

Nov. 17, 1953

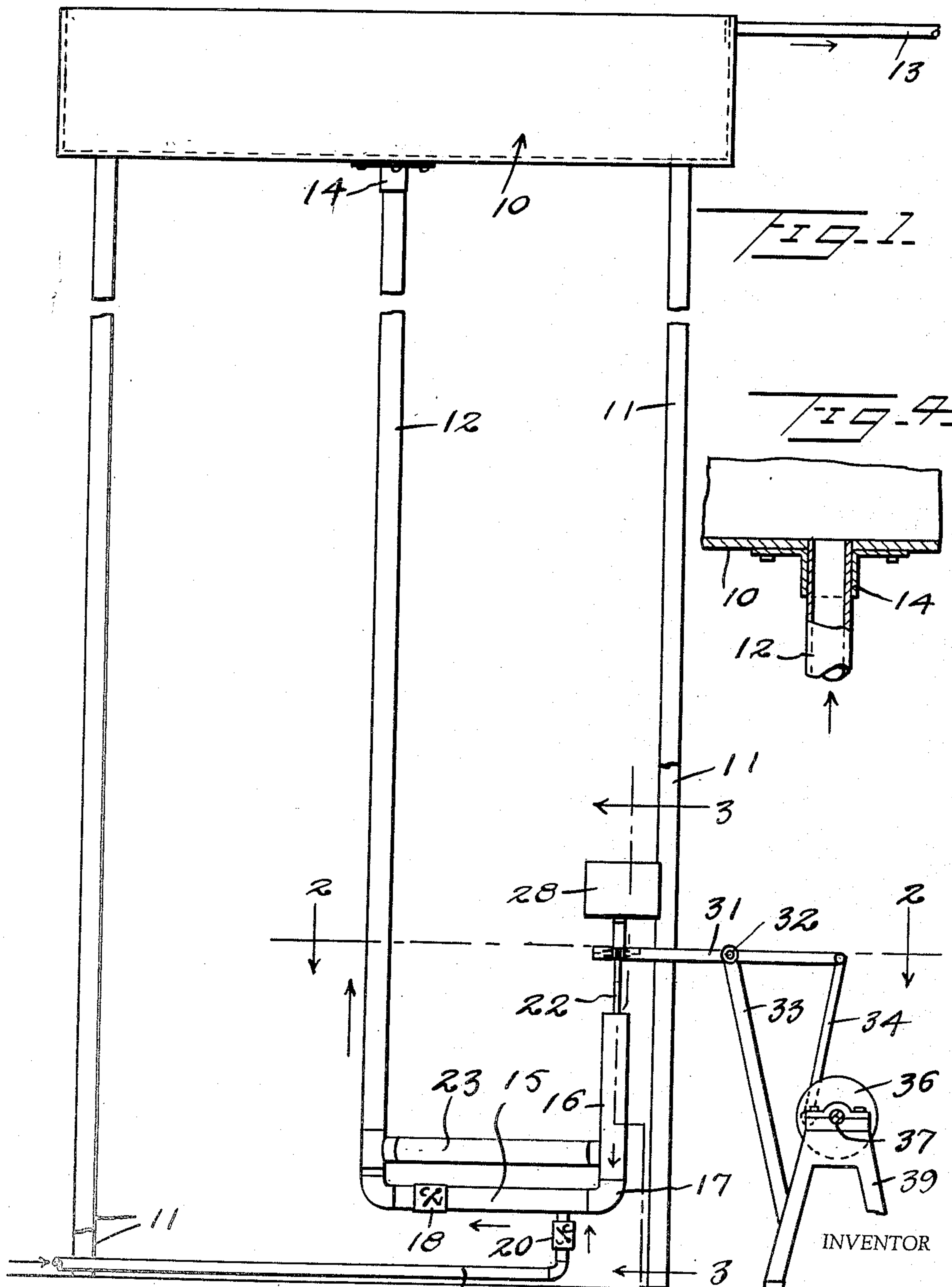
W. K. RICHARDSON

2,659,315

COUNTERBALANCE PUMP

Filed July 26, 1951

2 Sheets-Sheet 1



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BY

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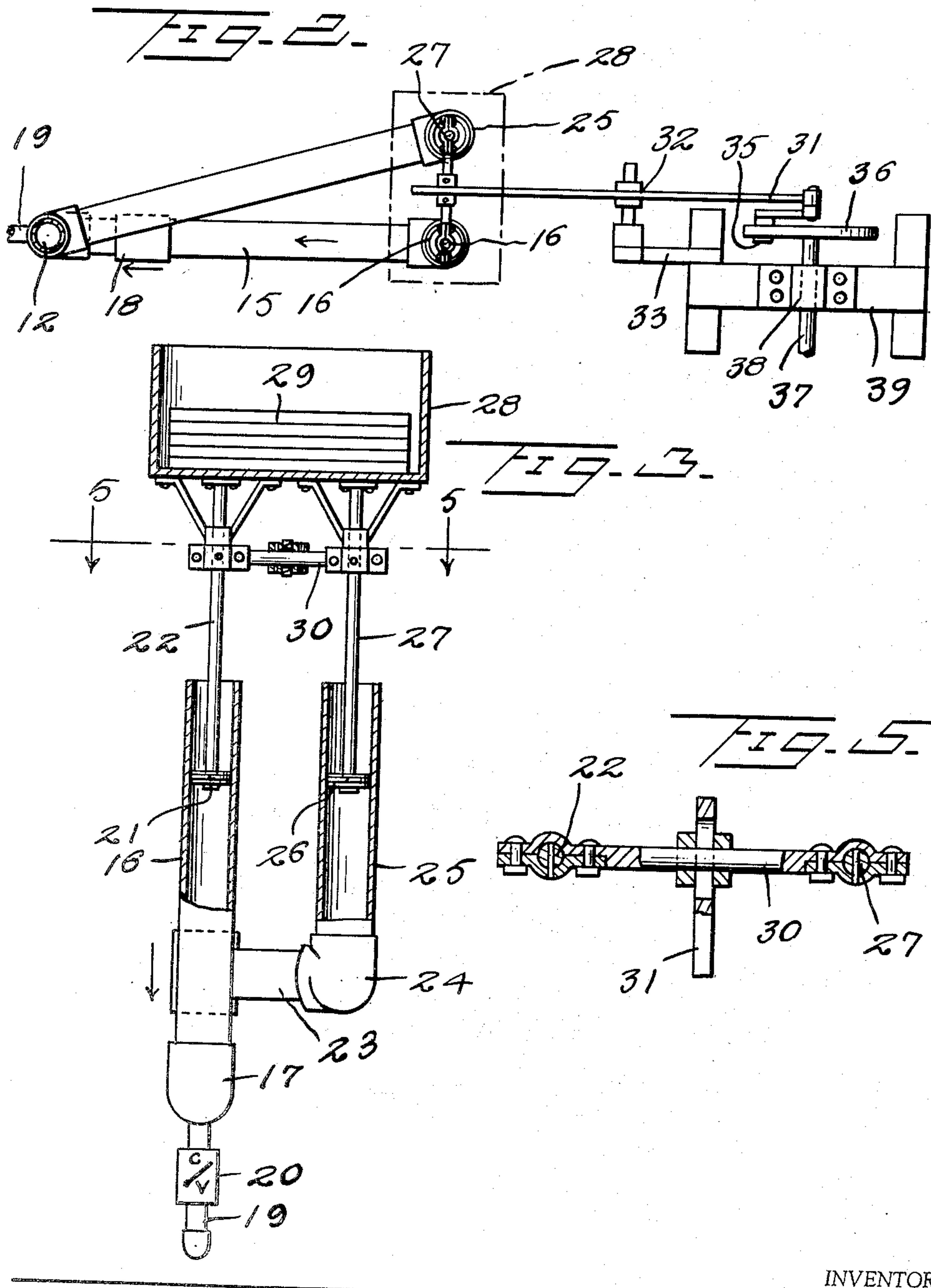
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COUNTERBALANCE PUMP

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Application July 26, 1951, Serial No. 238,690

3 Claims. (Cl. 103—153)

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This invention relates to pumps.

An object of this invention is to provide a pumping system wherein water or other liquid is elevated to a tank which is so constructed and arranged that the weight of the water in the column between the pump and tank is counterbalanced so that relatively small power will be required to elevate the liquid to the tank. In carrying out this invention a counterbalancing pumping member is provided which takes up the weight of the liquid column in cooperation with a counterweight. In this manner only a relatively small force is required to actuate the pump.

Another object of this invention is to provide a pumping system which is simple in construction and which can be economically operated.

With the above and other objects in view, my invention consists in the arrangement, combination and details of construction disclosed in the drawings and specification, and then more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a detailed side elevation of a counterbalancing pumping system constructed according to an embodiment of this invention.

Figure 2 is a fragmentary sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a fragmentary sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a fragmentary sectional view showing the connection between the standpipe and the elevated receiver.

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 3.

Referring to the drawings, the numeral 10 designates generally an elevated liquid receiver which is supported in the present instance on supporting legs 11. The receiver 10 is provided adjacent the upper portion thereof with an outlet pipe line 13. A vertically disposed standpipe or intake line 12 is connected at its upper end by means of a connecting member 14 to the bottom of the receiver 10.

The standpipe 12 has connected to its lower end a horizontally disposed pipe 15, and a pumping cylinder 16 disposed in the present instance in vertical position, is connected to the horizontal pipe 15 by means of an L 17. A downwardly closing check valve 18 is interposed in the pipe 15 so as to relieve the pumping cylinder 16 of any back pressure of the liquid in the standpipe 12.

An intake supply line 19 is connected into the horizontal pipe 15 between the check valve 18

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and the L 17 and a downwardly closing check valve 20 is interposed in the intake line 19. The cylinder 16 has slidable therein a pumping piston 21 and an upwardly extending piston rod 22 is connected at its lower end to the piston 21. A second horizontally disposed pipe 23 is connected at one end to the lower end portion of the standpipe 12 and is also connected through an L 24 to a vertically disposed counterbalancing cylinder 25.

A piston 26 is slidable in the cylinder 25 and a connecting rod 27 is connected at one end to the piston 26 and extends upwardly from the cylinder 25. A weight receptacle 28 is secured to the upper ends of the piston rods 22 and 27 and a plurality of counterbalancing weights 29 are adapted to be disposed in the receptacle 28. These weights 29 are of such character as to counterbalance the hydrostatic pressure of the liquid in the standpipe 12 so that the piston rods 22 and 27 may be vertically reciprocated through the medium of a relatively small power force.

A crosshead 30 is connected between the piston rods 22 and 27 below the receptacle 28 and in the present instance a rocking beam 31 is pivotally connected at one end to the crosshead 30. The beam or lever 31 is pivoted between the ends thereof on a pivot 32 carried by a support 33, and the opposite end of the lever or rocking beam 31 is pivotally connected to a link 34 which is pivoted to a crank pin 35. The crank pin 35 is carried by a crank plate 36 which is fixed on a drive shaft 37. The drive shaft 37 is adapted to be rotated by any suitable power means and is journaled adjacent the plate 36 in a bearing 38 carried by a bearing support 39.

In the use and operation of this pumping structure, the pump 16 is connected through the intake pipe line 19 to a source of liquid supply which may be below the ground or above the ground at a suitable point below the elevated receiver 10. The pistons 21 and 26 are reciprocated by rocking of the lever 31 and at this time the counterbalancing piston 26 will move the water upwardly in standpipe 12 and at the same time the liquid in cylinder 16 will also be forced past the check valve 18 upwardly into the standpipe 12 and into the receiver 10. When the pistons 21 and 26 are moved upwardly check valve 18 will close and water or other liquid will be drawn from the supply line 19 into cylinder 16. At the same time the water in standpipe 12 will move downwardly through horizontal pipe 23 into counterbalancing cylinder 25 so that only a relatively small power force will be required

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to move the pistons 21 and 26 upwardly and downwardly.

What I claim is:

1. A counterbalanced pumping system comprising an elevated receiver, a vertically disposed intake pipe connected at one end to said receiver, a pumping cylinder connected with the lower end of said intake pipe, an upwardly opening check valve between said pumping cylinder and said intake pipe, a supply pipe connected with said pumping cylinder, an upwardly opening check valve between said pumping cylinder and said supply pipe, a counterbalancing cylinder connected with said vertical pipe, a piston slidable in each cylinder, a piston rod extending from each piston, a receptacle fixed to said piston rods, counterbalancing weights in said receptacle, and means connected with said piston rods for reciprocating said pistons.

2. A counterbalanced pumping system comprising an elevated receiver, a vertically disposed intake pipe connected at one end to said receiver, a pumping cylinder connected with the lower end of said intake pipe, an upwardly opening check valve between said pumping cylinder and said intake pipe, a supply pipe connected with said pumping cylinder, an upwardly opening check valve between said pumping cylinder and said supply pipe, a counterbalancing cylinder

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connected with said vertical pipe, a piston slidable in each cylinder, a piston rod extending from each piston, and means connected with said piston rods for reciprocating said pistons.

3. A counterbalanced pumping system comprising a receiver, an intake pipe connected at one end to said receiver, a pumping cylinder connected with the other end of said intake pipe, a check valve between said pumping cylinder and said intake pipe, a supply pipe connected with said pumping cylinder, a check valve between said pumping cylinder and said supply pipe, a counterbalancing cylinder connected with said intake pipe, a piston slidable in each cylinder, a piston rod extending from each piston, a receptacle fixed to said piston rods, counterbalancing means associated with said receptacle, and means connected with said piston rods for reciprocating said pistons.

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