No. 836,268. PATENTED NOV. 20, 1906.

R. MIEHLE.

AIR CUSHION FOR PRINTING PRESSES.

APPLICATION FILED DEC. 19, 1902. RENEWED SEPT. 26, 1904.

2 SHEETS—SHEET 1.

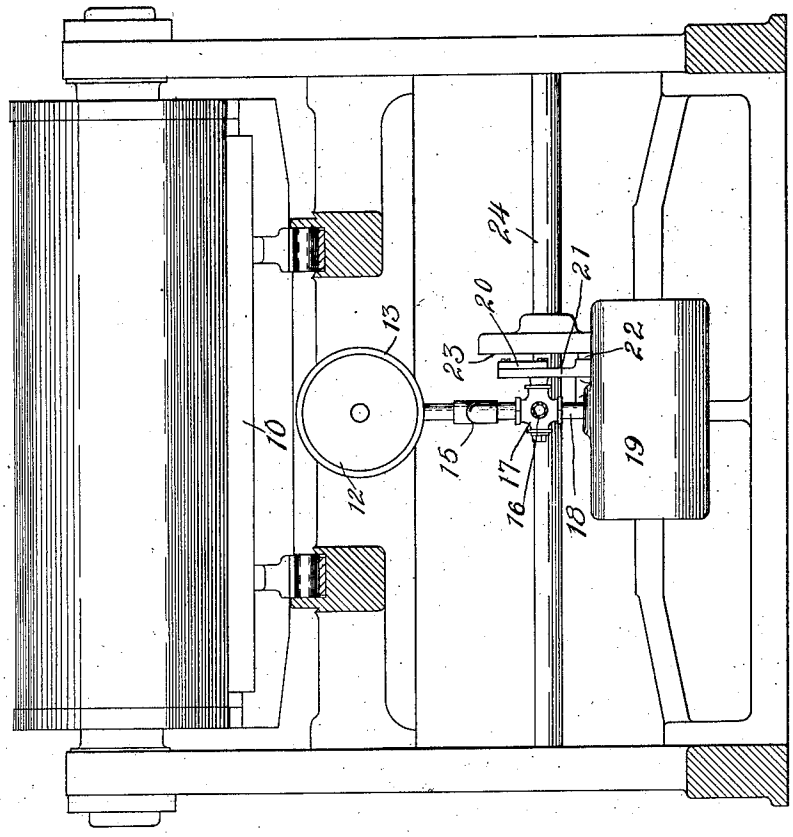


Fig. 1

WITNESSES:

Wm. Geiger

A. W. Munday.

INVENTOR.

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BY Munday, Evarts & Adcock.

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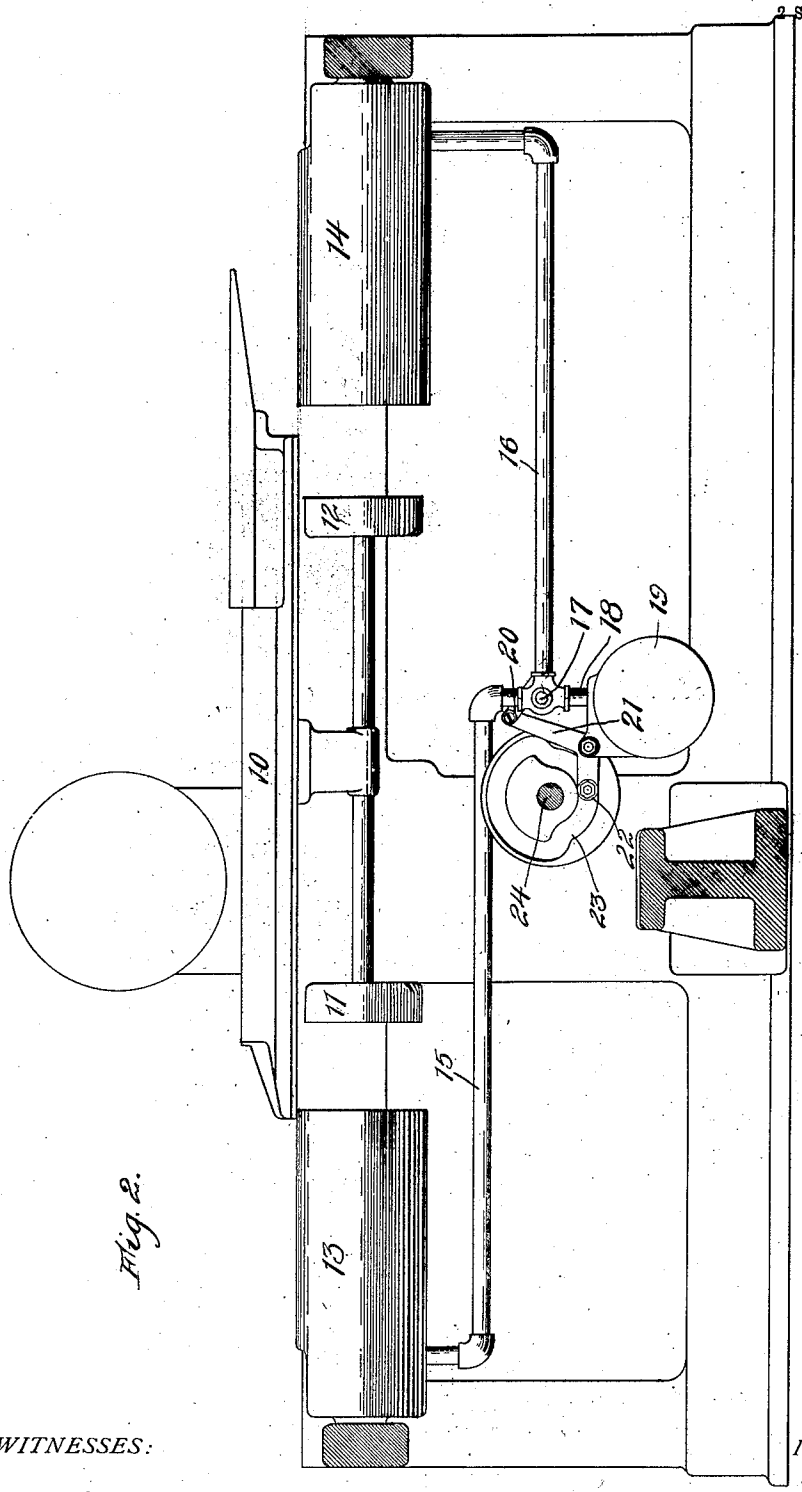


Fig. 2.

WITNESSES:

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UNITED STATES PATENT OFFICE.

ROBERT MIEHLE, OF CHICAGO, ILLINOIS.

AIR-CUSHION FOR PRINTING-PRESSES.

No. 836,268. Specification of Letters Patent. Patented Nov. 20, 1906.

Application filed December 19, 1902. Renewed September 26, 1904. Serial No. 225,975.

To all whom it may concern:

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

In that class of printing-presses in which a reciprocating bed is moved to and fro beneath an impression-cylinder it has been customary sometimes to provide a dash-pot or air-cushion cylinder at each end of the machine to receive dash-pistons mounted on the reciprocating bed for the purpose of cushioning the end of the stroke to obviate the shock and strain upon the mechanism due to the stoppage and reversal. A common difficulty with these devices is the liability to too great compression of the air at the end of the stroke after the momentum of the bed has been checked, resulting in the waste of power and a strain upon the driving mechanism upon the completion of the stroke. An ideal operation for an air-cushion in this relation will be to so contrive it that the passage of the piston into the cushioning-cylinder would compress the air up to a certain point—approaching the point of reversal—and thereafter would maintain some pressure, but not an increasing one, until the point of reversal was reached and after reversal would contribute some aid by the resilience of the air toward the return movement. Such a condition would relieve the driving mechanism of such strain and stop a reversed bed without shock.

The object of the present invention is to produce the above-outlined conditions as nearly as possible, and with this end in view I provide the cylinder or dash-pot near its closed end with an outlet provided with a valve connected to and operated by the constantly-moving parts of the press by mechanism so contrived and timed that as the piston nears the bottom of the cylinder this valve will be opened to permit the escape of air from the cylinder and prevent a continuing compression of the air in the cylinder, and the air which thus escapes from the cylinder is conveyed to an auxiliary closed air-tank, from which it flows out again into the cylinder on the return stroke of the piston. A single auxiliary air-tank may be employed for the two air-cylinders at each end of the stroke, together with a single valve and a single cam or operating mechanism for controlling the valve as the air-cylinders operate alternately, or a single cylinder cushioning both ends of the stroke and a single air-tank and valve may be used.

The construction and arrangement of this device will be better understood from the following description and the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is an end view, partly in section, of a printing-press containing the invention; and Fig. 2 is a side view, partly in section, of the same.

In said drawings, 10 is the reciprocating bed of the press.

11 and 12 are the two pistons connected to said press-bed.

13 and 14 are the two dash-pots or air-cylinders into the open mouths of which alternately the pistons 11 and 12 enter in the to-and-fro movement of the press-bed.

15 and 16 are two pipes opening from the interior, respectively, of the cylinders 13 and 14 and proceeding to the common three-way valve 17, located at the junction of the two pipes 15 and 16.

18 is a third pipe proceeding from the valve 17 to the auxiliary tank 19. To the handle 20 of the valve 17 is connected one end of a bell-crank lever 21, the other end of which is provided with a roller 22, engaging the groove of the cam 23. This cam 23 is mounted on a shaft 24, which is connected to the continuously-moving portions of the press mechanism, (the connection not being shown in the drawings,) and its revolution is so timed with reference to the movement of the press that when the piston 11 has entered the cylinder 13 the valve 17 will be closed and remain closed until said piston has neared the bottom of the cylinder 13 and the termination of the upstroke in that direction approached. At this point the revolution of the cam 23 will cause the valve 17 to be opened to permit the flow of the air from the cylinder 13 to the tank 19, in which position the valve will close the entrance to the pipe 16, and the cam is further contrived that this condition will be maintained until after the piston 11 is started on its return stroke and until the piston 12 has entered the cylinder 14 and approached in like manner the termination of its stroke, when the cam in its further revolution will close the valve 17 against the cylinder 13 and open it as to the cylinder 14. The result of

this arrangement is that the motion of the press-bed is checked in either direction by compression of air in one or other of said air-cylinders up to a certain point in the stroke, and thereafter a relief of the compression takes place to the extent of the capacity of the auxiliary air-tank, which auxiliary air-tank is emptied or its contents reduced to atmospheric pressure at each alternate stroke. The result is that the air-cushion operates noiselessly and smoothly to check the momentum of the press-bed steadily and without putting any extra strain upon the driving mechanism of the press, thus greatly improving the movement, diminishing the wear and strain, and lessening the power required to drive the press.

Some of the benefits of this invention will be attained by permitting the valve 17 to deliver the escaped air into the open atmosphere, and as air escapes very quickly it is extremely difficult to automatically open and vent in such timing and in such manner as to prevent the residue of momentum from causing too violent a shock at the reversal of the bed movement. With the auxiliary air-tank this difficulty is not experienced, as the air does not escape into the open atmosphere, but into the auxiliary air-tank when the valve is opened, and consequently all shock is prevented, because some pressure is still maintained upon the piston at the time of reversal.

I claim—

1. The combination with a reciprocating press-bed, of a cushioning air-cylinder, a piston for said cylinder, an outlet from the cylinder closed by a valve, and means for automatically opening and closing said valve from the movement of the press, the opening taking place shortly before reversal of the bed and preventing too great compression of the air at the end of the stroke, substantially as specified.

2. The combination with the reciprocating press-bed of a cushioning air-cylinder, a piston for said cylinder, an auxiliary air-tank communicating with the cylinder by a valve-controlled passage, and means for automatically opening and closing said valve of said passage, such opening taking place before reversal of the bed, substantially as specified.

3. The cushioning air-cylinder wherewith is combined an auxiliary air-tank, an outlet from the cylinder to said tank, a valve controlling said outlet, and means for opening said valve automatically as the piston of the air-cylinder nears the closed end of the cylinder.

4. The combination with a reciprocating device whose stroke is to be cushioned, of a cushioning air-cylinder having an auxiliary air-tank, an outlet from the cylinder to said tank, a valve controlling said outlet, and means for opening said valve automatically as the piston of the air-cylinder nears the closed end of the cylinder.

5. The combination with a reciprocating press-bed, of the cushioning air-cylinder, one at each end thereof, the pistons one for each cylinder, an outlet from each cylinder closed by a valve, and means for automatically opening said valves alternately as the pistons of the air-cylinders near the closed ends of the cylinders whereby the compression of the air at the end of the stroke is relieved.

6. The combination with the press-bed, of the cushioning-cylinders, the pistons, the valve-controlled outlets, and an auxiliary air-tank, together with means for automatically controlling the outlet air from the cylinders into the auxiliary tank alternately from the two cylinders by the movement of the press, substantially as specified.

7. The combination with a cushioning-cylinder of an auxiliary chamber into which the cylinder vents, and an automatic valve controlling the venting and timed to permit it when the pressure reaches a predetermined degree, substantially as specified.

8. The combination with a cushioning-cylinder of a closed auxiliary chamber into which the cylinder vents, a valve controlling the venting and timed to permit it when the pressure in the cylinder reaches a predetermined degree, and means for opening said valve automatically, substantially as specified.

9. In combination with a spring for counteracting or reducing the momentum of the reciprocating bed of a printing-press, means timed to the travel of the bed for first retaining the resistance of the spring during a certain portion of said travel and for afterward from a predetermined point in said travel so controlling said resistance as to restrict the further increase thereof during a further travel.

10. In combination with a spring for counteracting or reducing the momentum of the reciprocating bed of a printing-press, means timed to the travel of the bed for first retaining the resistance of the spring to counteract or overcome the momentum acquired by the bed during a portion of said travel, and for afterward, while reducing such resistance during a further travel beyond a predetermined point, retaining sufficient resistance at the end of the travel to assist in starting the bed in the reverse direction.

11. In combination with a spring for counteracting or reducing the momentum of the reciprocating bed of a printing-press, means for first retaining the resistance of the spring to counteract or reduce the momentum acquired by the bed in its travel, and cam-actuated mechanism deriving motion from the press for afterward so controlling such resistance as to restrict the further increase thereof during the further travel.

12. The combination with the cylinder and piston of an air-spring for a reciprocating printing-press bed, of an outlet-valve and mechanism timed to the travel of the bed for opening said valve at a predetermined point in said travel for releasing air from said cylinder to prevent a further increase of compression during the further travel.

13. The combination with the cylinder and piston of an air-spring for a reciprocating printing-press bed, of an outlet-valve and mechanism timed to the travel of the bed for keeping said valve closed to retain the air in the cylinder to a predetermined point in said travel and afterward opening said valve to restrict the further compression of the air in the cylinder during the further travel.

14. The combination with the cylinder and piston of an air-spring for a reciprocating printing-press bed, of an outlet-valve and cam-actuated mechanism timed to the travel of the bed for keeping the valve closed during an earlier stage of the entering movement of the piston into the cylinder and afterward opening said valve at a predetermined point in the travel of the bed and thereby providing for the escape of air from said cylinder during a further portion of said travel.

15. The combination with the cylinder and piston of an air-spring for a reciprocating printing-press bed, of an outlet-valve and cam-actuated mechanism timed to the travel of the bed for first keeping the valve closed during an earlier stage of the entering movement of the piston into the cylinder, then opening said valve at a predetermined point and afterward closing it before the next stroke of the bed.

16. 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 a spring for counteracting the momentum of the bed and means for restricting the resistance of said spring from and beyond that point in said movement at or near which the retardation takes place.

17. 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 comprising a cylinder and piston for counteracting the momentum of the bed, an outlet-valve to said cylinder, and mechanism deriving motion from the press for opening said valve at or near that point in said movement in either direction at which the retardation takes place.

18. 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 comprising a cylinder and piston for counteracting the momentum of the bed, an outlet-valve to said cylinder and mechanism deriving motion from the press for opening said valve at or near that point in said movement in either direction at which the retardation commences and closing it before the next stroke of the bed.

19. In an air-cushion device of the character described, the combination with the piston, piston-chamber having a vent-opening, and the auxiliary chamber into which said vent opens, of means controlling the movement of the air through said opening adapted to bring about the maximum resistance before the piston reaches the end of the compressing stroke and thereafter to maintain a decreased resistance as the piston moves to the end of its compressing stroke.

20. In an air-cushion device of the character described, the combination with the piston, piston-chamber having a vent-opening, and the auxiliary chamber into which said vent opens, of means controlling the movement of the air through said opening adapted to bring about the maximum resistance before the piston reaches the end of the compressing stroke.

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Witnesses:
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