

(No Model.)

J. P. SERVE.

MEANS FOR PREVENTING SHOCKS IN PUMPS.

No. 594,039.

Patented Nov. 23, 1897.

FIG. 1.

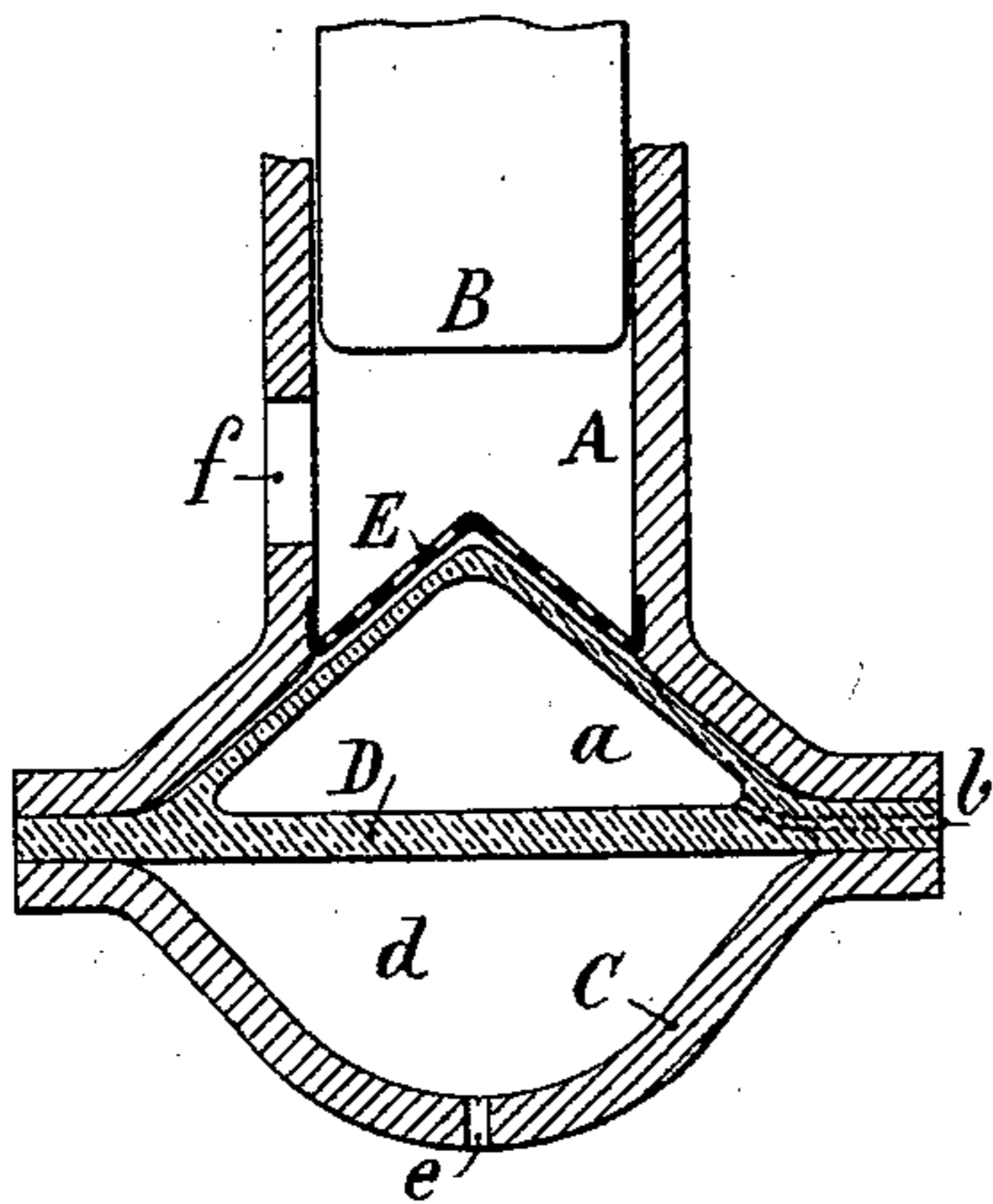


FIG. 2.

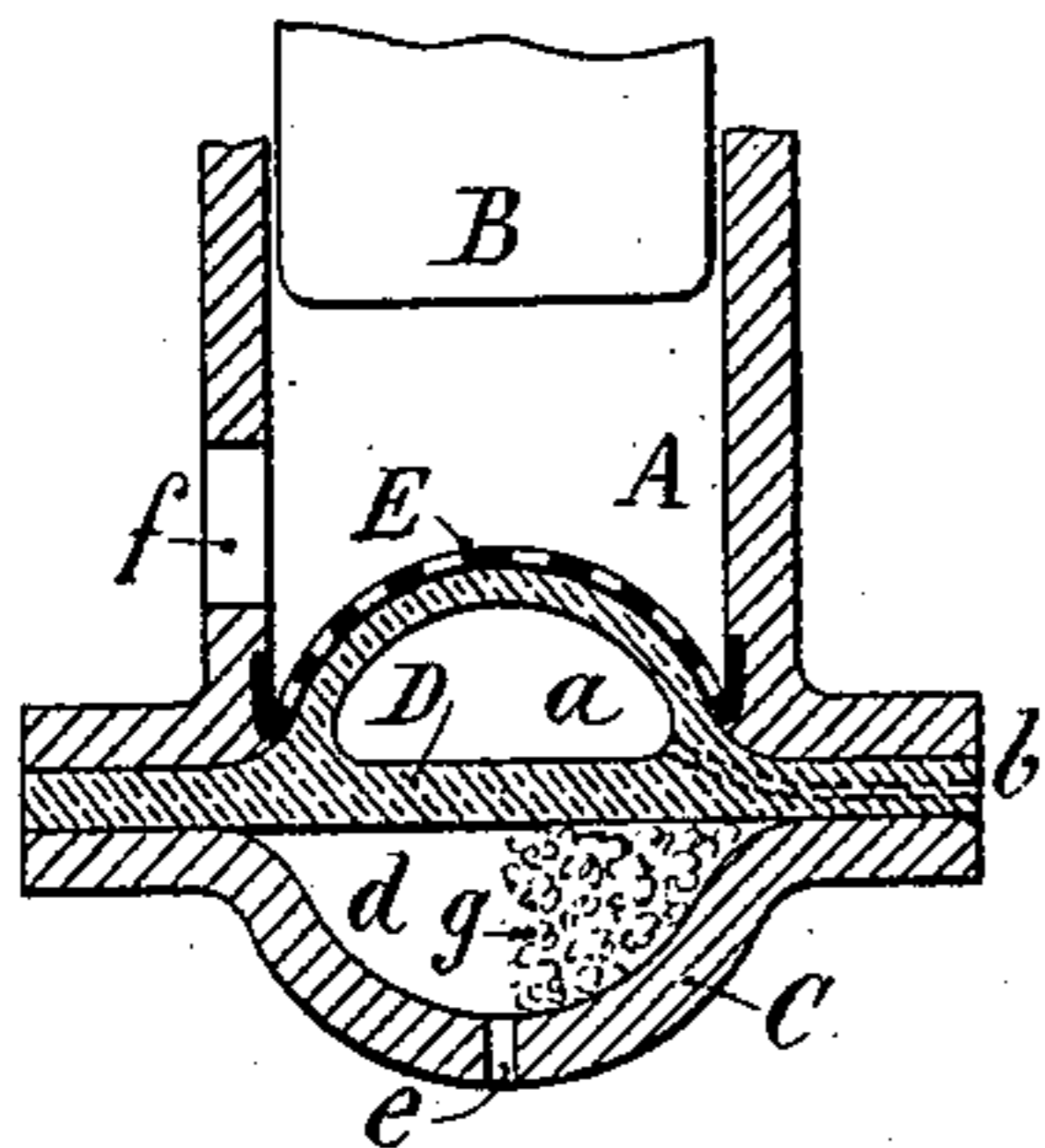


FIG. 3.

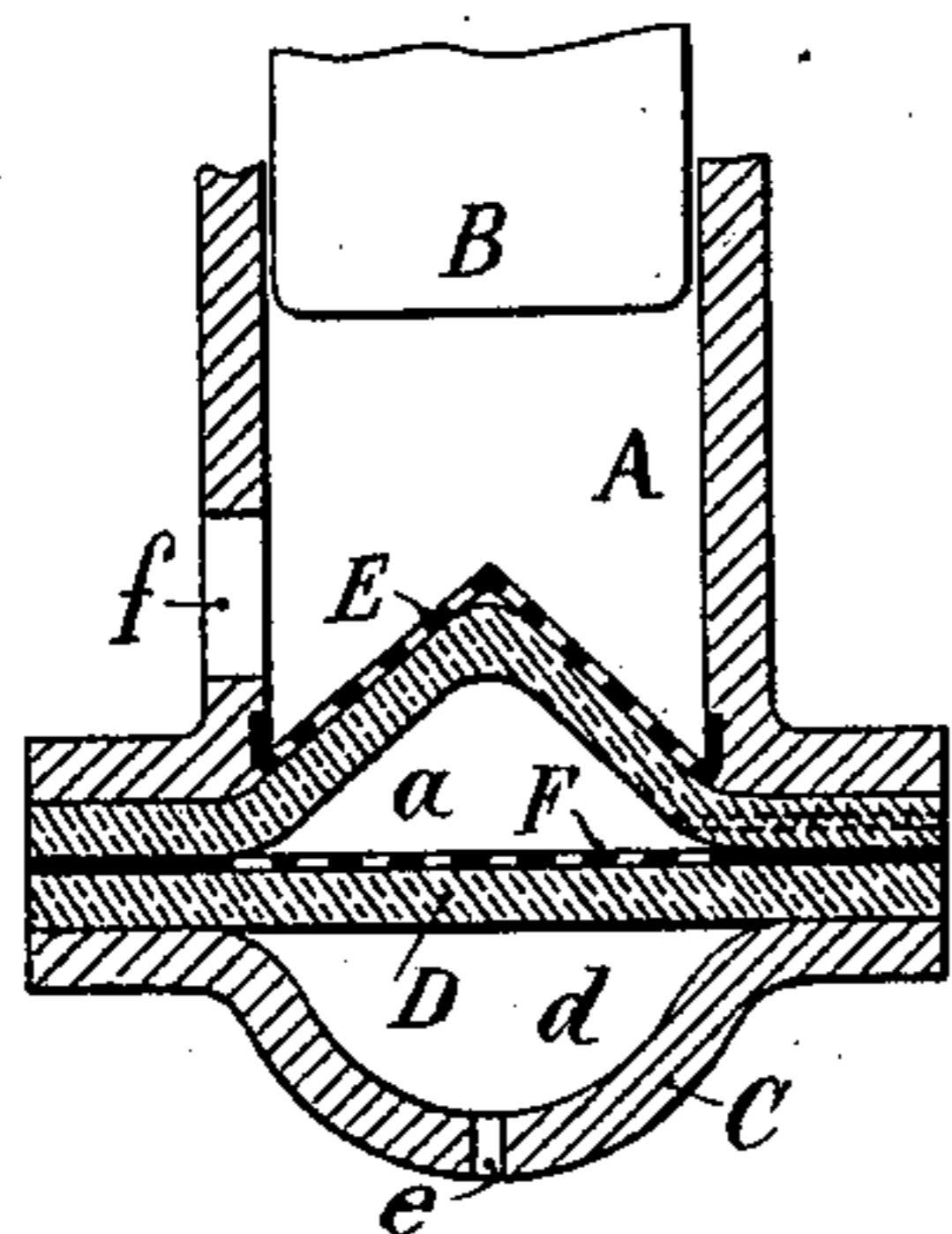


FIG. 4.

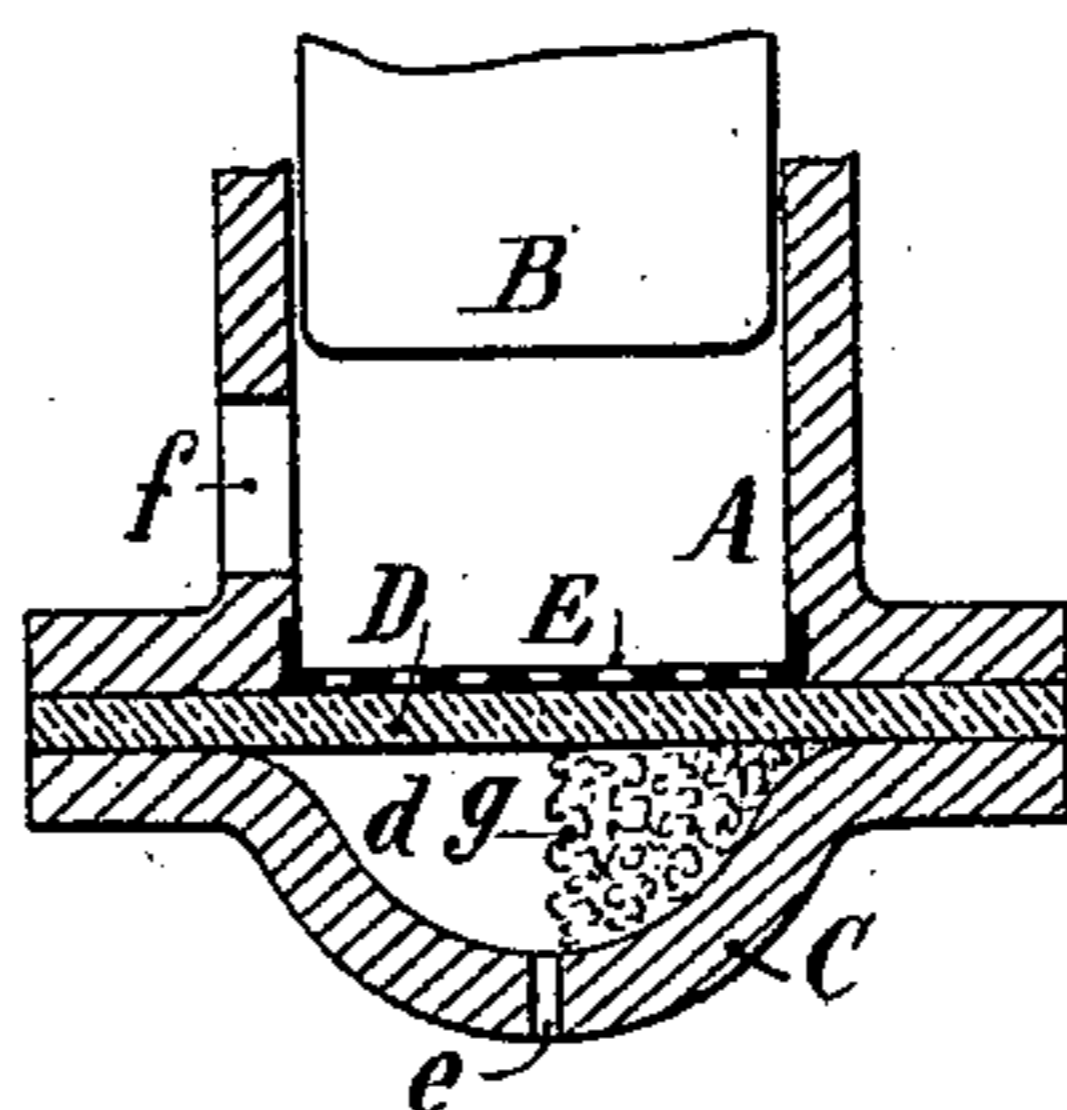


FIG. 5.

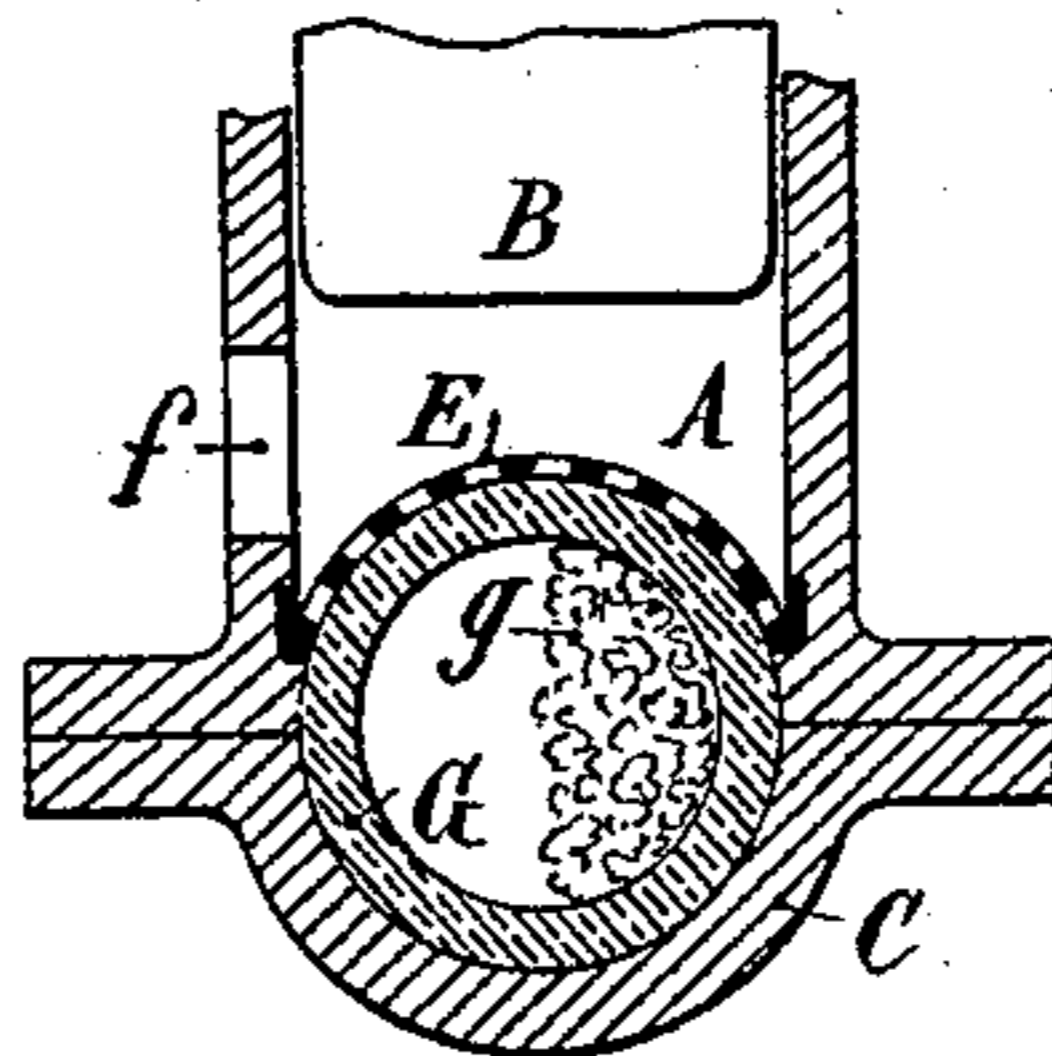
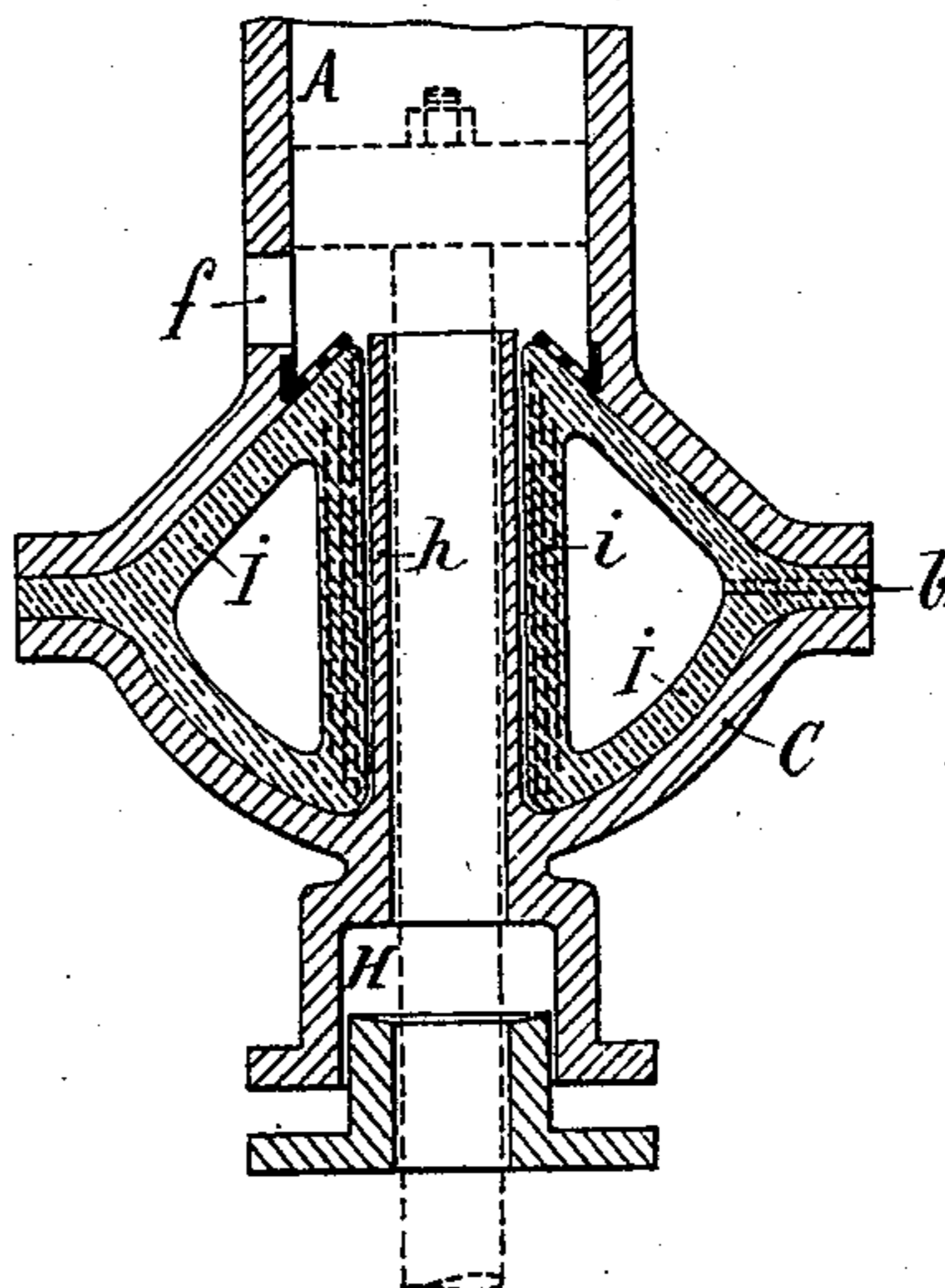


FIG. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

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MEANS FOR PREVENTING SHOCKS IN PUMPS.

SPECIFICATION forming part of Letters Patent No. 594,039, dated November 23, 1897.

Application filed August 21, 1896. Serial No. 603,482. (No model.)

To all whom it may concern:

Be it known that I, JEAN PIERRE SERVE, engineer, a citizen of the Republic of France, residing at Paris, in the Republic of France, have invented certain new and useful Improvements in Means for Preventing Shocks in Pumps on the Sudden Stoppage or Starting of the Flow of Liquids, of which the following is a specification.

This invention relates to that class of devices employed for preventing shocks called "water-hammers" due to the starting or sudden stoppage of the flow of liquids in pumps, and has for its object to provide means for obtaining this result in a more efficacious manner than by the use of air-reservoirs generally employed in which the air is rapidly absorbed by the liquid with which it is in direct contact.

The invention consists, essentially, in the use of elastic chambers which are placed inside the pump, such chambers being formed by a casing of flexible and impervious material inclosing either the air or other gas compressed at a pressure in proportion to that of the liquid or of flexible material containing interposed air in such a way that the gas is not in direct contact with the liquid, and so that the chamber thus formed may easily yield and afford an elastic support or cushion to the liquid at the moment of its starting and of its sudden stoppage. I have given the name of "hydro-reducer" to these elastic chambers, the arrangement and mode of fitting of which depend upon the various applications which may be made thereof and which will now be described in this specification with reference to the accompanying drawings, in which—

Figure 1 is a section of a pump with plunger-piston provided with my improvement. Figs. 2, 3, 4, and 5 are sections showing various elementary arrangements of hydro-reducers for pumps. Fig. 6 is a section showing the application of the invention to a double-acting piston-pump.

In order to realize the application of the invention to pumps with plunger-pistons, the arrangement shown in Fig. 1 is preferably employed. In this figure, A is the body or barrel of the pump, which is preferably somewhat enlarged at this point. B is the piston-plunger; C, the bottom of the pump. D is a disk or sheet of india-rubber or other flexible

material, which is interposed in the joint at the bottom C and which is provided with a pouch *a* of conical or rounded form, in which air may be compressed to a pressure which may be desired by means of a small conduit *b*, which is tightly closed by screwing up the joint with the addition of india-rubber solution in order to insure the hermetic closing of this joint. The pouch or pocket *a* is held in place in the interior of the pump by means of a grating E, of perforated metal, having the same form as the pouch. The bottom plate C of the pump is suitably rounded or dished in such a way as to reserve behind the india-rubber disk D a chamber *d*, which may be filled with compressed air by means of an opening *e*, which may be closed in any suitable manner or which may be simply filled with spongy india-rubber formed of a great number of irregular alveoles filled with air in order to impart to it a great elasticity.

It is understood that at each stroke of the plunger B the gas or elastic material contained in the chambers *a* and *d* furnishes an elastic support or cushion to the liquid forced back, which may flow then without a sudden shock through the orifice *f*, leading into the valve-box of the pump. In this arrangement the cushioning is shown as being placed at the end of the pump-barrel A; but it is understood that the orifice *f*, leading to the valve-box, may be placed at the end of the pump-barrel A, and in this case the cushioning arrangement will be placed laterally in the body or barrel of the pump.

The arrangement shown in Fig. 2 is the same except that the barrel of the pump is not enlarged in diameter at its end and that the air-chamber *a* may be semispherical in form and also that the chamber *d* may be filled with compressed air or spongy india-rubber *g*, as shown in the figure.

In the arrangement shown in Fig. 3 the pouch *a* is separated from the india-rubber disk D by means of a perforated grating inserted in the joint in order to admit of air being injected into the external pocket *d* to a greater pressure than that which is introduced into the internal pocket *a*.

In the arrangement shown in Fig. 4 the pouch *a* is dispensed with and the elastic support is provided for the liquid by a simple

elastic disk or plate D, maintained, as before, in the interior of the body of the pump by means of a grating E of perforated sheet metal, and the chamber existing between this plate
 5 D and the bottom C is filled internally, as before, with compressed air or spongy india-rubber *g*, the compressed air being introduced by means of an opening *e*, provided with a valve.

10 Finally, in the simpler arrangement shown in Fig. 5 the elastic cushion is furnished by means of a ball G, filled with air or spongy india-rubber and which is maintained in place between the grating E and the bottom C,
 15 which have exactly the same form.

In the case of a double-acting pump the end thereof through which the piston-rod passes must be arranged in the manner shown in Fig. 6. In this case the cover C, bearing the stuffing-boxes H, is provided with an internal sleeve
 20 *h*, projecting into the interior of the barrel A of the pump, which is suitably increased in diameter at this point, and it is on this sleeve *h* that the india-rubber cushion I, filled, as
 25 hereinbefore mentioned, with spongy india-rubber or, better still, with compressed air inserted by means of a small conduit *b*, passing through the joint of the pump, is fitted. It is of advantage in this case to provide a
 30 part of the chamber or cushion I in contact with the sleeve *h* with several layers *i* of

fabric or wire-gauze in order to prevent it bending under the action of the liquid acting on its surface.

I declare that what I claim is—

1. In combination with a pump; a plate or disk of flexible and impervious material provided on one side with a pouch or chamber filled with compressed air; a grating of the same form as said pouch to maintain it in
 40 place in the pump; and a chamber filled with compressed air formed on the opposite face of the flexible plate by the bottom of the pump, substantially as and for the purpose set forth.

2. In combination with a pump; two sheets
 45 of flexible material each so supported by metallic gratings as to form between them a chamber intended to receive compressed air and so placed within the pump as to form between the second sheet and the bottom of the
 50 pump a second chamber in which air may be compressed at a pressure superior to that in the first chamber substantially as hereinbefore described and for the purpose set forth.

In testimony whereof I have signed my
 55 name to this specification in the presence of two subscribing witnesses.

JEAN PIERRE SERVE.

Witnesses:

E. DUMAL,
 J. CONDOMY.