

(No Model.)

5 Sheets—Sheet 1.

C. C. WORTHINGTON.
PUMP.

No. 528,282.

Patented Oct. 30, 1894.

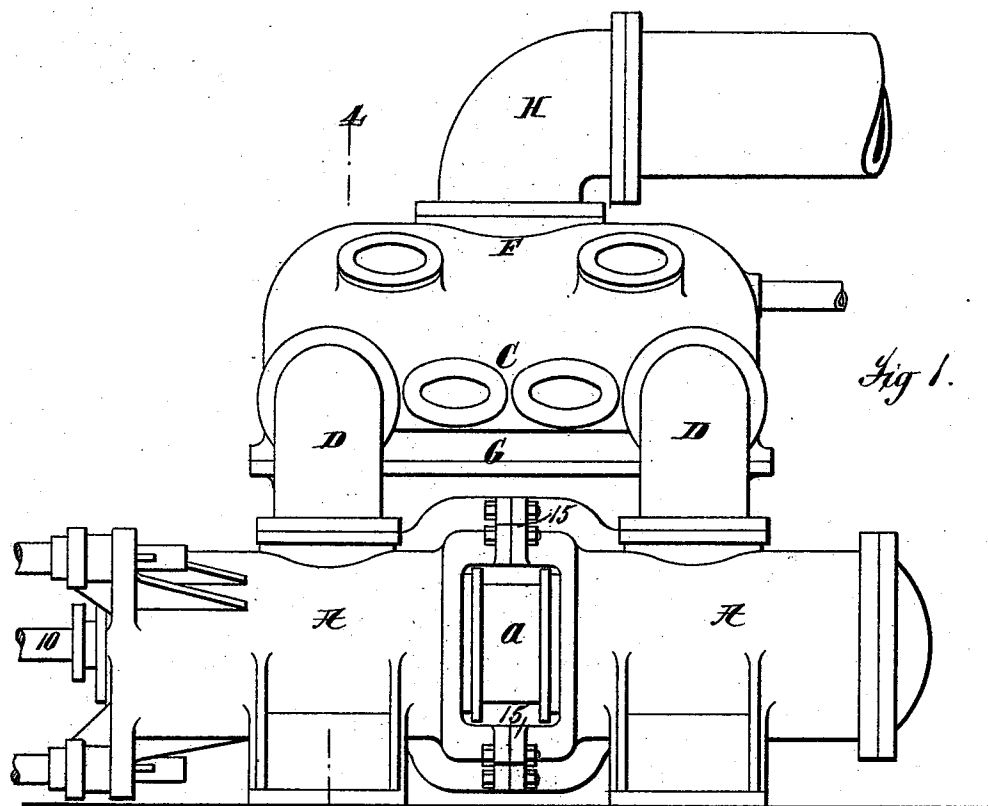


Fig. 1.

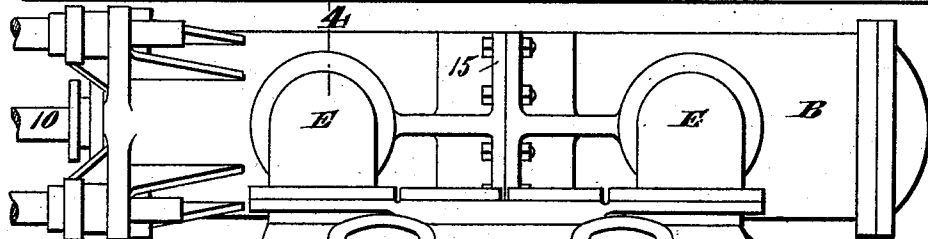
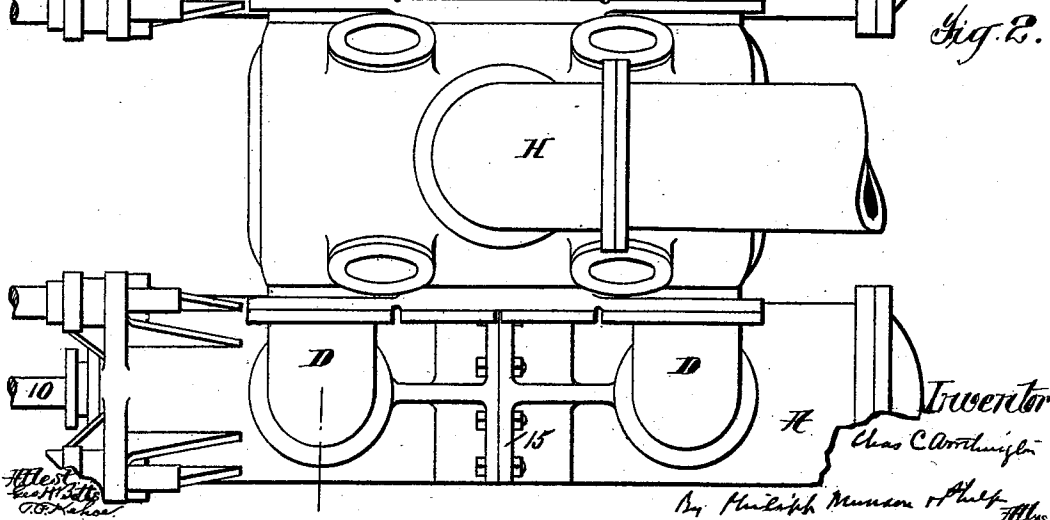


Fig. 2.



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Fig. 3

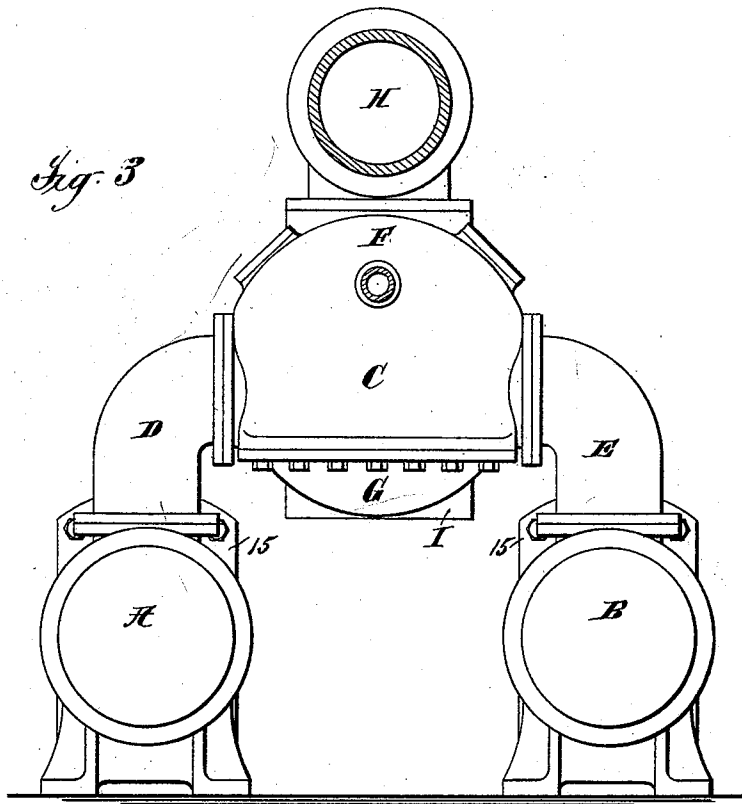
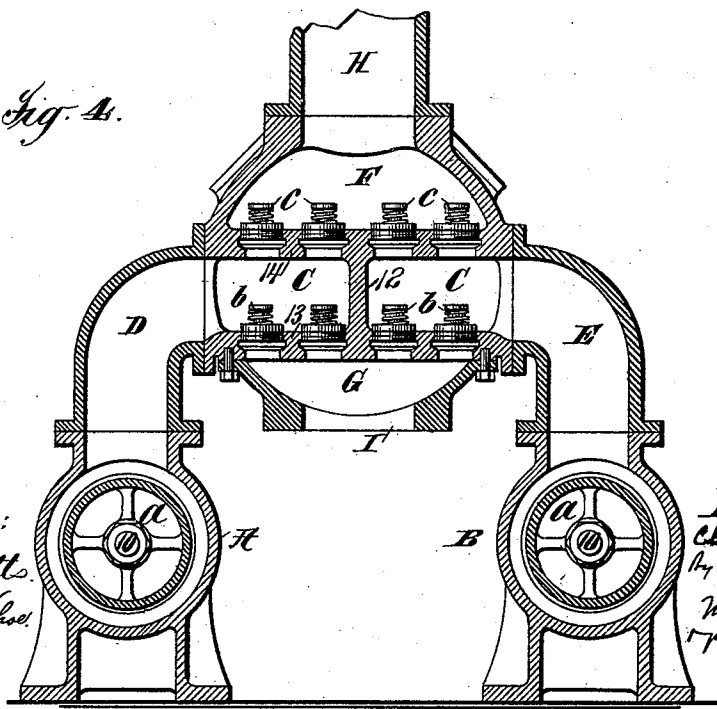


Fig. 4.



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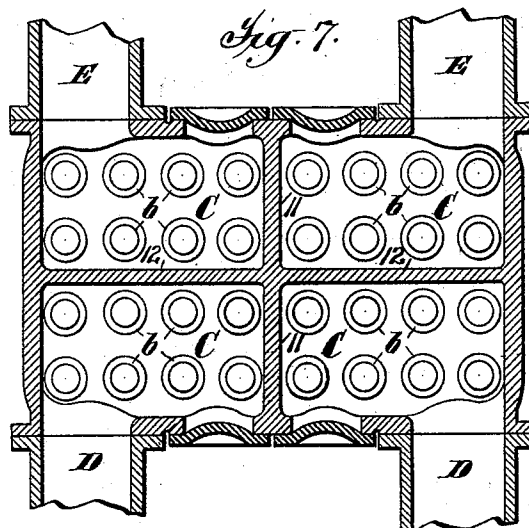
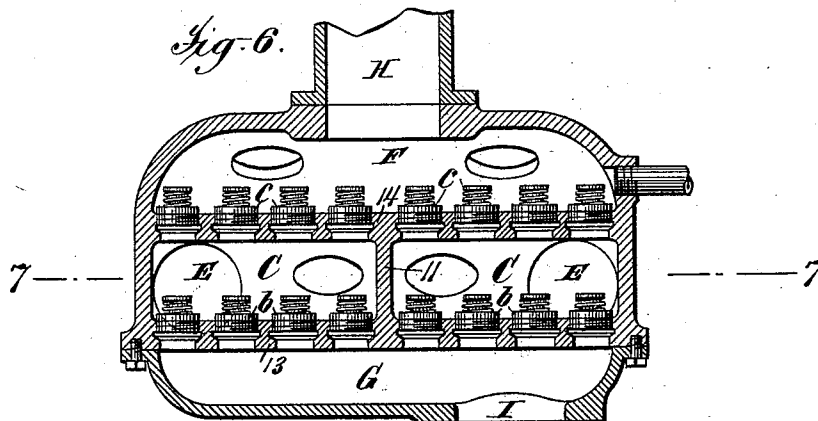
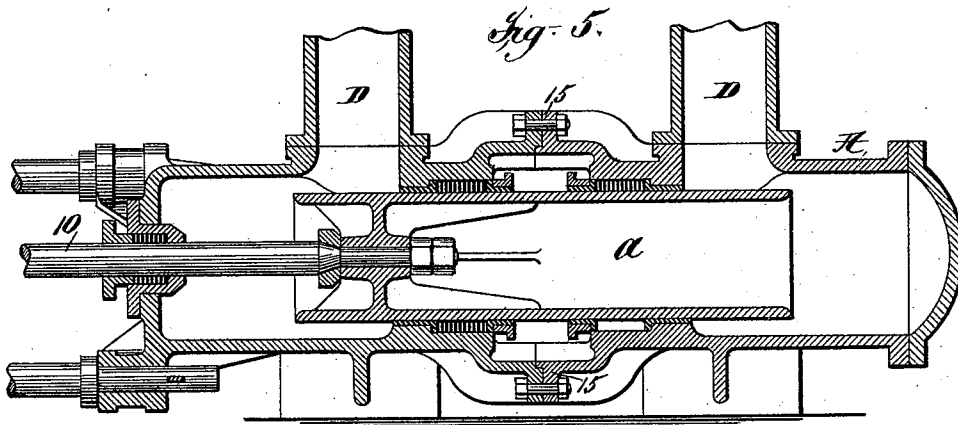
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Fig. 9.

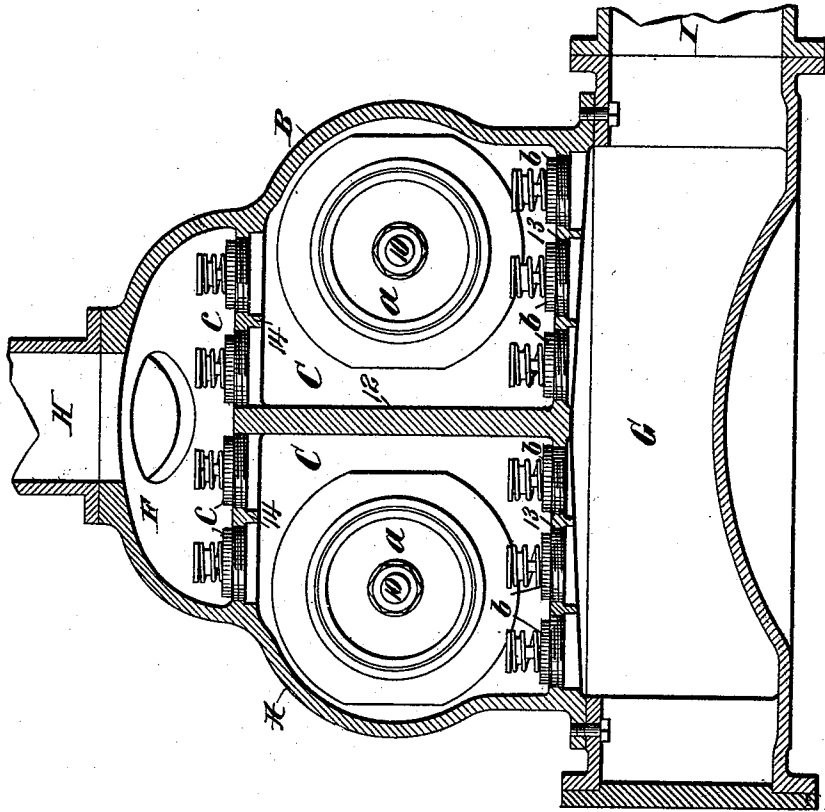
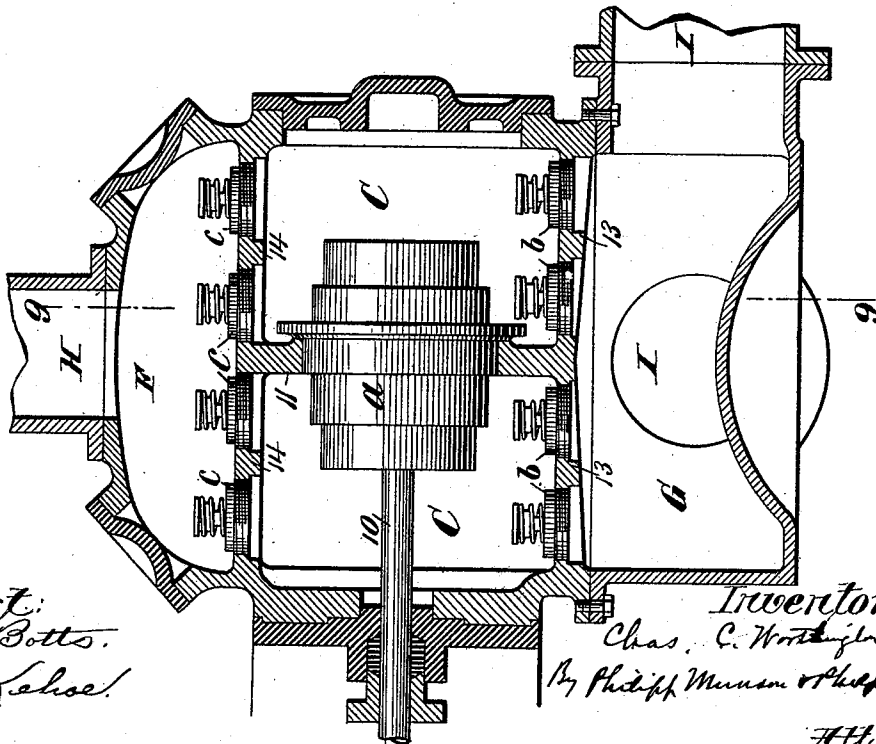


Fig. 8.



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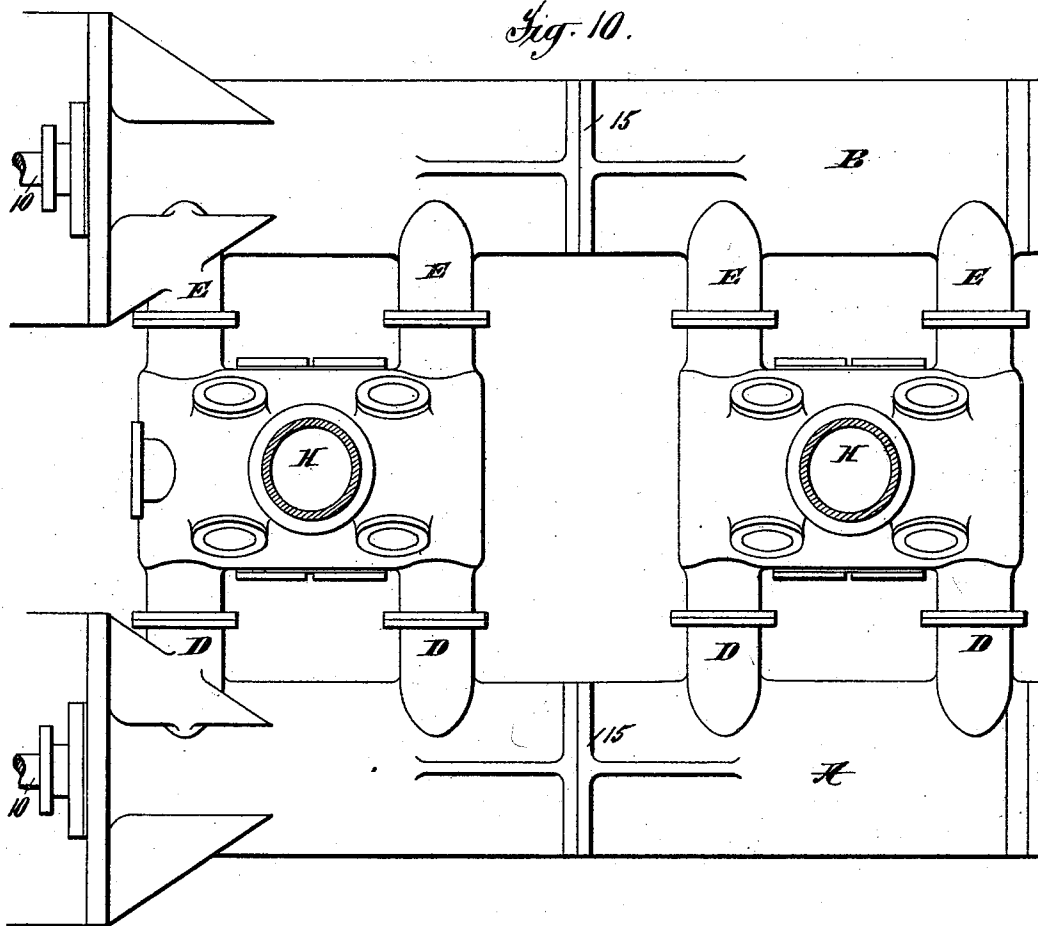
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Fig. 10.



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UNITED STATES PATENT OFFICE.

CHARLES C. WORTHINGTON, OF IRVINGTON, NEW YORK.

PUMP.

SPECIFICATION forming part of Letters Patent No. 528,282, dated October 30, 1894.

Application filed March 21, 1894. Serial No. 504,514. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. WORTHINGTON, a citizen of the United States, residing at Irvington, county of Westchester, and State of New York, have invented certain new and useful Improvements in Pumps, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The object of the present invention is to provide an improved pump construction and especially to improve the construction of that part of the pump containing the pulsation and force and suction chambers, the invention being especially applicable to horizontal pumps having the force chamber on one side of the pulsation chamber, the common form being that in which the force chamber is above and the suction chamber below the pump cylinders. In previous pump constructions of this class the suction chamber and the force chamber valve plate have been made integral with the pulsation chamber, and the cover forming the force chamber then secured to the pulsation chamber, with the result that the high force pressure must be sustained by the flanges securing the force chamber and these parts consequently made very heavy to secure the requisite strength.

30 I provide an improved construction reducing the weight and securing much greater strength by casting the force chamber integral with the pulsation chamber, so that the flange secured part is the suction chamber. By this improved construction, the strength resulting from a continuous jointless wall is brought on the force side where the pressure is great instead of on the suction side where there is less pressure, as in the usual constructions. The amount of metal required on the force side is thus lessened without decreasing the strength, and as the flanges now used sustain only the suction pressure, they may be made much lighter. Another very important advantage is secured by this construction in making possible the reduction of the size of the force chamber and the use of a less number of force valve openings. A larger percentage of valve area is usually required in the valves on the suction side than on the force side. In previous constructions, however, in which the suction valve openings

were tapped and the valve seats put in through the force valve openings, it was necessary to use as many of the latter as of the former, resulting in a larger force chamber and greater valve plate area than would otherwise be necessary. By the improved construction, in which the force valve openings are tapped and the force valves put in through the suction valve openings, there may be more suction valves than force valves, thus enabling the size of the force chamber to be reduced, and further decreasing the weight and cost of the structure, and increasing its strength.

As a full understanding of the invention can best be given by a description of constructions embodying the invention, all further preliminary description will be omitted and such a description now given in connection with the accompanying drawings, which show some of the preferred constructions in which the invention may be embodied, and the features of the invention will then be specifically pointed out in the claims.

While the invention considered broadly is applicable to duplex or single pumps, it has been designed especially for application to duplex pumps, and certain features of the invention reside in constructions of duplex pumps embodying the invention. The invention, therefore, has been illustrated and will be described in connection with duplex pumps of the general type now well-known as "Worthington duplex pumps," for a full description of which reference is made to many United States Letters Patent, especially Nos. 292,525, 332,857, and 341,534.

In the drawings:—Figure 1 is a side elevation of the water end of a duplex pump embodying all the features of the invention. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation. Fig. 4 is a vertical cross section taken centrally through the valve chamber on the line 4 of Figs. 1 and 2. Fig. 5 is a longitudinal central section of one of the pump cylinders. Fig. 6 is a central longitudinal section of the valve chamber at right angles to Fig. 4. Fig. 7 is a horizontal section on the line 7 of Fig. 6. Fig. 8 is a central longitudinal section of the pump cylinder on one side of a duplex pump showing a construction in which the pump cylinder

forms the pulsation chamber. Fig. 9 is a vertical cross section of the same construction taken through the pump cylinders on the line 9 of Fig. 8. Fig. 10 is a plan view of the water end of a duplex pump having separate castings for the pulsation chambers at the opposite ends of the pump cylinders.

Referring now especially to Figs. 1 to 7, A, B, are the two pump cylinders on opposite sides of the pump, and *a* the plungers which are shown as of the common hollow form operated by the piston rods 10. It will be understood however, that these plungers and the cylinders may be of any form other than that shown. In the construction shown in these figures, the pulsation chambers for the two sides of the engine, and for the two ends of the cylinders are made in a single casting, these pulsation chambers C being mounted above the cylinders A, B, and connected thereto respectively at the opposite ends of the cylinders by the elbow pipes D, and E, the two chambers for opposite sides of the engine being formed in the casting by a partition 11 longitudinal of the pump and the two chambers on each side for the opposite ends of the cylinders by the cross partition 12.

Integral with the casting forming the pulsation chambers C is the valve plate 13 for the suction valves *b*, and the valve plate 14 for the force valve *c*, the force chamber F being also integral therewith, while the suction chamber G is formed by a separate casting secured to the base of the pulsation chamber C by a flange and bolts as shown, or in any other suitable manner.

The force main H and suction main I connect respectively with the force and suction chambers F, G, as usual. The suction valve plate may be formed integral with the suction chamber and with the latter attached to the pulsation chamber, without departing from the invention, considered broadly, but the construction shown is much preferable as no joints are exposed to the pressure in the pulsation chamber, and this construction forms a part of the invention.

For convenience of construction the pump cylinders A, B are shown as each formed in two parts, the division line being transverse and central of the cylinders longitudinally, the two parts of the cylinders being connected together by flanges 15. It will be understood, however, that this is not essential. It will be seen that this construction provides a pulsation and force chamber in a single casting, so that the usual flanges on the force side are avoided and the force pressure resisted by a continuous wall of metal. In the construction shown, in which the suction chamber is on the opposite side of the pulsation chamber from the force chamber, the flanges are used for the suction chamber, but they are exposed only to the low suction pressure.

The construction shown in Figs. 1 to 7, employing a pulsation chamber for both sides

of a duplex pump connected to the pump cylinders by suitable pipes is very simple of manufacture, and will be found a very desirable construction. It will be understood, however, that the pulsation chamber formed in a single casting with the force chamber may be used, also, with other constructions of single or duplex pumps.

In Figs. 8 and 9 is shown a construction of duplex pump in which the pump cylinders A' B' form the pulsation chambers C', for the opposite sides of the engine, these two chambers being formed in a single casting with the force chamber F and suction and force valve plates 13, 14, the suction chamber G being formed by a separate casting secured by flanges to the base of the pulsation chamber, as before. It will be seen that this construction is substantially the same as that previously described, except that the pump cylinders form the pulsation chamber direct instead of being connected therewith by the elbow pipes. In this construction a less amount of valve area is shown on the force side, which is made possible by the invention, as above described, and, which, it is apparent, enables the size of the force chamber to be reduced, and the structure thus lightened while retaining the full strength.

In the constructions thus far described a single casting forms the pulsation chambers for the opposite ends of the pump cylinders, but it will be understood that this is not absolutely necessary, although preferable. Thus in Fig. 10 I have shown in plan view a construction similar to that shown in Figs. 1 to 7 except that separate pulsation, force and suction chambers are used for the opposite ends of the cylinders. It will be understood that in this construction, two pipes may be used on each side, one for each end of the cylinder, but it will be found preferable to use two pipes for each end of each cylinder, as the pipes are thus connected to the pulsation chamber at its ends, leaving the central part for the force main, and the two pipes form a stronger support for the pulsation chamber, as will be apparent from an examination of Fig. 10.

It will be understood by those skilled in the art that other changes may be made in the construction and arrangement of the pulsation chamber and other parts of the pump without departing from the invention.

What is claimed is—

1. A pump having a force chamber formed integral with the pulsation chamber and a suction chamber non-integral with but attached to the pulsation chamber, substantially as described.

2. A pump having a force chamber and suction valve plate integral with the pulsation chamber, and a suction chamber non-integral with but attached to the pulsation chamber, substantially as described.

3. A pump having a force chamber integral

with the pulsation chamber, and having the suction chamber on the opposite side of and non-integral with but attached to the pulsation chamber, substantially as described.

5 4. A pump having a force chamber and suction valve plate integral with and on opposite sides of the pulsation chamber, and having the suction chamber non-integral with but attached to the pulsation chamber, substantially as described.

10 5. A duplex pump having the force and pulsation chambers for both sides of the pump formed integral and having the suction chamber for both sides of the pump non-integral with but attached thereto, substantially as described.

15 6. A duplex pump having the force and pulsation chambers and the suction valve plate for both sides of the pump formed integral, and the suction chamber for both sides of the pump non-integral with but attached thereto, substantially as described.

20 7. A duplex double acting pump having a single casting forming the pulsation and force chambers, and the suction valve plate for both sides and ends of the pump, and a second single casting forming the suction chamber for both sides and ends of the pump at-

tached to the first mentioned casting, substantially as described.

30 8. The combination with the pump cylinders of a duplex pump, of a single casting above the pump cylinders forming the pulsation and force chambers for both sides of the pump, the suction chamber for both sides of the pump non-integral with but attached to said casting, and pipes connecting said pulsation chambers and pump cylinders, substantially as described.

9. The combination with the pump cylinders of a duplex pump, of a single casting above the pump cylinders forming the pulsation and force chambers for both sides and ends of the pump, the suction chamber for both sides and ends of the pump non-integral with but attached to said casting, and pipes connecting said pulsation chambers and pump cylinders, substantially as described.

45 In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES C. WORTHINGTON.

Witnesses:

LOUIS R. OLBERGER,
H. W. TILLINGHAST.