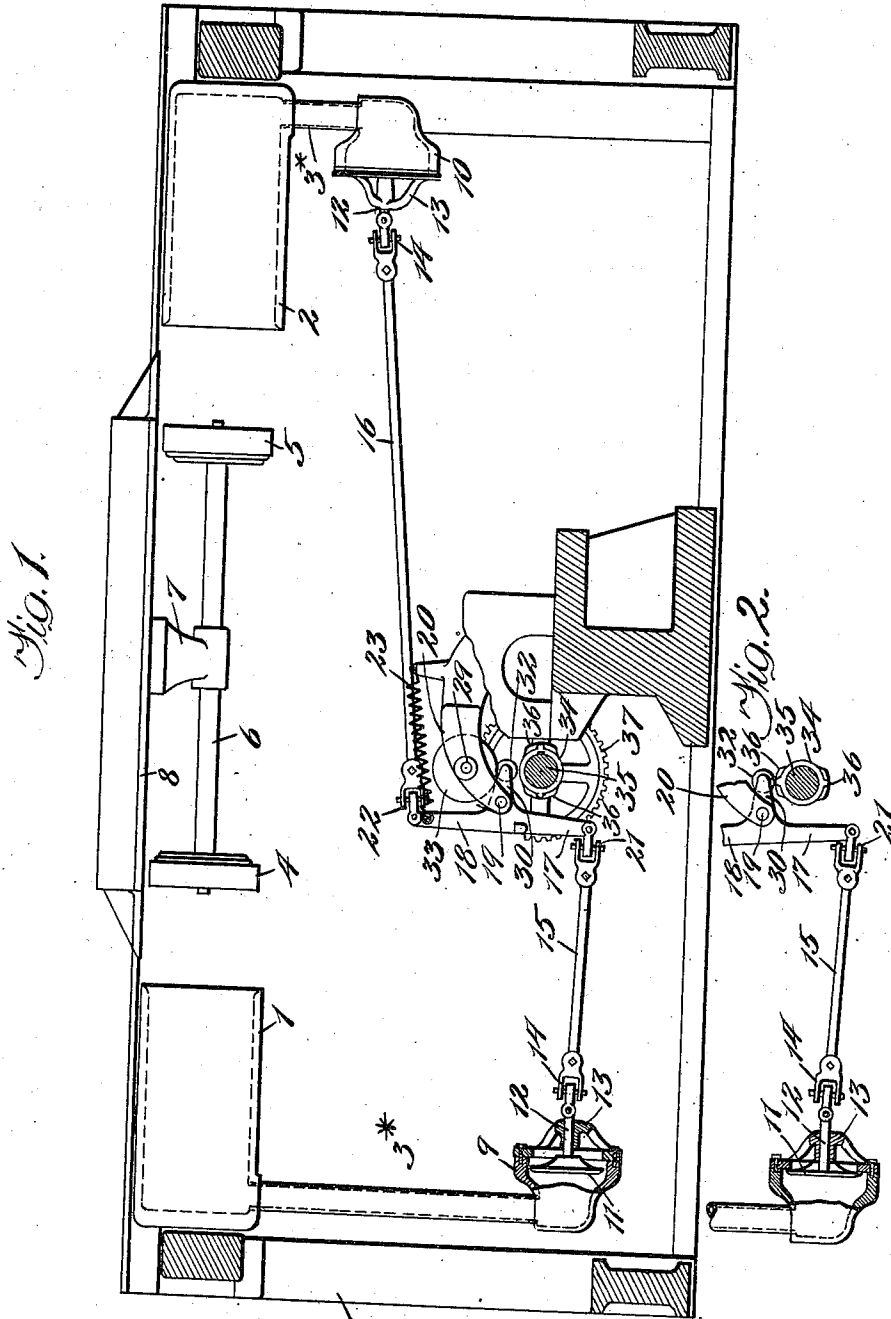


R. MIEHLE.
AIR CUSHION FOR PRINTING PRESSES.
APPLICATION FILED SEPT. 4, 1908.

989,384.

Patented Apr. 11, 1911.

3 SHEETS—SHEET 1.



Witnesses:
J. V. Thomas Jr.

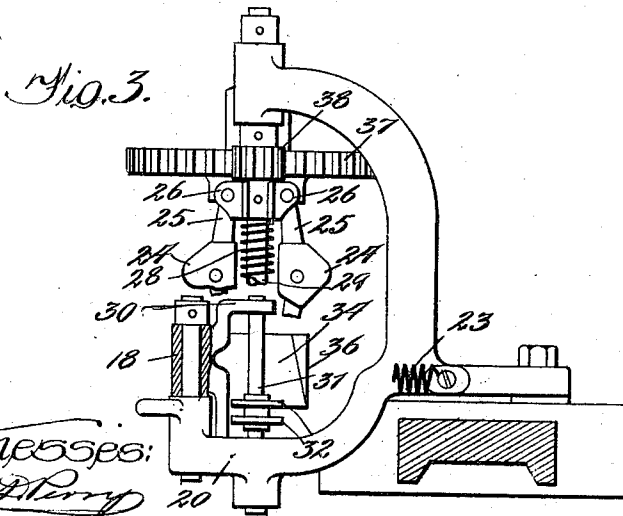
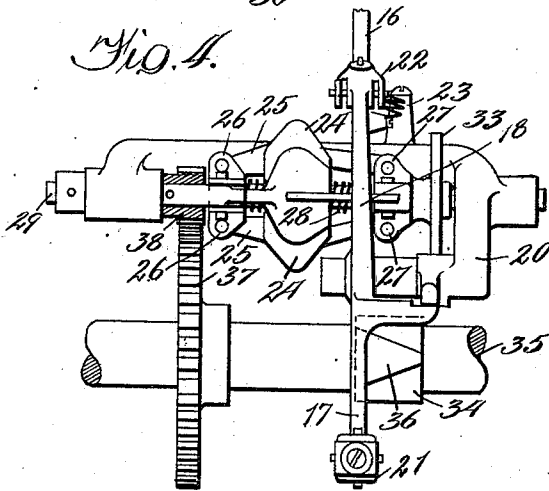
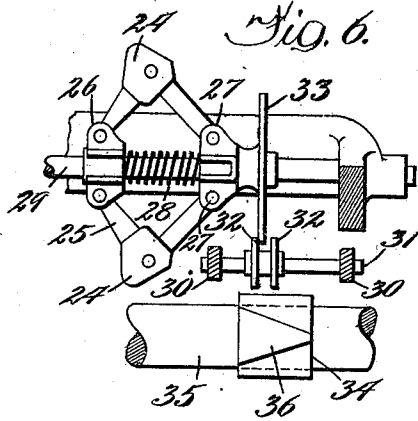
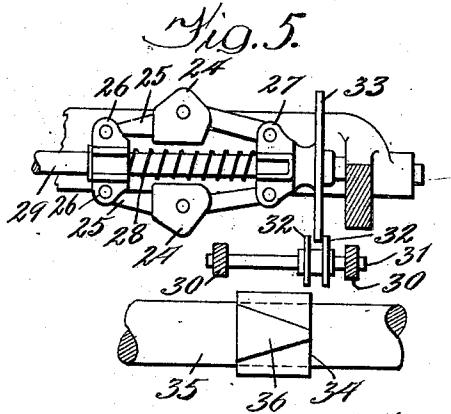
Inventor:
R. Miehle
By Brown & McPherson Attys

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3 SHEETS-SHEET 2.



Witnesses:

Ed. Perry

L. U. Tomarusk.

Inventor:

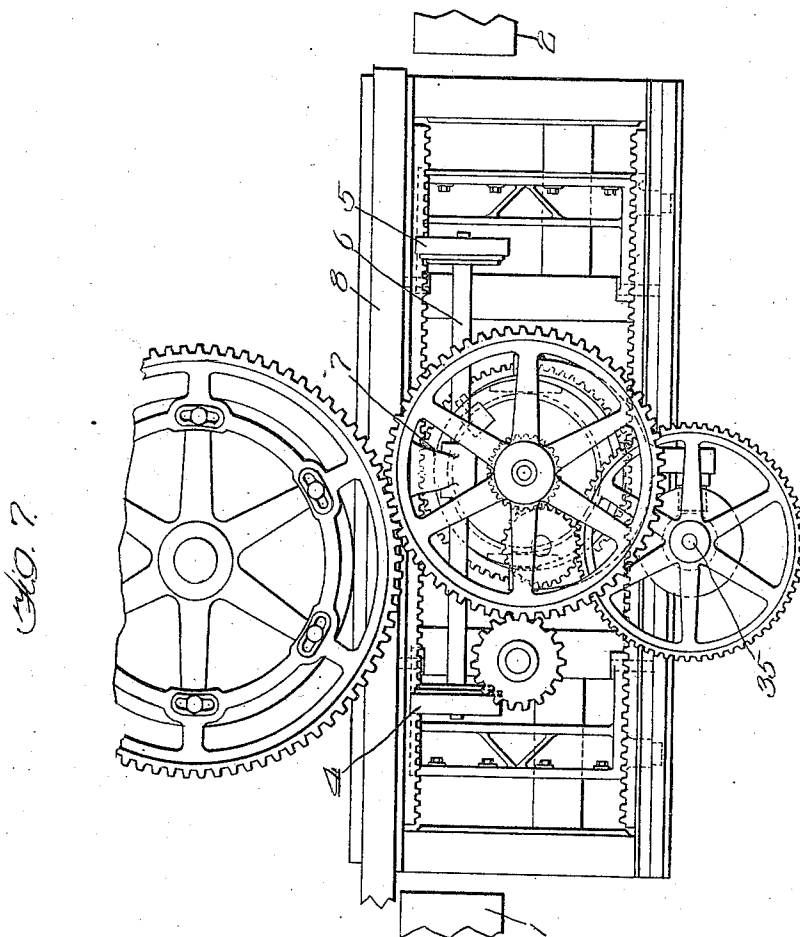
Robt. Miehle

*By Brown & Poiré
Attys.*

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3 SHEETS—SHEET 3.



Witnesses:
Edw. D. Perry
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UNITED STATES PATENT OFFICE.

ROBERT MIEHLE, OF CHICAGO, ILLINOIS, ASSIGNOR TO MIEHLE PRINTING PRESS & MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AIR-CUSHION FOR PRINTING-PRESSES.

989,384.

Specification of Letters Patent.

Patented Apr. 11, 1911.

Application filed September 4, 1908. Serial No. 451,732.

To all whom it may concern:

Be it known that I, ROBERT MIEHLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Air-Cushions for Printing-Presses, of which the following is a full, clear, and exact specification.

This invention relates to air cushions for printing presses, and more particularly to that class in which the amount of air compressed in the cushioning cylinders is regulated automatically by a governor positively driven to control the position of the regulating valve.

In mechanisms of this character considerable difficulty is experienced from the failure of the governor to close the valve early enough at high speed when properly timed or set for low speed; or, if set for an early closing, to give adequate cushion at high speed, it closes so early at low speed as to materially impede the motor in starting the press.

This invention is designed to avoid these difficulties, and has for its primary object to provide a mechanism embodying self-closing puppet-valves or equivalent valves for the air cylinders, which will be capable of being opened or closed by the governor, but which at the same time will be subject to movement by the air itself as an aid to the governor, so that at no time when the valve should be under motion by the governor will it be resisted by air compressed in the cylinder or by the vacuum created in the cylinder as the piston withdraws when the piston passes the point in its outward stroke where the valve closed in the opposite or inward stroke.

In the accompanying drawings which illustrate the invention as applied to the reciprocating bed of a printing press, Figure 1 is a side elevation partly in section of such bed, the press frame and the cushioning mechanism applied thereto, showing one of the valves open. Fig. 2 is a detail sectional view of one of the valve housings and a part of the governor mechanism, showing the valve closed. Fig. 3 is a detail elevation of the governor and its driving gears looking from the left in Fig. 1. Fig. 4 is a detail plan view of the governor mechanism partly in section and partly broken away. Fig. 5 is a detail of the governor and its cam,

showing the governor weights retracted, Fig. 6 is a similar view showing the governor weights expanded, and Fig. 7 is a diagrammatic illustration of the relation between the governor operating mechanism and the bed reciprocating mechanism.

The air cylinders 1, 2 are shown as mounted upon the frame 3 of the press in any suitable way, while 4, 5 are the pistons which enter these cylinders respectively and which are shown as mounted upon a rod 6 carried by a bracket 7 on the under side of the reciprocating bed 8. The cylinders 1, 2 are connected by pipes 3* with valve housings 9, 10 respectively, in which are seated puppet-valves 11 of any suitable construction, or valves of any other similar character capable of being opened and closed by the air pressure in the cylinders 1, 2, or opened by atmospheric pressure when a partial vacuum is created in the cylinders as their pistons 4, 5 withdraw. These valves 11 are secured to horizontal stems 12 mounted in spiders 13 attached in any suitable way to the valve housings 9, 10. The outer end of each stem 12 is provided with a gimbal or universal joint 14, and these two joints are attached respectively to two rods 15, 16 which are arranged in substantially horizontal positions and are connected with arms 17, 18 of a lever pivoted at 19 in a suitable fixed support or bracket 20. The connection between the rods 15, 16 and the arms 17, 18 is also preferably effected by means of gimbal or universal joints 21, 22 respectively, so that the movement of the rods induced by the oscillation of the lever arms 17, 18 will serve to seat and unseat the valves 11 without in any manner causing the valve stems 12 to bind in their guides, the valves 11 when not otherwise restrained being forced from their seats or opened by a suitable yielding means, such as a coil spring 23 attached at one end to the bracket 20, and at the other end to the arm 18.

As the bed 8 of the press reciprocates, the pistons 4, 5 alternately enter their respective cylinders 1, 2 and the motion of the bed is thus controlled or retarded more or less accordingly as the valves 11 are more or less open, or accordingly as these valves close at a sooner or later period in the reciprocation of the bed after the piston enters the cylinder, it being quite obvious that should the valve be closed the instant the piston enters

the cylinder, the cushioning or retarding effect upon the bed would be maximum, and should the valve be held open until the piston had reached the end of its inward stroke, the resistance or cushioning effect would be minimum, or virtually nothing. It is also quite obvious that as the piston withdraws from the cylinder, the valve 11 being closed, the motor which reciprocates the bed 8 will be unduly retarded in its action unless the valve 11 be opened accurately at the point where it closed when the piston was entering, because of the partial vacuum and suction which would be created in the cylinder after the air compressed therein had resumed normal or atmospheric pressure during the outward stroke of the piston. It is further evident that the valve for controlling the inlet and outlet of the air to and from the cylinder will, at times during both strokes of the piston, be subjected to considerable pressure, but it should be of such a character that this pressure, far from acting to retard the motion of the valve (which would subject the governor to undue resistance and render it inoperative), should assist in moving the valve in the direction in which it should be moved at that instant. For these reasons, self-opening valves such as the puppet-valves 11 are employed. It is a mechanical impossibility, however, to cause the pressure against the valve to automatically operate it in opening and closing throughout the great range of speed which the bed of the press undergoes, and consequently automatic governing means in combination with the self-opening valves becomes essential.

As an example of a suitable governor of the centrifugal type, an ordinary four ball governor mounted in a horizontal position is shown, 24 being the balls or weights, 25 their links or pivoted arms, 26 the fixed collar for said arms, 27 the sliding collar therefor, and 28 the spring which contracts the governor against the centrifugal force and which is shown as coiled upon the driving shaft 29, which rotates the collar 26 and its connecting weights. The lever arms 17, 18 are connected to a pair of horizontal arms or brackets 30 carrying a fixed shaft or axle 31, and upon this shaft or axle is mounted to slide and rotate a roller 32 having two flanges between which engages the edge of a disk 33 or other suitable means on the collar 27 for imparting motion to the roller 32 lengthwise of the shaft 31. The roller 32 as it thus moves longitudinally of shaft 31 traverses a controlling cam 34 mounted upon a shaft 35 which is rotated in unison with the reciprocating motion of the bed 8 by any suitable train of gears or other power transmitting mechanism commonly employed in this art for a similar purpose, an example of which is shown and described in my U. S.

Patent 661,378 of Nov. 6th, 1900, the shaft J^o therein being the same as shaft 35 in this application. The cam 34 is provided on diametrically opposite sides with V-shaped promontories 36 arranged longitudinally of the shaft 35 and adapted to engage the roller 32, and by thus lifting the brackets 30, rock the arms 17, 18 upon their pivot 19 and close both valves 11, or in any event, bring them so close to their respective seats as to cause the outwardly rushing air in advance of the entering piston to complete the closing action. Inasmuch as these cams 36 are timed in their movement with relation to the movement of the pistons 4, 5, it is apparent that the roller 32, by being engaged by the wider part of the cam at an earlier period in the rotation of the cam, will effect a closing of the valve 11 at a much earlier period in the inward stroke of the piston than would follow when the roller 32 is at the other or narrower end of the cam 36. Consequently the position of the roller 32 with relation to the length of the cam 36 determines the point in the stroke of the piston at which the valve 11 closes when the piston is moving inwardly, and at which it opens under the influence of the spring 23, and the suction of the piston during the outward movement of the latter, and as this position of the roller 32 is governed to a nicety by the speed of the piston's travel through the intermediary of the governor, it follows that its point of opening and closing will always be proportionate to the speed of the bed of the press. For example, if the bed should be moving very slowly when no cushioning effect at all is required, the valve 11 will remain open during the entire stroke of the piston, thereby avoiding any resistance whatever to the motor in starting the press. This is because the valve, when not brought into close proximity to its seat by the governor, is held open by the spring, and the feeble current of air passing the valve during the slow movement of the piston would not be sufficient to overcome the resistance of the spring 23 and force the valve to its seat, but should the press speed up, the governor would come into play and through the connections before described, bring the valve against its seat or into close proximity thereto at an earlier or later period in the inward stroke of the piston, according to the rate of speed, and the valve would again open at the same point during the outward stroke of the piston to relieve the piston from external atmospheric pressure, the opening of the valve occurring regardless of the position of the governor as soon as the external atmospheric pressure thereagainst becomes greater than the pressure within the cylinder, because, as before stated, the valve is free to be moved by the air pressure against either side independently of the governor, and consequently

the valve has a slight freedom of movement away from its seat even when the governor is holding the pulley 32 over the cam 36. This lost motion or freedom of movement of the valve independently of the governor need be but a very slight fraction of the entire motion of the valve, and may be such as would naturally follow from having a plurality of pivotal joints between the roller 32 and the valve stem 12, or it may be specially provided by enlargement of the pivot hole of one of such joints, as for example, the gimbal joint 14. However brought about it is utilized during the inward stroke of the piston in permitting the air pressure within the cylinder to close the valve without relying upon the pressure of the cam 36 against the pulley 32 to effect the ultimate seating of the valve. The advantage of this is apparent from the fact that the cams 36 are of such a shape that if the lifting of the roller 32 should be materially resisted, the roller instead of being lifted, would be shifted longitudinally on its shaft against the resistance of the governor, thereby setting the governor in a false position and failing to close the valve in time. During the outward stroke of the piston the said lost motion or freedom of movement of the valve is utilized in permitting the valve to open at exactly the point in the stroke of the piston where the pressure against its two faces is balanced.

The governor shaft 29 may be driven by any suitable connection with the shaft 35, but preferably by a train of positive gears such as the gear wheel 37 mounted upon the shaft 35 and a pinion 38 secured to the shaft 29 and meshing with the gear 37, so that the governor will always be in accurate time with the position of the pistons 4, 5, and its speed of rotation of the proper proportion with reference to the speed of the pistons.

What I claim is:

1. In a cushioning device for printing presses, the combination of the reciprocatory part to be cushioned, a cylinder and a piston therein operatively related to said part for cushioning the same in its movement, said cylinder having an air port, a governor operatively related to said part to be cushioned, a valve for controlling said port operatively related to and controlled by said governor and movable a limited distance independently of said governor by the pressure of air passing through said port.

2. In a cushioning device for printing presses, the combination of the reciprocatory part to be cushioned, a cylinder and piston therein operatively related to said part for cushioning the same, said cylinder having an air port surrounded by a valve seat, a governor operatively related to said part to be cushioned, and a valve controlling said port movable toward and from said seat and operatively related to and controlled by

said governor, said valve being movable toward and from its seat a limited distance independently of the governor by air pressure passing through said port.

3. In a cushioning device for printing presses, the combination of the reciprocatory part to be cushioned, a cylinder and piston therein operatively related to said part for cushioning the same, said cylinder having an air port for admitting air to and exhausting the same from the cylinder as the piston and cylinder move one with relation to the other, said port having a valve seat surrounding the same and a governor operatively related to said part to be cushioned for controlling said valve, said valve being movable a limited degree in both directions toward and from its seat independently of the governor by the air passing through said port whereby the valve when adjacent its seat may be closed automatically by the pressure within the cylinder and when against its seat may be opened automatically a limited degree by the external atmospheric pressure.

4. In a cushioning device for printing presses, the combination of the reciprocatory part to be cushioned, operatively related cylinders and pistons for cushioning said part, said cylinders each having an air port, horizontally arranged puppet-valves for controlling said ports, and a governor for said valves operatively related to the part to be cushioned, said valves having a limited degree of movement toward and from their seats in a horizontal direction independently of the operation of said governor.

5. In a cushioning device for printing presses, the combination of the reciprocatory part to be cushioned, cylinders and pistons for cushioning said part, said cylinders each having an air port, puppet-valves for controlling said ports, a pivoted lever, flexible joints connecting the ends of said lever respectively with the stems of said valves, a rotatable cam operatively connected with said part to be cushioned, an arm carried by said lever, a roller mounted upon said arm and adjustable lengthwise of the axis of said cam for oscillating the lever and operating said valves, and a centrifugal means moving in unison with the part to be cushioned and operatively related to said roller for adjusting it lengthwise of said cam.

6. In a cushioning device for printing presses, the combination of a reciprocatory part to be cushioned, cylinders and pistons for cushioning said part, said cylinders each having an air port, puppet valves for controlling said ports, a rotatable tapering cam operatively connected to the part to be cushioned, means for moving said valves in one direction with relation to their seats, embodying a member arranged to be acted

upon by said cam, and a centrifugal governor operatively connected with said member for changing its position with relation to the length of the cam, said governor being connected with the part to be cushioned and operating in unison therewith, and said valves having a limited degree of lost motion with relation to their seats independently of said cam while the cam and said member are in contact, whereby the valves may be moved a limited distance in either

direction by the air pressure alone independently of the governor.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 2nd day of September, A. D. 1908.

ROBERT MIEHLE.

Witnesses:

C. H. SEEM,

FRANCIS A. HOPKINS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
