

F. P. MORAN.
VALVE.
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1,402,082.

Patented Jan. 3, 1922.

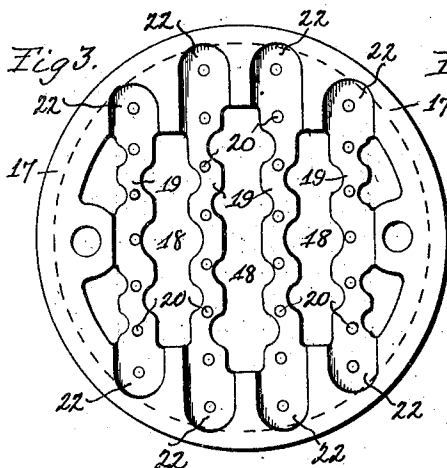


Fig. 3.

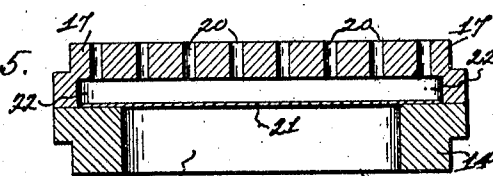


Fig. 5.

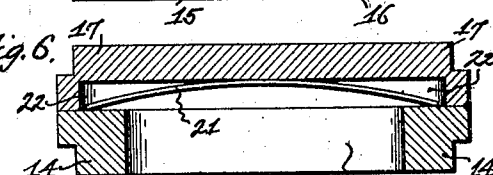


Fig. 6.

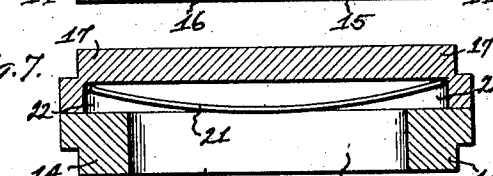


Fig. 7.

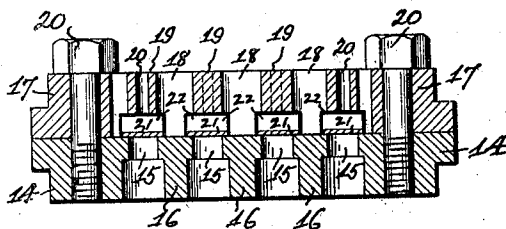


Fig. 1.

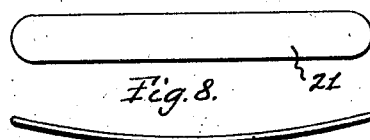


Fig. 8.

Fig. 9.

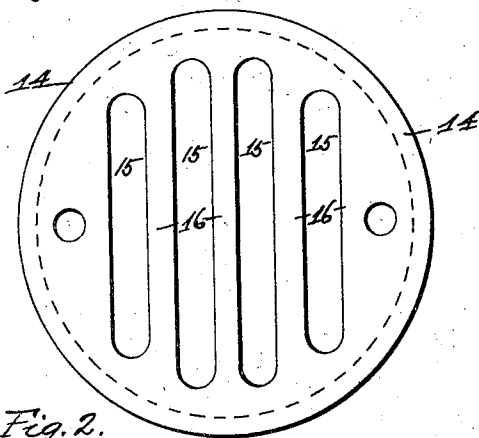


Fig. 2.

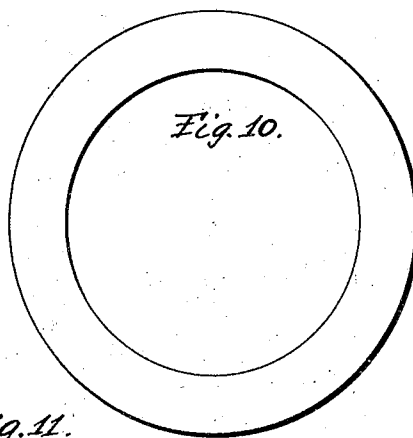


Fig. 10.

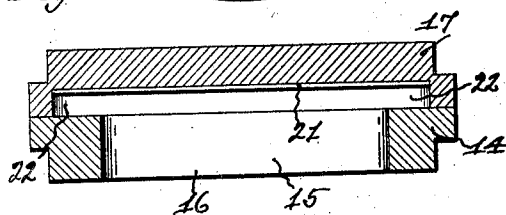


Fig. 4.

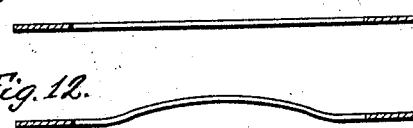


Fig. 11.

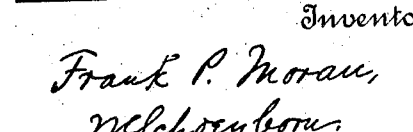


Fig. 12.

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UNITED STATES PATENT OFFICE.

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VALVE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FRANK PETER MORAN, a citizen of the United States, residing at Cincinnati, in the County of Hamilton and State of Ohio, have invented new and useful Improvements in Valves, of which the following is a specification.

This invention relates to valves and more particularly to the class called check valves of the automatic plate type which are especially and peculiarly adapted to be used in connection with any fluid or gas distribution apparatus, gas engines, blowers, compressors, or pumps.

The objects of my invention are to provide a flexible valve either of the strip or round form which is normally slightly flexed or bent, so that when at rest it always will leave its seat and partly open the valve and hence when the pressure is equalized on the inlet and outlet sides of the valve, said valve is open thereby insuring a balanced valve which will more quickly and easily open or close and capable of operating with a higher capacity, less repairs, without the usual auxiliary cooperating springs and attending noises.

A further object of this invention is to provide an automatic and flexed plate valve in which a slight difference of pressure on either side of the plate valve will quickly straighten or flatten out the same and fully open or entirely close the valve and eliminate sudden shocks or slamming, for in action said valve has no curved surface or seats to conform to, but seats itself on a plane surface in each of the guard and seat.

Another object of the invention is to provide a novel form of guard for the plate valve which will permit the pressure to quickly act on the flexed plate, thereby insuring rapid, constant and uniform action of the valve or pump under all speeds and conditions of operation.

Other objects of the invention will appear from the detailed description of the construction and operation of the valve to be hereinafter given.

The invention consists of structural characteristics and relative arrangements of elements which will be hereinafter more fully described and particularly pointed out in the appended claims.

In the one sheet of drawings in which

similar reference characters indicate the same parts in the several figures,

Figure 1 is a sectional view of the valve when assembled.

Figure 2 is a top plan view of the valve seat.

Figure 3 is a plan view of the underside of the guard.

Figure 4 is a sectional view showing the position of flexed plate when valve is open with plain guard.

Figure 5 is a sectional view showing the position of the flexed plate when valve is closed.

Figure 6 is a sectional view showing the original or normal position the flexed plate assumes when pressure is equalized in both sides.

Figure 7 is a sectional view similar to Figure 6, with the flexed plate reversely arranged in the valve.

Figure 8 is a plan view of a flexed plate.

Figure 9 is a side view showing the curvature normally assumed by the flexed plate.

Figure 10 is a plan view of an annular form of the plate valve before it has been flexed.

Figure 11 is a sectional view of Figure 10, and

Figure 12 is a sectional view of the annular plate shown in Figure 10, after being flexed and set.

Referring to the drawings 14 is the valve seat which is preferably as shown circular in form but any other shape or contour may be adapted without departing from the essential features of the invention. Said seat 14 is provided with a series of ports 15, separated by bridges 16, 16, as clearly shown.

17 is a guide or guard plate or cover which likewise is provided with a series of separated ports or slots 18, 18 and bridge sections 19, 19, and is secured by means of properly disposed screws or bolts 20 to the top of and arranged with respect to the top of the valve seat 14 in such a position that its ports or slots 18, 18, are centered between the ports 15, 15, or over the solid metal bridge sections 16, 16, in the top of the valve seat 14, as clearly shown in Fig. 1, thus bringing the solid or bridge sections 19, 19, of the valve guide or guard plate 17 properly over the ports 15, 15, of the valve seat

14, and arranging the ports 18, 18, with respect to the ports 15, 15, in a staggered relation.

The bridge sections 19, 19, of the guard or guide plate 17 may be plain, or have the configuration as shown in Fig. 3, or provided with a series of perforations 20, 20, in conjunction with the plain or varied bridge sections 19, 19, as shown in Figs. 3 and 5 for the purpose of allowing the pressure of the fluid to quickly act in the novel flexed plate valve or strip 21, to be presently described.

On the underside and opposite ends of the bridge sections 19, 19, of the valve guide or guard plate 17, and corresponding to the alignment of the ports 15, 15, of the valve seat 14 are cut or cast a series of shallow recesses 22, as shown in Figs. 1 and 3, opposite recesses of which are adapted to loosely receive the bent and firmly set flexible and yielding valve plate 21, shown in detail in Figures 8 and 9, for purposes to be presently described, and while the ends of the valve plates 21, 21, are shown semi-circular in shape and cooperating recesses 22, 22, are correspondingly formed, any other shape, as rectangular, may be readily substituted without departing from the spirit or changing the operation of the invention.

While I have shown a valve plate 21 in the form of a narrow strip, as illustrated in Figs. 1 to 9 inclusive, it will be readily seen and understood that said novel and flexed valve plate may be other shapes, as for example in case the ports 15 and 18 in the seat 14 and guard 17 are circular in form, then the valve plates would necessarily be annular in design, as shown in Figs. 10 and 11, and in order to carry out my invention said valve plates would be bent or flexed as shown in Figure 12, so that in their normal position they would not normally lie flat in or on the circular seats of seat 14 and guard 17, and hence capable of carrying out the same advantages, operations and functions as those of the form shown in Figures 1 to 9.

The ports being in the position shown in Figs. 1, 6 and 7 and the lower or outer ends of the ports 15 being in communication with and connected to a supply of fluid or gas, when an exhaust action is effected in the upper face of the valve guard plate 17 or outer ends of its ports 18, owing to the flexed valve plates 21 being normally partly off or removed from their seats and said valve plates being balanced, direct passages are provided which permit the fluid or gas to pass instantly through the valve without unnecessary resistance and do not require said valve plates 21 to be previously lifted from their seats as heretofore necessary in the old form of valves. Immediately after the fluid or gas begins to pass into the valve and against plates 21, said fluid plates are made to flatten out and assume the position in the

recesses 22 as shown in Fig. 4, when the passageways for the fluid or gas are fully open to permit the full suction stroke to be effected with the highest efficiency, and owing to the absence of all springs this suction operation is effected without any noise.

After the suction operation just described has been carried out, when the compression or lifting stroke is started and the pressure or flow is in an opposite direction through the valve and ports 18 and 15, the fluid or gas acting downwardly passes directly through the cut out portions or perforations 20 of the bridge sections 19 and immediately reacts against the upper surfaces of the plates 21 and forces them down and tightly holds them against the bridge sections 16 and over the parts 15 of seat 14 as illustrated in Fig. 5, thereby not only insuring a quick action of the valve but at the same time a minimum per centum of leakage or slippage due to the very low and rapid lift or movement of the valve plates. Said valve plates are also capable of long life and reversal of action and position as shown in Figs. 6 and 7.

From the foregoing disclosure of the construction, advantages and mode of operation of the valve, it will be readily seen that all the objects of the invention previously pointed out have been fully carried out and all its parts can be easily and cheaply manufactured, readily installed or taken down and inspected or repaired.

What I claim is:

1. An automatic plate valve, comprising a seat having a port, a guard having a port, and a recess in its underside adjacent to the seat, a permanently flexed plate valve in said recess and interposed between said seat and guard.

2. An automatic plate valve comprising a seat having a port, a guard having a bridge section and port, and a recess in its underside adjacent to the seat, a permanently flexed plate valve in said recess and interposed between said seat and guard, said bridge section being cut away to expose said flexed plate to oppositely directed pressures within said valve.

3. An automatic plate valve comprising a seat having a port, a guard having a port, and a recess in its underside adjacent to the seat, an elongated permanently flexed plate valve curved in the direction of its length in said recess and interposed between said seat and guard.

4. An automatic plate valve comprising a seat having a plurality of ports, a guard having a plurality of ports in staggered relation with respect to the ports in said seat and recesses in the underside between its ports and arranged directly over and adjacent to the ports in said seat, a permanently flexed plate valve in each of said recesses

and interposed between said seat and said guard.

5 5. An automatic plate valve comprising a seat having a plurality of ports, a guard having a plurality of ports in staggered relation with respect to the ports in said seat and recesses in the underside between its ports and arranged directly over and adjacent to the ports in said seat, a permanently
10 flexed curved plate valve in each of said recesses and interposed between said seat and said guard.

6. An automatic plate valve comprising a seat having a plurality of ports, a guard
15 having a plurality of ports in staggered relation with respect to the ports in said seat and recesses in the underside between its ports and arranged directly over and adjacent to the ports in said seat, an elongated per-

manently flexed plate valve curved in the direction of its length in each of said recesses and interposed between said seat and said guard.

7. An automatic plate comprising a seat having a plurality of ports, a guard having
25 a plurality of bridge sections and ports between said bridge sections and in staggered relation with respect to the ports in said seat, recesses in the undersides of said bridge sections and arranged directly over and adjacent to the ports in said seat, a permanently flexed plate valve in each of said recesses and interposed between said seat and guard, said bridge sections being cut away to
30 expose said flexed plate to oppositely directed pressures within the valve.
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In testimony whereof I affix my signature.

FRANK PETER MORAN.