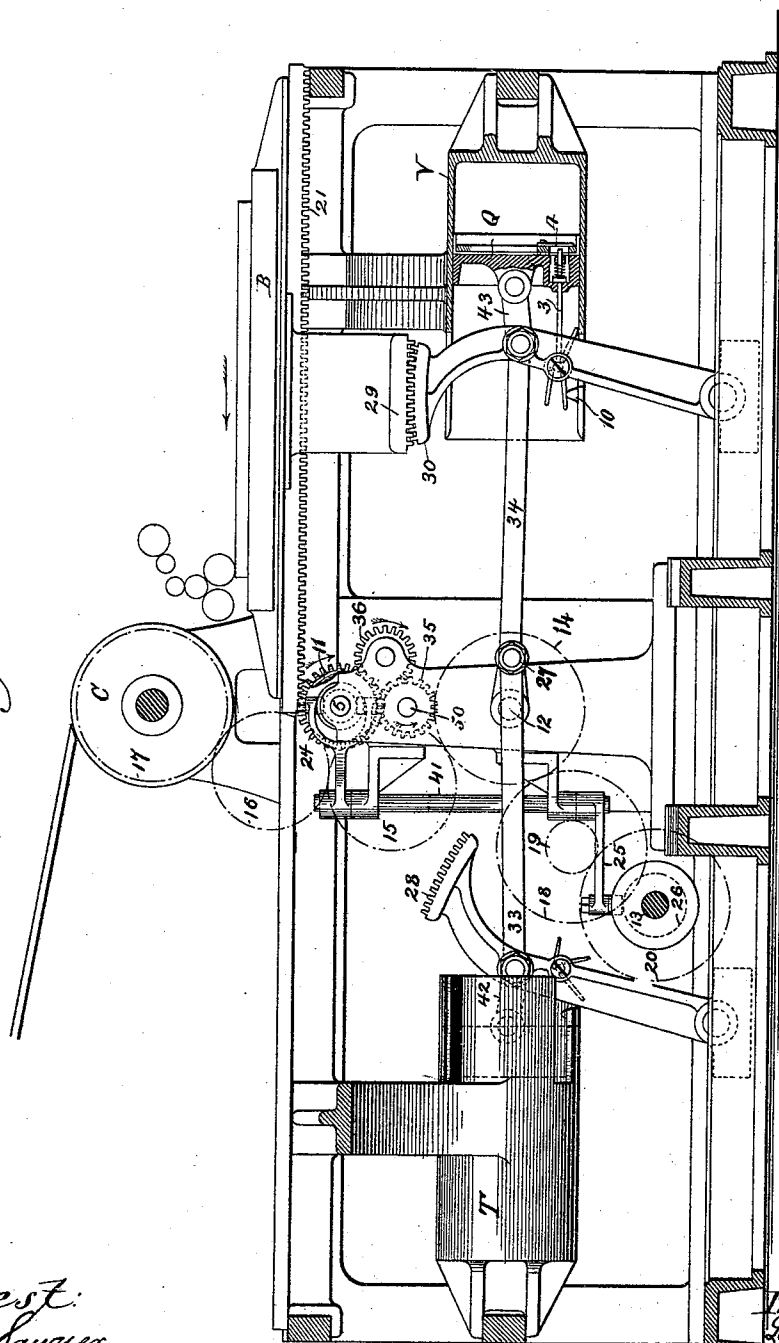
L. C. CROWELL.

BED MOTION FOR CYLINDER PRINTING MACHINES.

No. 478,573.

Patented July 12, 1892.

Fig. 1.



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J. M. Borch

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(No Model.)

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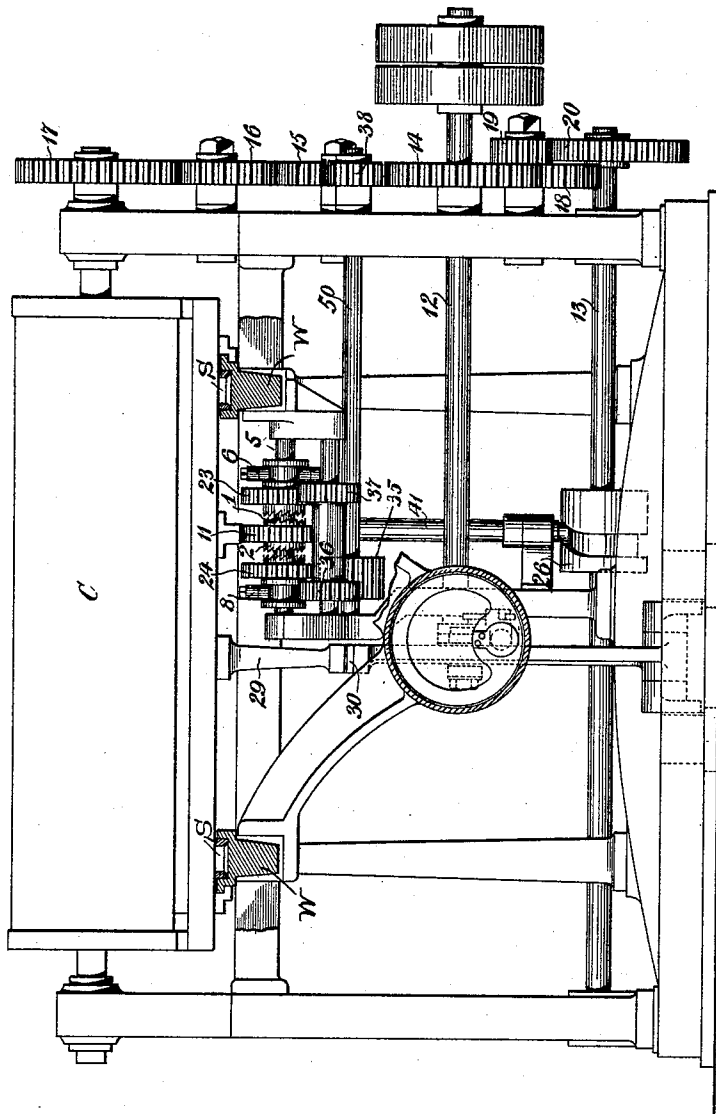
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Fig. 2.



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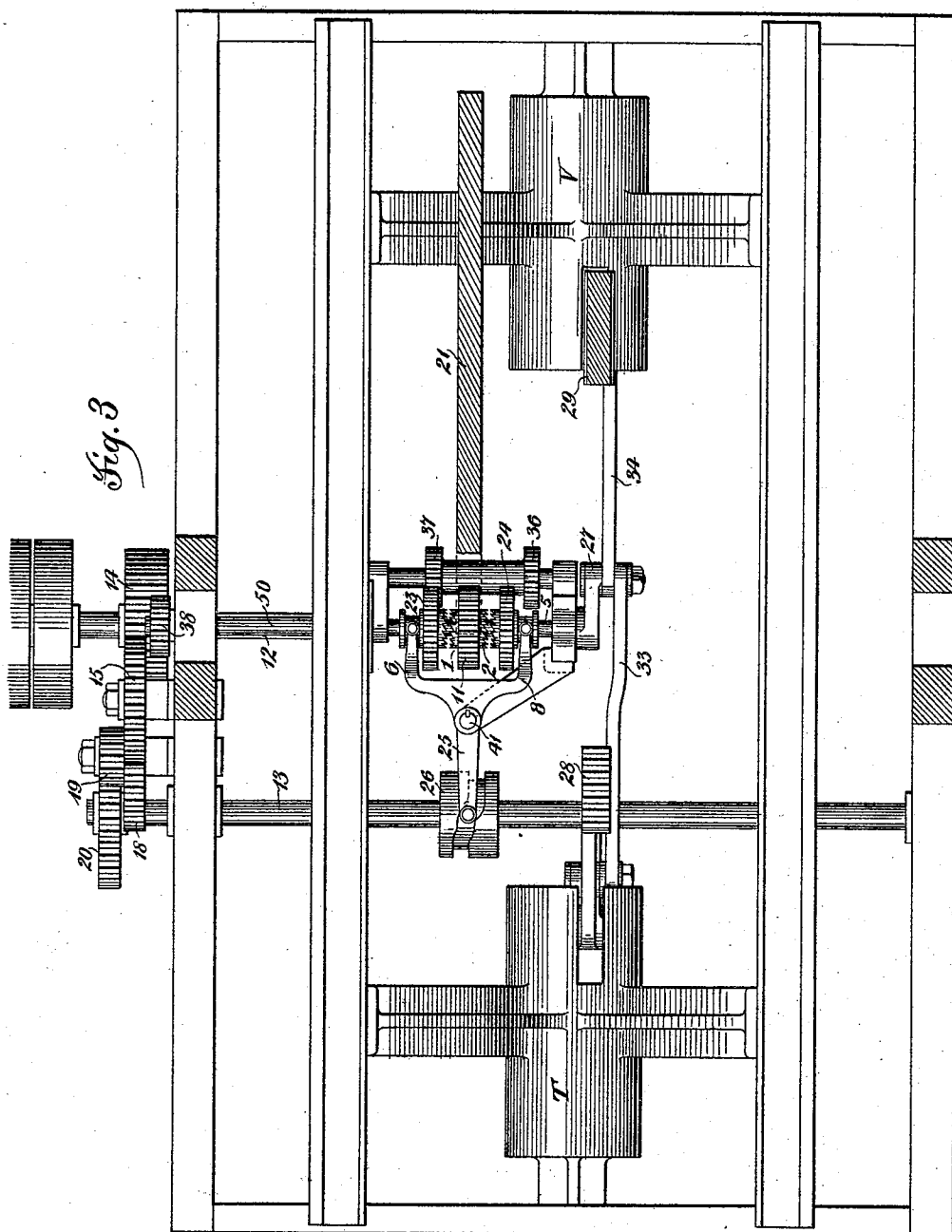
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(No Model.)

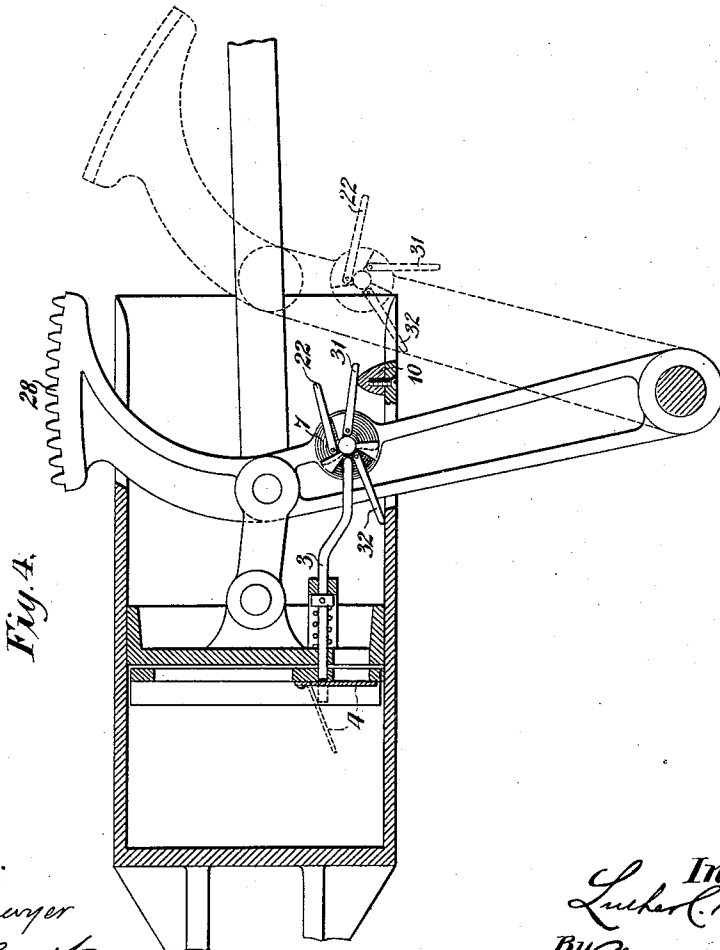
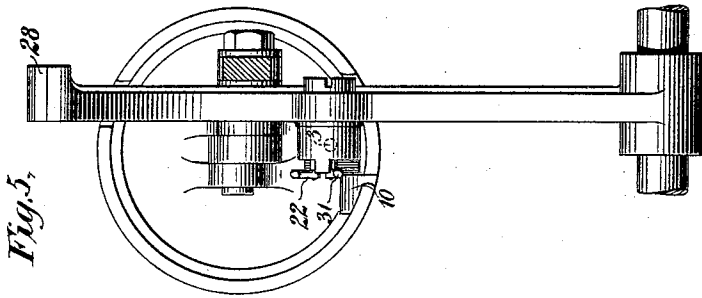
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UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR TO ROBERT HOE, STEPHEN D. TUCKER, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

BED-MOTION FOR CYLINDER PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 478,573, dated July 12, 1892.

Application filed April 1, 1892. Serial No. 427,317. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Bed-Motions for Cylinder Printing-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

These improvements relate to bed-motions of cylinder printing-machines, and more particularly to the rack-and-pinion mechanism whereby is imparted the greater part of the reciprocatory movement of the bed.

The invention consists in a rack-and-pinion mechanism so constructed and operating as to be capable of remaining constantly in gear and yet have the driving action of the pinion maintained to cause the principal part of the movement of the bed and suspended during the reversing of the bed at each end of its run, and in combination therewith means for accomplishing such reversing operation, and in combination with the latter an air-cushion as an auxiliary take-up device.

These improvements will preferably be combined with crank-operated controlling-arms as the reversing mechanism, and hence are so illustrated; but other constructions of reversing mechanism may be employed, as will appear in the following description of the manner in which the invention is or may be carried into effect, which description will now be given, aided by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of a printing-machine equipped with these improvements. Fig. 2 is an end view thereof, partly in section. Fig. 3 is a plan view taken just below the bed. Figs. 4 and 5 are detail views of the air-cushion valve-motion.

The improvements are particularly adapted for use in printing-machines of that class in which the type or form is carried upon a reciprocating bed and from which form an impression is taken by means of a cylinder or cylinders which carry a sheet in contact with

the form on the reciprocating bed as the latter moves in one direction under the cylinder, and which bed is returned in the opposite direction without contact with the cylinder, either by passing a low part thereof or by reason of the cylinder being raised out of printing position.

In the machine shown the impression-cylinder C is mounted to revolve in suitable journals supported by the frame-work by means of a wheel 17, which is driven through intermediates 16 15 from a wheel 14 on the shaft 12, and from which a train of wheels 18, 19, and 20 communicate motion to the shaft 13, whereby other parts are actuated.

The type-bed B moves upon sliders S, that run in ways W, supported in the usual manner in such machines, and its movements are governed by a main driving-pinion 14, which in this case is in the outside train. This pinion makes three revolutions to each reciprocation of the bed, and although that number is preferred for practical reasons it may make any other suitable proportion or number of revolutions without affecting the present improvement. The principal part of the reciprocatory movement of the bed is imparted through a single rack 21, fixed to the under side of the bed and with which a single driving-pinion 11 is constantly geared. This pinion 11 is fast on the shaft 5, and has secured to each of its opposite faces one member 12 of two oppositely-facing clutches. The opposite member of the clutch on one side of the pinion 11 is carried by a wheel 23, that revolves loosely upon and is free to slide on the shaft 5, and the opposite member of the clutch on the other side of the pinion 11 is carried by a wheel 24, that also revolves loosely upon and is free to slide on said shaft 5. The wheels 23 and 24 are driven constantly in opposite directions by means of a pinion 35 on the shaft 50, that in turn is driven by an intermediate pinion 38 from the said driving-pinion 14 of the outside train. The pinion 35 gears with the wheel 24 and with an intermediate 36, the latter being on a shaft which carries another intermediate 37, that gears with the wheel 23, and the

intermediate 37 and pinion 35 are wide enough to remain in gear with the wheels 23 and 24 as the latter slide on their shaft 5. This sliding movement is imparted to the wheels 23 24 by means of yokes 6 8, which, engaging in collars fixed to the wheels 23 24, are connected together, so as to be simultaneously moved by the vibratory action of a shaft 41, appropriately imparted by a lever 25 from the cam 26 on shaft 13. Although the rack 21 and pinion 11 are constantly geared, it will be understood that whenever the pinion 11 is clutched to either of the wheels 23 or 24, it and through it and the rack 21 the bed will be driven in the direction of the rotation of said pinion by one or the other of said wheels 23 24, and that when neither of these wheels 23 or 24 is clutched to the pinion 11, the latter will be moved by the action upon it of the bed-rack, to which motion is then imparted by the action of one or the other of the crank-actuated controlling-arms.

As the bed is directly driven by the pinion 11, which is clutched to one or the other of the wheels 23 24 only during the major part of its run in either direction, and at each end of its reciprocatory movement is controlled or driven by the reversing mechanism, the cam 26 is so shaped that it will cause both wheels 23 24 to be unclutched from said pinion 11 during this reversing operation, and hence, although this pinion 11 is then inactive as the bed-driver, it will still be driven by the rack and turn in the same direction that the rack is moving.

While the reversing mechanism may be any device that is capable of being engaged with and disengaged from the bed, and of operating to slow down and stop the bed in one direction and then start it and move it in a contrary direction—such, for instance, as the controlling devices described in my applications, Serial No. 421,914, filed February 18, 1892, and Serial No. 422,835, filed February 26, 1892, and Serial No. 427,554, filed April 2, 1892. The construction of controlling-arms shown herein is a preferred form, and their use either with or without the auxiliary take-up device provided by the air-cushions may be adopted.

As the construction and operation of this reversing mechanism will be readily understood in connection with a description of the movements of the type-bed, no preliminary description of it need be made.

In the positions of the mechanisms shown in Fig. 1 the type-bed B is supposed to be in a state of momentary rest in the position of the limit of its movement in one direction, it being coupled to the arm 30 by means of the segment-head of said arm engaging with the short rack, with which the lug 29, depending from the bed, is provided for that purpose. At this time the wheels 23 24 are so held by the yokes as to have their clutches uncoupled from the pinion 11, which is thus free to revolve and be moved by the rack 21 when it

moves. As this controlling-arm 30 and its companion 28 are rocked by the crank 27, acting through the connecting-rods 33 34, and said crank is revolved by the shaft 12, which carries the main driving-pinion 14, that actuates the pinion 11 through the train 38 35 36 37 and the wheels 23 24, it follows that said arms will move in timely co-operation with said pinion when it is to be set into action as the driver or is rendered inactive as the driver. As the bed is now to be moved in the direction of the arrow in Fig. 1 by means of the pinion 11 and crank 27, which are turning in the direction of their indicating-arrow, it follows that while the crank is making a quarter-turn from its position in Fig. 1 to a depending vertical position the controlling-arm 30 will make an inward sweep to a position which is equivalent to that in which its companion arm 28 is shown, during which movement said arm 30 will have started the bed and moved it with an accelerating speed which attains that of the surface speed of the driving-pinion 9 as the crank reaches its last-stated position, and as the crank is passing its lowest point the segment of the arm 30 will pass out of engagement with the segment of the lug 29 on the bed, and simultaneously the cam 26 will, through the yoke 6, move the wheel 23, so that its clutch member will engage the pinion 11, and thus drive it in the direction of the arrow in Fig. 1, the said pinion 11 then being active as the driver that moves the rack 21, through which it consequently drives the bed at the surface speed of the driving-pinion 9. The pinion 11 will continue to thus drive the bed during the major part of its travel or printing-run while the crank 27 has made a complete revolution, during which the arms 28 30 will have made two idle oscillations. When, however, the arm 28 begins its third oscillation, the crank 27 will in approaching and passing its low point cause the segment of said arm to engage the rack of the lug 29 while traveling at an equal surface speed therewith and in the same direction and to thereafter control the movement of the bed, the said wheel 23 being simultaneously uncoupled from the pinion 11 by an appropriate movement of the yoke, whereupon the pinion 11 will move idly, driven by the rack 21, during the time occupied by this third oscillation of the arm 28, during the first half of which said arm, or while the crank 27 is making a quarter-turn from its low point, causes the bed to be slowed down and brought to a state of rest, and thereafter in restarting the bed said arm 28 causes it to move with an accelerated speed while said crank makes its next quarter-turn. As the crank approaches and passes its high point the segment-head of the arm 28 will pass out of gear with the rack on lug 29 of the bed and the pinion 11 will be brought into action as the driver for the bed by a timely movement of the wheel 24, induced by the yoke moved by the cam 26, whereupon said pinion will be-

come the driver for the bed during the major part of its return movement or while the crank is making a complete revolution and the arms 28 30 make two idle oscillations. When, however, the next oscillation of the arm 30 is made, which is when the crank is passing from its high point to its low point, its segment-head first engages the rack 21 on the bed while traveling at a like surface speed with the bed, at which time the wheel 24 is unclutched from the pinion 11, so that the latter becomes idle as the driver, but is driven by the rack. As this crank runs from its high point to its quarter-point it causes the arm 30 to slow down the movement of the bed and bring the bed to a state of rest, as in Fig. 1, which is the position from which the movements of the parts has been described. A more particular description of the operation of these controlling-arms is contained in my application, Serial No. 421,914, filed February 18, 1892.

The reversing mechanism may have substituted for it the rotating cam illustrated and described in my application, Serial No. 427,554, filed April 2, 1892. As an auxiliary to the crank in overcoming the momentum when stopping the bed, as well as providing a means for aiding the starting of the bed by overcoming its inertia, which is desirable in large machines when the bed is heavy, and consequently its momentum and inertia are great, the air-cushion shown may be employed in conjunction with the controlling-arms. This air-cushion consists of the usual cylinders T V, respectively fixed to each end of the machine, with which pistons P Q, connected by short links 42 43, are employed. These cylinders are elongated, so as to provide sustaining-guides throughout the whole range of movement of the piston, and they are cut away to admit the unopposed play of the levers of the controlling-arms. As the said arms 28 30 each make two idle oscillations and one active one in reversing the bed, and it is essential that the air-cushion shall only be used during said active movement, a valve mechanism must be provided that will prevent any compression of air within the cylinders during the said two idle oscillations of the controlling-arms. While there are many ways of operating the valve so that it shall be closed only at each third entrance of the pistons into the cylinders, a good means for accomplishing this end is here shown.

The pistons are provided with an inwardly-moving flap-valve, as 4, which of course will close to confine the air, if permitted to freely operate, whenever the piston causes any compression of air in the cylinder. In order to prevent such compression during the idle movements of the controlling-arms, each valve is provided with a spring-seated rod 3, normally held so as to leave the valve free to act, which rod is long enough to be engaged by the high part of a cam 7, carried by each arm 28 30, whenever the same is presented for

contact with said rod 3. In order to present the high part of the cams 7 at appropriate times, said cams are pivoted to turn upon the arms 28 30 and they are caused to make a one-third rotation each time that the arms make an oscillation, as follows: Each cam is provided with three tappet-arms 22 31 32, that are pivoted to swing freely, but at times rest against an abutment or shoulder on their carrying-hub. When the arm, as 28 or 30, makes its movement toward the air-cylinder, the tappet-arm then depending will be moved through the slot in the cylinder and into contact with the edge thereof, and thus be forced to ride over the tappet 10 and caused to make a third rotation. This repeated, will, as is obvious, present the high part of the cam opposed to the rod 3 during two oscillations of the arm 28 or 30, and the low part during one or the active oscillation of such arm, and in the latter case the valve 4 will be automatically closed by the action of the spring on the rod 3 as the controlling-arm 28 or 30 is engaged with the bed, and remained closed as the piston is carried into the air-cylinder to compress the air thus confined therein. When the return stroke of the piston is made, the valve will automatically open, as will be apparent. One other means for effecting this same result is illustrated in my application, Serial No. 427,162, filed March 31, 1892, but is not claimed herein, except in its specific form.

What is claimed is—

1. The combination, with the type-bed, its single driving-rack, and single driving-pinion constantly geared therewith and mounted loosely upon its shaft, of two clutches running in opposite directions and operated to be alternately coupled to said pinion to actuate the same, substantially as described.

2. The combination, with the type-bed, its single driving-rack and single co-operating driving-pinion constantly geared therewith and turning freely upon a shaft, two actuating-pinions driven in opposite directions, and clutches alternately coupling said actuating-pinions to the driving-pinion for moving the bed during the major part of its run in both directions, of a reversing mechanism moving in harmony with said actuating-pinions and operating to slow down and stop the bed in one direction and start and accelerate the bed in a contrary direction at each end of its run, substantially as described.

3. The combination, with the type-bed, its single driving-rack, a loosely-running single driving-pinion therefor, two oppositely-rotating actuating-pinions, clutches for alternately coupling said actuating-pinions to the single driving-pinion and uncoupling them therefrom to produce the major portion of the reciprocation of the bed, and a reversing mechanism consisting of a crank revolved in harmony with and disconnected from the bed to control the end or reversing movements of the bed, substantially as described.

4. The combination, with the type-bed, its single driving-rack, single freely-moving driving-pinion, two actuating-pinions turning in opposite directions, and clutches for coupling said pinions, of crank-actuated controlling-arms alternately engaged with and disengaged from said bed, whereby the movement of the bed in each direction is begun by one of the controlling-arms, is continued throughout its major part by the single driving-pinion, and completed to a state of rest by the other of the controlling-arms, substantially as described.

5. The combination of the bed, its single driving-rack, and single freely-moving driving-pinion, two actuating-pinions driven in contrary directions from the crank-shaft, clutches for connecting said actuating and

driving pinions, rocking-arms 28 30, connected with the crank 27, and a socket for said arms in the bed, substantially as described.

6. The combination, with the bed, its controlling-arms, and air-cushions, of the valve 4, its operating-stem 3, and the rotating cam 7, substantially as described.

7. The combination, with the bed and its rack or lug 29, of controlling-arms 28 30, having segment-heads, substantially as described.

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

LUTHER C. CROWELL.

Witnesses:

THOS. F. KEHOE,
H. T. MUNSON.