

No. 681,233.

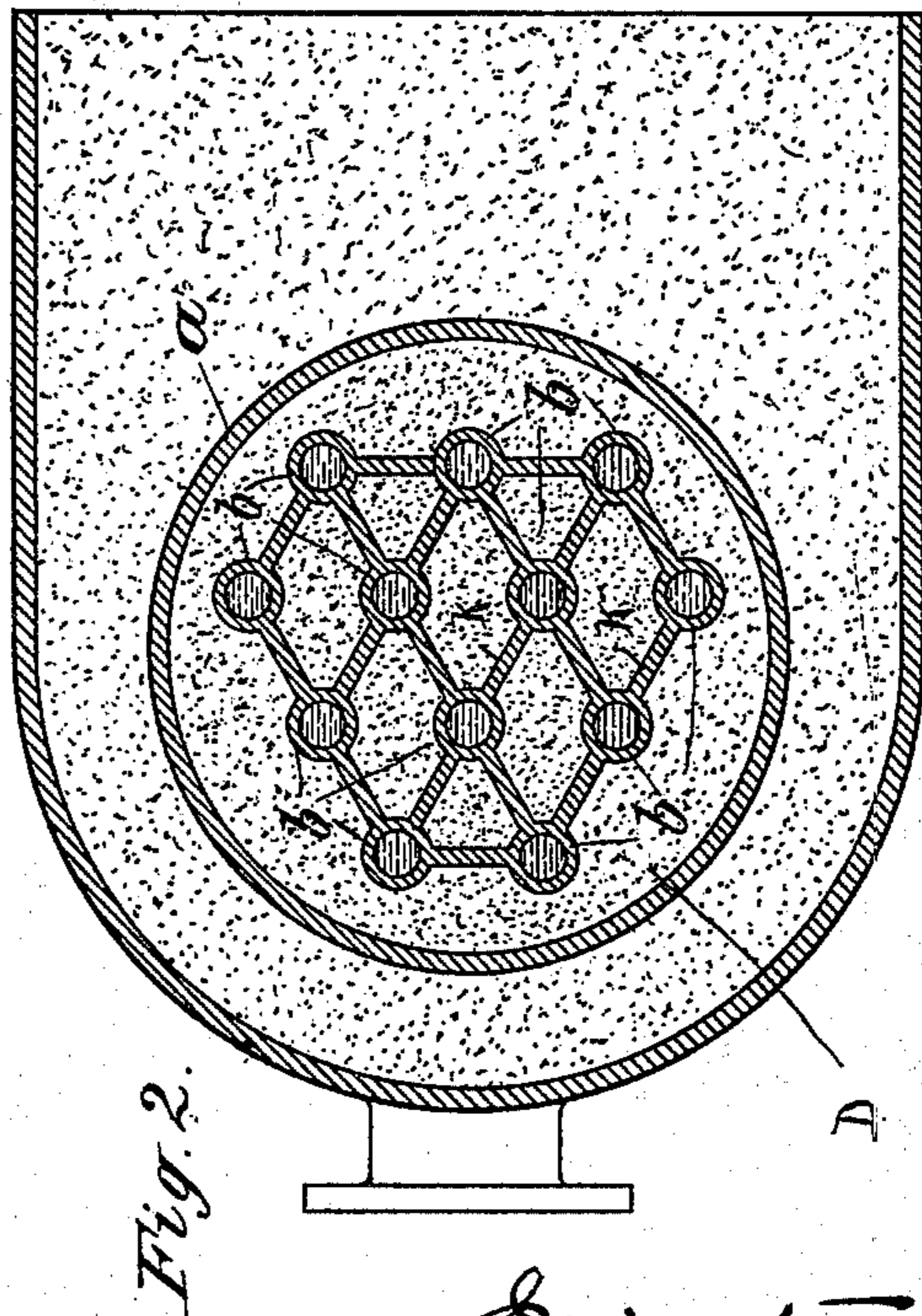
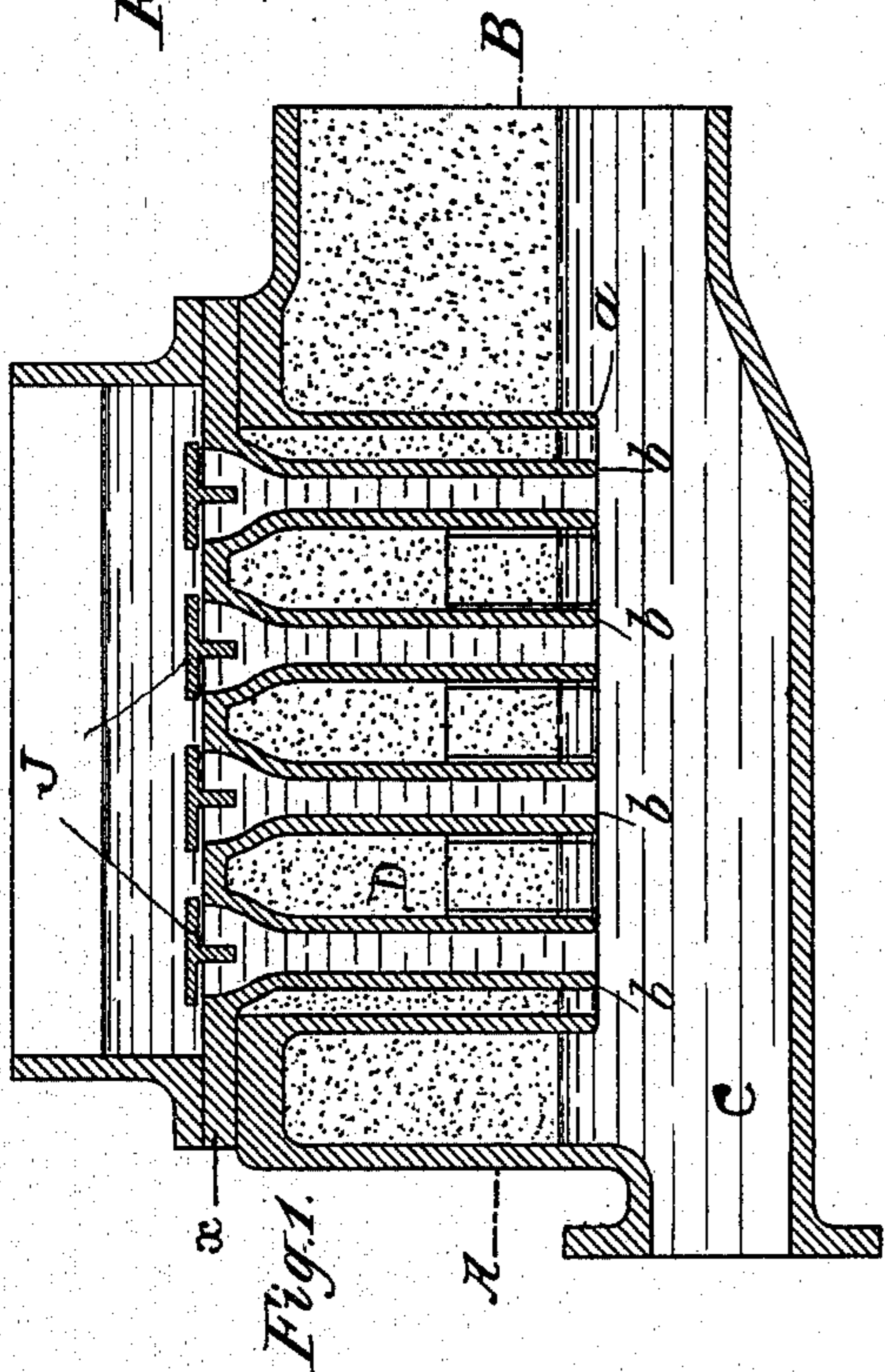
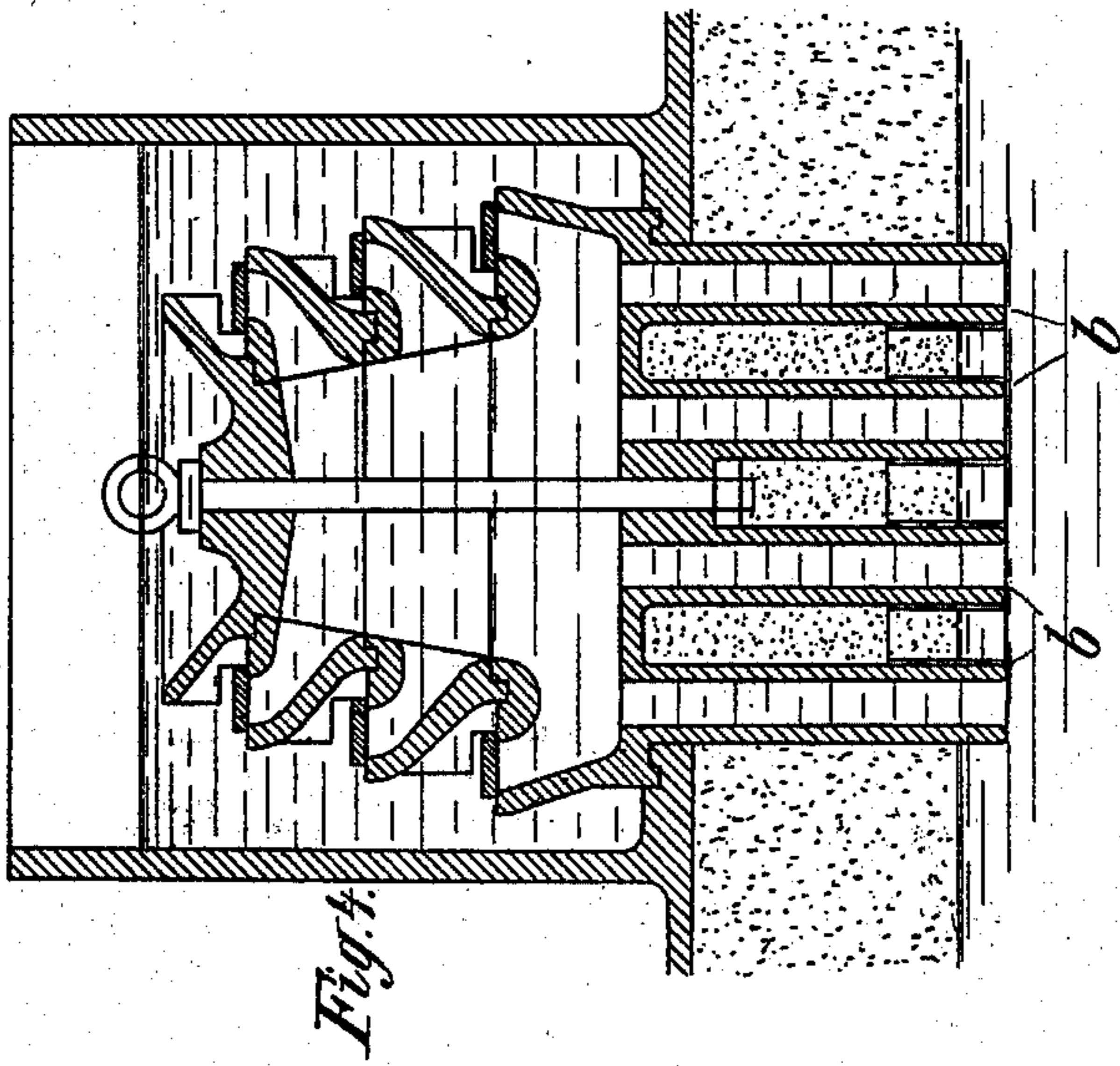
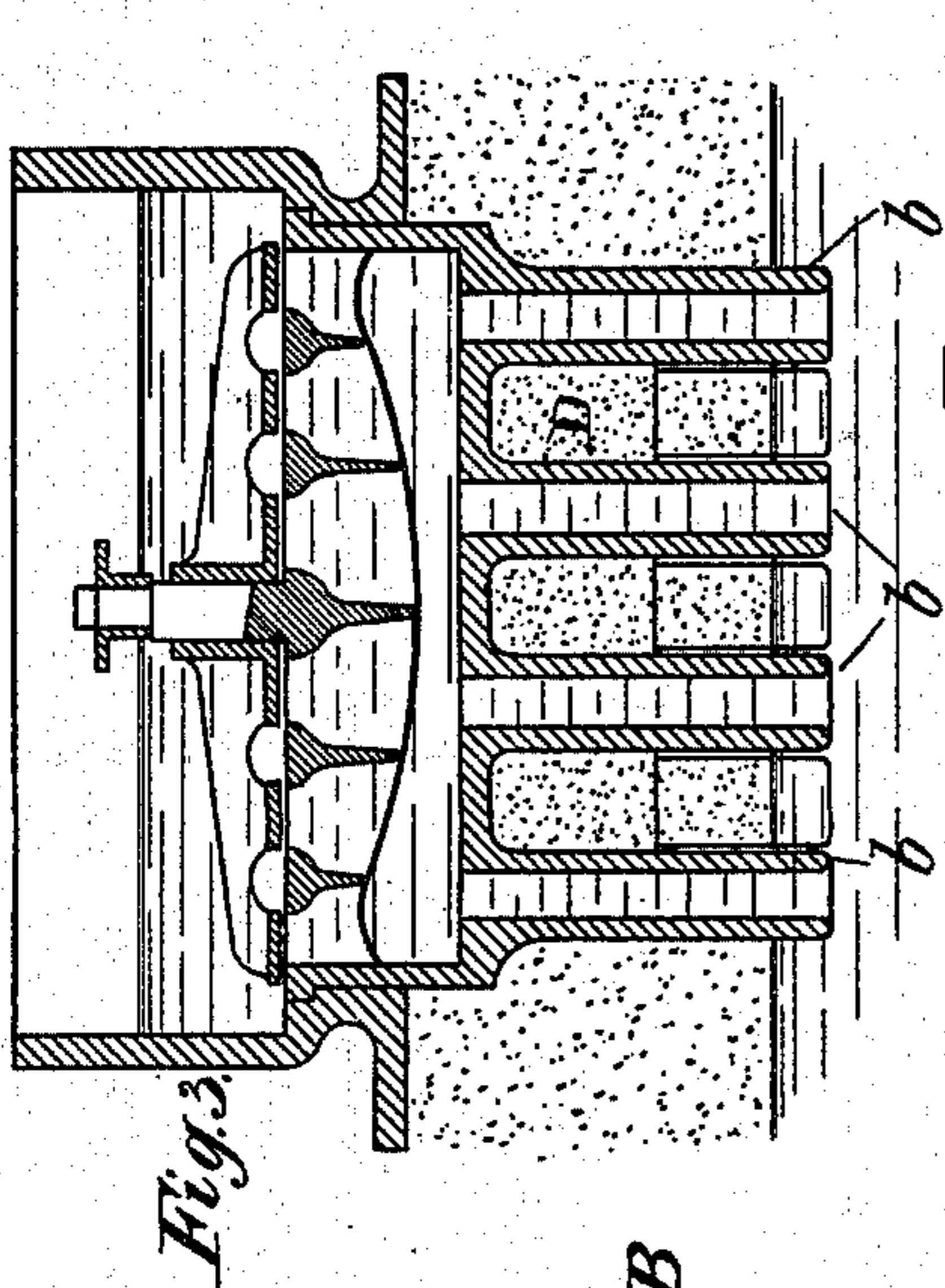
Patented Aug. 27, 1901.

J. KLEIN.

SUCTION VALVE FOR PUMPS.

(Application filed Nov. 22, 1900.)

(No Model.)



Witnesses
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UNITED STATES PATENT OFFICE.

JOHANN KLEIN, OF FRANKENTHAL, GERMANY.

SUCTION-VALVE FOR PUMPS.

SPECIFICATION forming part of Letters Patent No. 681,233, dated August 27, 1901.

Application filed November 22, 1900. Serial No. 37,383. (No model.)

To all whom it may concern:

Be it known that I, JOHANN KLEIN, manufacturer, a subject of the King of Bavaria, residing at Frankenthal, Palatinate, Germany, have invented certain new and useful Improvements in Suction-Valves for Pumps, of which the following is a specification.

This invention relates to suction-valves for pumps provided with sets or groups of valves or annular or step valves; and it has for its purpose to attain a very great speed of the pump.

One of the most important conditions for a silent working of a pump consists in preventing the interruption of the water column whereby water-hammer is produced. For this purpose the mass or volume of water to be accelerated should be as small as possible. In order to attain the same purpose, the suction air-chamber is arranged as close as possible to the suction-valves, and it is proposed to give the lower part of the body of the pump the form of a suction air-chamber. By this means, owing to the slight difference between the level of the suction-valves and the water-level in the suction air-chamber, the pressure required to accelerate the flow of water is materially reduced. Pumps provided with group, annular, or step valves have, however, the disadvantage that there exists a very great difference between the area of the cross-section of the suction-pipe extending into the suction-chamber and the cross-section of the passage of the suction-valves. Owing to the great variations of speed resulting therefrom in such pumps, the number of strokes cannot be increased beyond a determined limit.

This invention relates to the arrangement of a suction-valve wherein by a suitable construction of the valve-seat the obstacles in the movement above mentioned are avoided, and which, moreover, offers several other advantages as compared with the hitherto-known arrangements by which a silent exact working of the pump is insured and a much higher speed attained.

The accompanying drawings show several forms of construction of this suction-valve.

Figure 1 is a vertical section through the lower part of the pump, showing the form of

construction for group-valves. Fig. 2 is a horizontal section on line A B in Fig. 1. Fig. 3 is a similar section as Fig. 1 through a pump-body with annular valves. Fig. 4 shows a corresponding section through a pump-body with a three-step valve.

All these constructions have in common the arrangement of tubes *b*, which extend downward from underneath the valve-seats and dip into the water in the lower part of the suction-chamber C, thereby constituting in the upper part of this chamber, between the tubes themselves and between the latter and the adjacent walls of the pump-body, a free air space or chamber D as close to the suction-valves as is possible. In addition to these tubes *b* a cylinder *a* may be employed, which surrounds the whole series of tubes *b* and forms the outer wall of the air-chamber in the pump-body. In the construction shown in Figs. 1 and 2 the tubes *b* are formed in one piece with a diaphragm *x*, and at their upper ends they are fitted with valves J of ordinary known construction. In this instance to prevent throttling of the water by the valves the upper parts of the tubes are flared or coned, as shown. The several tubes *b* may also be connected by strengthening-webs *k k*. In annular and step valves, Figs. 3 and 4, there are also arranged below the several parts of the valve-tubes *b*, leading the water directly to the valve. In all these cases the water is subdivided by the small tubes *b* below each section of the valve, and variations of speed in the passage from the suction-chamber into the pump-chamber are avoided. The spaces between the valves in the old construction offer a resistance to the flow of the water; but in the new construction each space between the tubes *b* constitutes an air vessel, the pressure in which assists the movement of the water.

The water is led to the several parts of the valve in a number of straight parallel streams the axis of each of which is the shortest path from the suction-chamber to the pump-chamber, and as the direction of each stream is normal to the valve there is no tendency of the valve to tilt or bind. Each of the streams being inclosed and isolated, the production of eddies and counter-currents is reduced to

a minimum on the suction side, while at the same time the volume of liquid to be accelerated at every stroke of the piston is reduced to a minimum and the rate of flow is made
5 more uniform, so that at no one point is the velocity relatively greater than at any other point. If through the suction-conduit air-bubbles enter, they do not penetrate suddenly into the pump-chamber between the suction
10 and forcing valve, but they are distributed and enter only slowly into the pump-chamber, so that the frequently-occurring shocks are avoided.

I claim—

15 1. The combination with the valve, of a plurality of separated tubes leading thereto and serving to divide the water passing to the valve into a number of small streams, the space between the tubes constituting an air-

chamber adjacent to the valve, substantially 20 as described.

2. The combination with the valve-seat provided with a plurality of valve-controlled passages, of a plurality of separated tubes leading to said passages and serving to divide the 25 water passing thereto into a number of isolated parallel streams, and a cylinder surrounding said tubes and constituting the outer wall of an air-chamber formed by the spaces between the tubes, substantially as de- 30 scribed.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHANN KLEIN.

Witnesses:

JOS. KLEIN,
JACOB ADRIAN.