

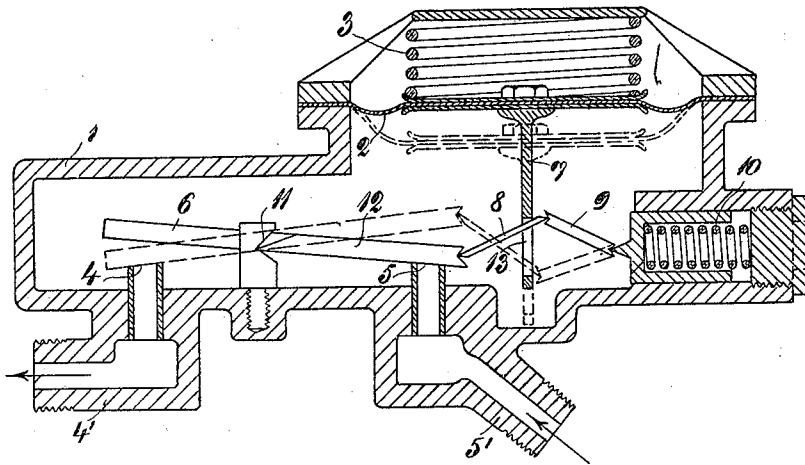
G. DALEN.

DEVICE FOR SUDDENLY OPENING AND CLOSING VALVES IN CERTAIN INTERVALS OF TIME.

APPLICATION FILED OCT. 29, 1915.

1,320,451.

Patented Nov. 4, 1919.



G. Dalén
Inventor.

By *E. J. Anderson*
Attorney.

UNITED STATES PATENT OFFICE.

GUSTAF DALÉN, OF SKÄRSÄTRA, LIDINGÖN, STOCKHOLM, SWEDEN.

DEVICE FOR SUDDENLY OPENING AND CLOSING VALVES IN CERTAIN INTERVALS OF TIME.

1,320,451.

Specification of Letters Patent.

Patented Nov. 4, 1919.

Application filed October 29, 1915. Serial No. 58,702.

To all whom it may concern:

Be it known that I, GUSTAF DALÉN, subject of the King of Sweden, residing at Skärsätra, Lidingön, Stockholm, Sweden, have invented certain new and useful Improvements in Devices for Suddenly Opening and Closing Valves in Certain Intervals of Time, of which the following is a specification.

The invention relates to an automatic device for intermittently opening and closing a valve or valves at intervals of time, in which a movable diaphragm actuates means having free motion so that when said means is moved to an unstable position, the valve or valves are actuated independently of the diaphragm.

The invention has for its object to provide a reliable and simple device for opening and closing the valve or valves by means of which the pressure on the valves during the closing period maintains a certain amount until the moment of opening, when said pressure suddenly ceases.

The invention is shown in one construction on the drawing, which shows a vertical section of a diaphragm casing with inlet and outlet valves for air or gas. According to this construction one of the valves is opened when the other is closed, but this is no essential feature of the invention, which is employable also in connection with one single valve.

1 indicates the casing, which is closed by a diaphragm 2, loaded in a common manner by means of a spring 3. 4 indicates the seat of the outlet 4' and 5 the seat of the inlet 5', and against said seats the valve plate 6, 12 acts alternately. For this purpose the valve plate 6, 12 is movable at its middle part on a pivot 11, and one arm 12 of the said plate constitutes a member of a toggle joint or knee lever system, which according to the invention is composed of three members, 9, 8, 12, held together against one another by means of a spring 10. The knee lever system is actuated by the diaphragm 2 by means of any suitable connection, which in the construction shown on the drawing comprises a bar 7. The actuation is arranged in such a manner, that it admits a certain idle motion of the members constituting the knee lever system, limited by stops or the like, independent of the movement of the diaphragm, after the said mem-

bers have been moved by the diaphragm to the unstable position. For this purpose the bar 7, according to the construction illustrated, is provided with a slot 13, embracing the part 8 and actuating the same with its upper or lower edge, so as to allow of the further sudden movement of the members 8, 9 and 12, independently of the diaphragm, after the toggle members 8 and 9 have reached the unstable position.

In the position shown on the drawing the valve seat 5 is closed by means of the arm 12 of the valve plate with a certain pressure, exerted by the spring 10, whereby the members 8 and 9 take the position shown. The diaphragm 2 has taken its highest position, and the gas or air is exhausted from the casing 1 through the open seat 4. When now the diaphragm moves down the bar 7 actuates the knee lever system, so that the members 8 and 9, which formed a knee facing upward will aline, and take an instable position. During said motion the spring 10 still exerts a pressure on the valve plate, so that its arm 12 firmly abuts against the valve seat. When the diaphragm moves still further the members 8 and 9 freely reverse, so as to form a knee, facing downward, abutting against the lower edge of the bow 13, whereby the pressure on the valve is suddenly directed upward and the inlet 5' is suddenly opened. Said motion of the valve plate 12 is limited by the valve 6 abutting against the valve seat 4, whereby simultaneously the outlet 4' is closed (compare the position of the members 6, 12, 8 and 9 in dotted lines).

When the diaphragm 2 owing to the gas flowing in through the inlet 5', begins to move upward, the reverse operation takes place, the lower edge of the slot 13 co-acts upon bar 8 so that pressure is exerted on the valve 6 by the spring 10, until the members 8 and 9 are reversed and are abutting against the upper edge of the slot 13. The inlet 5' is thus closed and the valve outlet 4 is opened, as shown in full drawn lines. The free movement of the valve plate 12 is now limited by abutting against the valve seat 5.

Having now particularly described my invention and ascertained in which manner the same is to be performed, what I claim is:

1. In a valve mechanism the combination of a casing having a stationary valve seat,

a valve member pivoted at a point above the seat for engaging said seat, a movable diaphragm provided with an arm, a spring tensioned member alining with the pivot point of the valve member and toggle members connecting said valve member and spring tensioned member and coacting with the diaphragm and arm so as to press the hinged member in position until the said toggle members have passed to a point below their alining position.

2. In a valve mechanism the combination of a casing having a stationary valve seat, a valved member swingably mounted at a point above the seat for opening and closing said seat, a spring pressed movable diaphragm provided with an arm, a spring tensioned member having a bearing alining with the mounting point of the valve and positioned above the upper edge of the seat, a multiple toggle arrangement of which the valve forms a part connected with the bearing and operatively connected with said arm, whereby said toggle arrangement will coact with said diaphragm to press the hinged valve member in closed position until said toggle arrangement has passed to a point below its alining position.

3. In a valve mechanism the combination of a casing having a pair of valve seats, a double valve member pivotally mounted between said seats and operable to alternately

open and close the latter, a spring tensioned member, a pair of toggle members connecting said double valve member and the spring tensioned member to hold the valve member in set position under tension, a spring tensioned diaphragm and an arm carried by the diaphragm having a slot receiving said toggle members, said slotted arm operable by the diaphragm to throw said toggles at definite instants in the arm strokes to actuate the valve member, substantially as set forth.

4. In a valve mechanism, in combination, a casing having a stationary valve seat, a swingable valve member for engaging the seat, a movable diaphragm provided with an arm, a spring tensioned member, the upper edge of the valve seat being below the alining mounting point of the valve member and the spring member and a double toggle member connecting said valve and spring member and coacting with the diaphragm and arm so that the valve member will not be lifted until the double toggle member has passed to a point below the alining position thereof.

In testimony whereof I have affixed my signature in presence of two witnesses.

GUSTAF DALÉN.

Witnesses:

FRANK LYON,
A. BJÖRCK.

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