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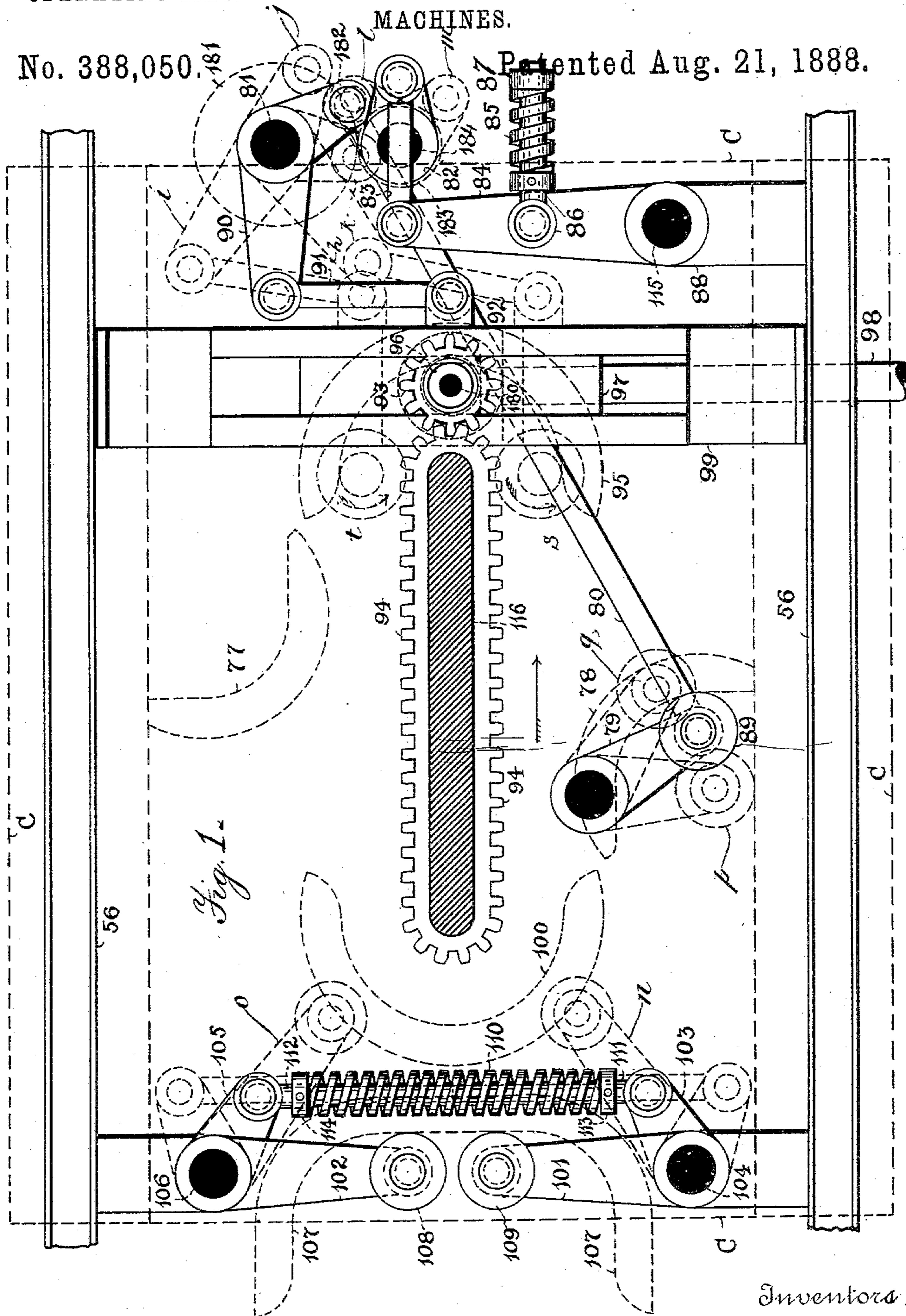
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C. KAHLER & L. E. BROOKES.

OPERATING MECHANISM FOR TYPE BEDS OF CYLINDER PRINTING  
MACHINES.

No. 388,050.

Patented Aug. 21, 1888.



Witnesses,  
*Albert H. Adams.*  
*Harry F. Jones.*

Inventors,  
*Carroll Kahler,*  
*Leonard E. Brookes,*

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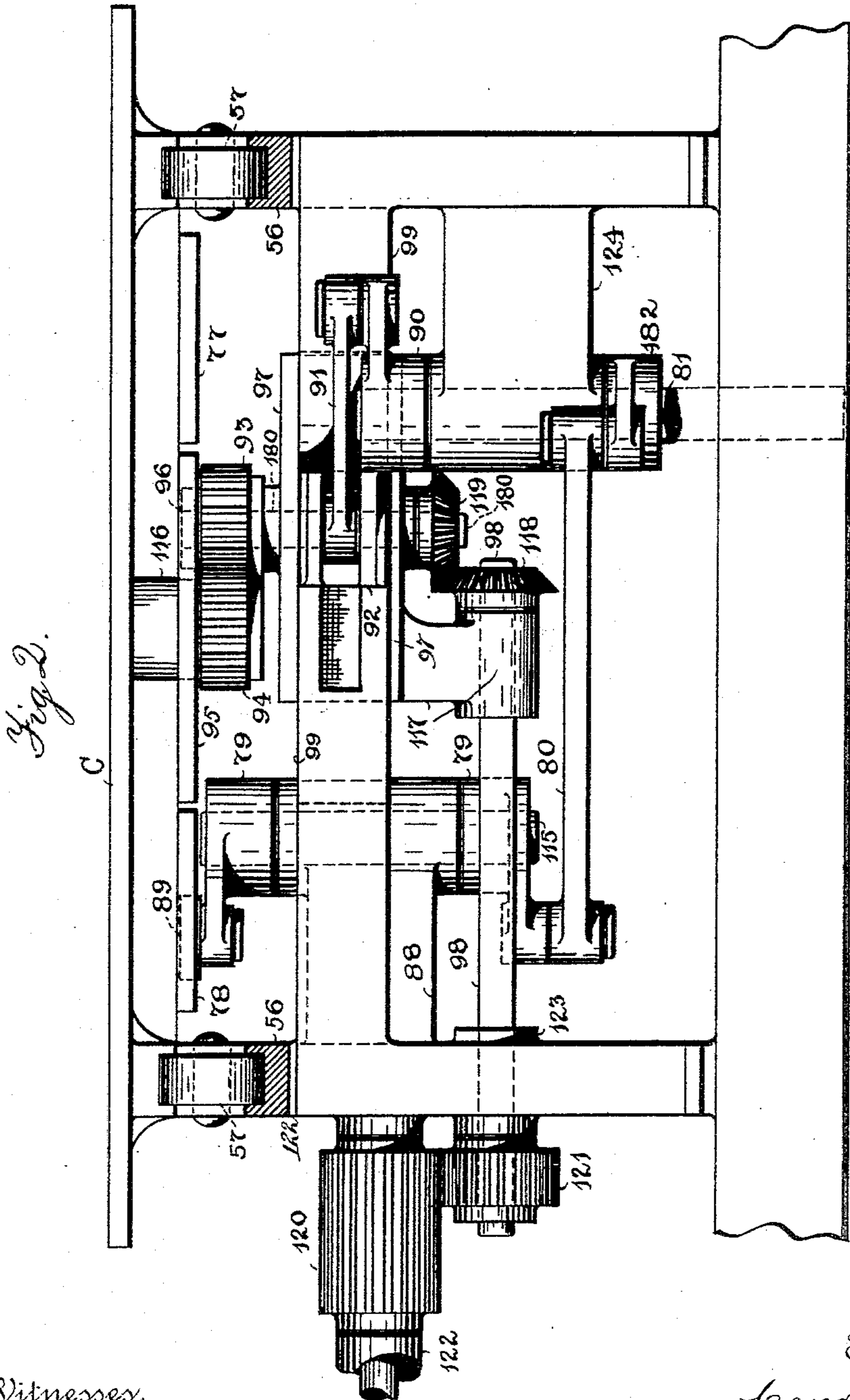
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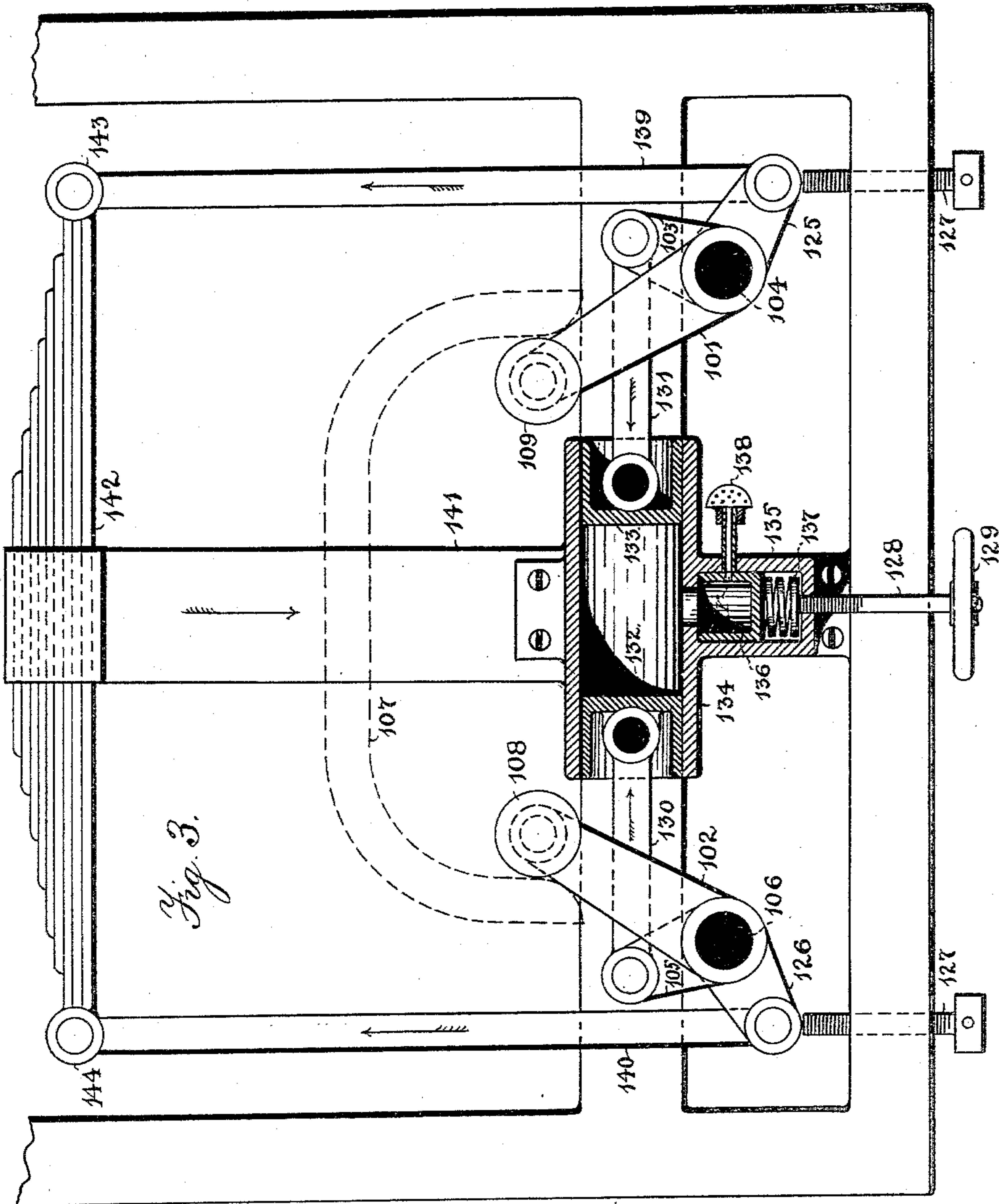
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# UNITED STATES PATENT OFFICE.

CONRAD KAHLER AND LEONARD E. BROOKES, OF CHICAGO, ILLINOIS, ASSIGNORS TO THEMSELVES AND JOHN J. KAHLER, OF SAME PLACE.

OPERATING MECHANISM FOR TYPE-BEDS OF CYLINDER PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 388,050, dated August 21, 1888.

Application filed September 22, 1887. Serial No. 250,424. (No model.)

*To all whom it may concern:*

Be it known that we, CONRAD KAHLER and LEONARD E. BROOKES, residing at Chicago, in the county of Cook and State of Illinois, and citizens of the United States, have invented a new and useful Improvement in Operating Mechanism for Type-Beds of Cylinder Printing-Machines, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of the bed-driving mechanism and a cushioning device for the same. Fig. 2 is an end elevation of the bed-driving mechanism and the automatic sliding frame of driving-gear. Fig. 3 is a plan view, partly in section, of a cushioning device formed by a peculiar and novel arrangement of springs and air-cylinders.

These improvements relate to that class of printing-presses known as "flat-bed cylinder-presses," and particularly to the driving mechanism and cushioning devices for the bed of a cylinder-press.

The object of the present invention is to overcome the objections and defects pertaining to flat-bed cylinder-presses, and its nature consists in providing new and novel mechanism for imparting a uniform reciprocating motion to the bed or form-carriage, and in providing a cushioning device for the bed or form-carriage, as hereinafter specified.

The mechanism for driving the bed or form-carriage C of the machine at a uniform rate of speed and the cushioning devices for stopping and starting the bed or form-carriage C without shock or jar at the end of its travel in either direction will now be described. The driving mechanism is shown in Figs. 1 and 2 of the drawings, and in Fig. 1 the bed or form-carriage is removed, but shown in position by the dotted outline.

The bed or form-carriage C has depending from its under side and secured thereto by a web or flange, 116, a rack, 94, having straight sides and curved ends, with which meshes a gear or toothed wheel, 93, on the upper face of which is mounted a roller or thimble, 96.

The arrangement of the rack herein described is one by which the rack is attached directly under the bed and in a central position,

and the driving-gear 93 is supported in a horizontal position and has a rotation in the proper or desired direction for driving the rack and giving the bed or form-carriage the necessary forward and back movement. The driving-gear 93 is attached to a shaft, 180, which shaft is journaled in a sliding frame, 97, and this frame in turn is carried in a cross-frame, 99, attached rigidly to the side frame of the machine, thus insuring great steadiness of motion and almost perfect freedom from side or end strain upon the bed or form-carriage. This shaft 180 above the gear 93 carries the roller or thimble 96, and to its lower end is secured a beveled gear, 119, by which the shaft is driven from a beveled driving-gear, 118, on the end of a shaft, 98, which shaft is supported at its inner end in a bearing, 117, depending from the sliding frame 97, and is mounted at its outer end in a bearing, 123, on the side frame of the machine, and its outer end carries a gear or toothed wheel, 121, which wheel meshes into a long pinion, 120, mounted on a shaft supported in bearings 122, and receiving motion from a suitable driving-gear. The shaft 98 is securely held against lateral motion in the bearing 117, and is free to revolve in its bearings 117 and 123, and at the same time is free to slide endwise in the bearing 123 with the sliding movement of the frame 97.

At each end of the rack, and secured to the under side of the bed C, is a semicircular shoe, 95 and 100, and each shoe is formed upon a radius equal to the distance from the center of the curved end of the rack to the circumference of the roller or thimble 96 farthest away from the center of the curved end of the rack, and each shoe is firmly attached to the bed C at a point to be in line with the roller 96, and these shoes prevent the bed C from traveling more than the required or predetermined distance, and also assist the gear 93, through the medium of the roller 96, in turning and reversing the movement of the bed or form-carriage C, the shoe 95 acting at one end and the shoe 100 at the other.

The under side of the bed has secured thereto, on opposite sides of the rack, shoes 77 and 78, with which coact devices for moving the sliding

ing frame, and these devices are shown only for one shoe, 78, it being understood, however, that similar devices are provided for coacting with the shoe 77.

5 The shaft 115 is mounted in a box, 88, on the side frame of the press, and this shaft at each end has secured thereto an arm, 79, the upper arm having a roller, 89, mounted on its end to engage with the shoe 78, and the lower arm  
10 having in its outer end a pin or pivot, to which is connected a rod, 80, which rod at its other end is connected to a pin or pivot on the end of an arm, 182, secured to a shaft, 81, which shaft is supported in a box or bearing, 124,  
15 from the side frame of the machine. This shaft 81, at its lower end below the arm 182, has secured thereto a gear-wheel, 181, and to its upper end is secured an arm, 90, having in its outer end the pin or pivot, to which is connected one end of a rod, 91, the other end of  
20 which is pivotally connected between ears 92, projecting out from the sliding frame 97.

The gear-wheel 181 on the shaft 81 meshes with a similar gear-wheel, 183, on an upright  
25 shaft, 184, supported in a suitable bearing or box, and having secured to its upper end an arm, 82, having a pin or pivot in its outer end, to which is connected one end of a rod, 83, the other end of which is connected by a suitable  
30 pin or pivot to a lever, 84, and to the lever 84 is pivotally connected a guide-rod, 86, around which is a compression-spring, 85, which abuts at its outer end against a collar, 87, firmly attached to the side frame of the machine, and in  
35 which collar the rod 86 slides, and, as shown, the inner end of the spring 85 abuts against a collar secured to the rod adjacent to the lever 84.

The operation of these devices is as follows:  
40 When the bed has arrived almost at the end of its travel in the opposite direction to that indicated by the arrow of Fig. 1, the driving-gear 93 will be on the side of the bed and at the point indicated by the dotted circle *s*, Fig.  
45 1, and at this point the shoe 78 will engage the roller 89 on the lever 79 and move the lever 79 from the position indicated by the dotted lines *q* to that shown by the full lines, moving the lower arm, 79, likewise, and through the rod  
50 80 turning the arm 182 from the position indicated by the dotted lines *j* to the position shown by the full lines, partly rotating the shaft 81, which moves the arm 90 from the position indicated by the dotted lines *h* to that  
55 indicated by the full lines, and this arm 90, through the connecting-rod 91 and ears 92, moves the sliding frame 97 from the position indicated by the lower dotted lines, Fig. 1, to the position shown by the full lines for the  
60 ears 92 with the movement of the pinion 93 around the end of the rack 94, as shown in Fig. 1 in full lines, and by thus assisting the turning of the pinion at the starting-point through the devices just described relieves the  
65 driving-gear 93 of all strain in making the turn. The pinion or gear 93 continues its

travel around the end of the rack to the point indicated by the upper dotted circle, *t*, of Fig. 1 for the reverse travel of the bed or form-carriage in the direction indicated by the arrow, 70 and when the wheel 93 has reached this point the upper arm, 79, will have been carried by the travel of the pinion around the end of the rack to the position shown by the dotted lines *p*, Fig. 1, turning the shaft 115 and the lower arm, 75 79, and through the connecting-rod 80 turning the arm 182 to the position shown by the dotted lines *h*, rocking the shaft 81, and turning the arm 90 to the position shown by the dotted lines *i*, and through the rod 91 and ears 92 80 carrying the moving frame 97 to the limit of its movement in that direction and in position for the travel of the rack 94 to the other side of the gear 93, Fig. 1. The parts remain in this position until the rack 94 has traveled in 85 contact with the gear to its opposite end from that shown in Fig. 1 and in the direction indicated by the arrow, Fig. 1, when the shoe 77 comes into play, and, in connection with corresponding devices to those already described 90 for coaction with the shoe 78, moves the sliding frame back to a position for the gear to be on that side of the rack indicated by the dotted circle *s*, but at the opposite end from that shown in the figure, and these movements will 95 continue at each forward and back movement of the bed or form-carriage, and with each movement the gear 93 is assisted in starting on its turn around the end by the sliding frame 97, through the shoes 77 and 78 and their coacting devices, 100 and on a reverse movement the arm 90 will be moved from the dotted position *i* to the dotted position *h*, and the arm 182 will be moved from the dotted position *k* to the dotted position *j*. When the sliding frame is in its central posi- 105 tion, as indicated by the full lines in Fig. 1, the arm 82 and the connecting-rod 83 will be on what is known as the "dead-center," having been carried there by the action of the gear-wheels 181 and 183, which partly turn the 110 shaft 184, and in this position it will be seen that whichever way the arm 82 is moved through the medium of the gears 181 and 183 it will receive the full force of the compression-spring 85 by means of the lever 84, and 115 securely hold the sliding frame locked during either the backward or forward travel of the bed or form-carriage C, and when the arm 182 is in the position shown by the dotted lines *j* the arm 82 will be in the position shown by 120 the dotted lines *l*, Fig. 1, and when the arm 182 has been carried to the dotted position *k* the arm 82 will be carried to the dotted position *m*, and from either position, *l* or *m*, the arm 82 comes to the full-line position when the gear 125 93 is going around the extreme end of the rack.

The cushioning of the bed or form-carriage at either end of its travel is a necessary and important feature of printing-presses, and one part of our invention relates to improvements 130 therein, and will now be described. In Fig. 1 we have shown a cushioning mechanism for

a press where the bed is to have a uniform speed.

At each end of the bed or form-carriage C, and secured in any suitable manner to the under side of the bed, is a shoe, 107, the shape of which is shown by the dotted lines, Fig. 1. A lever, 101, is firmly secured to the upper end of an upright shaft, 104, mounted in bearings or journal-boxes attached to the frame of the machine, and this arm at its outer end has a roller or thimble, 109, mounted on a suitable pin or pivot, and the lower end of the upright shaft 104 has secured thereto an arm or lever, 103, to the outer end of which is pivotally attached a guide-rod, 111, which enters and works within a compression-spring, 110, the rod having a thrust collar or washer, 113, to work against the end of the spring. A corresponding set of devices, consisting of an arm or lever, 102, upright shaft 106, roller or thimble 108, arm or lever 105, guide-rod 112, and thrust-collar 114, is provided for the opposite side of the press, the guide-rod 112 entering and working in the opposite end of the spring 110.

The operation is as follows: When the levers 101 and 102 are in the position indicated by the dotted lines *n* and *o*, respectively, the travel of the bed or form-carriage in the direction toward these levers will cause the shoe 107 to engage with the thimbles 108 and 109 noiselessly and without shock, and by such engagement carry the arms forward with the travel of the bed into the position shown by the full lines, Fig. 1, and when the arms 101 and 102 are in this position the bed will be at the end of its travel, and during such movement the arms 103 and 105 will be carried from the position indicated by the dotted lines, Fig. 1, to the position shown by the full lines, compressing the spring 110 between the collars 113 and 114 on the rods 111 and 112, so that on the reverse travel of the bed the reaction of the spring will assist in returning the bed through the arms 103 and 105 and the levers 101 and 102, which are returned by the action of the spring from the position shown in full lines to that shown by the dotted lines, and at the same time a cushioning of the bed at the end of its movement is had from the compression of the spring 110. The spring 110 and the co-acting devices therefor form an effectual cushion where the travel or speed of the press is uniform; but where a variable speed is required the spring would not be effective, and we have devised an air-cushion arrangement, which is illustrated in Fig. 3, and in which the levers 101 and 102, thimbles or rollers 108 and 109, upright shafts 104 and 106, and arms 103 and 105, as in the compression-spring arrangement, are used. A rod, 131, is pivotally connected to the outer end of the arm 103, and has attached to its outer end a piston, 133, which is located and works in the main air cylinder 134, and a piston, 132, located and operating in the air-cylinder 134, at the opposite end, is

connected by a rod, 130, with the arm 105. Attached to the side of the main air-cylinder 134 is a small cylinder, 135, in which is a piston, 136, and a compression-spring, 137, the pressure of which is regulated by a screw-threaded stem, 128, operated by a hand-wheel, 129, the end of the stem being in contact with the end of the spring. The cylinder 135 communicates with the cylinder 134 by a suitable opening, and the piston 136 is hollow, and in its side wall has a small orifice, *r*, which communicates with a pipe having on its end a porous diaphragm, 138. The upright shaft 104 has secured thereto an arm, 125, to which is pivoted one end of a connecting-rod, 139, the other end of which is attached by a pin or pivot, 143, to the end of a leaf-spring, 142, and the shaft 106 is connected with the spring 142 by an arm, 126, connecting-rod 140, and pin or pivot 144. The spring 142 is supported by a suitable frame-piece, 141, and the rollers 108 and 109 are adjusted to the shoe 107 by means of adjusting-screws 127 working against the arms 125 and 126, so that by means of the spring 142 the levers 101 and 102 are kept in the proper position for the rollers to engage with the shoe 107.

The operation of this device is as follows: When the bed-shoe 107 carries the levers 101 and 102 from the position shown in Fig. 3 to that shown by the full lines in Fig. 1, or toward the center of the machine, the upright shafts 104 and 106 will be partly rotated, turning the levers 103 and 105 toward the center of the machine and causing the pistons 132 and 133, through the connecting-rods 130 and 131, to force the air in the cylinder 134 out through the opening into the piston 136, and from such piston, when the press is running at a slow speed, the air will pass through the orifice *r* and connecting-pipe to the porous diaphragm 138; but as the speed of the press increases the pistons 132 and 133 move faster, and the air, not being able to escape fast enough through the orifice *r*, forces the piston 136 back in the cylinder 135, closing the communication through the pipe to the diaphragm, and forming in the piston 134 an air-cushion to resist and retard the momentum of the bed or form-carriage, and the quicker the movement of the press the more rapid the closing of the orifice *r* and the larger the volume of air to form the air-cushion. The initial pressure at which the exhaust *r* will be closed by the piston 136 is regulated by the screw 138 to give the spring 137 a greater or less amount of force, so that the operator can adjust the devices to produce the requisite amount of cushion at each end of the bed to a nicety, and the cushioning effects can be had for variable rates of speed.

What we claim as new, and desire to secure by Letters Patent, is as follows:

1. In a flat-bed press, a bed-driving mechanism consisting of a rack centrally located and attached directly to the bed or form carriage, a sliding frame carrying a single driv-

ing-gear meshing with said rack, rock-shaft 81, lever 90, and rod 91, connecting said shaft and sliding frame, and means for automatically operating the frame, substantially as set forth.

2. In a flat-bed press, a cushioning device consisting of springs, fixed air-cylinders, and an automatic governor, substantially as described.

3. The reciprocating bed C, provided on its under side with a rack, 94, and having at the end of the rack a curved shoe, and a shoe on one side of the rack, in combination with a pinion, 93, sliding frame 97, and an operating mechanism for moving the frame to start the pinion on its travel around the end of the rack, substantially as described.

4. The bed C, provided with the rack 94 on its under side, and having a shoe at the end of the rack and a shoe at the side thereof, pinion 93, roller 96, and sliding frame 97, in combination with the arm 79, roller 89, rock-shaft 115, and connecting-rod 80, for operating the mechanism to move the sliding frame and start the roller around the end of the rack without straining the parts, substantially as specified.

5. The bed C, provided with a rack, 94, on its under side, and having a shoe at the end and side of the rack, pinion 93, roller 96, and sliding frame 97, in combination with the arm 79, roller 89, rock-shaft 115, connecting-rod 80, arm 182, rock-shaft 81, arm 90, and connecting-rod 91, attached to the sliding frame for operating the sliding frame at the start of the pinion around the end of the rack, substantially as specified.

6. The shoe 78, secured to the under side of the bed C, in combination with the arms 79, roller 89, rock-shaft 115, and connecting-rod 80, for operating a mechanism to move a sliding frame carrying the driving-pinion for the bed-rack, substantially as specified.

7. The sliding frame 97, carrying the driving-pinion for a rack of a printing-press bed, in combination with the rod 91, arm 90, rock-shaft 81, arm 182, and a connection between the arm 182, and operating devices moved from the travel of the bed for shifting the sliding frame, substantially as and for the purposes specified.

8. The shoe 78, arms 79, roller 89, rock-shaft 115, and connecting-rod 80, in combination with the arm 182, lever 90, and rod 91, for starting a sliding frame carrying a driving-pinion, substantially as described.

9. The lever 84, compression-spring 85, and sliding rod 86, in combination with the arm 82 and connecting-rod 83, for locking a sliding frame carrying a driving-pinion for a printing-press bed-rack, substantially as and for the purpose specified.

10. The lever 84, compression-spring 85, and sliding rod 86, in combination with the arm 82, connecting-rod 83, rock-shaft 184, and gears 181 and 183, for operating the arm 82, with the movement of a sliding frame car-

rying the driving-pinion of a printing-press bed-rack, substantially as and for the purposes specified.

11. The rock-shaft 81, arm 90, and rod 91, connected with a sliding frame carrying a rack-driving pinion of a printing-press bed, in combination with the gears 181 183, rock-shaft 184, arm 82, connecting-rod 83, lever 84, compression-spring 85, and sliding rod 86, for moving the sliding frame and locking it in position, substantially as and for the purposes set forth.

12. The shoe 78, arms 79, roller 89, rock-shaft 115, connecting-rod 80, arm 182, rock-shaft 81, lever 90, and connecting-rod 91, in combination with the gears 181 183, rock-shaft 184, arm 82, connecting-rod 83, lever 84, compression-spring 85, and sliding rod 86, for moving a sliding frame to start a driving-pinion and for locking the frame and pinion at the limit of their movements, substantially as and for the purposes specified.

13. The combination, with a reciprocating bed or form-carriage, C, provided with a rack, 94, on its under side, of a driving-pinion, 93, carried by a sliding frame, 97, devices for starting the sliding frame at the commencement of the travel of the pinion around the end of the rack, and the arm 82, connecting-rod 83, rock-shaft 184, and gear-wheels 181 and 183, for locking the sliding frame at the limit of its movement in either direction endwise, substantially as and for the purpose specified.

14. The shoe 107 and arms 101 and 102, each having a roller at its outer end, in combination with the rock-shafts 104 and 106, and arms 103 and 105, for operating the cushioning device at the limit of the end movement of a bed or form-carriage, substantially as specified.

15. The cushioning device for a bed or form-carriage of a printing-press, consisting of an air-cylinder, 134, compression-pistons 132 and 133, secondary cylinder 135, and cut-off piston 136, operated by the movement of the bed or form-carriage for cushioning purposes with variable speed, substantially as specified.

16. The air-cylinder 134, pistons 132 and 133, and secondary cylinder 135, in combination with the cut-off piston 136, compression-spring 137, adjusting-stem 138, and devices for operating the compression-piston from the movement of a bed or form-carriage for a printing-press, substantially as and for the purposes specified.

17. The shoe 107, arms 101 and 102, each having a roller at its outer end, rock-shafts 104 and 106, and arms 103 and 105, in combination with the connecting-rods 130 and 131, compression-pistons 132 and 133, air-cylinder 134, secondary cylinder 135, and cut-off piston 136, for cushioning the bed or form-carriage of a printing-press at the end of its movement under variable rates of speed, substantially as specified.

18. The arms 101 and 102, each carrying a

roller at its outer end, rock-shafts 104 and 106, and arms 125 and 126, in combination with the adjusting-screws 127, for regulating the position of the arms 101 and 102, substantially as and for the purpose specified.

19. The arms 101 and 102, each having a roller at its outer end, rock-shafts 104 and 106, and arms 125 and 126, in combination with the connecting-rods 139 and 140 and spring 142, substantially as and for the purpose specified.

20. The shoe 107, arms 101 and 102, each carrying a roller at its outer end, rock-shafts 104 and 106, and arms 125 and 126, in combination with the connecting-rods 139 and 140 and spring 142, substantially as and for the purposes specified.

21. The shoe 107, arms 101 and 102, each carrying a roller at its outer end, rock-shafts 104 and 106, arms 125 and 126, connecting-rods 139 and 140, and spring 142, in combination with the arms 103 and 105, connecting-rods 130 and 131, compression-pistons 132 and 133, air-cylinder 134, secondary cylinder 135, and pressure-pistons 136, for cushioning a bed or form-carriage at the end of its movement, substantially as specified.

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