

(No Model.)

3 Sheets—Sheet 1.

L. D' AURIA.
PUMP.

No. 603,884.

Patented May 10, 1898.

Fig. 1.

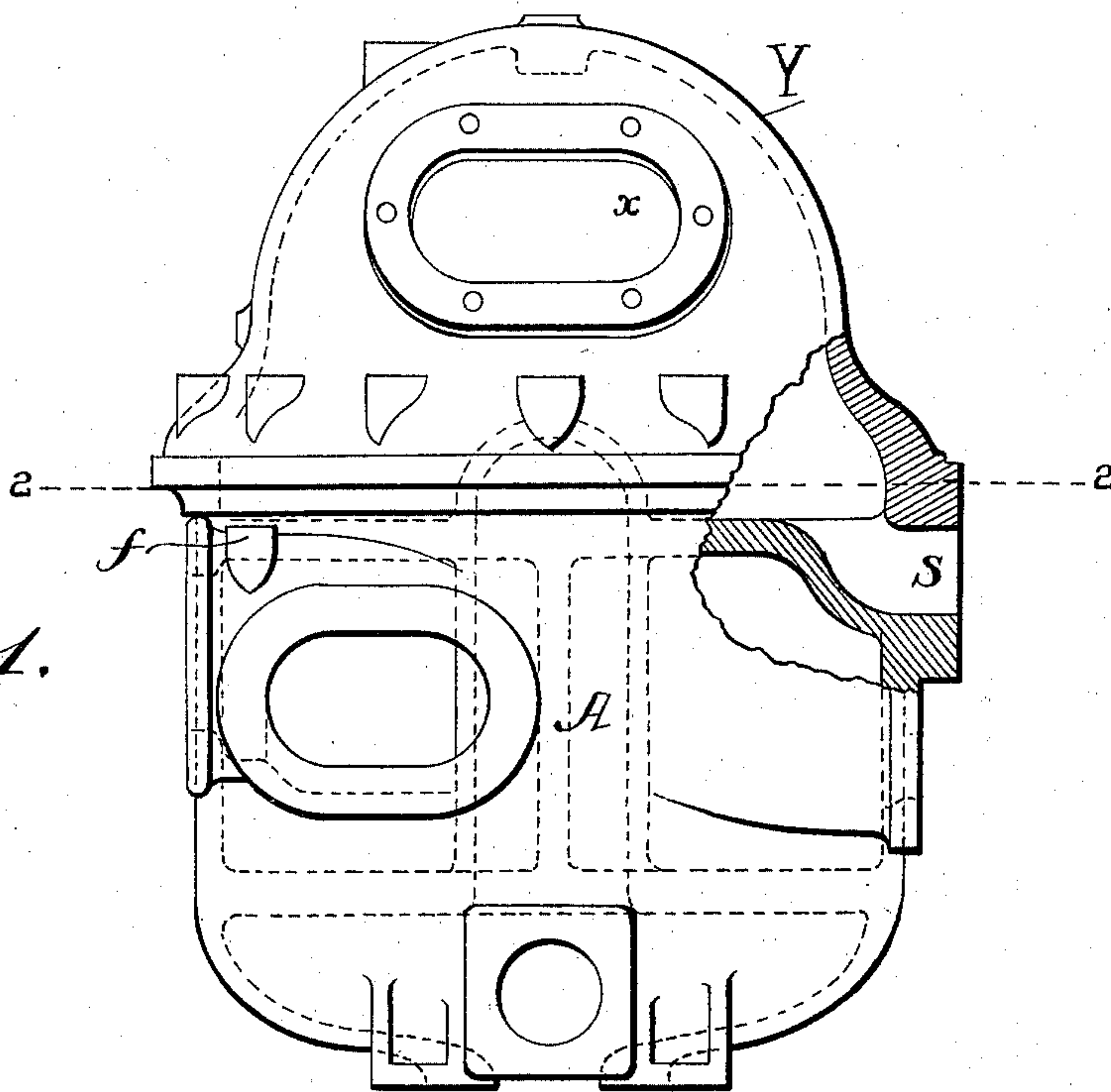
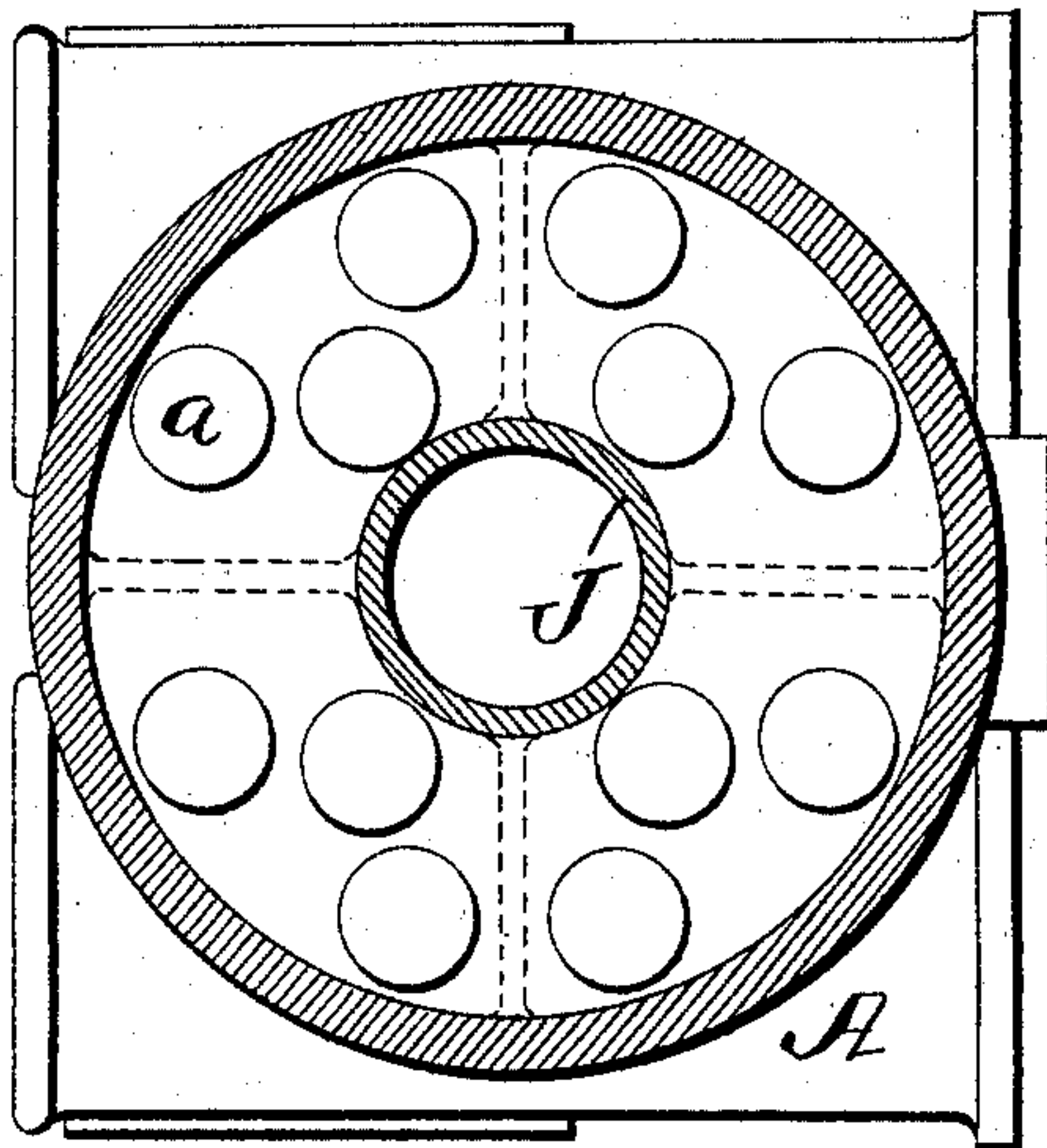


Fig. 2.



Witnesses:

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J. P. Appleman.

Inventor.

Luigi D' Auria,
By Horson & Horson,
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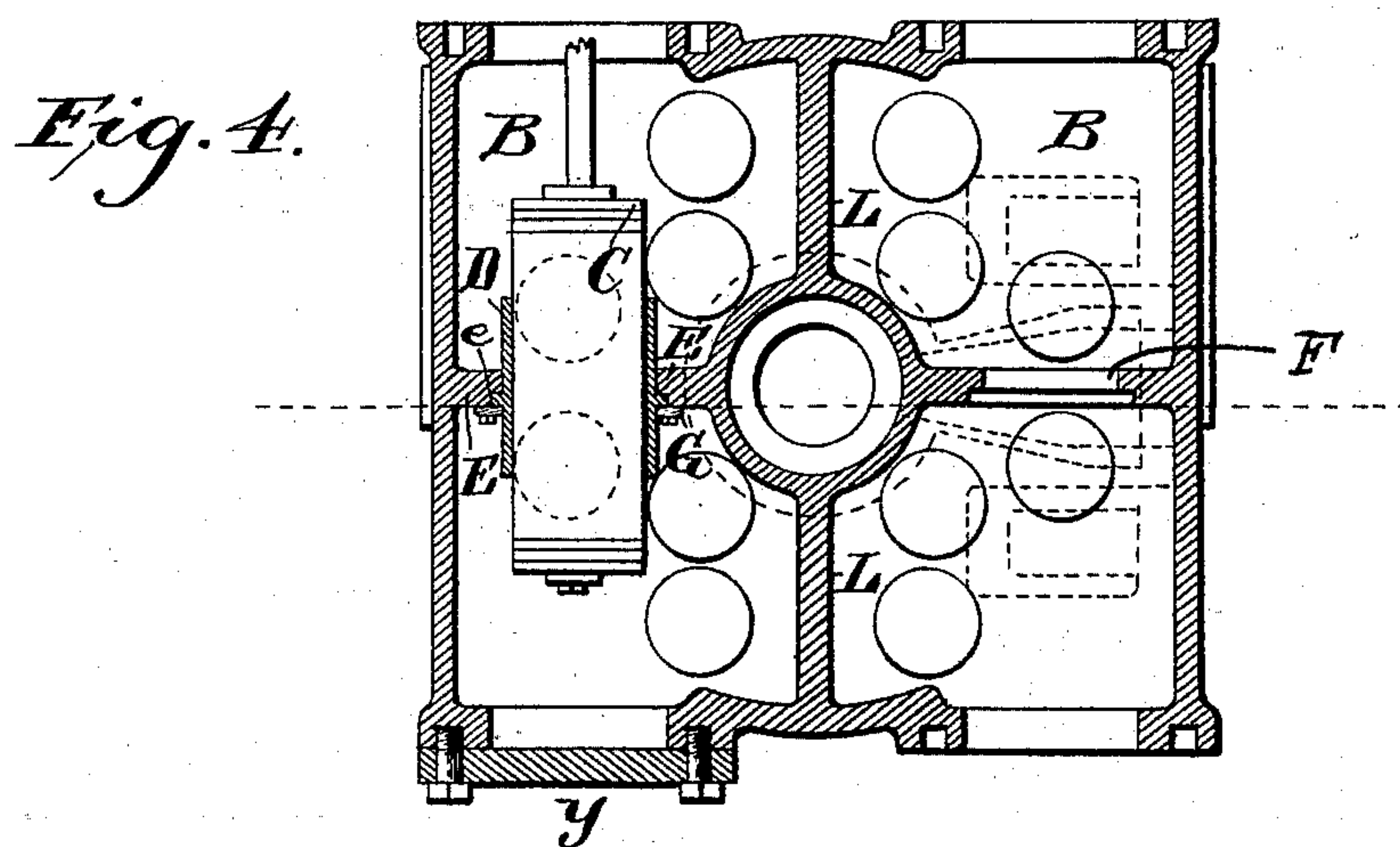
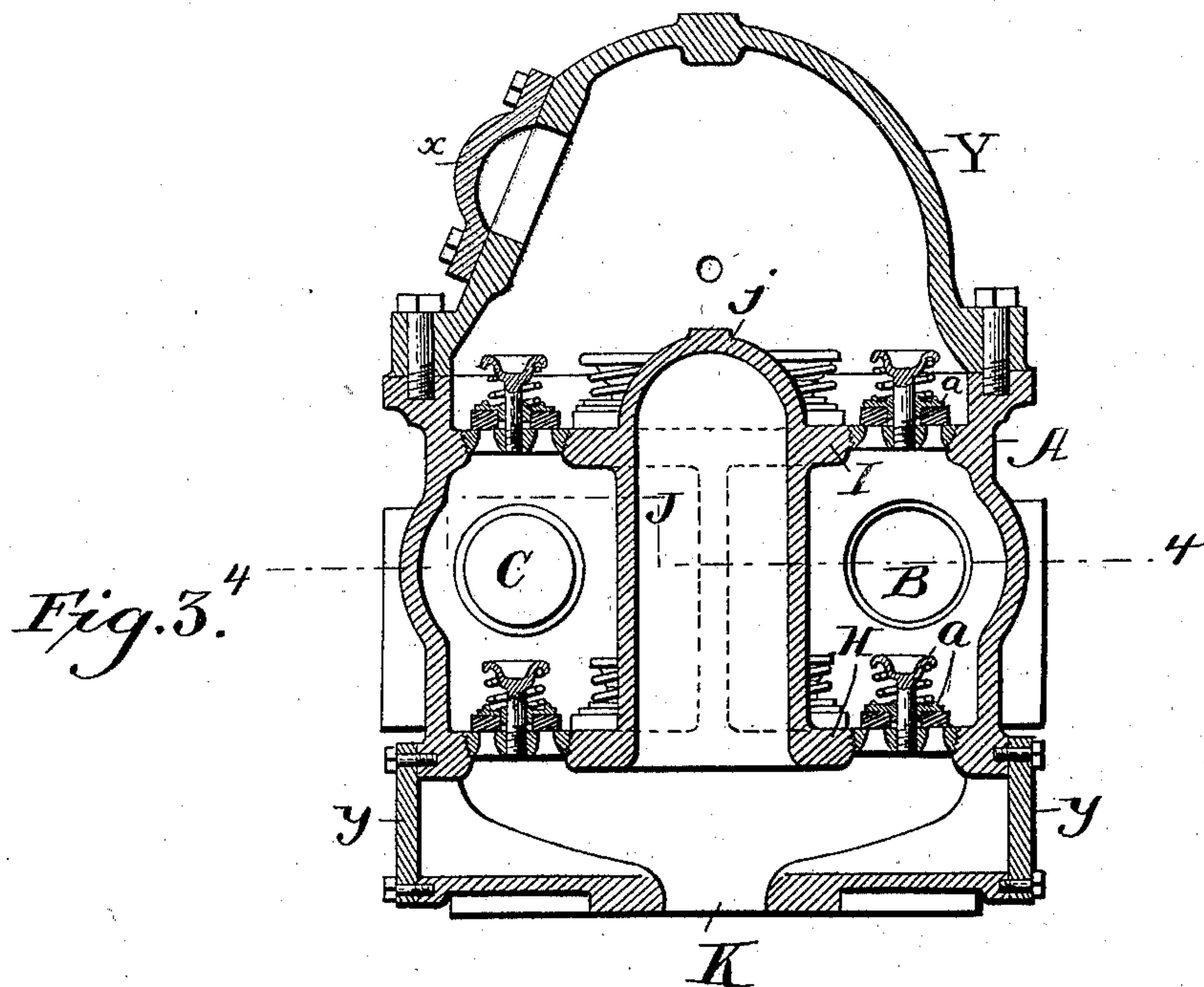
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3 Sheets—Sheet 3.

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PUMP.

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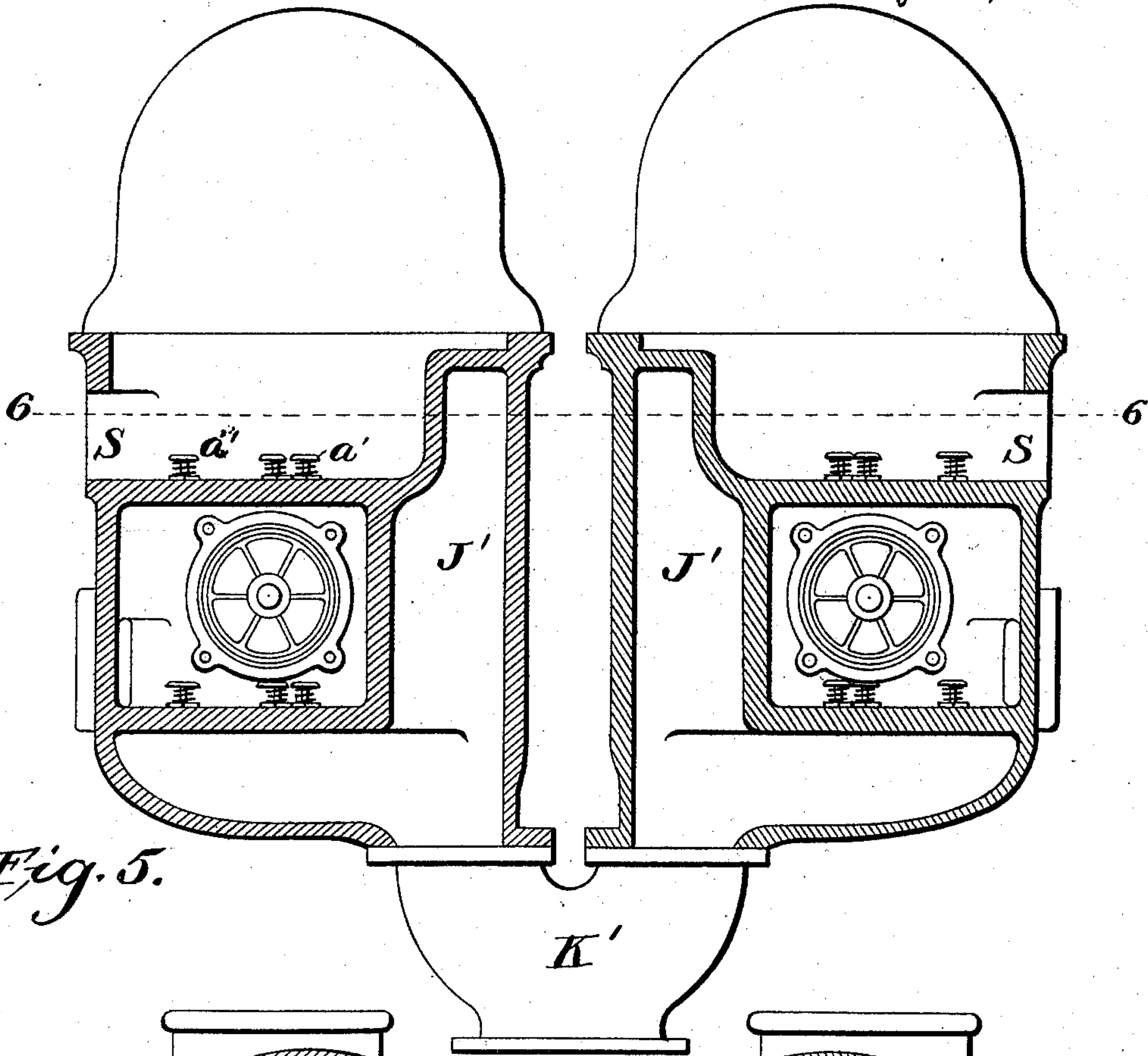


Fig. 5.

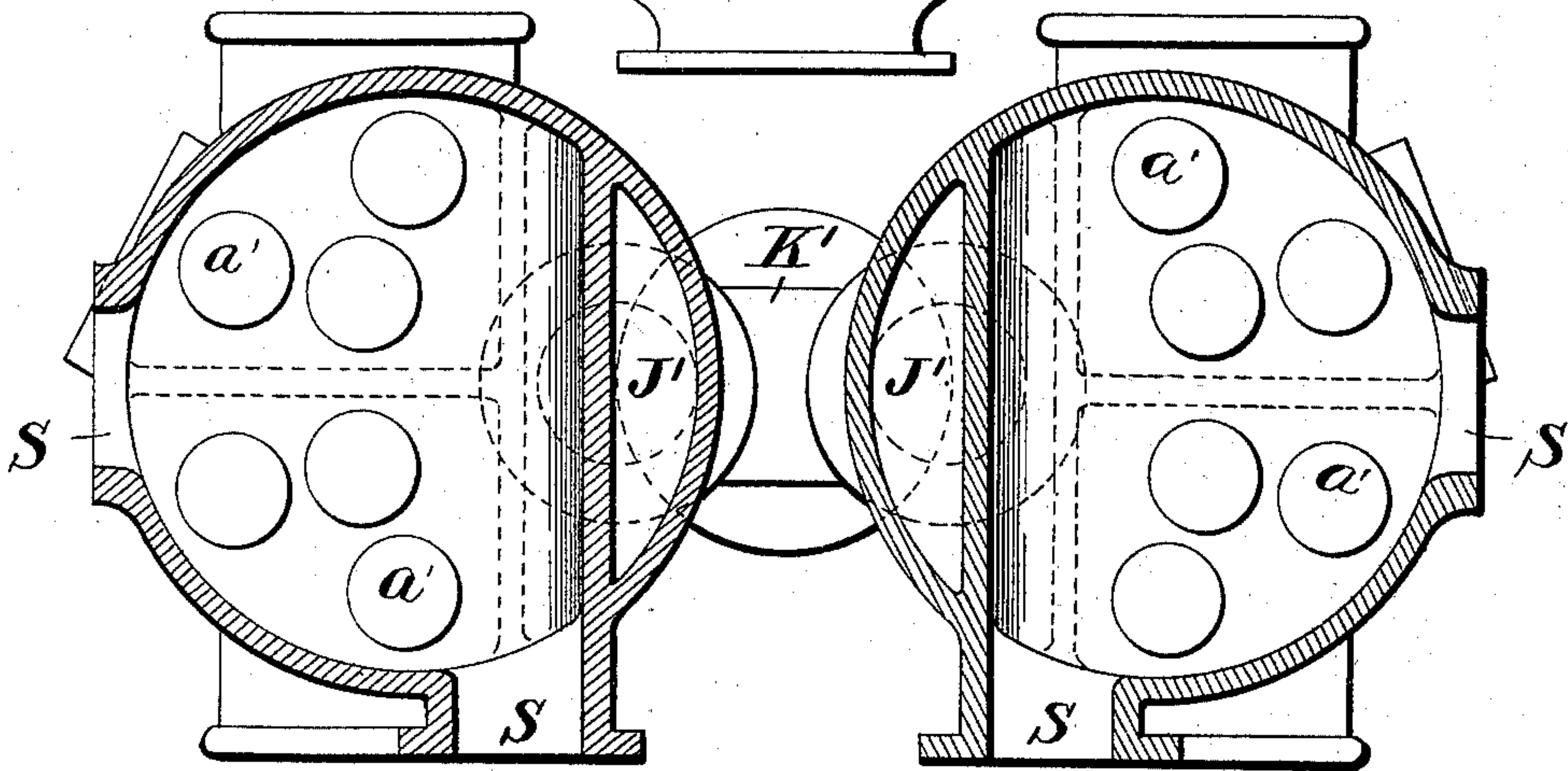


Fig. 6.

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UNITED STATES PATENT OFFICE.

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PUMP.

SPECIFICATION forming part of Letters Patent No. 603,884, dated May 10, 1898.

Application filed April 17, 1897. Serial No. 632,579. (No model.)

To all whom it may concern:

Be it known that I, LUIGI D'AURIA, formerly a subject of the King of Italy, (but having declared my intention to become a citizen of the United States,) residing in the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

My invention relates to liquid-pumps, and more particularly to the water end of duplex pumping-engines in which the plunger is reciprocated with comparatively great frequency or high speed.

In the operation of liquid-pumps the reciprocating action of the plunger must naturally cause the liquid column of suction to pulsate, and when this pulsation does not correspond exactly in every respect with the reciprocation of the plunger serious shocks or concussions ensue, often accompanied by disastrous consequences. Heretofore to avoid these concussions it has been proposed to employ a so-called "relieving-chamber" attached to the suction-pipe outside of the pump; but this arrangement only affords some relief when the pump is run at moderate speed. Besides in this form of pump the location of the relieving-chamber outside of the pump makes an additional cumbersome part that destroys the symmetry of the engine and adds to the bulk of the machine, making it more awkward and expensive for transportation, as well as entailing extra work in assembling the parts at the place where the pumps are erected, and this is especially objectionable in the larger sizes of pumps. An advance has been made over this arrangement in another form of pump in which each pump-barrel is surrounded vertically by an annular relieving-chamber communicating with the suction-chamber; but in this construction the relieving-chambers are not in the best position to reduce the pulsation of the liquid column of suction and the consequent shocks to a minimum, especially when the plunger reciprocates with high frequency or high speed, for the reason that the suction liquid is still subject to a sudden change of direction when acting in said relieving-chambers, and the construction itself is, moreover, bulky, heavy, and

expensive, necessitating two relieving-chambers for a single pump or four relieving-chambers for a duplex pump.

In my invention the relieving-chamber is located substantially centrally within the pumps at the least distance from the suction-valves and is preferably made integral with the pump-barrels and casing; and to avoid any change of direction the suction-column is made to discharge within the casing in a general direction substantially in line with said relieving-chamber. It will be seen that by this arrangement the only variations in the speed of the liquid column of suction are those due to the changes to which the pressure in the relieving-chamber may be subject during the stroke of the plungers and that due to the inertia of the comparatively small mass of liquid contained in said chamber, and as a consequence of this arrangement and construction additional strength is acquired by the pumps without increasing either weight or bulk and the plunger can attain the highest speed and reciprocate with greatest frequency without inducing serious pulsations in the liquid column of suction.

In the drawings I have shown my invention as applied to two forms of duplex pumps; but it is to be understood that it is applicable to other forms of pumps as well, though I have shown its application in the present instance to the preferred forms.

In the drawings, Figure 1 is a side elevation, partly broken away, of a duplex pump of smaller and medium sizes. Fig. 2 is a horizontal section on the line 2 2, Fig. 1. Fig. 3 is a central vertical section. Fig. 4 is a horizontal section on the line 4 4, Fig. 3. Fig. 5 is a central elevation of the modification. Fig. 6 is a horizontal section on the line 6 6, Fig. 5.

Referring now particularly to the drawings, in which the same reference characters relate to the same or corresponding parts in all the views, A represents the pump body or casting containing the pump-chambers B, in which operate suitable plungers C, preferably working in bushings D, secured to openings F in central webs E of the casting, the said bushings in the present instance being provided with annular flanges e, seated, respectively,

in a recess formed in the webs E and each held in place by a suitable retaining-ring G, bolted thereto.

The lower and upper valve-decks H and I are provided with suitable suction and discharge valves *a*, three being shown in the present instance for clearer illustration at each end of the respective pump chambers or cylinders; but of course any suitable number may be employed, as desired.

Substantially centrally located between the two pump-cylinders is my improved relieving-chamber J, which chamber may be of any suitable form, preferably circular in cross-section, as shown. This chamber extends from the lower valve-deck to the upper and is preferably closed by a dome-shaped top *j*, and the said chamber is also preferably formed integral with the casting or the body of the pump. It will be observed that this chamber has its central axis substantially in line with the center of the suction-opening K, at which point the connection is made with the suction-pipe, and that the inlet to this chamber is at the least distance from and substantially in the same plane with the openings to the said suction-valves.

By locating the relieving-chamber centrally within the pump-body and connecting it thereto by means of the webs E and the partitions L increased strength and stability are given to the pump as a whole, because the union of this chamber with the webs and partitions serves to brace and support the ends and sides of the casting as well as the valve-decks. Furthermore, placing the chamber within the pump-body in the manner defined makes a self-contained pump and further contributes to the symmetrical arrangement of the parts. Again, in addition to obviating the objections incident to the use of an exterior chamber, as hereinbefore referred to, when said chamber is contained within the pump-body and formed integral therewith, as preferred in all cases, the number of parts to be transported and to be fitted at the place where the pump is erected is materially diminished, thereby diminishing the cost of transportation and erection.

The pump-plungers are preferably provided at either end with cored bosses *f*, to which the usual relieving-valves are fitted. The discharge S is preferably a cored passage in the body of the pump leading from an opening in close proximity to the discharge-valves, as shown in Figs. 1 and 5, thereby providing a direct egress for the liquid.

Suitable hand-holes *x* and *y* are provided, as is customary in pumps of this character, for the purpose of giving ready access to the interior of the pump, the former in the cover Y being utilized for replacing or repairing the discharge-valves without removing said cover and the latter, *y*, for the purpose of adjusting the suction-valves *a*.

Where the pumps are of very large capacity, it may be sometimes desirable to cast the

two sides of duplex pumps separately, and in Figs. 5 and 6 I have shown a modified arrangement of the relieving-chamber suitable for such construction, where it will be seen that the chambers J' are located upon the inside of each pump-chamber, the suction-opening K', as in the construction before described, being substantially in line with said chambers, so that the same result may be accomplished, as already described. In this construction it will be noted that with respect to the pump as a whole the two chambers taken together are centrally located, thus preserving the symmetrical disposition of the parts of the pump with the same advantage incident thereto as set forth in relation to the construction already described.

By the use of my invention I am enabled to increase the number of strokes of the plunger per minute and to a very considerable extent improve upon what has been heretofore thought the safe limit of speed.

For the reasons already mentioned I consider my present improvement a marked advantage over the prior art and therefore do not wish to be limited to the exact construction shown, as the details may be varied without departing from the spirit of my invention.

I claim as my invention—

1. The herein-described improvement in pumps, consisting in the combination with the suction-chamber, of a relieving-chamber located within the liquid end of the pump, substantially in line with the general direction of flow of the incoming liquid from the suction-pipe, said chamber having its inlet substantially in the same plane with the openings to the suction-valves, substantially as and for the purpose set forth.

2. The herein-described improvement in pumps, consisting in the combination with the suction-chamber, of a relieving-chamber located within the liquid end of the pump, substantially in line with the general direction of flow of the incoming liquid from the suction-pipe and formed integral with the pump-body, the inlet to the said chamber being in substantially the same plane as the openings to the suction-valves, substantially as and for the purpose set forth.

3. The herein-described improvement in duplex pumps, consisting in the combination with the suction-chambers, of a relieving-chamber located centrally between the pump-chambers, and having an inlet-opening substantially in line with the general direction of flow of the incoming liquid from the suction-pipe, and located substantially in the same plane as the openings in the suction-valves, substantially as and for the purposes set forth.

4. The herein-described improvement in duplex pumps, consisting in the combination with the suction-chambers of the pump, of a relieving-chamber located centrally within the liquid end of the pump between the pump-chambers and substantially in line with the

general direction of flow of incoming liquid from the suction-pipe, the inlet to said chamber being located substantially in the same plane as the openings to the suction-valves, substantially as and for the purposes set forth.

5. The herein-described improvement in duplex pumps, consisting in the combination with the suction-chamber, of a relieving-chamber formed integral with the liquid end of the pump and located centrally therein between the pump-chambers, the inlet to said chamber being located substantially in the same plane with the openings to the suction-valves, substantially as and for the purposes set forth.

6. The herein-described improvement in duplex pumps, consisting in the combination with the suction-chamber and the valve-decks, of a relieving-chamber located centrally within the suction-chamber, with webs integrally uniting the said relieving-chamber with the valve-decks and pump-body, the in-

let to said chamber being located substantially in the same plane with the openings to the suction-valves, substantially as and for the purposes set forth.

7. In a pump, the combination with the suction-chamber and the suction and discharge valve decks thereof, of a relieving-chamber located substantially in line with the general direction of flow of the incoming liquid from the suction-pipe, having its inlet substantially in the same plane with the openings to the suction-valves, and formed integral with the pump-body, and a cored discharge-passage in the pump-body opening in the discharge-valve deck, substantially as described.

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

LUIGI D'AURIA.

Witnesses:

R. T. FRAZIER,
JOS. H. KLEIN.