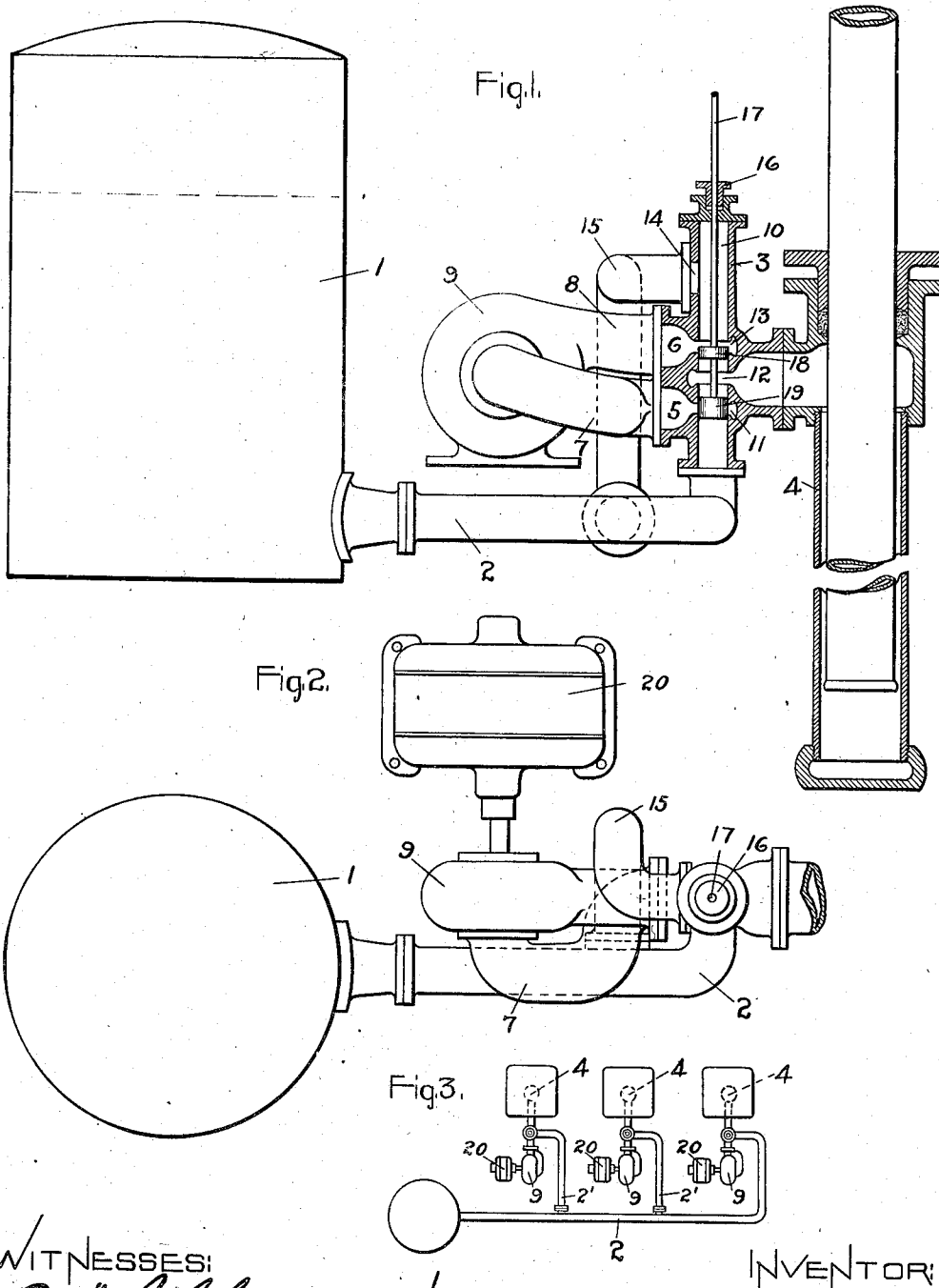


J. H. CLARK.
PUMPING SYSTEM FOR HYDROSTATIC APPARATUS.
APPLICATION FILED SEPT. 3, 1904.

920,825.

Patented May 4, 1909.



WITNESSES:
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UNITED STATES PATENT OFFICE.

JOHN H. CLARK, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY,
A CORPORATION OF NEW YORK.

PUMPING SYSTEM FOR HYDROSTATIC APPARATUS.

No. 920,825.

Specification of Letters Patent.

Patented May 4, 1909.

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To all whom it may concern:

Be it known that I, JOHN H. CLARK, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Pumping Systems for Hydrostatic Apparatus, of which the following is a specification.

The present invention relates to hydrostatically-actuated devices such as elevators, cranes, hoists, etc., and more particularly to the means for storing, subjecting to pressure and delivering the water or other liquid to the working cylinder of the device, and the object of the invention is to provide simple and highly efficient means of this character so constructed and arranged as to conserve to the fullest extent the potential energy of the descending loads and without producing excessive strains in the operative parts.

In carrying out my invention I provide an accumulator consisting of a hermetically-sealed tank of sufficient size to contain all the liquid used in the operation of the hydrostatically-actuated device or devices and a considerable amount of air or other elastic medium, and between the accumulator and each of the working cylinders of the devices I connect a pump and a controlling valve so arranged that the water passes through the pump in the same direction both when passing from the accumulator to raise the lifting plunger and when returned from the working cylinder to the accumulator on the descent of the plunger. This arrangement permits of a substantially continuous unidirectional operation of the pump to assist in raising the pressure in the accumulator on the descent of the plunger as well as to supply the necessary increment of pressure to the fluid from the accumulator to raise the plunger without subjecting the pump and its actuating mechanism to the great stresses incident to other forms of hydrostatic actuating devices.

The invention will be more readily understood upon reference to the following detailed description and the accompanying drawing forming a part of this specification, in which—

Figure 1 shows in part side elevation and part section an arrangement of accumulator, pump, valve and connections to an elevator cylinder embodying one form of my inven-

tion; Fig. 2 is a plan of the same; and Fig. 3 is a plan in outline of the same arrangement in which a plurality of elevators are supplied from a common accumulator.

The accumulator which is shown in the form of a vertical cylindrical tank 1 and sealed air-tight is connected near its lower end by a main supply pipe 2 with the lower end of a valve chest 3 which is in turn connected to the elevator cylinder 4. The valve chest 3 is provided with two passage ways 5 and 6 which are respectively connected with the suction pipe 7 and the discharge pipe 8 of a centrifugal pump 9 and has a central valve chamber 10 extending vertically there-through connecting at its lower end with the main supply pipe 2 and with the ports 11 to the suction pipe 7, 12 to the elevator connection, and 13 to the discharge pipe 8 leading from the sides thereof. Near the upper end of the valve chamber 10 is an opening 14 connected by a bent by-pass pipe 15 to the main supply pipe 2, and at its end is a stuffing box 16 through which passes the valve rod 17 on which are two valves 18 and 19. The pump 9 is shown connected to an electric motor 20, but it is, of course, apparent that any suitable driving means may be employed.

When a number of elevators are located in the same building they may be connected to a single accumulator as shown in Fig. 3 by branch supply pipes 2' leading from a main supply pipe 2 which is alone connected to accumulator, or they may be severally connected directly to accumulator if found more convenient.

The operation of the device shown is substantially as follows: When it is desired to raise the elevator the valve rod 17 is raised from the position shown in Fig. 1 so that valve 18 clears the lower seat of the discharge port 13, and valve 19 clears the lower seat of port 11 and a channel for the water in the tank 1 is opened through supply pipe 2, port 11 passage 5, suction pipe 7, pump 9, discharge pipe 8, passage 6, port 13, port 12 to the elevator cylinder 4, the pressure on the opposite ends of the valves being equalized or balanced through the by-pass pipe 15. When it is desired to stop the elevator the valves 18, 19 are moved downward into the position shown in Fig. 1 when valve 19 covers both seats of the suction port 11 and valve 18

covers the lower seat of port 13 so that no exit is open to the water in the elevator cylinder and no passage remains open to the suction of the pump. When it is desired to
 5 lower the elevator the valve rod is depressed so as to lower the valve 19 clear of the upper seat of port 11 thereby opening a passage from the elevator cylinder 4 through port 12,
 10 port 11, passage 5, through the suction pipe 7, pump 9, discharge pipe 8, passage 6, port 13, opening 14, by-pass pipe 15, supply pipe 2 to the tank 1.

With this construction it will be noted that the pump operates to assist the tank
 15 pressure to raise the elevator and also without reversal operates in conjunction with the exhaust pressure of the water from the elevator cylinder to raise the pressure in the tank so that the only work imposed upon the
 20 pump is that necessary to overcome the preponderance of the load over the tank pressure in going up and the preponderance of the tank pressure over the load in coming down, and as its effort is expended in the
 25 same direction throughout both movements of the elevator, the maximum strains thrown upon the pump and its driving means are only one-half as great as in the ordinary forms of hydraulically actuated elevator
 30 devices.

I do not desire to restrict myself to the particular form or arrangement of parts herein described and shown; since it is ap-

parent that they may be changed and modified without departing from my invention. 35

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. The combination with a hydrostatic device and a pressure tank each having a passage way for the pressure fluid, of a valve chest having connections at both ends with the passageway of the tank, and a central port connected to the passage way of the hydrostatic device, a unidirectional centrifugal pump having suction and discharge passages
 40 connected to intermediate ports in said valve chest, and two valves in said chest in operative relation to said intermediate ports. 45

2. The combination with a hydrostatic device and a pressure tank each having a single passage way for the pressure fluid, of a valve chest having both its ends connected to the tank passage way and a central port connected to the passage way of the hydrostatic device, a unidirectional centrifugal pump
 50 having suction and discharge passages directly connected to ports in the valve chest on opposite sides of the central port, and valves for closing either or both of the pump ports. 55

In witness whereof I have hereunto set my hand this 20th day of August, 1904. 6

JOHN H. CLARK.

Witnesses:

BENJAMIN B. HULL,
 HELEN ORFORD.