No. 771,327. PATENTED OCT. 4, 1904.

A. H. SCHMIDT.

VALVE.

APPLICATION FILED APR. 2, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

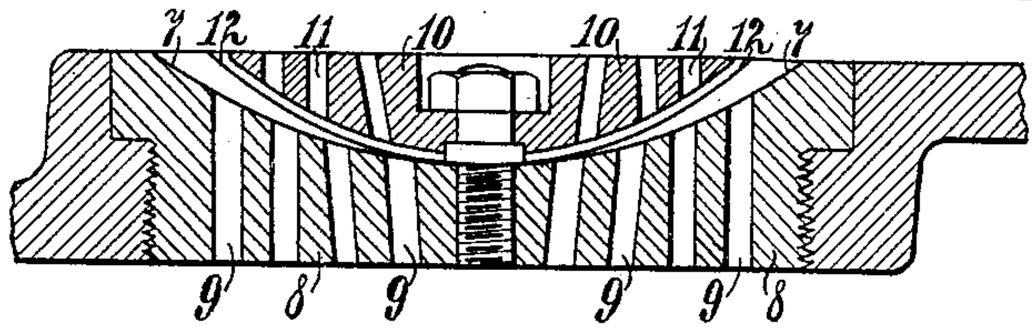


Fig. 2.

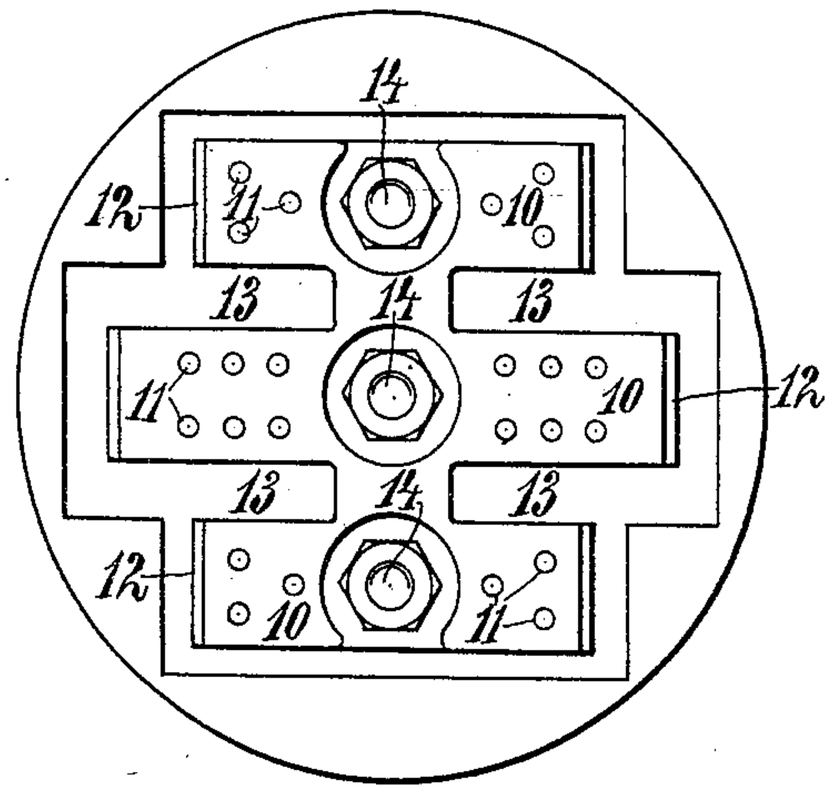


Fig. 3.

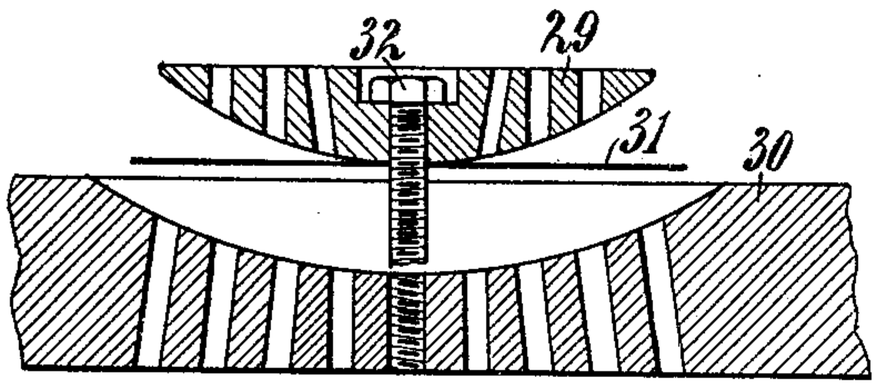


Fig. 5.

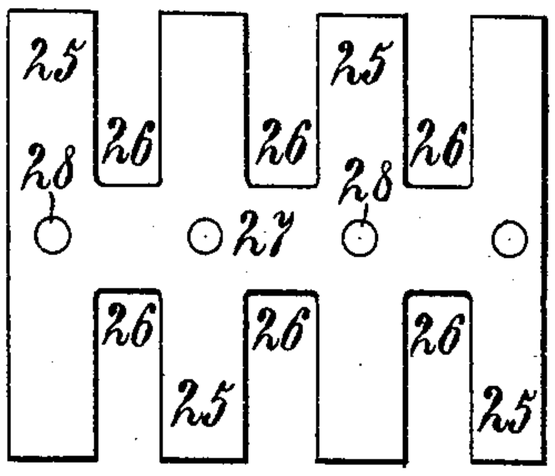
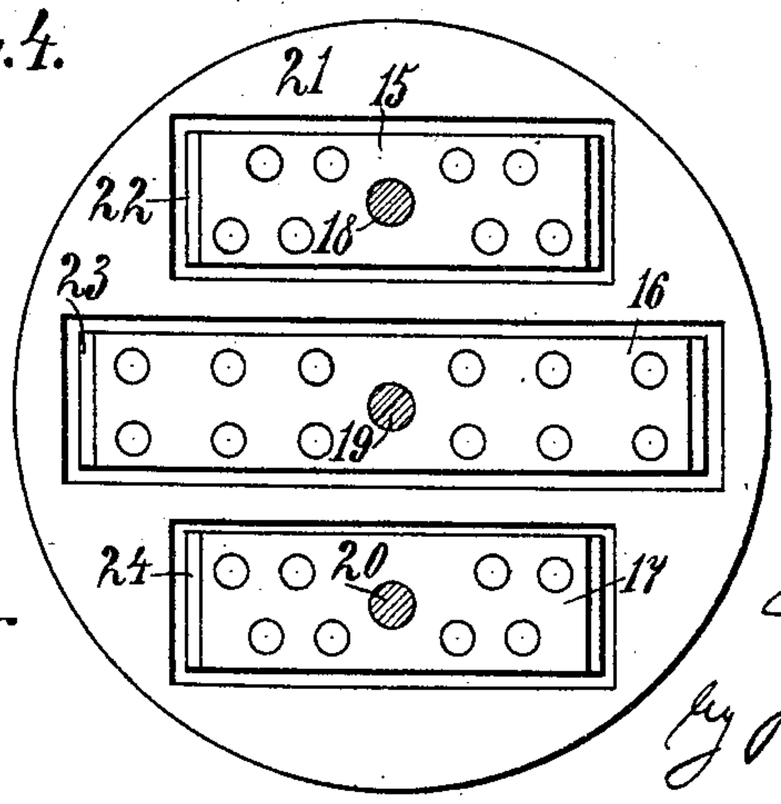


Fig. 4.



Witnesses:
G. S. Noble
Franz Ebner

Inventor,
August Hermann Schmidt
by B. Singer
Atty.

No. 771,327. PATENTED OCT. 4, 1904.

A. H. SCHMIDT.

VALVE.

APPLICATION FILED APR. 2, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig.6.

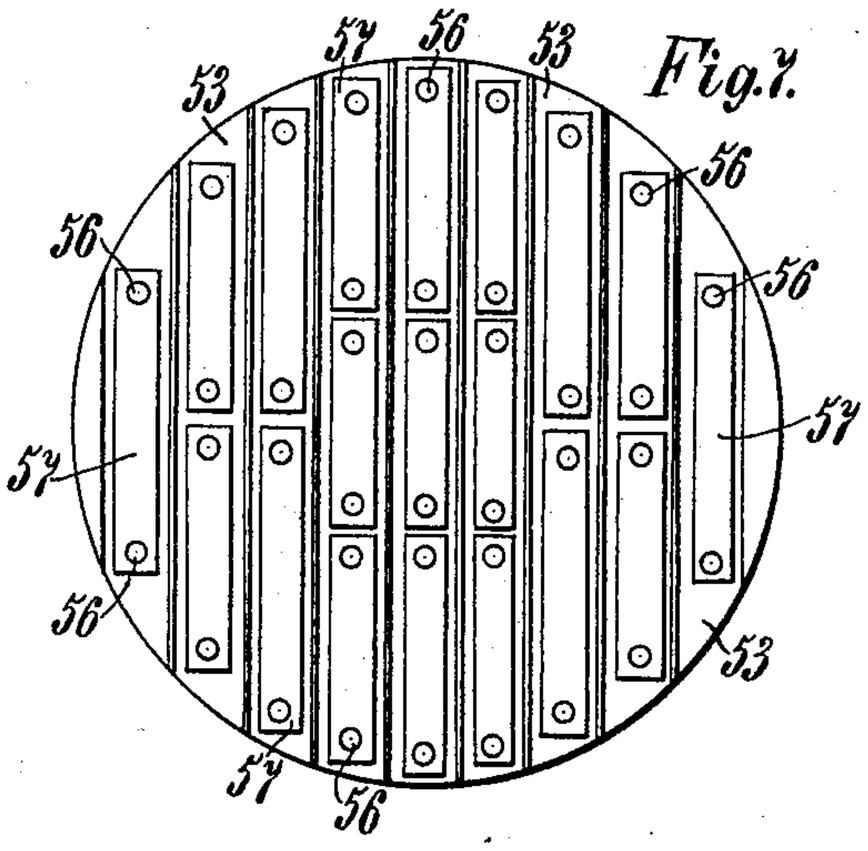


Fig.7.

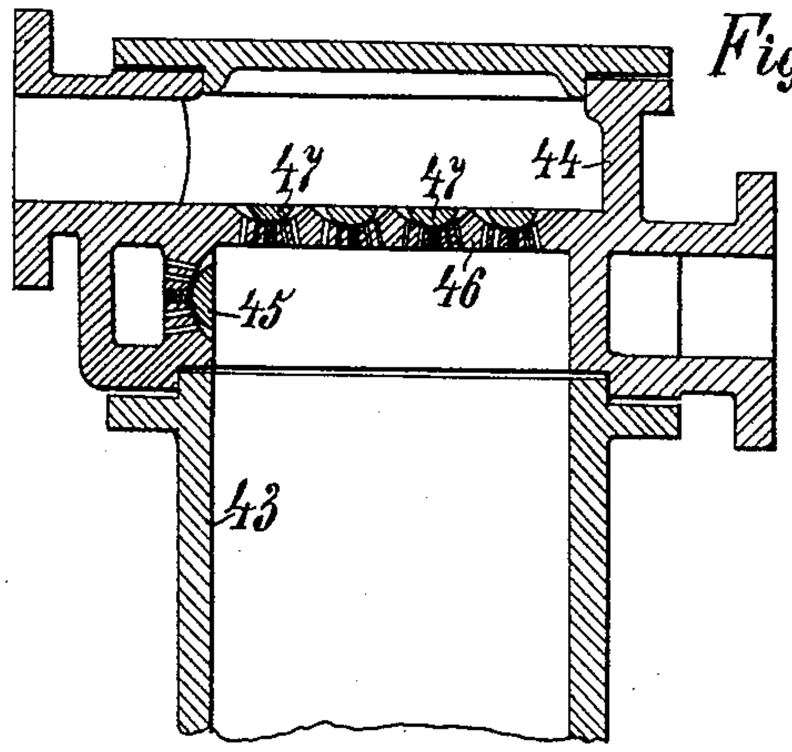


Fig.9.

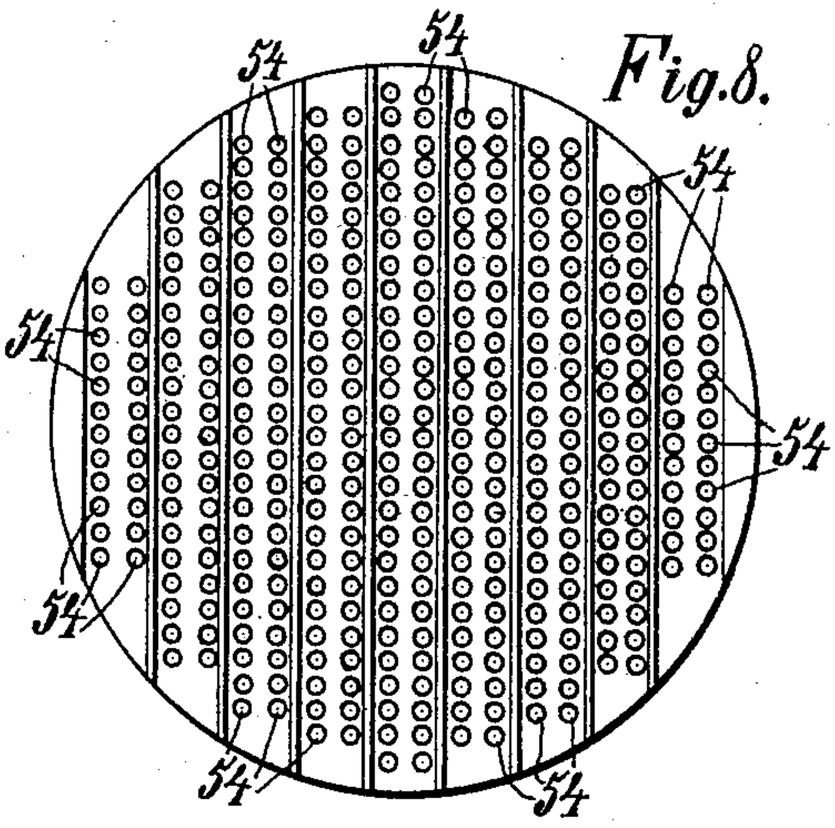


Fig.8.

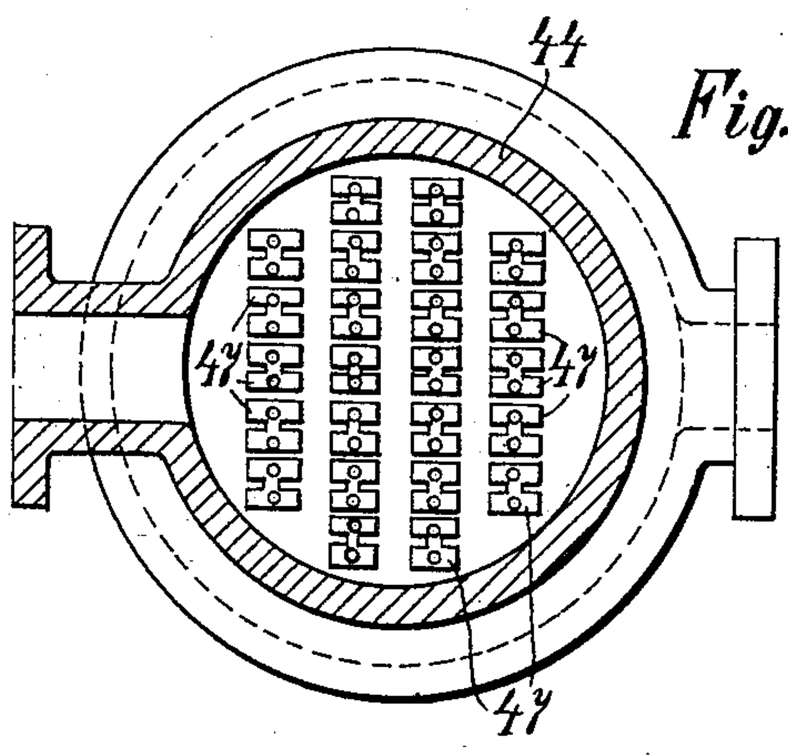
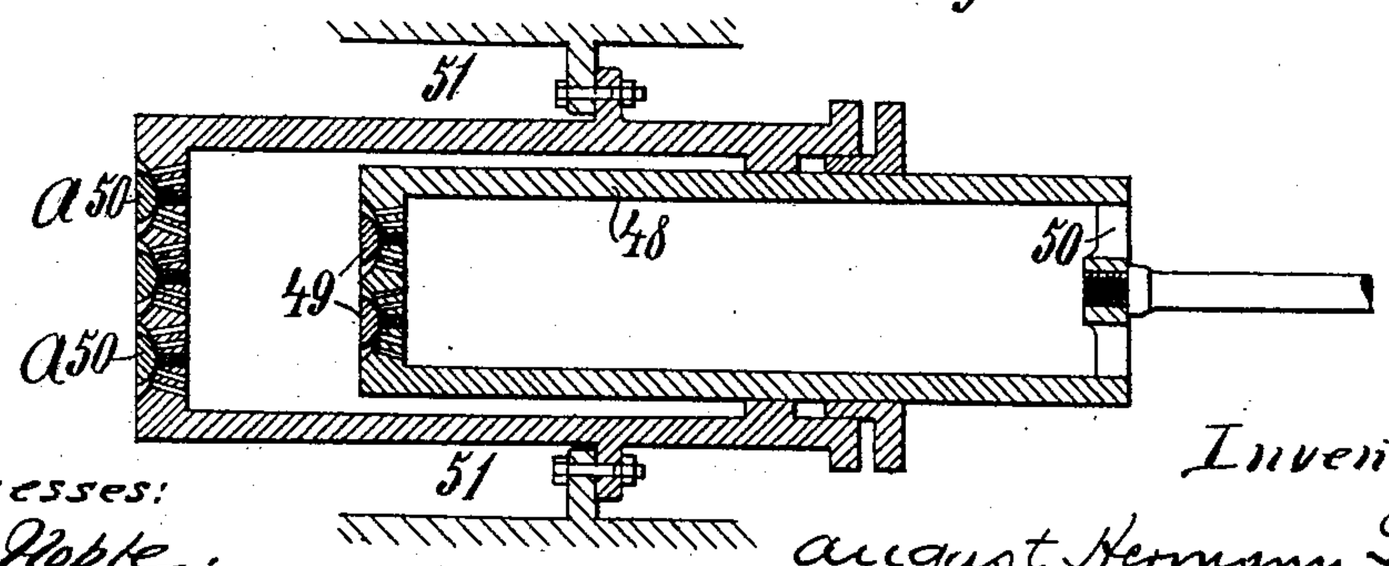


Fig.10.

Fig.11.



Witnesses:
G. S. Noble.
Fanny Ebner.

Inventor;
August Hermann Schmidt.
by P. Singer
Att'y.

No. 771,327. Patented October 4, 1904.

UNITED STATES PATENT OFFICE.

AUGUST HERMANN SCHMIDT, OF HAMBURG, GERMANY.

VALVE.

SPECIFICATION forming part of Letters Patent No. 771,327, dated October 4, 1904.

Application filed April 2, 1903. Serial No. 150,733. (No model.)

To all whom it may concern:

Be it known that I, AUGUST HERMANN SCHMIDT, a subject of the German Emperor, and a resident of Hamburg, in the Empire of Germany, have invented certain new and useful Improvements in Valves, of which the following is a specification.

This invention relates to an automatically opening and closing valve for pumps of all kinds—for instance, compressing-pumps, air-pumps, feed-pumps, draining machinery, waterworks, and the like—but more particularly for high-speed pumps for the purpose of temporarily allowing and interrupting the flow of liquid or gas.

Former valves in which the valve-body forming part of the surface of a cylinder bearing on the valve-seat, also cylindrical, is so distorted on account of overpressure of the medium traversing the valve that the diameter of the cylinder to which the valve-body appertains is varied have the drawback that in consequence of the cylindrical form of the valve-seat the detrimental space is a proportionally large one. In consequence thereof the sucking action in liquid and gas pumps is rendered difficult and their volumetrical efficiency will be a small one. This drawback is avoided in the present valve by the fact that the valve-seat is formed in the wall of the chamber to be provided with suction or pressure valves and connected to the stroke-stop in such a manner that the latter, holding the resilient valve-body fast between itself and the valve-seat, coincides with the surface of said wall. This arrangement brings about the advantage that the plunger may be moved over such valves or may be led up close to said valves, so that the detrimental or useless space is reduced to a minimum, and therefore turns out far smaller than in any valve of similar construction hitherto known.

The valve is represented in the annexed drawings in Figures 1 to 14. Figs. 1 and 2 show a form of construction of the valve in cross-section and plan view, respectively. Fig. 3 discloses the method of fastening the elastic valve-body to the valve-seat. Fig. 4 is a plan view of a similar form of construction with that difference that instead of a single elastic sheet several of these, all separated from each other, are employed. Fig. 5 is a plan view of a particularly elastic spring-plate. Figs. 6 to 8 show a cross-section and two plan views, respectively, of valves principally intended for compressors. Figs. 9 and 10 show in vertical section and plan view, respectively, the cylinder of a compressor with its valve-box. Fig. 11 is a vertical section of an air-pump in which the air is drawn in through the piston-valves.

As stated above, the present valve, compared with those hitherto known, has the advantage that the detrimental space of the pump is nearly completely obviated—to wit, is reduced to a minimum. For this reason it is especially adapted for use in pumps working with a high vacuum—as, for instance, required with steam-turbines.

As will be seen from Figs. 1, 2, the valve consists of a valve-seat 8, having a segmental recess. In the valve-seat passages 9 9 are provided, and above the latter the spring 12 and the stop 10 are arranged, the latter being preferably provided with similar passages 11. The spring 12 is in the form of a segment of a cylinder and is gripped between the valve-seat and the stop. In plan view the spring may be rectangular or may have the shape shown in Fig. 2. In the latter case the stop and springs have slots 13 to facilitate the flow of the fluid before or after passing through the valve. A suitable number of screws 14—as, for instance, three—are used for connecting the spring and the stop to the valve-seat.

The fastening of the elastic strips can be effected in an exceedingly simple manner, as, for instance, illustrated in Fig. 3. The fastening of the stop 29 to the valve-seat 30 causes the flat elastic strip 31 to be pressed against the valve-seat, and the tightening of the screws 32 produces a fixed connection between the stop 29 and the valve-seat 30. It is also obvious that the renewal of the springs can be effected in a very simple manner without interfering to any great extent with the arrangement of the pump. The slots 13 13, Figs. 1 and 2, divide the stop and the spring into a number of almost independently-acting parts, in the case illustrated three parts, which is to be clearly seen from Fig. 4. Consequently

there are three stops 15 16 17, each connected to the valve-seat 21 by a screw 18, 19, or 20 and each gripping a spring 22 23 24. In most cases, more particularly where a large passage area is required, the stop and the spring are given the shape shown in Fig. 5, in which case the said parts are rectangular with slots 26, so that the spring consists of an elongated part 27, gripped between the stop and the valve-seat by screw 28 and having tongues 25. The latter form the valve proper adapted to bear against the valve-seat and the stop.

The form of the valve shown in Figs. 6 to 8 for compressors allows of using comparatively very large passage-sections. As shown in Figs. 6 and 7, the valve-seat in this case has trough-shaped grooves 53, the surfaces of which form segments of cylinders. The valve-bodies are elastic rectangular strips 57 of comparatively small breadth. In each trough 53 there are two or more rows of passages 54, which are covered by the strips 57 when the valve is closed. The strips 57 are gripped between the valve-seat and the stops 55, the latter being connected to the valve-seat by screws 56. From Figs. 9, 11 the advantages these valves offer in gas-compressors and vacuum-pumps are clearly visible, as they may receive as small dimensions as possible and nevertheless provide a large passage area, while the detrimental space is nearly fully avoided. In Figs. 9, 10, 43 is a compressor-cylinder provided with a valve-box 44, the suction-valves 45 being arranged in the walls 46 and the pressure-valves 47 in the bottom of the valve-box. The piston can thus move right up to the pressure-valves, so that the only detrimental or useless space is that of the passages in the valve-seat.

In the construction shown in Fig. 11 a pump is represented into which air is caused to pass by the valve 49 in the piston 48. For this purpose the piston must be open at 50. On the back stroke of the piston—*i. e.*, when the piston 48 approaches the pressure-valve a^{50}—the air is compressed in the chamber 51.

Having now fully described my invention, I declare that what I claim is—

1. In a valve for alternately permitting and interrupting the passage of fluids, the combination of a valve-body formed as a segment of a cylinder, adapted to be distorted by the pressure of the fluid, of a cylindrical valve-seat formed in the wall of the chamber to be provided with suction and pressure valves, a stop-stroke gripping said valve-body and coinciding with the surface of said wall, substantially as and for the purpose set forth.

2. In a valve for alternately permitting and interrupting the passage of fluids, the combination of an elastic valve-body formed as a segment of a cylinder, adapted to be distorted by the pressure of the fluid, of a cylindrical valve-seat formed in the wall of the chamber to be provided with suction and pressure valves, a stop-stroke gripping said elastic valve-body and coinciding with the surface of said wall, substantially as and for the purpose set forth.

3. In a valve for alternately permitting and interrupting the passage of fluids, the combination of an elastic valve-body formed as a segment of a cylinder and consisting of a plurality of separate sections adapted to be distorted by the pressure of the fluid, of a cylindrical valve-seat formed in the wall of the chamber to be provided with suction and pressure valves, a stop-stroke gripping said elastic valve-body and coinciding with the surface of said wall, substantially as and for the purpose set forth.

4. In a valve for alternately permitting and interrupting the passage of fluids the combination of an elastic valve-body formed as a segment of a cylinder adapted to be distorted by the pressure of the fluid, of a cylindrical valve-seat formed in the wall of the chamber to be provided with suction and pressure valves, a stop-stroke, with means of fastening said elastic valve-body between said stop-stroke and valve-seat, said stop-stroke coinciding with the surface of said wall, substantially as and for the purpose set forth.

5. In a valve for alternately permitting and interrupting the passage of fluids, the combination of an elastic valve-body consisting of a rectangular piece of metal formed as a segment of a cylinder, provided with slots forming a central elongated part and tongues at both sides thereof divided by said slots respectively, substantially as and for the purpose set forth.

6. In a valve for alternately permitting and interrupting the passage of fluids, the combination of an elastic valve-body consisting of a rectangular piece of metal formed as a segment of a cylinder, provided with rectangular slots forming a central elongated part and rectangular tongues at both sides thereof divided by said rectangular slots respectively, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

AUGUST HERMANN SCHMIDT.

Witnesses:
E. H. L. MUMMENHOFF,
OTTO W. HELLMRICH.