No. 861,566. PATENTED JULY 30, 1907.

E. WIKI.

FLAP VALVE.

APPLICATION FILED MAR. 7, 1907.

Fig. 1.

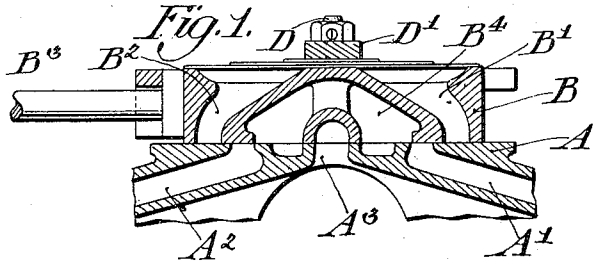


Fig. 2.

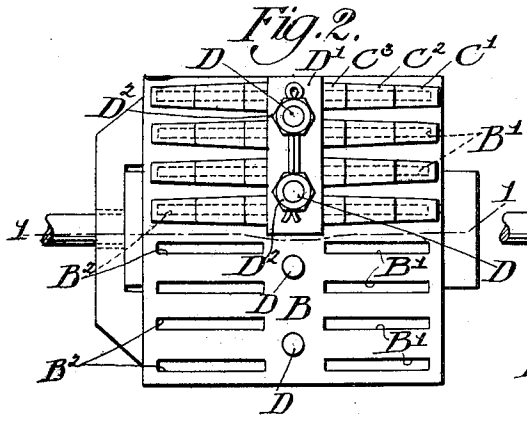


Fig. 9.

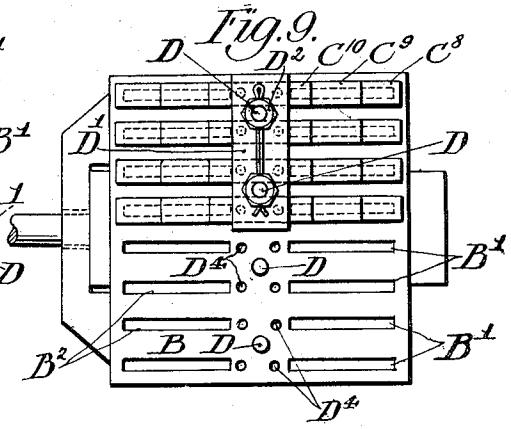


Fig. 3.

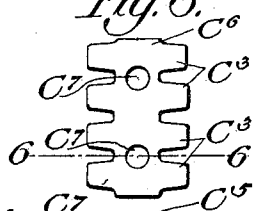


Fig. 10.

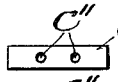


Fig. 11.

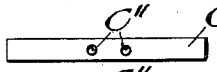


Fig. 12.

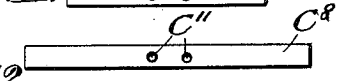


Fig. 4.

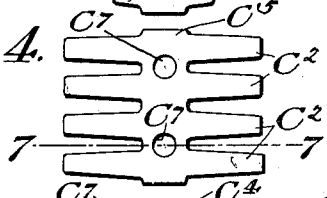


Fig. 6.

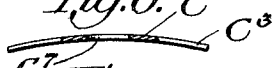


Fig. 7.

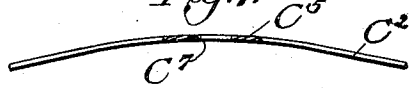


Fig. 5.

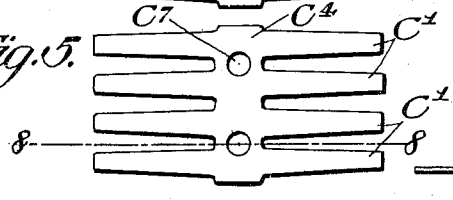
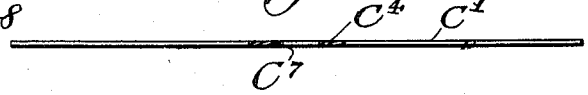


Fig. 8.



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FLAP-VALVE.

No. 861,566. Specification of Letters Patent. Patented July 30, 1907.

Application filed March 7, 1907. Serial No. 361,107.

To all whom it may concern:

Be it known that I, EDUARD WIKI, a citizen of the Republic of Switzerland, residing in Lucerne, Switzerland, have invented a certain new and useful Improvement in Flap-Valves, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My present invention relates to valves and particularly to the construction of valves such as are used in pumps of the compressor or blowing engine, vacuum or other types, in which a sliding valve body, which may be of the piston or flat seated type is provided with ports which are moved into and out of register with ports of the valve casing and the valve body has its ports provided with flap valves.

The object of my invention is the production of a simple and effective construction suitable for operation in high speed machinery and in which the flap valves are made light so as to have little inertia and hence act quickly and are arranged to uncover the ports controlled by them as much as may be necessary with a small amount of lift, the construction being such that the flap valves require no back stops and the amount of lift may vary automatically with the conditions of service.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of my invention, however, and the advantages possessed by it, reference may be had to the accompanying drawings and descriptive matter in which I have illustrated and described forms in which my invention may be embodied.

In the drawings, Figure 1 is a sectional elevation on the line 1—1 of Fig. 2, of a slide valve having ports controlled by my improved lift valve, D^1. Fig. 2 is a side view of the valve shown in Fig. 1 with part of the flap valve removed. Figs. 3, 4 and 5 are plan views of the different strips of resilient material of which the flap valves are constructed. Fig. 6 is the sectional elevation on the line 6—6 of Fig. 3. Fig. 7 is a sectional elevation on the line 7—7 of Fig. 4. Fig. 8 is a sectional elevation on the line 8—8 of Fig. 5. Fig. 9 is a view similar to Fig. 2, showing a modified form of my invention and Figs. 10, 11 and 12 are plan views of the different flap valve strips employed in the construction shown in Fig. 9.

In the valve construction shown in Figs. 1 to 8, A represents a casing wall or seat having ports A^1 and A^1 which may lead to the opposite cylinder ends of the compressing cylinder of the double acting blowing engine or the like, and A^3 represents an inlet port. The sliding valve body B working on the upper face of the casing A has sets of outlet ports B^1 and B^2.

The valve body is moved by the stem B^3 to bring the ports B^1 and A^1 and B^2 and A^2 alternately in and out of register. When the ports B^1 and A^1 are in register, the ports A^2 are connected to the ports A^3 by a passage B^4 formed in the valve body B. Similarly when the ports B^2 and A^3 register, the passage B connects the ports A^2 and A^3.

Each of the ports B^1, which are arranged in a row, is placed end to end with a corresponding port B^2, the ports B^2 being arranged in a row similar to the ports B^1. The flap valves controlling each of the ports B^1 and B^2, each comprises a set of thin, narrow strips or fingers C^1, C^2 and C^3 formed of resilient material. Each finger C^1 entirely covers the corresponding port B^1 or B^2 while the fingers C^2 extend over only a portion of the length of the corresponding port, and the topmost finger C^3 extends over only a shorter portion of the corresponding port. In the form shown in Figs. 1 to 8 inclusive, the fingers C^1, covering the ports in one half of the valve body, are all integrally connected by a body portion C^4 between the ports B^1 and B^2, and the corresponding fingers C^2 and C^3 are similarly connected by body portion C^5 and C^6. Registering apertures C^7 formed in the body portions C^4, C^5 and C^6 receive bolts D carried by the valve body and a clamping bar D^1 and nuts D^2 on the threaded outer ends of the bolts D^1 are employed for clamping the plates firmly against the portion of the valve body between the ports B^1 and B^2. It will be understood that another and similar set of fingers and clamping bar D^1 are employed for the port shown as uncovered in Fig. 2, though I may integrally connect all the fingers and employ a single clamping bar.

In order to insure that the fingers C^1 properly close the ports B^1 and B^2 when the flap valve is in the closed position, I may advantageously bow initially the outer plates as shown in Figs. 6 and 7, while making the inner plate flat, as shown in Fig. 8, so that in the closed positions of the flap valve fingers each finger C^1 is spring held against its seat.

In operation when the ports B^1, for instance, are moved into register with the ports A^1 and the pressure rises in the latter, the corresponding flap valves lift and allow the passage of air through the ports B^1. As the fingers are narrow, overlapping the ports but little, and fingers for adjacent ports are separated, a very slight lift is sufficient to make the escape passage between the fingers C^1 and the top of the valve body equal to the area of the ports B^1. Furthermore, the amount of lift depends upon the difference in pressure above and below the flap valves, thus automatically accommodating itself to the conditions of service and as soon as the pressure above and below the flap valves is equalized, the valves close. By making the flap valves of this composite leaf spring form I am able to entirely dispense with the rigid back bearings that it has heretofore been found necessary to employ in valves of this general type to stop the lift of the flap valves, and

against which the flap valves tend to knock themselves to pieces.

My improved flap valves are comparatively easy to construct and properly assemble and the valves are capable of an automatic variation in the amount of lift to accommodate the needs of use.

In the construction shown in Figs. 9, 10, 11 and 12, which I prefer on account of the simplicity over the construction shown in Figs. 1 to 8 inclusive, the flap valves for each pair of end to end ports B^1 and B^2 are formed by three strips C^8, C^9 and C^{10} which may be rectangular in outline and cut from stock strips or bars. Advantageously the strips C^9 and C^{10} may be bowed as are the upper two plates in the construction shown in Figs. 1 to 8. The strips are held in position by guide pins D^4 carried by the valve body which pass through apertures C^{11} formed in the strips. The various strips are clamped against the valve body by a clamping bar D^1 and bolts and nuts D and D^2 as in the construction first described.

Having now described my invention what I claim as new and desire to secure by Letters Patent is,

1. In a valve for pumps, the combination with a sliding valve body moving over a stationary port or ports, said body having formed in it a narrow elongated port and a flap valve for said port consisting of a series of light, thin, narrow strips of resilient material secured to said body at one end of said narrow port and having portions projecting over said port, the portions of said strips projecting over said port being of different lengths, said portions of the outer strips being shorter than the corresponding portions of the strips less remote from the valve body.

2. In a valve for pumps, the combination with a sliding valve body moving over a port or ports of the compression cylinder, said body having formed in it a narrow elongated port and flap valve for said port comprising a thin, narrow, elongated strip of resilient material extending over the port and one or more superposed similar strips, each having a portion which extends over said port and is shorter than the corresponding portion of the strip immediately beneath it.

3. In a valve for pumps, the combination with a sliding valve body moving over a port or ports of the compressing cylinder, said body having formed in it one or more sets of ports each set of ports comprising two narrow elongated ports placed end to end, and flap valves comprising two strips or fingers of light, thin, resilient material connected together for each set of ports, each finger entirely covering one of said two ports and one or more similar fingers superposed thereon and means for securing said resilient material against the body between the ports, the superposed strips extending over a portion only of ports.

4. In a valve for pumps, the combination with a sliding valve body moving over a port or ports of the compression cylinder, said body having in it a plurality of narrow, elongated ports arranged in two rows with one port of each row in line with the corresponding port of the other row and flap valves for said ports comprising a light, narrow strip of resilient material for each pair of alined ports and one or more similar superposed strips, and means for securing all of said strips against the body of the valve between the rows of ports, the superposed strips being each shorter than the strip beneath it.

5. In a valve for pumps, the combination with a sliding valve body moving over a port or ports of the compression cylinder, said body having in it a plurality of narrow, elongated ports arranged in two rows with one port of each row in line with the corresponding port of the other row and flap valves for said ports comprising a light, narrow strip of resilient material for each pair of alined ports and one or more similar superposed strips, means for securing all of said strips against the body of the valve between the rows of ports, the superposed strips being each shorter than the strip beneath it, said means including a clamping bar extending between the rows of ports and means for drawing it toward said valve body.

6. In a valve, a valve body, having a pair of narrow, elongated ports placed end to end and flap valves for said ports comprising a set of narrow rectangular strips of thin, resilient material superposed one above the other and clamped against the valve body between the adjacent ends of the ports with portions of their free ends projecting over the ports, the projecting portions of the outer strips being shorter than the corresponding portions of the inner strips.

7. In combination a valve body having two rows of narrow ports, each port being elongated in a direction transverse to the direction of the rows, and flap valve for said ports, comprising a light, narrow strip or finger of resilient material for and extending over each port and one or more superposed corresponding strips extending over a portion only of the port, the extending portion of each of said superposed strips being shorter than the corresponding portion of the strip beneath it, and means for securing all of said strips in place comprising a clamping bar extending between two rows of ports and means for drawing said clamping bar toward said valve body.

8. In combination a valve body having two rows of narrow ports, each port being elongated in a direction transverse to the direction of the rows, and flap valves for said ports, comprising a light, narrow strip or finger of resilient material for and extending over each port and one or more superposed strips extending over a portion only of the port, the extending portion of each of said superposed strips being shorter than the corresponding portion of the strip beneath it, and said superposed strips being also initially made concave toward the valve body, whereby the flap valves are normally spring pressed against the valve body.

EDUARD WIKI.

Witnesses:
EDW. HAEGE,
KARL HURTER.