No. 780,060. PATENTED JAN. 17, 1905.

G. B. PETSCHE.

PUMP.

APPLICATION FILED APR. 25, 1903.

2 SHEETS—SHEET 1.

FIG. 1.

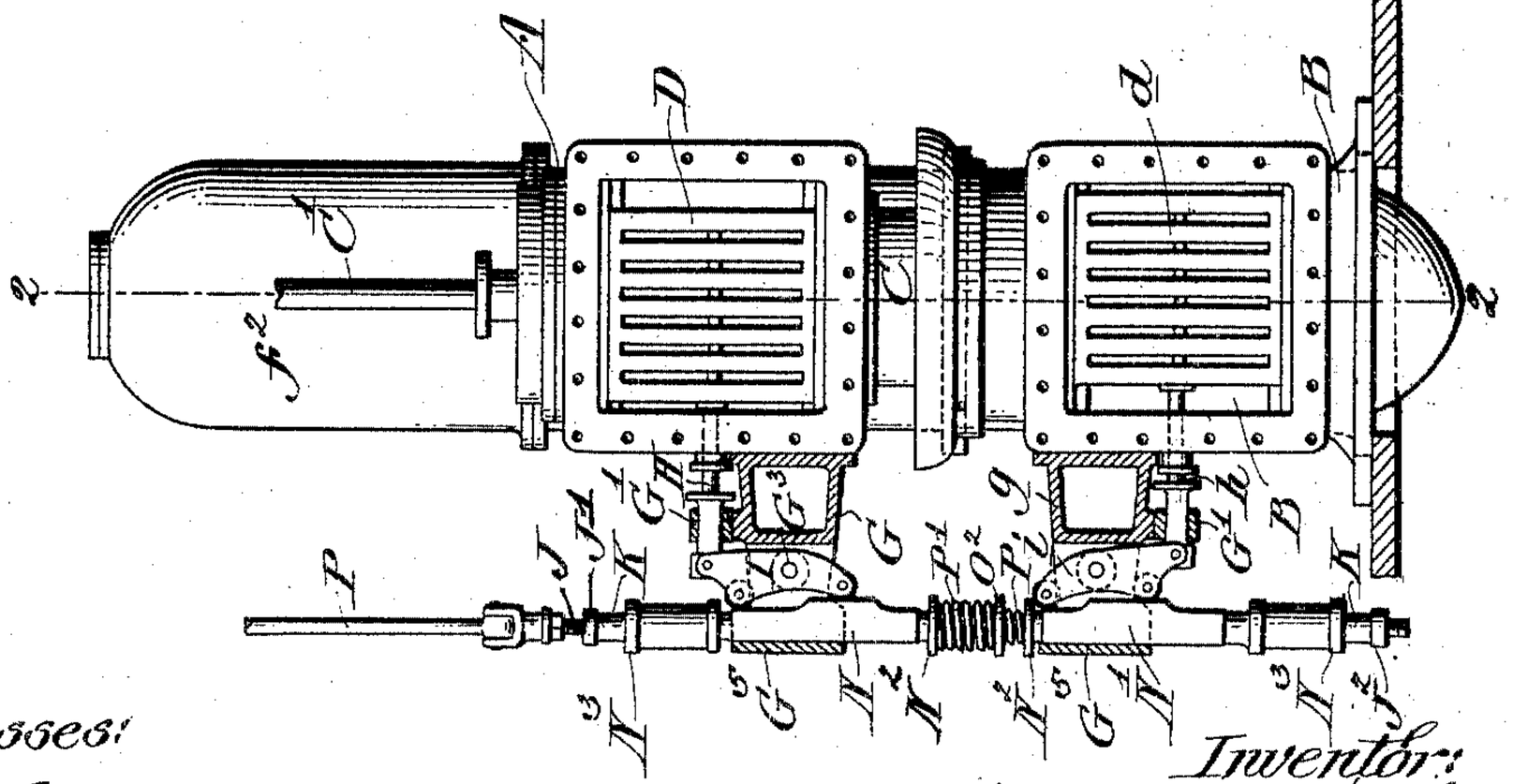
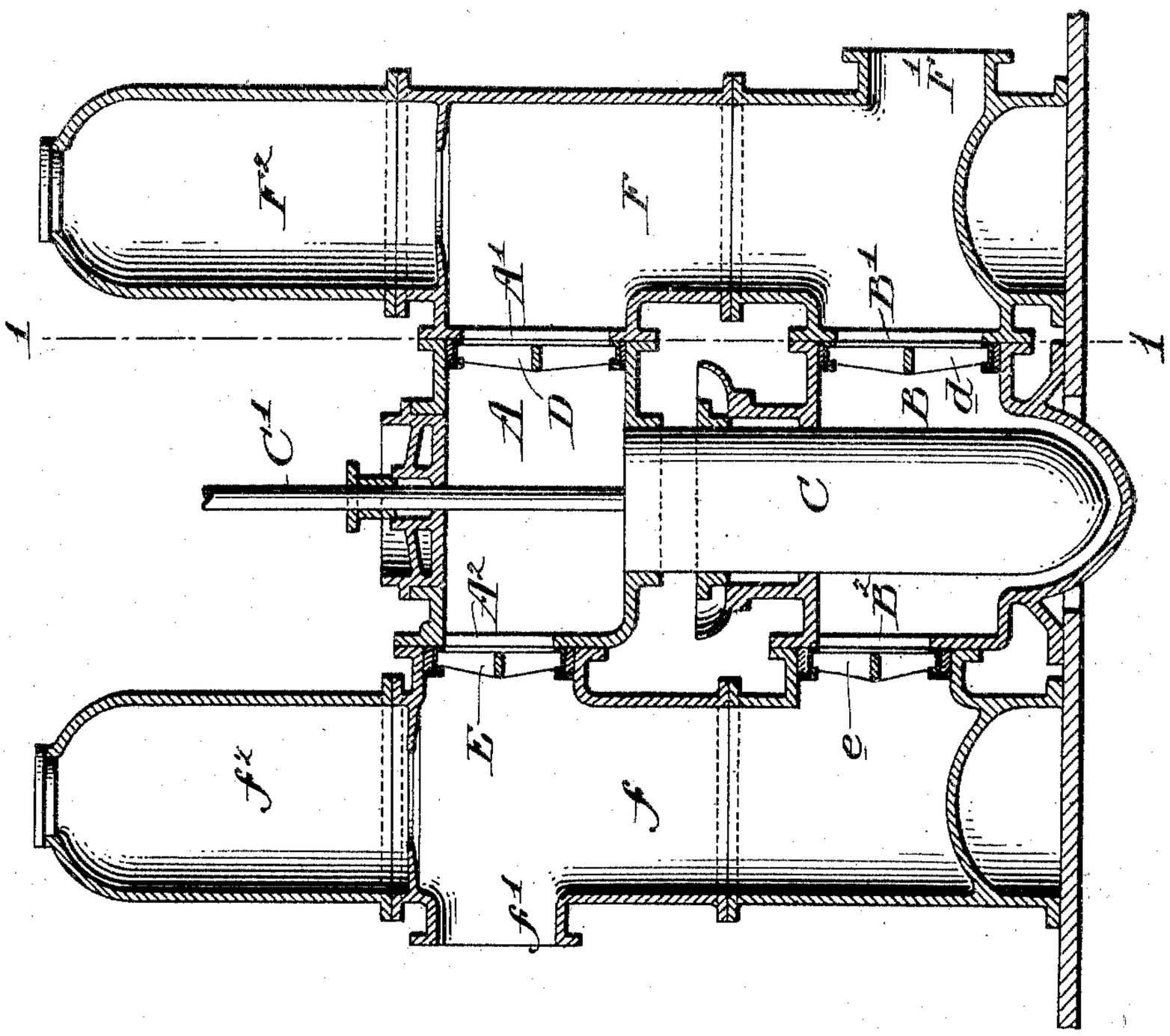


FIG. 2.



Witnesses:
D. Stewart
D. H. Williamson

Inventor:
Gustav B. Petsche
by his Atty
Thomas J. Thompson

No. 780,060. PATENTED JAN. 17, 1905.

G. B. PETSCHE.

PUMP.

APPLICATION FILED APR. 25, 1903.

2 SHEETS—SHEET 2.

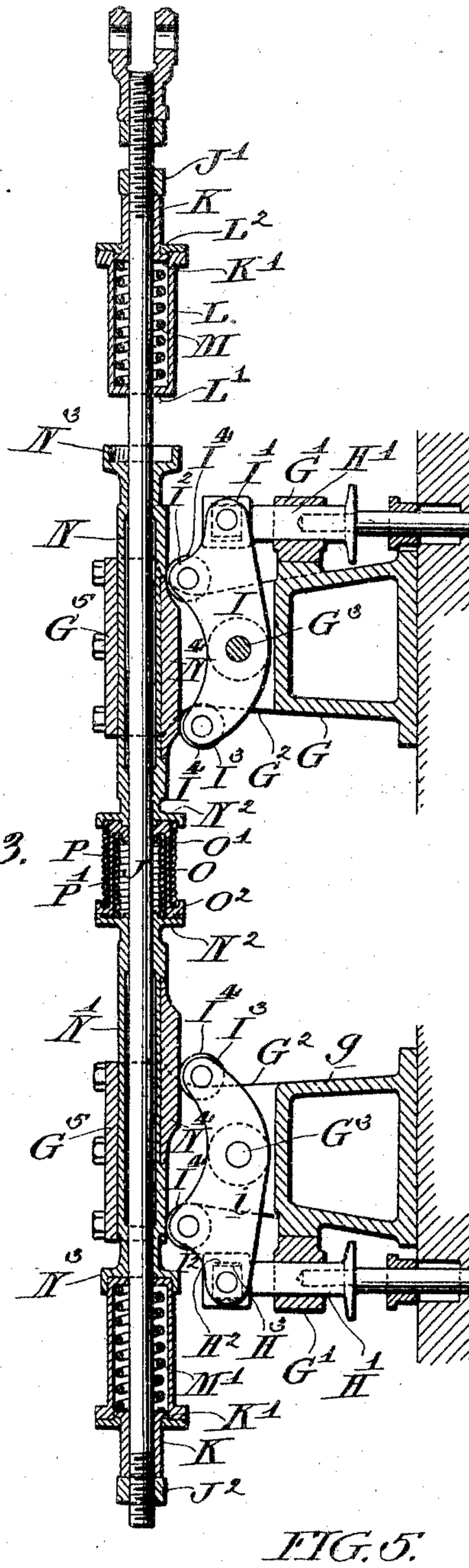


FIG. 3.

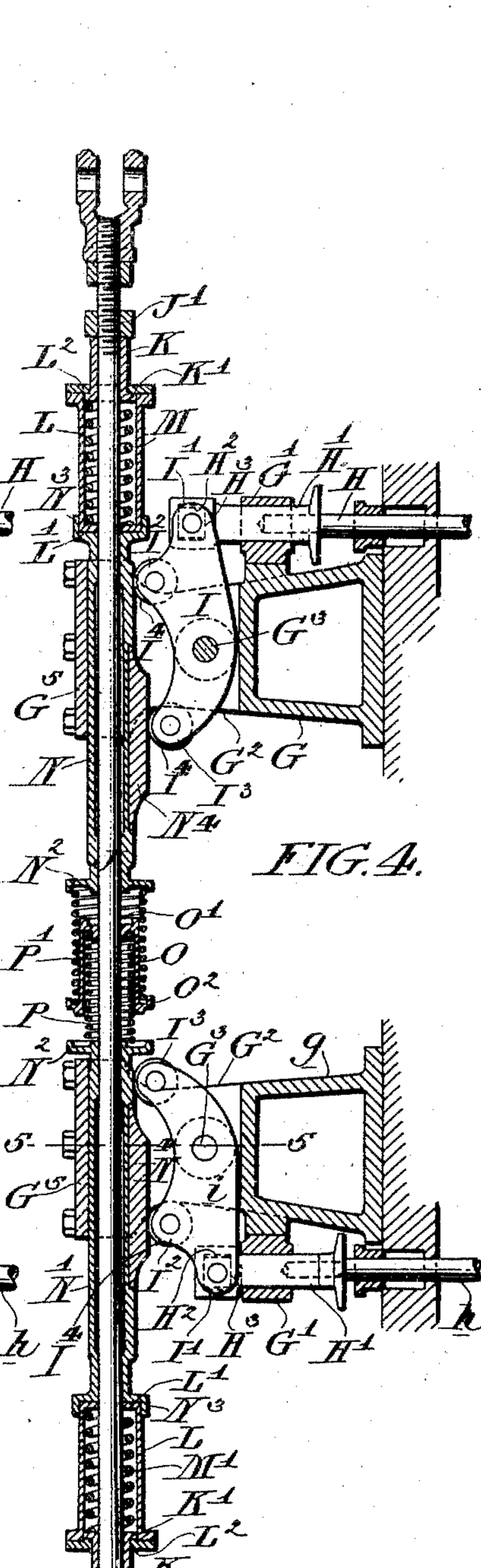


FIG. 4.

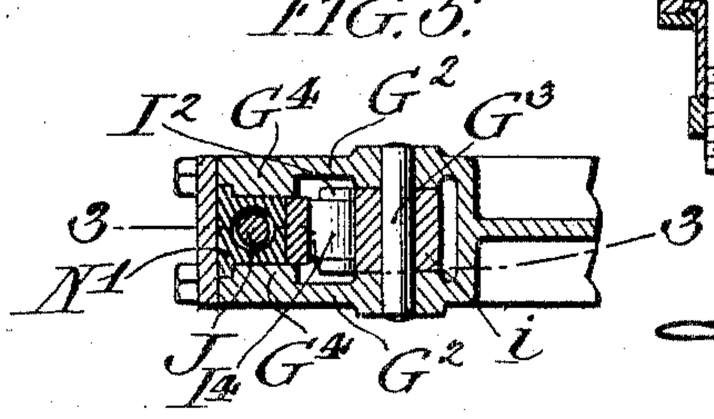


FIG. 5.

Witnesses:
H. Stewart
A. Williamson

Inventor:
Gustav B. Petsche
by his atty.
Francis J. Chandler

No. 780,060. Patented January 17, 1905.

UNITED STATES PATENT OFFICE.

GUSTAV BERNHARD PETSCHE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE SOUTHWARK FOUNDRY & MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

PUMP.

SPECIFICATION forming part of Letters Patent No. 780,060, dated January 17, 1905.

Application filed April 25, 1903. Serial No. 154,200.

To all whom it may concern:

Be it known that I, GUSTAV BERNHARD PETSCHE, a subject of the Emperor of Germany, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Pumps, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to pumps, and is broadly applicable to pumps used in connection with both liquids and gases, though especially adapted for use in connection with incompressible fluids.

Primarily the object of my invention is to provide improved means for actuating the valves for controlling the entrance and exit of fluid to and from the pump-chamber, whereby said valves are actuated through resilient means which permit them to remain stationary when the forces opposing their movement exceed a determined amount, this method and, in a broad sense, the means for actuating the valves in connection with liquid-pumps being substantially of the character described in my Patents Nos. 714,603 and 714,604, granted on the 25th of November, 1902. In my present invention I employ a cam or equivalent acuating device by means of which motion is imparted to a valve and which is normally moved through a determined path, but so actuated through resilient means which permit it to remain stationary when the force opposing its movement exceeds a determined amount; but this invention, broadly speaking, forms the subject-matter of my copending application, filed April 25, 1903, Serial No. 154,199, my present invention being limited to a special construction by which the cam or equivalent actuating device is so connected with the mechanism which gives it motion that it has the capacity of remaining stationary under sufficient resistance against the pressure tending to move it in either direction; and, further, my invention consists in special details of construction, all of which will be best understood as described in connection with the drawings in which my invention is illustrated, and in which—

Figure 1 is a sectional elevation of a liquid-pump provided with my improvements, the section being taken as on the line 1 1 of Fig. 2. Fig. 2 is a sectional elevation through the pump, taken as on the line 2 2 of Fig. 1. Fig. 3 is an elevation, on an enlarged scale, showing the valve-actuating cams, the means for actuating said cams, and the means by which they communicate motion to the valves, the said cams and the springs coacting with them being shown in section taken as on the line 3 3 of Fig. 5, and the said Fig. 3 showing one of the cams in the act of yielding to the resistance opposing the movement of the valve. Fig. 4 is a view similar in all respects to Fig. 3, except that the cams are shown in shifted position; and Fig. 5 is a cross-sectional view taken on the line 5 5 of Fig. 4.

A and B indicate pump-chambers having admission-valve ports (indicated at A′ and B′) and delivery-valve ports, (indicated at A^2 and B^2.)

C is the plunger, working through the chambers A and B and actuated through a plunger-rod (indicated at C′) by moving parts of the pumping-engine. (Not shown.)

D and *d* are the admission-valves, which are of the sliding gridiron type and arranged with their faces toward the inflow of water through the ports A′ and B′.

E and *e* are the delivery-valves, of the same sliding gridiron type as the admission-valves and arranged with their faces also in the direction of the flow of water through their controlled ports.

F is a chamber forming part of the annular conduit which receives its water through the port (indicated at F′) and which, as shown, is provided with an air-chamber F^2.

f is the delivery-chamber of the pump, communicating with the delivery-main through port *f′* and having, as shown, an air-chamber f^2.

G and *g* are brackets extending out from the side of the pump, placed, as shown, one above the other and similar in all respects except that, as shown, their characteristic parts are reversed in position. These brackets are provided with bearings (indicated at G′) and are formed with outwardly-extending parallel arms G^2 G^2, between which extends the pivot-pin (indicated at G^3) and on the ends of which are formed or supported the guideways, (indicated at G^4 G^4.)

G^5 indicates a plate secured to the outer ends of the arms G^2 and serving as a back bearing for the sliding cams, to be described.

H and *h* indicate the valve-rods connected with the upper and lower pair of valves, which may be either the admission or delivery valves, but which, as shown, are the admission-valves D and *d*. The ends of these rods are connected with slides (indicated at H′ H′) which are supported and guided in the guideways G′ G′, said slides, as shown, having transversely-slotted heads H^2, in which are supported sliding blocks, (indicated at H^3.)

I and *i* are three-armed levers pivoted to rock on or with the pins G^3 and having their longer arms (indicated at I′) connected with the sliding blocks H^3, while their shorter arms (indicated at I^2 and I^3) are of equal length and each supports a cam-roller, (indicated at I^4 I^4, &c.)

J indicates a reciprocating rod which is given its motion preferably by a connection with the pumping-engine (not shown) and so as to move in perfect synchronism with the plunger. One of these rods, it will be understood, is to be supplied in connection with each pair of admission or delivery valves, and, as shown, the rods are connected with an actuating-rod (indicated at P) and have, screwing upon their ends, adjusting-nuts (indicated at J′ and J^2) against which in the construction shown abut sleeves K K, having outwardly-flanged heads, (indicated at K′,) over which extend the cylindrical spring-casings L L, having their inner ends provided with inwardly-turned flanges, (indicated at L′,) while the outer ends of the cylinders are secured to annular heads (indicated at L^2) which fit on the sleeves K beneath the flanges K′.

M and M′ indicate springs situated in the spring-casings and abutted at one end against the flange L′ of the casing and at the other end against the flange K′ of the sleeve K. This construction, it will be seen, enables either spring to be compressed by power acting on the ends L′ of the spring-casings, the casing under such conditions moving toward the end of the rod J, to which it is attached or connected.

N and N′ indicate sliding cam-blocks supported on the rod J and of such conformation, as indicated in Fig. 5, as to fit in the bearings G^4 and abut against the plate G^5.

N^4 N^4 indicate the cams proper formed on or secured to the cam-blocks, and by preference the cam-blocks are formed, as shown, with outwardly-extending flanges N^2, constituting spring-seats at one end and a cup-shaped extension N^3 at the other end, which is adapted to make a neat fit with the end of the spring-casing L.

O is a spring-supporting thimble formed with an outwardly-extending annular flange O^2. This thimble is placed on the rod J between the spring-seats of the cam-blocks M and M′, and springs P and P′ are placed between it and the spring-seats N^2, as shown, this special construction having for its object the provision of resilient force of great uniformity to hold the cam-blocks apart, but is not claimed in this application, because it is in part the subject-matter of my copending application above mentioned.

Assuming that the cam-blocks N and N′ move with the rod J, to which they are connected, it will be seen that as the rod J shifts from the position shown in Fig. 3 to that shown in Fig. 4 the cam-faces act upon the three-armed levers I and *i*, causing said levers to rock, so that the lever I draws outward the valve-stem H and the valve connected therewith, while the lever I is so actuated as to push inward the valve-stem *h*, connected with it, and I may state that by preference and in the construction shown, and particularly with reference to the delivery-valves, the outward movement of the valve-rod is utilized to open the valves, while the inward movement is utilized to close them, and it will be seen that the arrangement of the cams and cam-levers is such that the valve-stems H and *h* are given a reciprocating movement, the one being moved to open its valve when the other is moved to close its valve. If the resistance to the motion of the valve exceeds that determined by the energy and adjustment of the springs P and *p*, the cam-block controlling the movements of said valve will remain stationary, as is shown in Fig. 3, with respect to the cam-block N, the rod J moving through its determined and constant path and the springs P and P′ being compressed, as shown in said Fig. 3, and obviously as soon as the resistance diminishes to a point below that provided for by the energy of said springs they will at once act on said cam-block, causing it to move to normal position upon the rod with great rapidity and in doing so to shift the valve-lever and valve to open the valve. In order to avoid destructive shocks due to this rapid movement of the cam-block on the rod, I provide the flanged cup N^3, coacting with the end of the spring-casing L, as shown, so as to act as a dash-pot or elastic take-up, and of course any of the many familiar constructions for serving this purpose could be equally well employed.

In my copending application above referred to I have shown and described similar mech-

anism for communicating motion to the valves, except that in said other application the cam-blocks N and N′ are on their outer ends supported against fixed abutments on the rod J. In my present application the abutments, made up of the springs M and M′ and the casings, &c., described in connection with said springs, are resilient, so that they are capable of yielding, and thus permitting the cam-blocks to remain stationary when the resistance to the inward movement of the valves exceeds the amount determined by the energy of the springs M and M′, and, generally speaking, the provision of this spring-abutment constitutes the novel feature of my present invention, though it will be understood the detail of construction is capable of wide variation without departure therefrom.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a pump, the combination with a valve-spindle, of a reciprocating positively-actuated part, a valve-actuating cam, and springs connecting the valve-actuating cam with the reciprocating part acting to normally secure the parts together in fixed position but permitting the reciprocating part to move independently of the valve-actuating cam in either direction whenever its resistance to the motion of the valve exceeds a determined amount.

2. In a pump, the combination with a valve-spindle, of a positively-actuated reciprocating rod, a valve-actuating device mounted on said rod to slide upon it, spring-abutments secured on said rod acting against the valve-actuating device at both ends to normally hold it in fixed position on the rod, but permit said rod to move in either direction, independently of the slidable device, whenever the resistance to the valve exceeds a determined amount.

3. In a pump, the combination with a valve-spindle, of a positively-actuated reciprocating rod, a valve-actuating device mounted on said rod to slide upon it, said slidable device having a spring-abutment at one end and a dash-pot member at the other, a coacting dash-pot member, normally supported in fixed position on the rod by a spring, and serving as an abutment for the slidable valve-actuating device, and a spring acting against the spring-seat and normally holding the slidable member against the dash-pot member.

4. In a pump, having valves operating simultaneously or nearly so, in opposite directions, the combination with said valves of a reciprocating rod, valve-actuating devices slidably connected with said rod, elastic abutments against which the outer ends of said devices normally rest, and springs acting to hold said devices against the elastic abutments.

5. In a pump, having valves operating simultaneously, or nearly so, in opposite directions, the combination with said valves of a reciprocating rod, valve-actuating cams slidably connected with said rod, elastic abutments against which the outer ends of said cams normally rest, and springs acting to hold said cams against the elastic abutments.

GUSTAV BERNHARD PETSCHE.

Witnesses:
CHAS. F. MYERS,
D. STEWART.