R. D. DAY.

PLATE VALVE.

APPLICATION FILED APR. 20, 1914.

1,227,759. Patented May 29, 1917.

FIG. 1

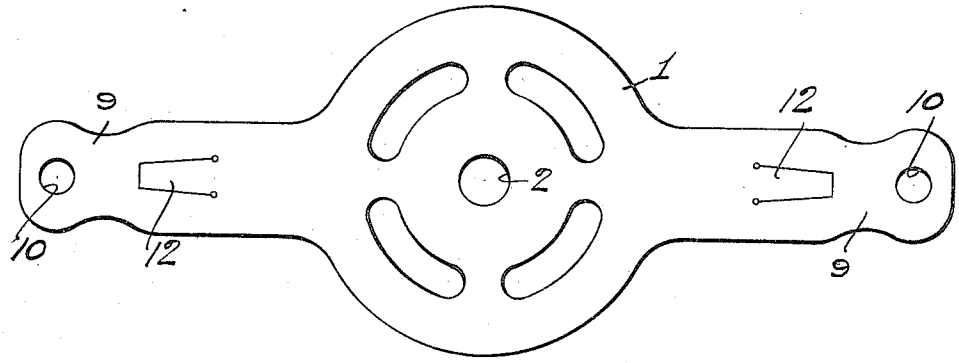



FIG. 2

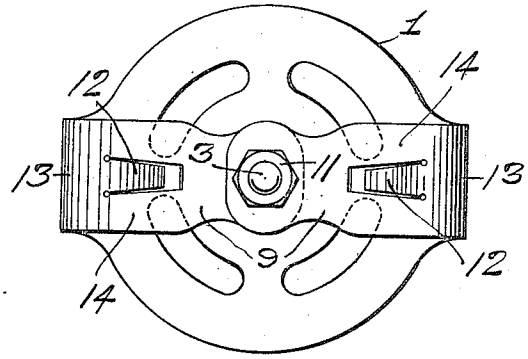
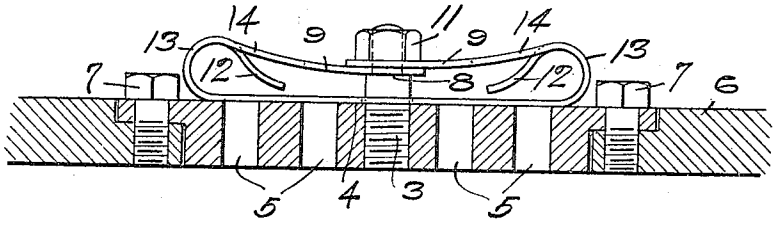



FIG. 3




WITNESSES.

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

# UNITED STATES PATENT OFFICE.

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## PLATE-VALVE.

1,227,759. Specification of Letters Patent. Patented May 29, 1917.

Application filed April 20, 1914. Serial No. 833,110.

*To all whom it may concern:*

Be it known that I, RODNEY D. DAY, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Plate-Valves; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to valves of the type usually employed in blowing engines, air compressors, and similar apparatus, and has for its object the production of a valve of very simple and economical construction. A further object is to provide the valve with integrally formed springs which shall control the opening and closing movements thereof, the valve being so constructed that there can be no motion thereof with respect to its seat, except in the direction of opening and closing; that is to say, there shall be no turning about its own center as an axis, and no displacement of the valve center line with regard to the center line of the valve seat. A further object is to so arrange the valve and its springs that the springs may act also as a stop member, making a separate stop plate unnecessary. A further object is to so arrange the springs of the valve that the well known change-in-scale effect may be secured without the addition of auxiliary features. By the expression "change in scale" is meant that there will be a different degree or extent of expansion or contraction for a given weight or pressure exerted; that is to say, for example, take the ordinary spring scale. One pound weight will expand the spring a certain distance in one scale; in another scale having a heavier spring, one pound weight will expand the spring a less distance. In connection with the present invention, the expression means that a different amount of spring resistance is brought into play at different positions of the valve, hence necessarily there will be a change in scale, or difference in the amount of displacement of the valve for a given pressure exerted thereon at different positions of the valve. With these and other objects in view, as will appear from the following description, the invention consists in the construction and arrangement of parts, a preferred embodiment of which is illustrated in the accompanying drawing, in which Figure 1 is a plan view of the blank from which the valve plate and springs are formed. Fig. 2 is also a plan view showing the spring members of the valve turned to operative position, and Fig. 3 is a sectional view of the valve, and so much of a cylinder head or other part with which the valve coöperates.

Referring to Fig. 1, the valve consists of the flat plate 1, centrally perforated at 2 to receive a bolt or screw 3, (Fig. 3,) by which the valve is held to its seat 4. This seat may be provided with a plurality of openings 5, and is secured to the cylinder head 6 or other part as by the bolts 7. The bolt 3 by which the valve is held to its seat is shouldered as at 8 to receive the spring extensions 9—9 of the plate valve, which extensions are perforated at 10 to fit the outer extremity of the bolt 3. These ends are held down upon the shoulder 8 of the bolt by means of the nut 11, and this nut may be screwed sufficiently tight to prevent any possibility of rotation of the valve plate and springs on the valve seat and to prevent any other movement of the valve with respect to its seat except the normal opening and closing movement at right angles to the seat. Obviously, also the extremities of the bolt may be square in cross section or any other means may be employed for this purpose.

From an inspection of Fig. 3 it will be seen that as the plate valve 1 rises from the valve seat, the spring members 9 must lengthen somewhat to permit the upward travel of the valve plate; said members 9 can only do this by drawing on the sharply curved parts 13 where the springs start from the flat plate. This gives a very different effect from that produced when the valve just lifts and the bending of the springs is practically all in the thin narrow parts 14 where the spring is cut away to form the auxiliary spring tongues 12. Thus is produced in effect the change-in-scale which is necessary to prevent chattering of the valve and to hold the valve in proper relation to the valve seat, determined by the changes in pressure of the air or other fluid passing through the valve.

It will be seen also that the extremities of the extensions 9 which are attached to the bolt 3, form in effect a stop plate to limit the upward movement of the valve.

To increase the change-in-scale effect, I preferably cut or punch out from the spring extensions 9, auxiliary spring tongues 12,

which are bent down to the position shown in Fig. 3, so that as the valve plate rises, it will contact with these spring tongues, whereby the change-in-scale effect produced by the spring extensions 9, will be enhanced and at the same time these auxiliary spring tongues 12 form a spring or cushioning stop for the valve plate.

While I have herein shown a form of the device in which two springs are used, it is evident that the number of springs may be increased to any desired extent, for example, there may be three or four springs spaced equally apart about the valve plate. While I have herein shown and described particular embodiments of the invention, it is to be understood that the same may be altered in details and in relative arrangement of parts within the scope of the appended claims.

What I claim is:

1. A plate valve having a plurality of lateral spring extensions overlying said valve and fixed with relation to the valve seat, said spring extensions being so constructed and disposed as to exert a change-in-scale upon the valve plate as the latter rises from the seat and also being adapted to act as a stop for the valve plate.

2. A plate valve having a plurality of lateral spring extensions overlying said valve and fixed with relation to the valve seat, said spring extensions being so disposed as to exert a change-in-scale upon the valve plate as the latter rises from the seat and also being adapted to act as a stop of the valve plate, and a plurality of auxiliary spring members adapted to increase the change-in-scale effect of the main springs and to act as a cushion stop for the valve plate.

3. A plate valve having a plurality of lateral spring extensions bent to overlie the valve plate and having their extremities fixed with relation to the valve seat whereby said extensions may act as a stop for the valve plate and may exert a change-in-scale effect upon said plate and auxiliary spring members carried by said main spring members and overlying the valve plate to increase the change-in-scale effect and to act as a cushioning or cushion stop for the plate.

4. A plate valve having lateral spring extensions bent to overlie the valve plate and having their extremities fixed opposite the geometric center of the valve plate and with relation to the valve seat, and so disposed that the rising of the valve plate has a tendency to lengthen the spring extensions, whereby the fixity of the extremities of said spring members produces a change-in-scale in the operative effect of said spring members.

5. A plate valve having lateral spring extensions bent to overlie the valve plate and having their extremities fixed opposite the geometric center of the valve plate and with relation to the valve seat, and so disposed that the rising of the valve plate has a tendency to lengthen the spring extensions, whereby the fixity of the extremities of said spring members produces a change-in-scale in the operative effect of said spring members, certain of said spring members carrying auxiliary spring members symmetrically disposed over the valve plate to increase the change-in-scale effect and act as a cushion stop for the valve plate.

6. The combination with a valve seat having a valve securing standard thereon, with a plate valve having spring extensions bent over the valve plate and secured to said standard, said standard passing freely through the valve plate, whereby said extensions may exert a change-in-scale effect upon the valve plate, and may act as a stop for said plate.

7. The combination with a valve seat having a valve securing standard thereon, with a plate valve having spring extensions bent over the valve plate and secured to said standard, said standard passing freely through the valve plate, whereby said extensions may exert a change-in-scale effect upon the valve plate and may act as a stop for said plate, and auxiliary spring members struck from said main spring members and projected toward said valve plate, whereby said auxiliary spring members may increase the change-in-scale effect upon the rise of the valve plate, and may act as a cushioning stop for said plate.

In testimony whereof, I the said RODNEY D. DAY have hereunto set my hand.

RODNEY D. DAY.

Witnesses:

ROBT. D. TOTTEN,

JOHN F. WILL.

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