No. 741,813. PATENTED OCT. 20, 1903.

C. R. MOORE.

PUMP.

APPLICATION FILED APR. 4, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

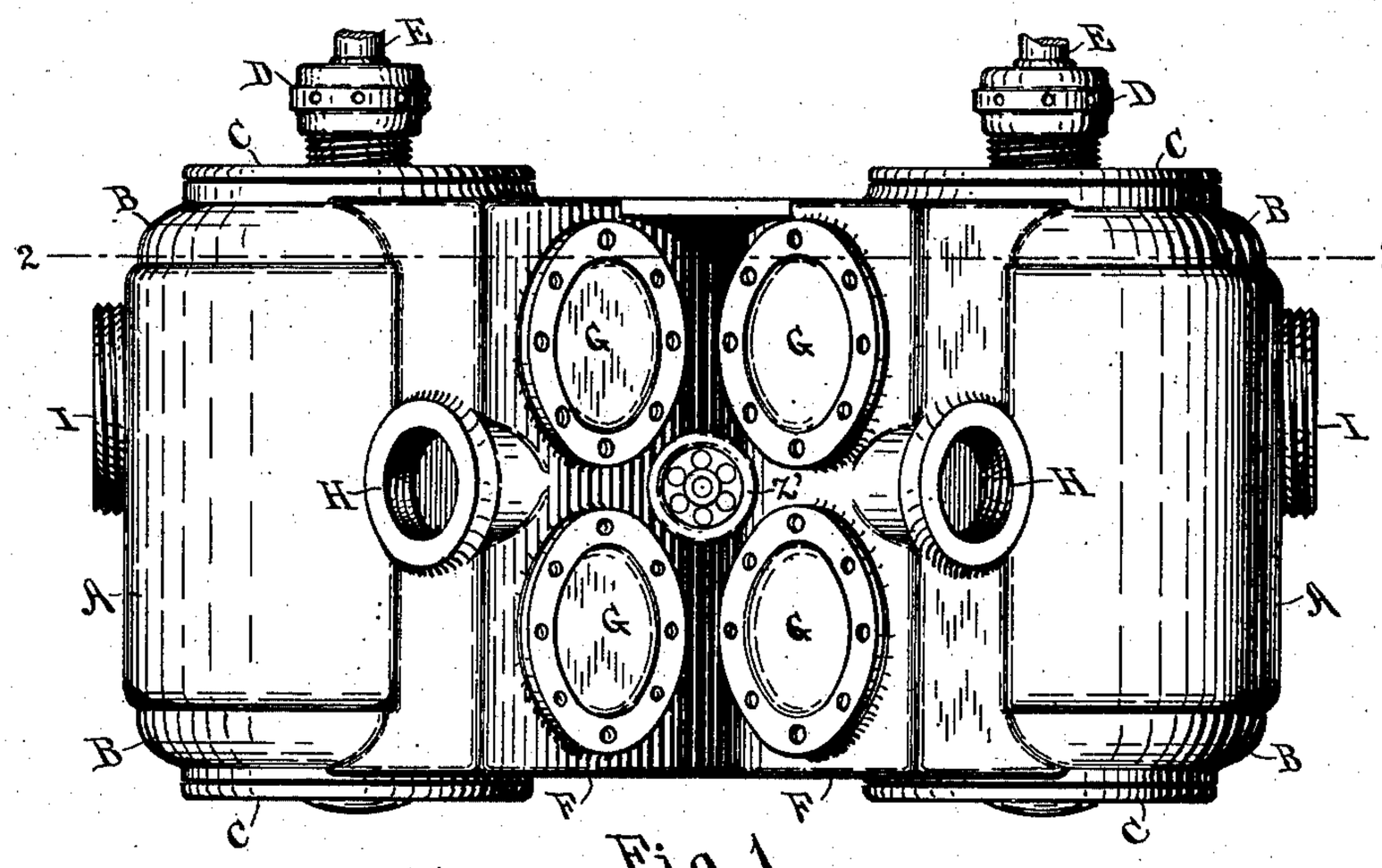

Fig. 1.

Fig. 2.

WITNESSES:

A. B. Diven

M. E. Verbeck.

INVENTOR

Charles R. Moore

BY

Eugene Diven

ATTORNEY

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NO MODEL. 3 SHEETS—SHEET 2.

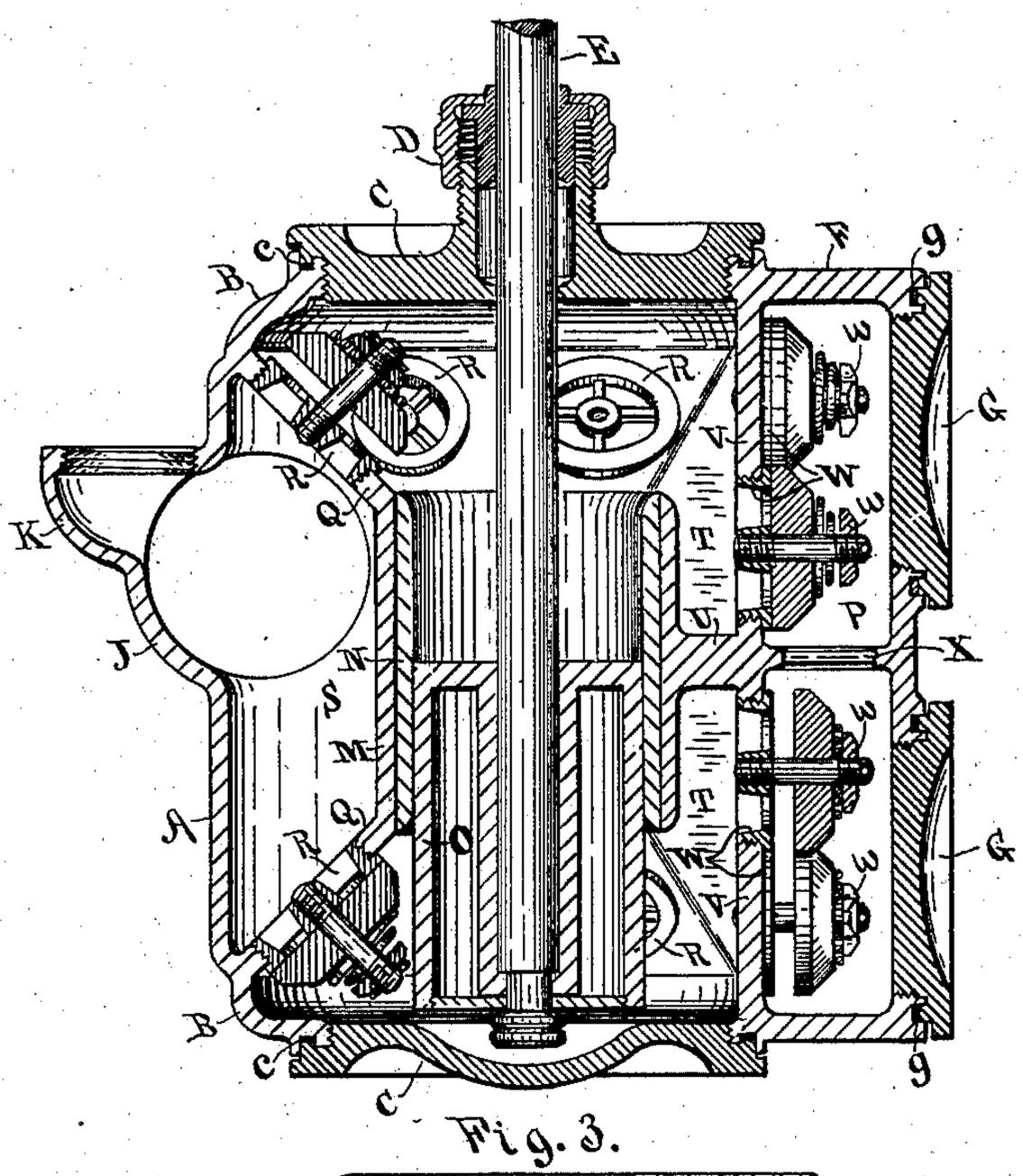

Fig. 3.

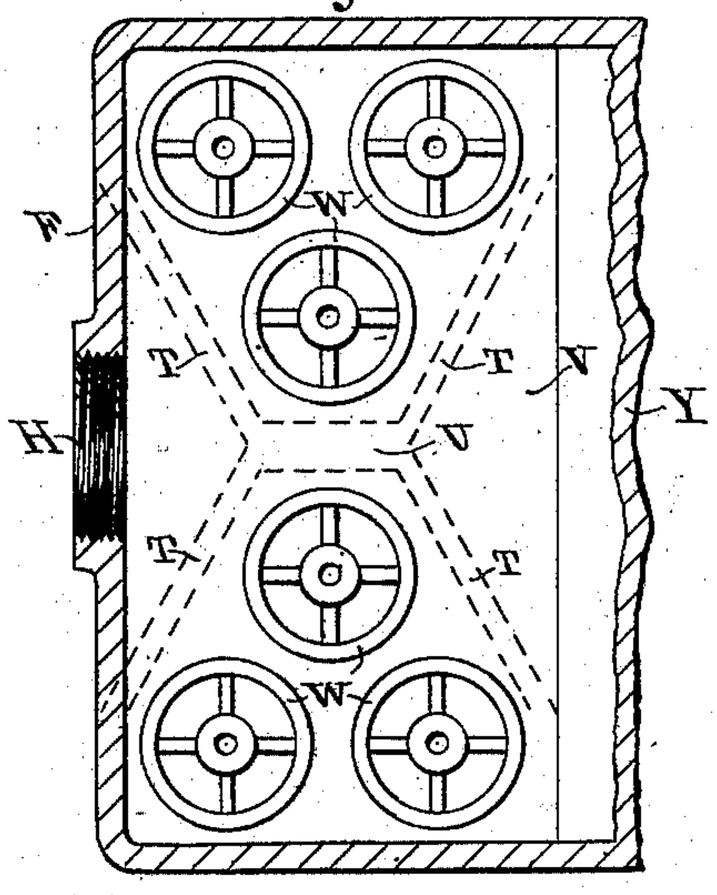

Fig. 4.

WITNESSES:

A. E. Driven

M. E. Verbeck.

INVENTOR

Charles R. Moore

BY

Eugene Driven

ATTORNEY

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NO MODEL. 3 SHEETS—SHEET 3.

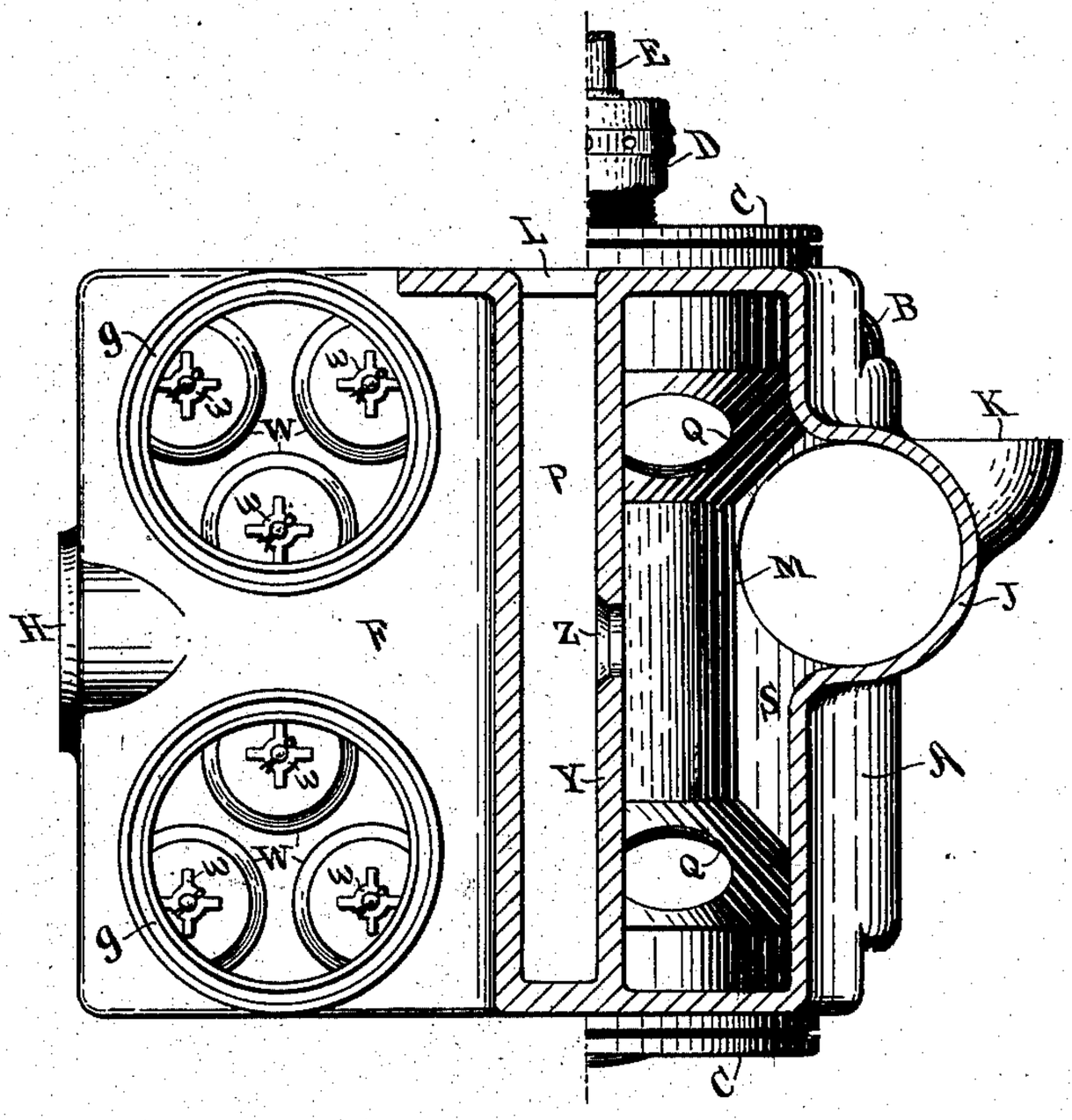

Fig. 5.

WITNESSES:

A. B. Diven

M. E. Verbeck.

INVENTOR

Charles R. Moore

BY

Eugene Diven

ATTORNEY

No. 741,813. Patented October 20, 1903.

UNITED STATES PATENT OFFICE.

CHARLES R. MOORE, OF ELMIRA, NEW YORK.

PUMP.

SPECIFICATION forming part of Letters Patent No. 741,813, dated October 20, 1903.

Application filed April 4, 1903. Serial No. 151,074. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. MOORE, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

My invention relates to improvements in pumps of the double-acting type, and has to do more particularly with pumps intended for fire-engine purposes, wherein the plungers are required to travel at a high speed with a comparatively short stroke. In this class of pumps it is essential that the casing and working parts shall be as compact as possible and of as small weight as compatible with the strength required for high-pressure water-delivery. It is also essential that the inlet-valves shall be of sufficient number and capacity to freely admit the water, so that it shall follow the plunger and fill the pump-barrel to the full length of the stroke when the plunger is traveling at high speed. Heretofore much difficulty has been experienced in providing sufficient valve area for this purpose on the suction side of pumps of this type, much loss in efficiency being experienced when running at high speeds, due to the excessive lift required of the valves and the necessary slippage as the valves are reseated upon the back stroke of the plunger. Moreover, where the combined areas of the valve-openings are closely proportioned to the plunger area much loss is experienced due to the friction of the water in passing through the valve-ports. To render a pump of this type efficient, therefore, it is essential that the suction-valves shall be of as large area as possible in order to reduce friction loss and also to reduce the lift of the valves in order to avoid undue slippage.

It is therefore the object of my improvements to provide a compact and strong pump in which the valve partitions and chambers shall be so arranged and positioned as to increase the efficiency in a given size of pump.

A further object is to so arrange the working chambers of the pump as to bring both the suction and discharge valves into close proximity to the plungers, and thereby reduce the air-spaces to a minimum, and a final object is to provide valve-chambers so arranged that all the valves, both suction and delivery, may be quickly got at for purposes of renewal or repair through adequate openings closed by screw-caps instead of bolted plates, as is now the general practice, the screw-cap being more quickly removable and susceptible of being given a more water-tight packing.

I attain my objects by means of the arrangement and construction of the several parts of the pump, as illustrated in the accompanying drawings, in which—

Figure 1 represents a front elevation of my improved pump; Fig. 2, a plan view of the same, partly in section, on the line 2 2 in Fig. 1; Fig. 3, a vertical section, on a larger scale, on line 3 3 in Fig. 2; Fig. 4, a detail showing a section on line 4 4 in Fig. 2; and Fig. 5, a section on the line 5 5 in Fig. 2, showing the parts somewhat distorted for the purposes of illustration.

Like letters refer to like parts in the several views.

A represents the main pump-casing, which comprises substantially two cylinders integrally united and having also integrally formed therewith the partitions and walls which form the suction and pressure chambers, the valve-partitions, both suction and delivery, the suction-inlet, and the connections for the vacuum and air chambers and for the outlet or delivery gates. The heads, both at top and bottom of the main-casing cylinders, are contracted at B and are closed by screw-caps C, these caps being provided with annular packing-ribs adapted to set into grooves cut in the heads upon packing-rings, of lead or other suitable material, as indicated at *c*. The upper caps are provided with stuffing-boxes at D, through which pass the plunger-rods E. At the forward sides of the casing-cylinders are substantially rectangular projections F F, set at an angle, substantially as shown, and forming intercommunicating pressure-chambers P. The front walls of these pressure-chambers are provided with hand-holes, closed by the screw-caps G, opposite each set of delivery-valves, these caps being formed substantially in the same manner as the head-caps C and being packed in the same way by lead or other packing rings or washers *g*. These caps C and G will be

provided with spanner-holes, as indicated, or notches for the purpose of setting them up or loosening them for removal. At H the pressure-chambers are provided with screw-threaded openings to receive the usual shut-off gates, to which the hose is coupled. Instead of one outlet at the center of each chamber, as shown, I may have two outlets at each side in the larger sizes of pumps, thereby providing for leading off four lines of hose instead of two, as in the present instance. At the back of the main casing is a transverse cylindrical offset J, provided at each end with screw-threads at I to receive the connections for the suction-hose couplings. The cylindrical offset J permits of the insertion of a strainer extending from one side to the other between the suction-openings. Offsets K are provided opposite each cylinder to receive the usual vacuum-chambers, and at L at the top of the pressure-chambers is an opening which leads to the air-chamber connection, (not shown,) which is flanged and bolted in place in the customary manner.

At the center of each cylinder of the main casing is a barrel M, preferably provided with a removable lining N, through which travels the plunger O, attached to the rod E. Encircling the top and bottom of the barrels M are the outwardly-inclined valve-partitions Q, around which are disposed the valve-seats R, which are screwed into suitably bored and tapped openings in said partitions. By this angular arrangement of these partitions it will be evident that an increased valve area can be attained in the space between any given diameters of pump-barrel and main-casing cylinder. Moreover, it will be evident that since the valve-seats point to a common center a smaller opening for the cylinder-heads is permissible, and I am therefore enabled to use screw-caps instead of bolted plates for these closures. The valve-openings may be readily got at, when the cylinder heads or caps are off, for the purpose of preparing them to receive the valve-seats and for inserting the valve-seats therein, and the valves themselves may be quickly and easily placed in position or removed for repairs. In addition to this it will be seen that the valves are set close around the plunger at each end of its stroke and that therefore the working chambers between the suction and delivery valves are reduced in area, thereby also reducing the air-spaces at the ends of the plunger-strokes. Surrounding the barrels between the partitions Q is a common suction-chamber S, into which the suction connection J opens.

The continuity of the conical partitions Q is broken toward the front of the pump opposite the pressure-chambers P by the downwardly-inclined partitions T, terminating in the dividing-partition U, whereby are formed two longitudinal passages leading from the ends of the barrels to the delivery-valves. These delivery-valves are set upon the vertical partitions V, which are provided with valve-seats W in the usual way, as will be seen in Fig. 4. There are three delivery-valves for each end of the pump, the valve-seats being arranged so that the single valves are placed opposite one another toward the center, thereby permitting the walls T of the working chambers to be inclined toward one another, and so reducing the area of these chambers correspondingly. It will be noted in this connection that the valves at each end are in the proportion of five suction to three delivery, from which fact it will be seen that the inflow from the suction-chamber will be ample to fill the working chambers at all times, even when running at very high speed. From an inspection of Fig. 5 it will be seen that the delivery-valves are all accessible upon removing the screw-caps G and that there is ample opening provided for the insertion of tools to prepare the valve-openings to receive the valve-seats W and for inserting or replacing the valves. In this connection I may say that I preferably use a stud for the valves, which is screwed fast to the valve-seats, the outer end of the stud being screw-threaded to receive a pronged nut *w*, which latter is held from unscrewing by means of a split pin passed through a hole at the end of the stud, as indicated more clearly in Fig. 5.

In order to brace and stiffen the front walls of the pressure-chambers P, I connect them with the rear walls at the center, as indicated at X in Fig. 3, with a brace-bar formed integrally therewith in the process of casting. In like manner other strengthening ribs and braces may be formed where needed to stiffen the various walls and partitions when casting the pump.

Between the suction-chamber S and pressure-chambers P is a partition Y, which passes across from one pump-barrel to the other, and at the center of this partition I provide a passage Z, adapted to be opened and closed by a valve *z*, controlled by the hand-wheel *z'* on a valve-stem which passes out at the front through a suitable stuffing-box. When open, this passage Z forms a communication from the pressure to the suction side of the pump and permits the water to circulate from one side to the other when the plungers are in operation and the delivery-valves are closed down for any reason, as is frequently required when a fire-engine is in service.

In the smaller sizes of pumps I will use two delivery-valves at each end instead of three, as shown in the accompanying drawings, and the suction-valves will be correspondingly reduced in size and increased in number, thereby permitting me to bring the casing-cylinders closer to the pump-barrels and rendering the pump still more compact. Other variations in the details of construction may be made without departing from the spirit of my invention, and I do not, therefore, restrict my-

self to the precise structural arrangement as illustrated herewith. My improvements may also be applied to single-cylinder as well as double-cylinder pumps.

The operation of a pump of this type is well understood, and a detailed description thereof is therefore not required.

Having described the novel features of my improved pump, what I claim as my invention, and desire to secure by Letters Patent, is—

1. In a pump, the combination of a casing, a pump-barrel centrally located therein, inclined valved partitions extending around between the casing and each end of the barrel, a discharge-chamber, valved passages leading to said chamber from the spaces formed at each end of the casing outside said partitions, a suction connection leading into the water-chamber formed between the casing and pump-barrel, and an outlet from the discharge-chamber.

2. In a pump, the combination of a casing having its ends contracted and closed by removable caps, a pump-barrel centrally located in said casing, outwardly-inclined partitions extending around between the casing and each end of the barrel, valves disposed around said partitions and pointing to common centers outside the casing-heads, a discharge-chamber, valved passages leading to said chamber from the spaces formed between said partitions and the casing-heads, a suction connection leading into the water-chamber formed between the casing and pump-barrel, and an outlet from the discharge-chamber.

3. In a pump, the combination of a casing, a pump-barrel centrally located therein, outwardly-inclined valved partitions extending around between the casing and each end of the barrel, longitudinal passages breaking through said partitions at one side of the barrel, a central transverse partition separating said passages, a discharge-chamber separated from said passages by valved partitions, a suction connection leading into the water-chamber formed between the casing and pump-barrel, and an outlet from the discharge-chamber.

4. In a pump, the combination of a casing having its ends contracted and closed by screw-caps, a pump-barrel centrally located in said casing, outwardly-inclined partitions extending around between the casing and each end of the barrel, valves disposed around said partitions and pointing to common centers outside the casing-heads, longitudinal passages breaking through said partitions at one side of the barrel, a central transverse partition separating said passages, a discharge-chamber separated from said passages by valved partitions, a suction connection leading into the water-chamber formed between the casing and pump-barrel, and an outlet from the discharge-chamber.

5. In a pump, the combination of a casing comprising two cylinders set side by side and integrally united, the ends of said cylinders being contracted and closed by removable caps, a pump-barrel centrally located in each of said cylinders, outwardly-inclined partitions extending around between the cylinders and barrels at each end thereof, valves disposed around said partitions and pointing to common centers outside the casing-heads, longitudinal passages breaking through said partitions at the sides of the pump-barrels, central transverse partitions separating said passages, discharge-chambers separated from said passages by valved partitions, said chambers being set at an angle to and intercommunicating with one another, hand-holes closed by removable caps in the outer walls of said chambers opposite each group of discharge-valves, a partition running across between the barrels whereby a common water-chamber is formed around the barrels behind the discharge-chambers, a suction connection leading into said water-chamber, and outlets from the discharge-chambers.

6. In a pump, the combination of a casing comprising two cylinders set side by side and integrally united, a pump-barrel centrally located in each of said cylinders, outwardly-inclined partitions carrying suction-valves extending around between the cylinders and barrels at each end thereof, longitudinal passages breaking through said partitions at the sides of the pump-barrels, central transverse partitions separating said passages, discharge-chambers separated from said passages by valved partitions, said chambers being set at an angle to and intercommunicating with one another, a partition running across between the barrels whereby a common water-chamber is formed around the barrels behind the discharge-chambers, a suction connection leading into said water-chamber, and outlets from the discharge-chambers.

7. In a pump, the combination of a casing comprising two cylinders set side by side and integrally united, a pump-barrel centrally located in each of said cylinders, partitions carrying suction-valves extending around between the cylinders and barrels at each end thereof, longitudinal passages breaking through said partitions at the sides of the pump-barrels, central transverse partitions separating said passages, discharge-chambers separated from said passages by valved partitions, said chambers being set at an angle to and intercommunicating with one another, a partition running across between the barrels whereby a common water-chamber is formed around the barrels behind the discharge-chambers, and a hand-operated valve in said partition whereby communication may be opened between the suction and discharge sides of the pump.

8. In a pump, the combination of a casing, a pump-barrel centrally located therein, partitions extending around between the casing and barrel at each end thereof, suction-valves carried thereby, longitudinal passages at one

side of the barrel breaking through said partitions, a central transverse partition separating said passages, and a discharge-chamber separated from said passages by valved partitions.

9. In a pump, the combination of a casing, a pump-barrel centrally located therein, partitions extending around between the casing and barrel at each end thereof, suction-valves carried thereby, longitudinal passages at one side of the barrel breaking through said partitions, a central transverse partition separating said passages, and a discharge-chamber separated from said passages by valved partitions, the discharge-valves at each end being so grouped as to be accessible through hand-holes provided in the outer wall of said chamber opposite each group.

In testimony whereof I have affixed my signature in presence of two witnesses.

CHARLES R. MOORE.

Witnesses:

CHARLES O. EACKER,

M. E. VERBECK.