No. 733,331. PATENTED JULY 7, 1903.

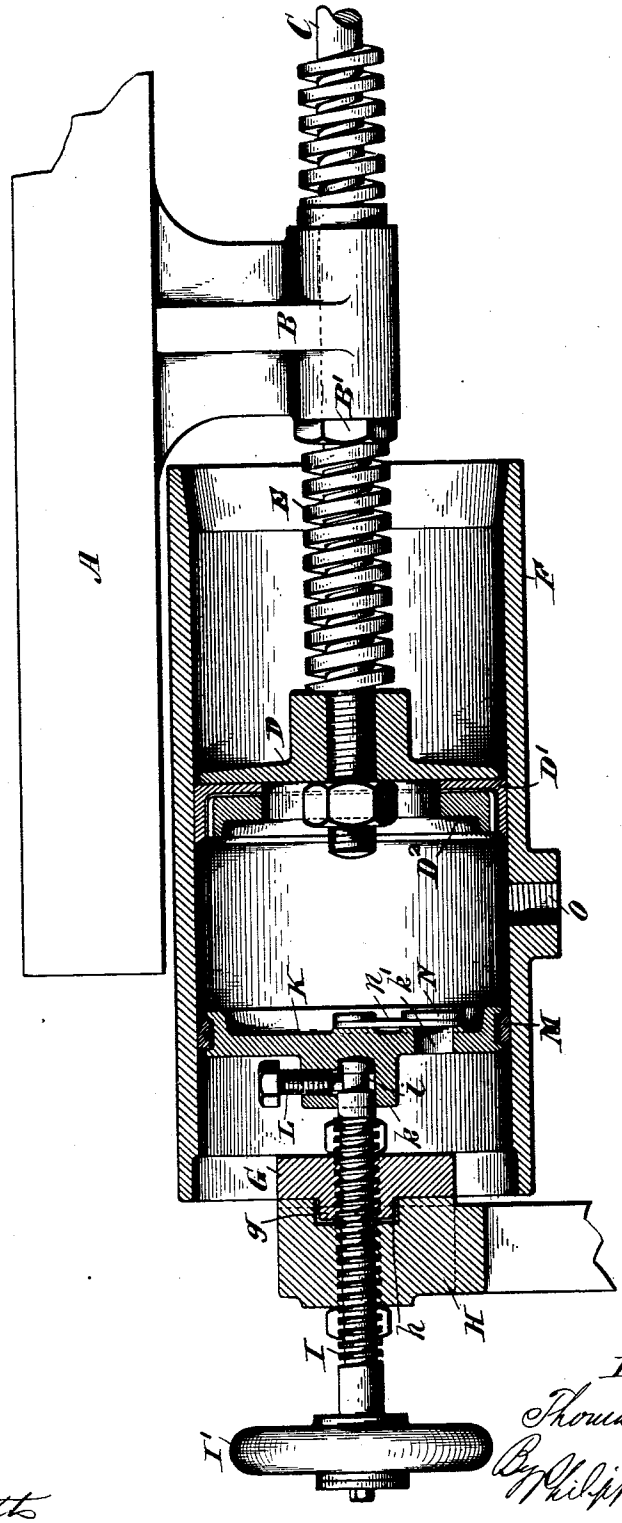
T. M. NORTH.

CUSHION FOR RECIPROCATING BEDS OR OTHER MOVING PARTS.

APPLICATION FILED OCT. 17, 1898.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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APPLICATION FILED OCT. 17, 1898.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

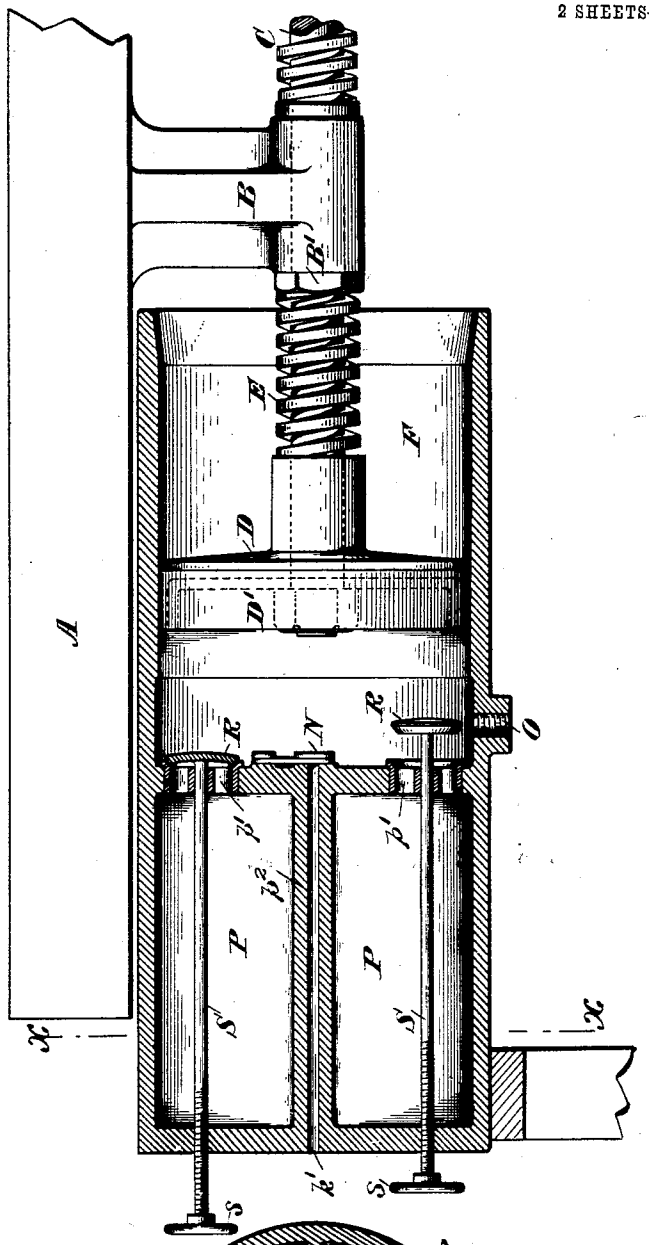
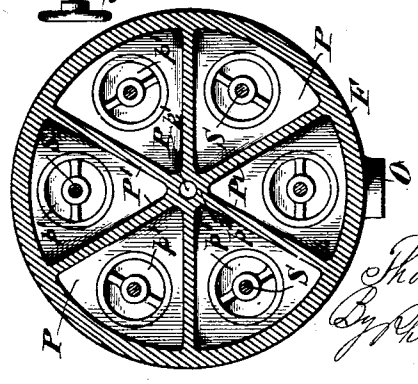


Fig. 3.



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No. 733,331. Patented July 7, 1903.

UNITED STATES PATENT OFFICE.

THOMAS M. NORTH, OF BROOKLYN, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ROBERT HOE AND CHARLES W. CARPENTER, OF NEW YORK, N. Y., UNDER THE FIRM-NAME OF R. HOE AND COMPANY.

CUSHION FOR RECIPROCATING BEDS OR OTHER MOVING PARTS.

SPECIFICATION forming part of Letters Patent No. 733,331, dated July 7, 1903.

Application filed October 17, 1898. Serial No. 693,726. (No model.)

To all whom it may concern:

Be it known that I, THOMAS M. NORTH, a subject of the Queen of Great Britain and Ireland, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Cushions for Reciprocating Beds or other Moving Parts, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in cushioning devices, and while the invention is primarily adapted and intended for use with the reciprocating beds of printing-machines or planing-machines it is also useful in and intended for use in many other relations.

It has long been customary to use cushioning devices of various descriptions with the reciprocating beds of printing-presses, the beds of planers, and other analogous devices in order to take up the shock at the end of the stroke and prevent excessive wear and tear of the operating mechanism. Such cushioning devices have been constructed in various ways. Heavy metal springs have been used; but they have been found objectionable because of the number necessary to be used where the bed is of any considerable weight. Another objection to the use of springs is found in the difficulty in adjusting them, for it is to be understood, of course, that the amount of cushioning should be adjusted to correspond with the force with which the bed or other parts strike the cushion, and this force varies with the velocity of travel of the bed or the speed of the machine. Devices in which the compressing effect of a piston on a volume of air confined in a cylinder have also been used as cushioning devices, either the piston or the cylinder being stationary and the other part being mounted on and traveling with the reciprocating bed or other moving part. When, however, an air-cylinder is used as a cushioning device, its cushioning effect varies according to the amount the air is compressed, and since the travel of the bed is constant it has been customary in some cases to adjust either the cylinder or the piston so that the piston will have varying degrees of travel in the cylinder. In this way the volume of air in the cylinder, and consequently the amount of compression, will be varied and a greater or less cushioning effect produced. In order to obtain the greatest efficiency from cushioning devices constructed in this manner, however, it has been necessary to vary the adjustment for varying speeds of the press. In other words, there has been no automatic adjustment of the parts, and if with the cushioning device adjusted for a definite speed the machine is speeded up or speeded down it has been necessary to make a hand adjustment, which is sometimes attended with some difficulty, and especially if anything like a fine adjustment was attained.

It is the object of this invention to produce a cushioning device which shall attain all the advantage of the air-cushions heretofore used and at the same time have the additional advantage of a certain amount of automatic adjustment.

A further object of the invention is to improve the devices by which the volume of air in the cylinder may be increased or diminished, as desired.

With these and other objects in view the invention consists in certain parts, improvements, and combinations, as will be hereinafter described, and more particularly set forth in the claims hereunto appended.

In the accompanying drawings, which constitute a part of this specification, and in which like characters of reference indicate the same parts, Figure 1 is a vertical longitudinal section of a cushioning device embodying the construction by which an automatic adjustment is obtained, the bed or other moving part being shown in elevation. Fig. 2 is a similar view illustrating a modification of the devices for adjusting the volume of a cylinder. Fig. 3 is a section on the line $x\,x$ of Fig. 2, the bed being omitted.

Referring to the drawings, A indicates a reciprocating part, such as the bed of a printing-machine, a planer, or other analogous machine. Depending from this bed A is a bracket B. In this bracket is mounted a longitudinal rod C, which carries at one of its

ends a loosely-mounted piston-head D, a suitable packing being provided, so that a tight joint will be formed between the head and the rod. This packing serves to prevent any leakage between the head and the rod. It is to be understood that the rod C carries a similar piston-head at its other end; but this being the ordinary construction and not necessary to an understanding of the invention the second head has not been shown. The piston-head D has the usual packing D′, of leather or other similar substance, this packing being secured to the piston-head by any suitable means, such as a circular angle-plate D^2. This angle-plate is preferably secured to the piston-head by means of bolts passing through it and the head, the packing being thus firmly clamped in place. Located between the piston-head D and the bracket B is a strong spring E. This spring finds its bearing at one end against the head D and at the other end against a nut B′, which holds the rod C against longitudinal movement in the bracket.

The piston above described works in a cylinder F, which cylinder may be supported in any convenient way. It is preferably supported, however, by a cross-bar G, which bar has a projection g, entering a recess h in another bar H, which forms a portion of the frame of the machine. The bars G and H have a threaded perforation extending therethrough, and in this perforation works a screw I, on one end of which is a hand-wheel I′. The other end of the screw I is secured in any convenient way, so as to be able to rotate in a movable cylinder-head K. Preferably the head and screw will be secured together by means of a small screw L, working in a threaded hole in a rearwardly-projecting boss k of the head K and having a reduced end which engages a groove i in the inner end of the screw I. The cylinder-head is surrounded by any suitable packing M, which makes a tight fit between it and the cylinder, and is further provided with a perforation k', which serves to admit air to the cylinder as the piston-head retreats. This perforation is closed by a flap-valve N, which may be of any suitable form. It is herein shown as a disk supported by a flexible piece of leather or other suitable material n, which is pinned to the cylinder-head. The cylinder is further provided with an opening O, which leads to a relief-valve, which may be opened to place the cylinder in communication with the outer air when the press is being turned by hand. This being the ordinary construction, however, it is not shown.

The construction being as above described, the volume of air in the stationary cylinder can be roughly controlled by manipulating the screw I by the hand-wheel I′, whereby the position of the cylinder-head K is changed, the volume of air increased or decreased, and the cushioning effect varied. With this construction the adjustment need not be exact, however, since the spring interposed between the piston-head and the bracket B can be depended upon to give a certain amount of automatic variation in the cushioning effect. Furthermore, the volume of air in the cylinder need not be adjusted for minor changes in the velocity of the machine, for the spring will automatically produce the desired changes in the cushioning effect. It has been further found that by thus combining the air and spring cushions the shock on the press is more effectually relieved and a better cushioning effect produced than by the use of either of these devices alone.

Figs. 2 and 3 illustrate a modification of the means for controlling the volume of air in the cylinder. The movable cylinder-head is dispensed with, and the inner portion of the cylinder is divided into a number of cells or chambers P by partitions P′, extending from a central hub p^2. In the construction shown there are six of these cells or chambers; but the number may of course be varied as desired. Each of these cells or chambers communicates with the main chamber of the cylinder by means of an opening p'. These openings are controlled by means of valves R, mounted on valve-stems S. These valve-stems are threaded for a portion of their length and engage tapped openings in the outer wall of the cylinder. They are provided with heads s, by which they may be manipulated and the valves opened and closed as desired. Air is admitted behind the retreating piston through a perforation k', as before, this perforation being located in the hub P^2, from which the partitions P′, forming the chambers P, extend. The perforation k' is controlled by a valve N, which may be of the construction shown in the other modification.

If it is desired to increase the volume of air in the cylinder, one or any number of the cells or chambers P are brought into communication with the main body of the cylinder by opening the valves R. Very exact adjustment can be obtained in this manner, as the exact amount of increase in volume caused by opening a cell can be readily determined.

Various changes may be made in the mechanical details by which the invention is carried into effect. For instance, either the cylinder or the piston might be carried by the bed or other moving part, and the spring might be arranged behind the cylinder-head instead of behind the piston. Other changes may obviously be made without departing from the spirit and scope of the invention, and it is to be understood, therefore, that the invention is not to be limited to the precise constructions shown and described.

What is claimed is—

1. In a cushioning device, the combination with a cylinder having a head, of a piston-head, one of said parts being loosely mounted, a spring located behind said loosely-mounted part, and means whereby one of these parts

may be reciprocated with relation to the other, substantially as described.

2. In a cushioning device, the combination with a cylinder, of a loosely-mounted piston-head, means whereby one of these parts may be reciprocated with relation to the other, whereby the air in the cylinder is compressed and a spring located behind the piston-head, substantially as described.

3. In a cushioning device, the combination with a cylinder having a series of chambers in its end, said chambers being formed by partitions extending from a common hub, and means whereby any or all of these chambers may be placed in communication with the interior of the cylinder, substantially as described.

4. In a cushioning device, the combination with a cylinder having a series of cells or chambers in its end, each of said cells or chambers opening into the main body of the cylinder, valves for controlling the openings, valve-stems extending through the chambers, of a piston and means whereby a reciprocating movement is established between the cylinder and piston, substantially as described.

5. In a cushioning device, the combination with a cylinder having a series of cells or chambers in its end formed by partitions extending from a common hub, openings between the cells and the main chamber of the cylinder, valves for controlling said openings, an air-inlet located in the hub from which the partitions extend, and a valve for controlling said inlet, of a piston working in said cylinder, and means whereby the cylinder and piston may be reciprocated with relation to each other, substantially as described.

6. The combination with a reciprocating bed, of a bracket depending therefrom, a rod mounted in said bracket, a piston-head loosely mounted on the rod, a spring between the bracket and the head, a stationary cylinder in which the piston reciprocates, and means for controlling the volume of air in said cylinder, substantially as described.

7. The combination with a reciprocating bed, of a bracket depending therefrom, a rod located in the bracket, a piston-head loosely mounted on the rod, a spring between the piston-head and the bracket and surrounding the rod, a cylinder in which the piston reciprocates, the cylinder having a series of chambers, and means whereby any or all of the chambers may be connected with the cylinder, substantially as described.

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

THOMAS M. NORTH.

Witnesses:
F. W. H. CRANE,
E. L. SPEISS.