

I. E. MERCER.
VALVE.

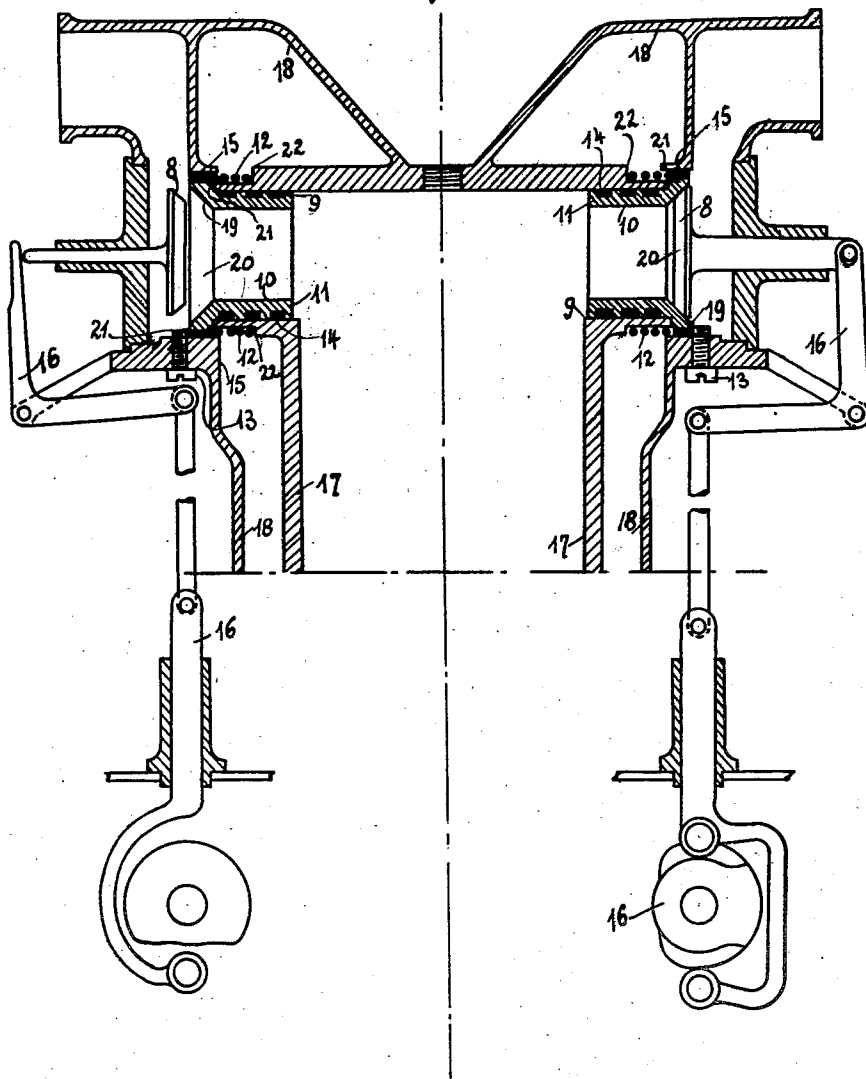
APPLICATION FILED SEPT. 7, 1912.

1,049,123.

Patented Dec. 31, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

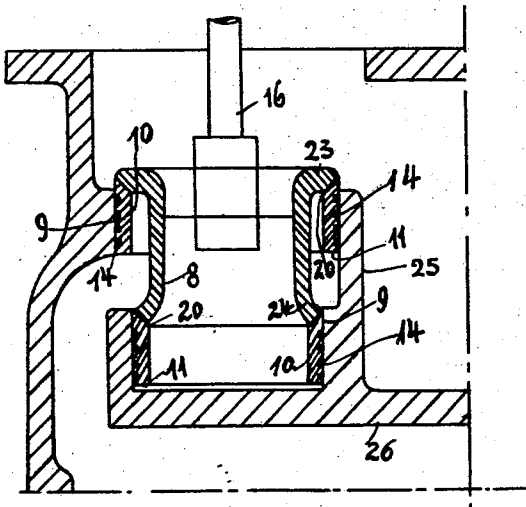


Fig. 3.

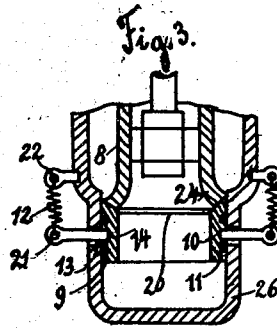
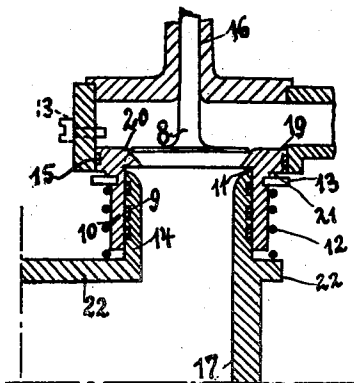


Fig. 4.



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UNITED STATES PATENT OFFICE.

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VALVE.

1,049,123.

Specification of Letters Patent.

Patented Dec. 31, 1912.

Application filed September 7, 1912. Serial No. 719,182.

To all whom it may concern:

Be it known that I, IVOR EDWIN MERCER, a subject of the King of Great Britain, residing at "The Cedars," Kent Road, Gravesend, in the county of Kent, England, have invented certain new and useful Improvements in and Relating to Valves and the Like, of which the following is a specification.

My invention relates to means for insuring the tightness of valves of the lift type for fluid-pressure engines, and it is directed to that well-known class of such means comprising principally a tubular member adapted to form a movable seat for the valve for which purpose it is arranged about the valve passage or port so that it can move axially during a portion of the opening and closing operations of the valve. Therefore the member moves for a short distance along with the valve during the initial opening thereof, or in other words the member "follows" the valve, while during the final closing of the valve the member likewise moves or "goes" with it. The "following" movement of the member is effected to a greater or lesser extent by the pressure of the fluid upon one end or part thereof, aided by a spring or springs, while the reverse movement is accomplished by the valve itself under the agency of its actuating mechanism. Stops are provided in connection with the tubular member for limiting its movements, and likewise piston rings or other packing for preserving a tight joint.

My invention consists in the construction, arrangement and combination of the aforementioned components in general, with the object of obtaining compactness of the whole, and with the further object of giving easy access to the spring or springs and of maintaining it or them out of contact with the fluid whereby it or they is or are not subject directly to the heat thereof and thus coolness is secured.

I will now fully describe my invention with reference to the accompanying drawings wherein:—

Figure 1 is a vertical sectional elevation of part of a vertical internal combustion four-cycle engine showing the application of the invention to an inlet valve and also to an exhaust valve. Figs. 2 and 3 are vertical sectional elevations at right angles to one another depicting the invention applied to

a steam engine inlet valve of the double-beat type. And Fig. 4 is a vertical sectional elevation of another application of the invention to a valve for an internal combustion engine; in other words the figure represents a modification of the construction shown in Fig. 1.

The same reference numerals are adopted throughout to designate the same or corresponding parts, and of such parts already generally explained, and referring first to the figures generically, 8 denotes the valve, 9 the valve passage or port, 10 the tubular movable member, 11 the portion of the member subject to the pressure of the fluid, 12 the spring or springs, and 13 the limiting means or stop device, while 14 and 15 indicate the joint-packing applied in connection with the member 10.

I will now deal specifically with Fig. 1 wherein the valve 8 on the left-hand side of the figure, and which is shown open, is the exhaust valve, while the valve 8 on the opposite side of the figure, and which is shown closed, is in the inlet valve. Both valves 8, 8 are identical, hence the description I am about to give is equally applicable. The valve 8 is of a well-known type and arrangement with a single valve element proper or head, while its operating mechanism, which is indicated at 16, is likewise of an ordinary kind. The passage 9 of the valve 8 is formed by shaping the head of the cylinder 17 and the adjoining part of the water jacket 18 as represented. The tubular member 10 is in the form of a cylindrical liner fitted in the valve passage 9 so that it may slide or move endwise therein either inward or outward with respect to the vertical axis of the cylinder 17 as depicted, respectively, at the right and left hand sides of the figure. The inward movement is effected by the valve 8 when being closed by its mechanism 16, while the outward movement is accomplished by the fluid pressure within the cylinder 17 (when such exists) acting upon the inner end 11 of the member 10, and, as I will presently explain, by the action of the spring 12 which thus operates either alone or in conjunction with the cylinder pressure. The member 10 is formed at its outer end with an outwardly-extending flange 19 whose outer face is recessed to wholly constitute the seat 20 for the valve 8. The inner face of the flange 19 is employed to form one abutment 21 for the spring 12; the

complementary abutment 22 being obtained by fashioning the cylinder head as illustrated, and between these abutments 21 and 22 the spring 12 is situated so as to act as explained, viz., to always tend to force or slide the member 10 outward. To limit this movement it is necessary to provide the means or stop device 13, and such may, as illustrated, suitably consist of a set-screw applied in proximity to the valve passage 9.

It will be noted that the spring 12 is located in the water jacket 18 so that it is protected from the heat of the valve passage 9; while its arrangement relatively to the member 10 presents the attribute of easy access.

The packing 14 and the packing 15, which is in the form of split metal rings of the customary kind, is respectively applied to the body of the member 10 and to the flange 19 in order to preserve a fluid-tight joint and a water-tight joint between it and the valve passage 9.

Having described the construction, I will now explain the operation.

Assuming an explosion has taken place in the cylinder 17, then both valves 8, 8 are closed and held closed by the mechanisms 16, 16, and the members 10, 10 are pressed tightly against the valves 8, 8 by the pressure within the cylinder 17 and by the action of the springs 12, 12 as illustrated at the right-hand side of the figure, and thus a tight joint is obtained at each valve 8. Supposing now the exhaust valve 8 (the left-hand one) is opened subject to its mechanism 16, then the member 10 slides or moves with it or, in other words, follows it up under the influence of the pressure of the fluid within the cylinder 17, and under the pressure exerted by the spring 12 until its outer end contacts with the stop device or screw 13 and thus the further motion of the member 10 is prevented, whereupon it reposes in this position until the valve 8 in returning to close the passage 9 under the agency of the mechanism 16, first contacts with it at the seating 20 and eventually carries it back or returns it to its original position against the fluid pressure (if any) within the cylinder 17 acting upon its end 11, and against the pressure of the spring 12, which pressures or pressure re-act or reacts when the closing action of the valve 8 is completed to press the member 10, or, in other words, the seating 20 tightly against the valve 8, all as shown at the right-hand side of the figure, whereby the requisite tightness is insured and maintained. Supposing, lastly, the inlet valve 8 (the one at the right-hand side of the figure) is opened by its mechanism 16, then the member 10 operates as explained with regard to the exhaust valve, with the exception that as there is little or no pressure within the cylinder 17 the spring 12 alone accomplishes its movement to fol-

low the valve 8 in opening. When the mechanism 16 operates to close the valve 8, the action of it and the member 10 are as already described.

Now as to Figs. 2 and 3 which illustrate a steam valve of the double-beat type, and therefore having two valve elements or heads 23 and 24. The seating for the upper element or head 23, as well as that for the lower element or head 24, is formed by a member 10 recessed as at 20 therefor, as in the previous example. The upper member 10 is slidably fitted in the part 25 of the valve casing, chest or box 26 and so is the lower member 10 in the passage 9, split-ring packing 14 being applied as illustrated for the usual purpose. The lower end 11 of each member 10 is subject to the steam pressure so that when it exists it acts to force the member 10 toward, or into contact with, the corresponding valve element or head. Though only shown in Fig. 3 in connection with the lower member 10, each member is fitted with springs 12, 12 which act, irrespective of the steam pressure, upon the end 11, for which purpose they are situated between the abutments or attachments 21 and 22. The abutment or attachment 21 consists of an eye-bolt fixed to the member 10 and led to the outside of the valve casing, chest or box 26 through a slot 13 whose upper end constitutes the limiting means or stop device aforesaid. The abutment or attachment 22 consists of an eye-bolt secured to the casing, chest or box 26. The operation of the valve mechanism 16 in closing the valve is, as before, against the steam pressure and the action of the springs 12, 12. As in the other example, the arrangement of the springs 12, 12 tends to accessibility and protection from heat.

In use, assuming, as depicted in the figures, the valve 8 is closed by the mechanism 16 and there is pressure acting upon the end 11 of the member 10, then the springs 12, 12 are stretched between their abutments or attachments 21 and 22 due to the action of the valve element or head 23 or 24 pressing down the member 10, and thus the effect of the springs 12, 12, as well as the effect of the steam pressure acting upon the end 11 of the member, is to force the latter into tight contact with its valve element or head thereby insuring the requisite tightness. Now on opening the valve 8 by the mechanism 16, the member 10, under the influence of the steam pressure on its end 11 and the reaction of the springs 12, 12, follows the valve 8 until the abutments or attachments 21, 21 contact with the upper end of the slots 13, 13 and in this position the member 10 remains until it is returned to its original position by the action of the element or head 23 or 24 upon its seating 20 on closing the valve 8 by the mechanism 16. The ele-

ment or head 23 of the valve 8 should entirely cover its seating 20 as this is forced against the element or head 23 by the springs 12, 12 only except for what pressure
5 may exist in the cylinder 17, which pressure is a negligible quantity at certain periods of the stroke in a condensing engine.

Lastly as to Fig. 4, which is closely related to Fig. 1. Here the member 10 is arranged
10 as a circular sleeve to the valve passage 9 upon which it is designed to slide or move; the part 11 upon which the fluid pressure acts is arranged as an internal flange at the outer end of the member 10; the spring 12 is
15 arranged in direct contact with the member 10; and the abutment 21 for the spring 12 is formed by a projection from the member 10 and designed to also act as the stop device
20 screw as indicated by the dotted lines at 13.

Also the abutment 22 is slightly modified as indicated. In all other respects the arrangement and operation are the same as explained with regard to Fig. 1, and as will be clear from the reference numerals shown. 25

What I claim as my invention and desire to secure by Letters Patent is:—

Means for insuring the tightness of lift valves for fluid pressure engines, comprising the combination of the valve with a movable
30 tubular member provided with the valve seat and having a portion adapted to receive the fluid pressure, a spring device acting on said member, and a stop device for said member.

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