No. 703,045. Patented June 24, 1902.

G. L. CUDNER & J. DYER.

APPARATUS FOR RAISING LIQUIDS.

(Application filed June 5, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig: 1.

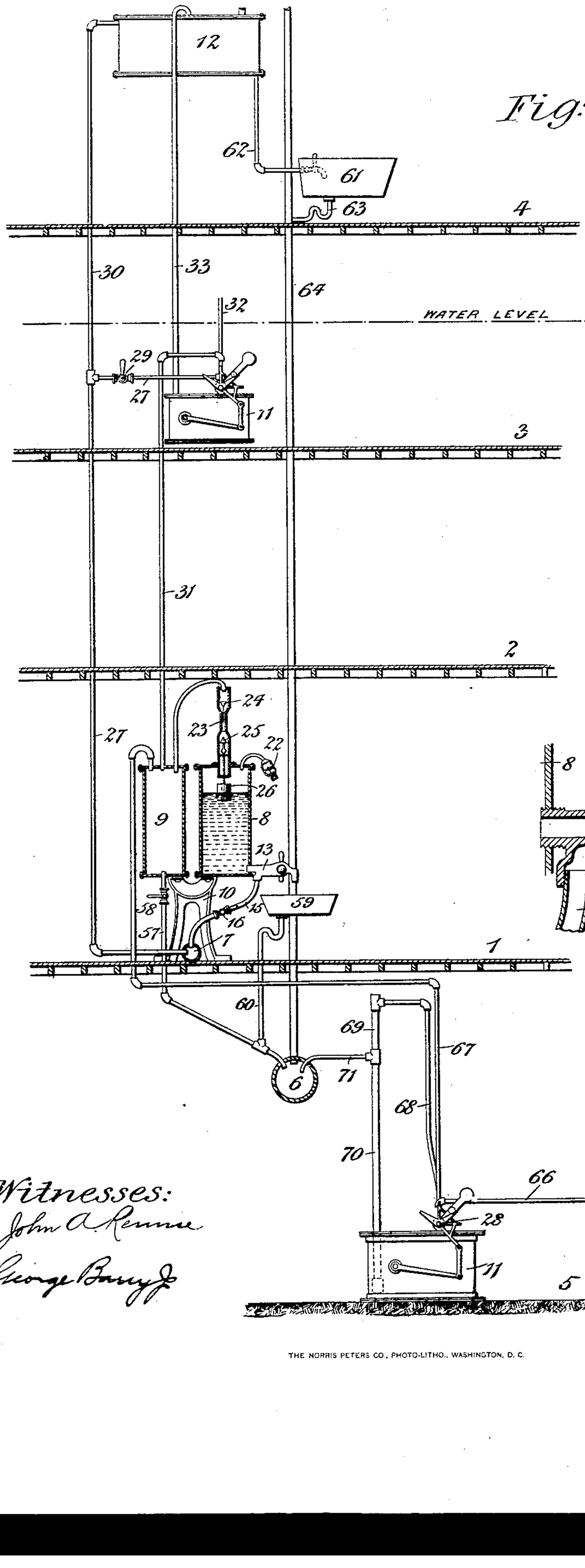
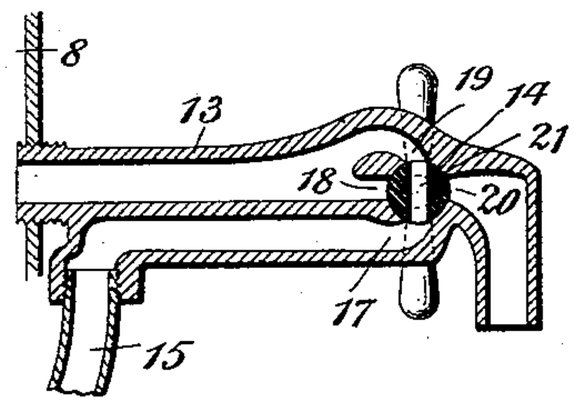


Fig: 7.



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(No Model.) 2 Sheets—Sheet 2.

Fig: 2.

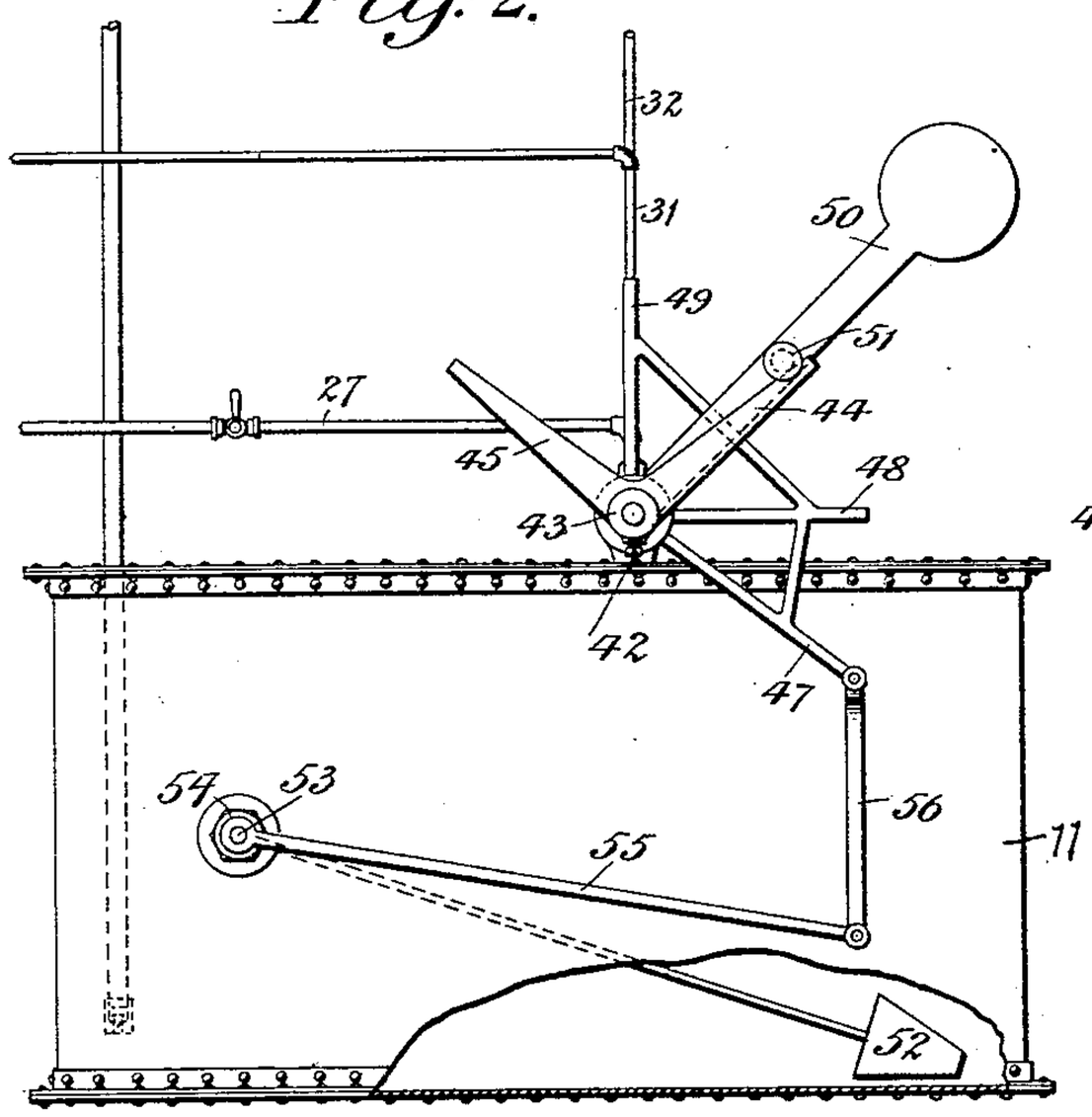


Fig: 3.

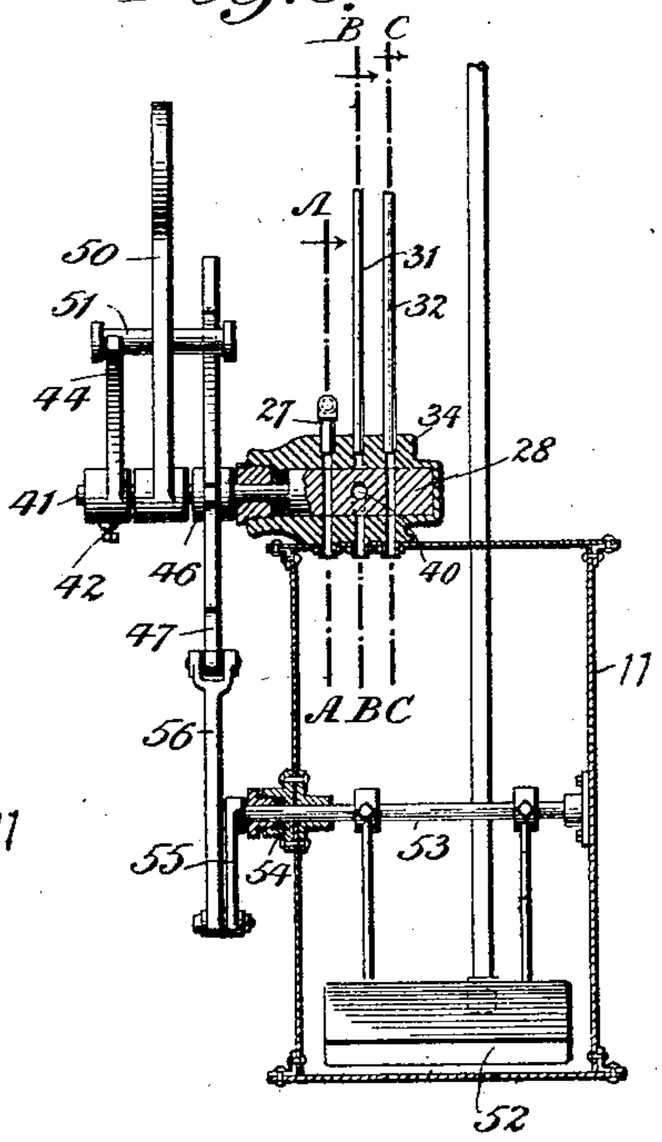


Fig: 4.

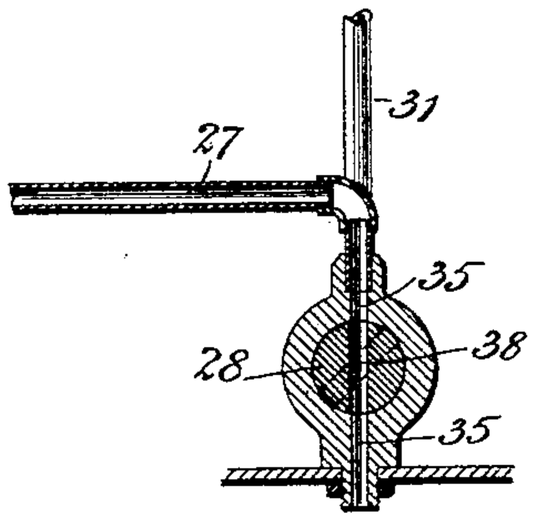


Fig: 5.

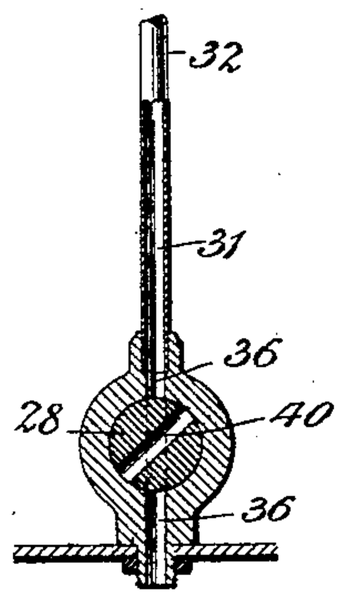
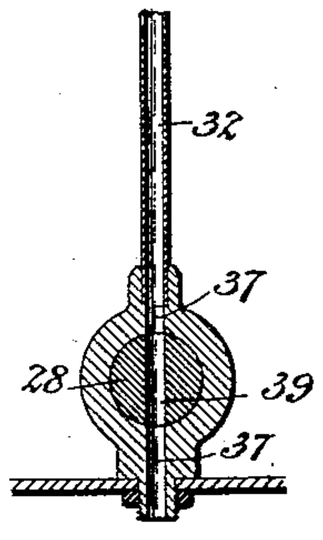


Fig: 6.



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UNITED STATES PATENT OFFICE.

GUSTAVIS L. CUDNER AND JOHN DYER, OF NEW YORK, N. Y.

APPARATUS FOR RAISING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 703,045, dated June 24, 1902.

Application filed June 5, 1901. Serial No. 63,203. (No model.)

To all whom it may concern:

Be it known that we, GUSTAVIS L. CUDNER and JOHN DYER, citizens of the United States, and residents of the borough of Manhattan, in the city and State of New York, have invented new and useful Improvements in Apparatus for Raising Liquids, of which the following is a specification.

Our invention relates to improvements in apparatus for raising liquids; and it has for its object to provide an apparatus having certain new and improved features in construction, form, and arrangement, whereby the liquid will be raised at intervals in a very simple and effective manner to a higher level than the natural head of the liquid which it is intended to raise.

This apparatus is well adapted for raising water in a building to floors above the natural head of the water and also to raise sewage from a basement or cellar to a sewer at a higher level.

A practical embodiment of our invention is represented in the accompanying drawings, in which—

Figure 1 represents a liquid-elevating system embodying our improved apparatus, certain of the parts being shown in section to more clearly illustrate the working of the same. Fig. 2 is an enlarged view, in side elevation, of the liquid-elevating tank, a portion of the same being broken away to show the valve-operating float therein. Fig. 3 is a vertical transverse section through the tank in the plane of the controlling-valve, the levers for operating the same being shown in full lines. Fig. 4 is an enlarged section through the controlling-valve, taken in the plane of the line A A of Fig. 3. Fig. 5 is an enlarged section taken through the valve in the plane of the line B B of Fig. 3. Fig. 6 is an enlarged section taken through the valve in the plane of the line C C of Fig. 3; and Fig. 7 is an enlarged longitudinal vertical section through the main draw-off cock.

Proceeding to describe a system of liquid elevation embodying our invention, the several floor-levels are denoted by 1, 2, 3, and 4, and the cellar-level by 5. The water level or head is represented as being between the third and fourth floors of the building at a point above the liquid-elevating tank, to be hereinafter described.

The sewer is denoted by 6, and it is shown as located at a point between the first-floor level and the cellar-floor level.

The water-main is denoted by 7, and it is here shown as being located at the first-floor level.

The main pressure or supply tank is denoted by 8, and the compressed-air reservoir or tank is denoted by 9. These two tanks are represented in the accompanying drawings as being supported upon a suitable stanchion 10, located on the first-floor level.

A liquid-elevating tank 11 is represented as being located on the third-floor level for use in raising the water to a water-tank 12, located at a higher point than the water-level—as, for instance, at a point above the fourth-floor level.

The main pressure or supply tank 8 is provided with a draw-off cock 13, through which water may be supplied to the tank 8 when the valve 14 is turned in a direction to close the cock, the connecting-pipe between the main and the cock being denoted by 15 and having a suitable controlling-cock 16 therein. The draw-off cock is provided with four ports 17, 18, 19, and 20 opening to the face of the valve 14, which valve has a single through-port 21 therein. When the valve 14 is turned in one direction, free communication is established from the water-main 7 to the interior of the tank 8 through the ports 17 and 19, while the ports 18 and 20 are closed. When the valve is turned in the other direction, free communication is established from the interior of the tank 8 to the exterior through the ports 18 and 20, while the ports 17 and 19 are closed. It will thus be seen that the water is never drawn from the water-main, but always from the pressure or supply tank.

An automatic valve 22 is connected with the top of the tank 8, which valve is arranged to close when subjected to pressure from within the tank and to open when subjected to suction from within the tank for automatically keeping the tank supplied with air during its intermittent operations caused by the rise and fall of the water therein.

A compressed-air-feed pipe 23 leads from

the top of the tank 8 to the compressed-air reservoir or tank 9. Within this pipe there is mounted an automatic valve 24, arranged to open under pressure from within the tank 8 to permit the escape of the compressed air to the tank 9 and to close under pressure from the tank 9 to prevent the return of the air to the interior of the tank 8. A positively-operated valve 25 is also mounted in the pipe 23, which valve is connected to a float 26, located within the tank 8, so that when the water-level in the tank reaches a predetermined point the valve 25 will be closed for preventing the water from escaping through the pipe 23 to the interior of the compressed-air reservoir or tank 9.

A water-feed pipe 27 leads from the water-main 7 to the tank 11 through a controlling-valve 28, which automatically opens and closes communication between the feed-pipe 27 and the tank 11 in a manner to be hereinafter described. A suitable cock 29 is located in the pipe 27 for regulating the flow of water therethrough.

A waste-pipe 30 leads from the top of the water-tank 12 to the feed-pipe 27 for permitting the escape of water from within the said tank after it has been filled.

A compressed-air-feed pipe 31 leads from the interior of the reservoir 9 to the interior of the liquid-elevating tank 11 through the valve 28, the said valve serving to open and close communication therethrough at predetermined intervals. A vent-pipe 32 also leads from the exterior to the interior of the tank 11 through the said valve 28. A water-elevating pipe 33 leads from a point within the tank 11 near its bottom upwardly into the water-tank 12.

The valve 28 is constructed and operated as follows: The valve is mounted in a suitable casing 34, having three pairs of ports 35 36 37 opening to the face of the valve in their different planes, the ports 35, which connect the water-supply pipe 27 with the interior of the tank, being opened by a through-port 38 in the valve at the same time that communication from the interior of the tank to the vent-pipe 32 is established through the ports 37 and a through-port 39 in the valve. The third port 40 is located in the valve 28 in position to open communication through the compressed-air pipe 31 and the ports 36 to the interior of the tank when the pipes 27 and 32 are closed and to close communication between the said pipe 31 and the tank when the pipes 27 and 32 are opened. The valve-stem 41 has fixed thereto by means of a set-screw 42 a V-shaped two-armed lever 43, one arm of which is denoted by 44 and the other arm by 45. A rocking lever 46 is loosely mounted on the stem 41 of the valve, which lever is provided with three arms 47 48 49. A weighted lever 50 is loosely mounted upon the stem 41 of the valve between the levers 43 and 46, which rocking lever is provided with a double stud 51, projected laterally from beyond both sides of the lever into the planes of the arms of the levers 43 and 46. A float 52 is fixed to a shaft 53, mounted within the tank, one end of the said shaft being extended through a water-tight bearing 54 in the side of the tank and being provided with its crank-arm 55 exterior thereto. The free end of this crank-arm 55 is connected to the free end of the arm 47 of the lever 46 by means of a connecting rod or link 56, so that the lever 46 is rocked by the rise and fall of the float 52 within the tank. The arms 48 and 49 of the lever 46 are so arranged that when the float 52 is raised by the rise of the water within the tank to a predetermined point the arm 48 will engage one arm of the cross-stud 51 of the weighted lever 50 and carry the lever over beyond its center, so that it will fall by gravity and cause the other arm of the stud 51 to engage the arm 45 of the lever 43 and depress it, thus rocking the valve 28 into a position to close communication from the water-supply and to the air-vent and at the same time open communication to the compressed-air pipe. This movement will permit the compressed air to force the water up through the elevating-pipe 33 into the tank 12. When the water is nearly exhausted from the tank 11, the float 52 will have been lowered to a point sufficient to cause the arm 49 of the lever 46 to swing the weighted lever 50 over beyond center in the opposite direction, causing the lever to fall by gravity and engage the arm 44 of the lever 43 and swing the valve 28 into position to close the compressed-air pipe and open the water-supply and air-vent pipes, thus permitting the tank to refill.

A waste-pipe 57 leads from the reservoir or tank 9 to the sewer 6, which waste-pipe may be provided with a suitable stop-cock 58. A sink 59 is represented beneath the draw-off cock 13, which sink is connected, by means of a waste-pipe 60, with the waste-pipe 57, leading to the sewer 6.

A tub 61 is represented on the fourth-floor level, to which leads the water-pipe 62 from the water-tank 12 and from which leads a branch waste-pipe 63, connected to a main waste-pipe 64, leading to the sewer 6.

The means which we have shown for elevating the sewage from a point below the sewer-level to the sewer is constructed and arranged as follows: A water-closet bowl 65 is represented at a point below the sewer 6, from which leads a sewage-supply pipe 66 to a liquid-elevating tank 11, similar to the one hereinabove described, through the controlling-valve 28. A compressed-air pipe 67 leads from the tank 9 through the valve 28 to the tank 11, which pipe is similar in its action to the pipe 31, opening into the water-elevating tank, hereinabove described. A vent 68, similar to the vent 32, leads from the sewage-elevating tank to an upward extension 69 of the sewage-elevating pipe 70, which sewage-elevating pipe corresponds to the liquid-ele-

vating pipe 33. This sewage-elevating pipe 70 is connected through the pipe 71 with the sewer 6.

The operation of the sewage-elevating apparatus is quite similar to the water-elevating apparatus hereinabove described.

The apparatus as hereinabove described is very simple in its operation and entirely automatic and may be used for the elevation of liquid of any character. By producing a draw-off cock in which the water-main is absolutely cut off while drawing water from the tank it will be seen that the tank will be more rapidly emptied of its water, thus giving a greater air-space therein for the head of water to compress when the cock is closed to the exterior but open from the main to the interior of the tank. This permits of producing a much greater air force, and thereby producing better results in the elevation of the water.

It is evident that changes might be resorted to in the form, construction, and arrangement of the several parts without departing from the spirit and scope of our invention. Hence we do not wish to limit ourselves strictly to the structure herein set forth; but

What we claim is—

1. An apparatus for raising liquids, a liquid-elevating tank, a liquid-elevating pipe leading therefrom, a liquid-feed pipe, an air-vent pipe, a compressed-air-feed pipe, a controlling-valve for the liquid-feed, air-vent and compressed-air-feed pipes, and means for operating said valve comprising a float, a rocking lever loosely mounted on the valve-stem connected to the float, a two-armed lever fixed to the valve-stem and an intermediate weighted lever loosely mounted on the valve-stem in position to be engaged by the lever connected to the float for causing the weighted lever to engage the lever connected with the valve-stem, substantially as set forth.

2. In an apparatus for raising liquids, a liquid-elevating tank, a liquid-feed pipe, an air-vent pipe, a compressed-air-feed pipe, a controlling-valve therefor, a crank-shaft mounted in the tank, with its arm exterior thereto, a float fixed to said shaft, a lever fixed on the valve-stem, a lever loosely mounted on the valve-stem and connected to the crank-shaft arm and a weighted lever arranged in position to be engaged by the said loosely-mounted lever to be swung into position to fall by gravity into engagement with the valve-lever to operate the valve, substantially as set forth.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of two witnesses, this 28th day of May, 1901.

GUSTAVIS L. CUDNER.
JOHN DYER.

Witnesses:
FREDK. HAYNES,
C. S. SUNDGREN.