

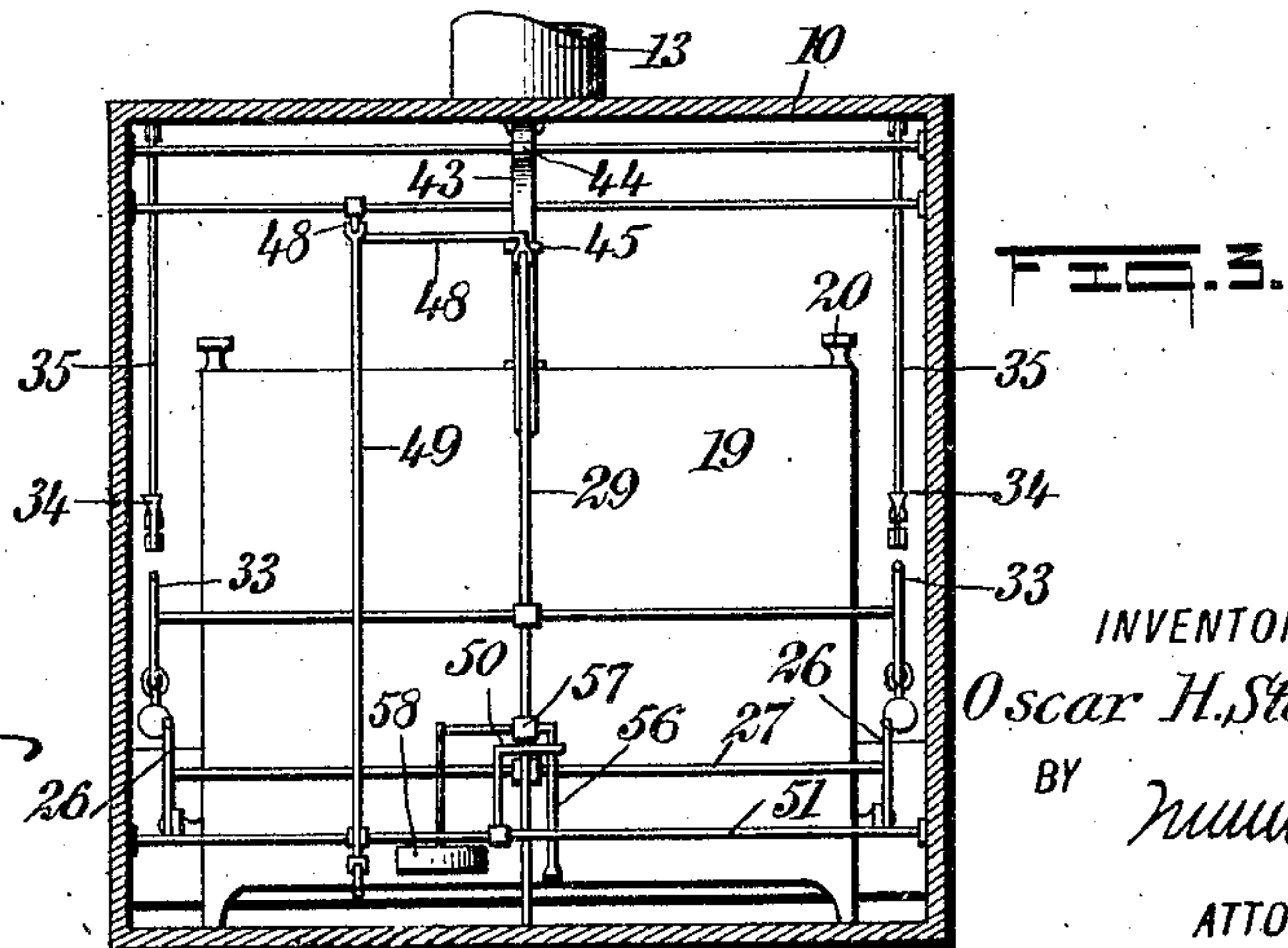
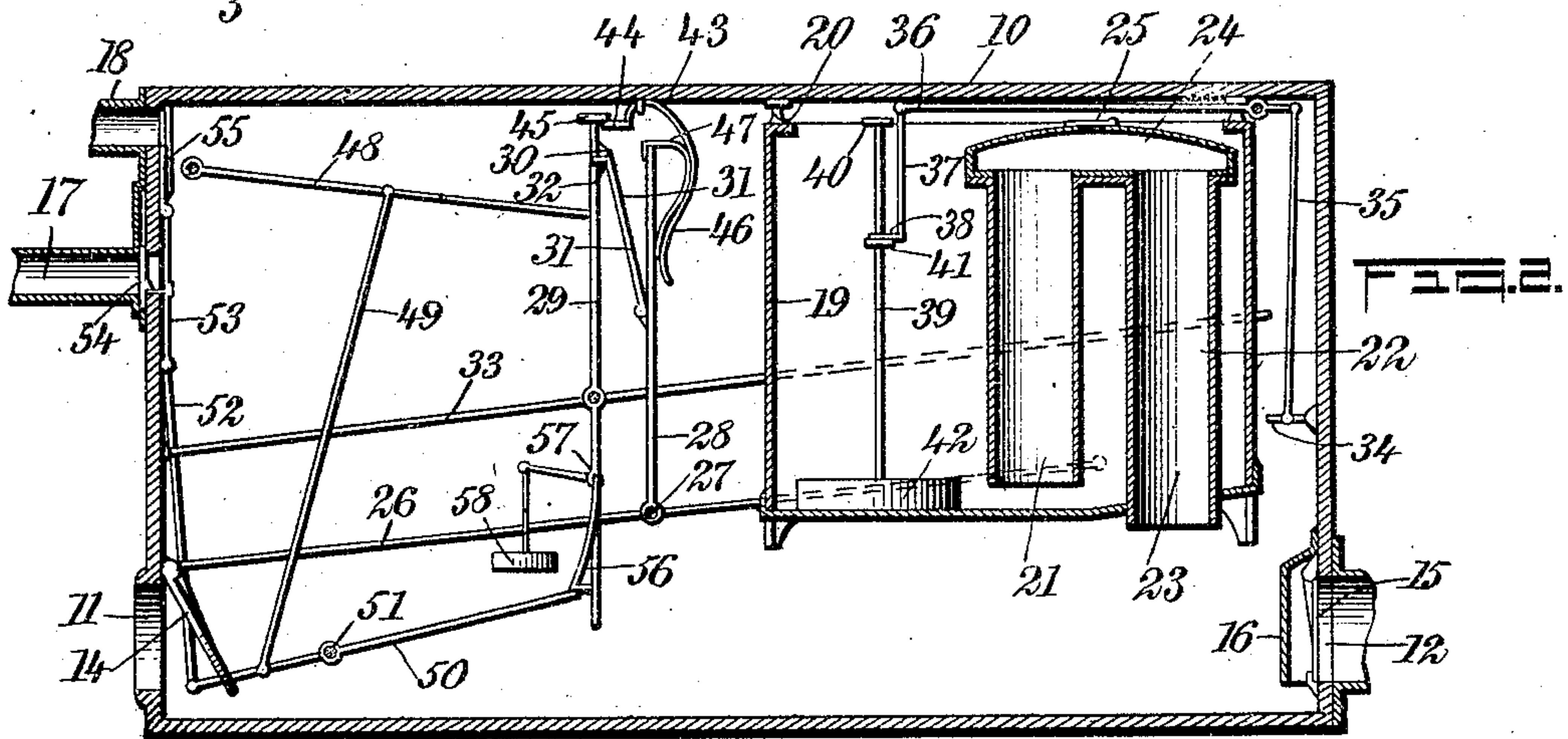
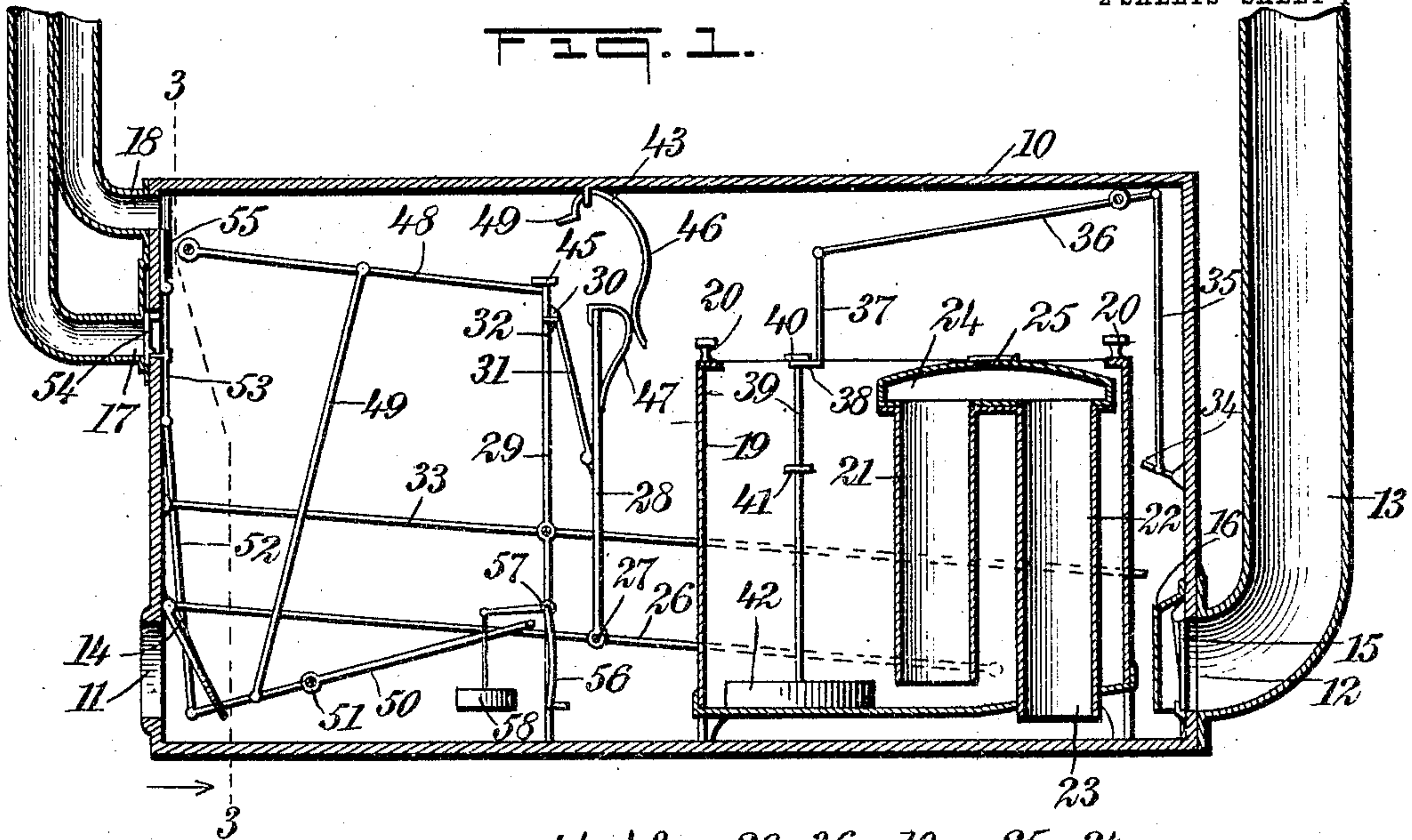
No. 785,443.

PATENTED MAR. 21, 1905.

O. H. STAKEMANN.
APPARATUS FOR RAISING LIQUIDS.

APPLICATION FILED OCT. 26, 1904.

2 SHEETS—SHEET 1



WITNESSES:

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A. H. H.

INVENTOR

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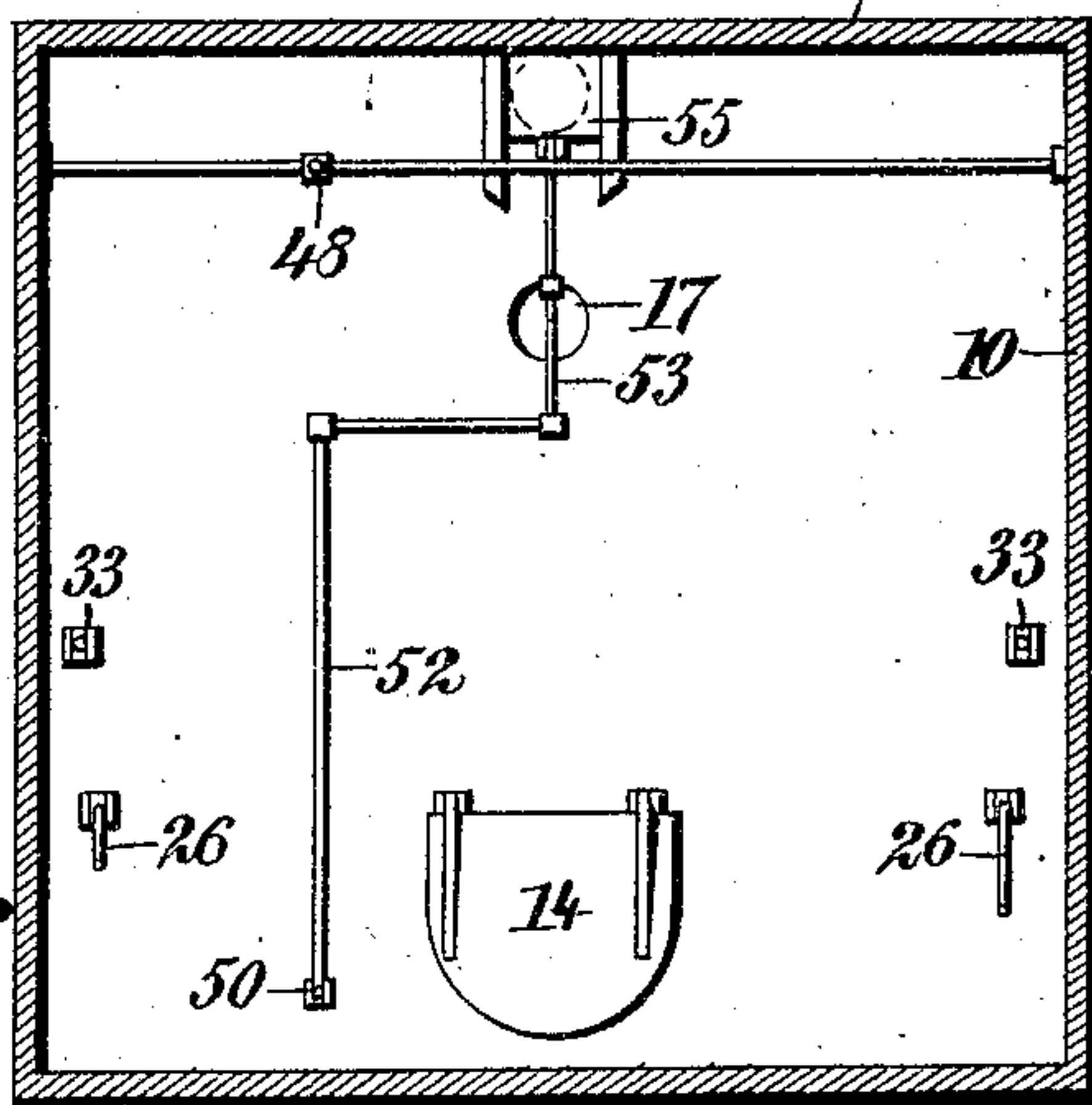
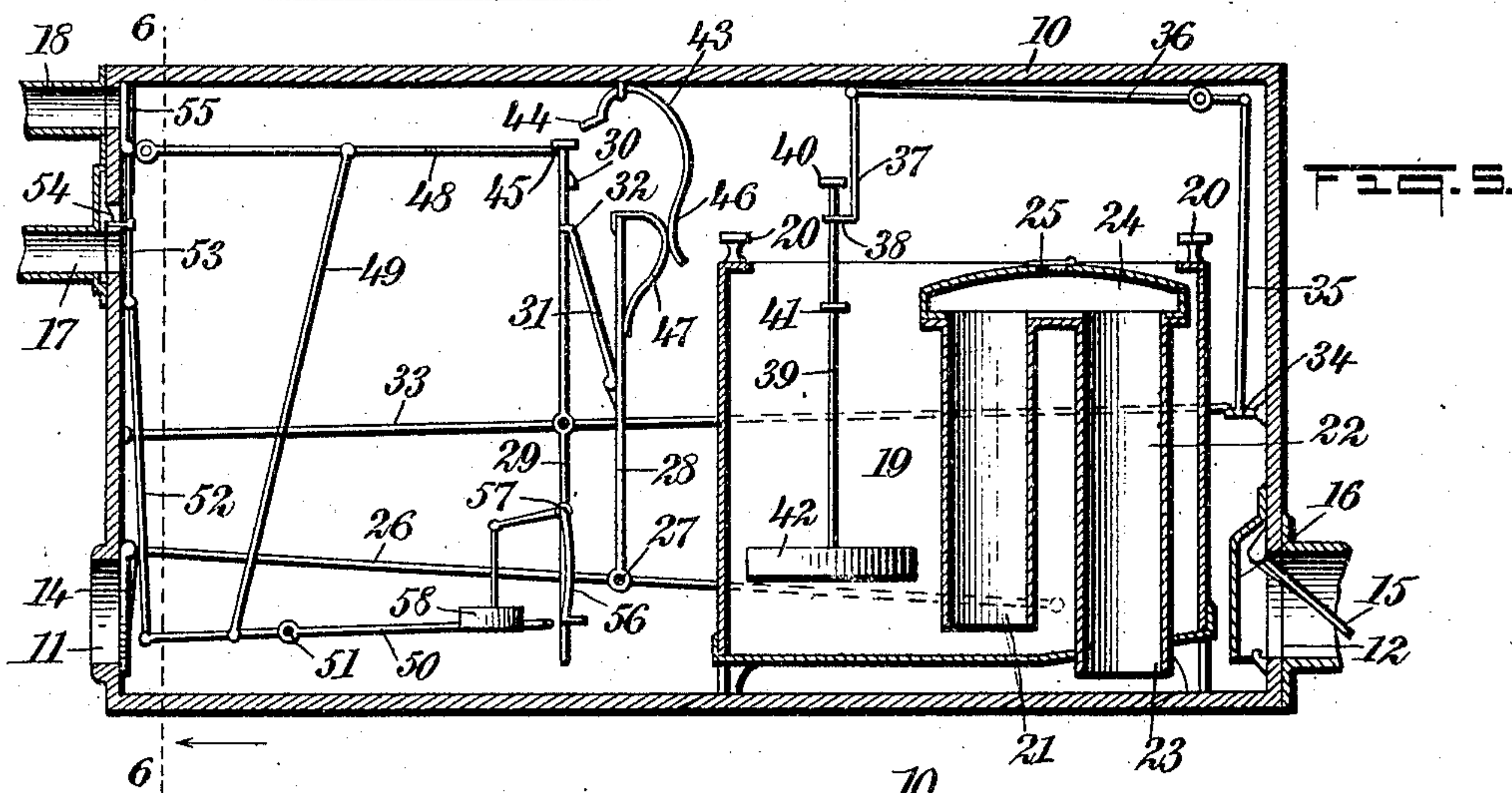
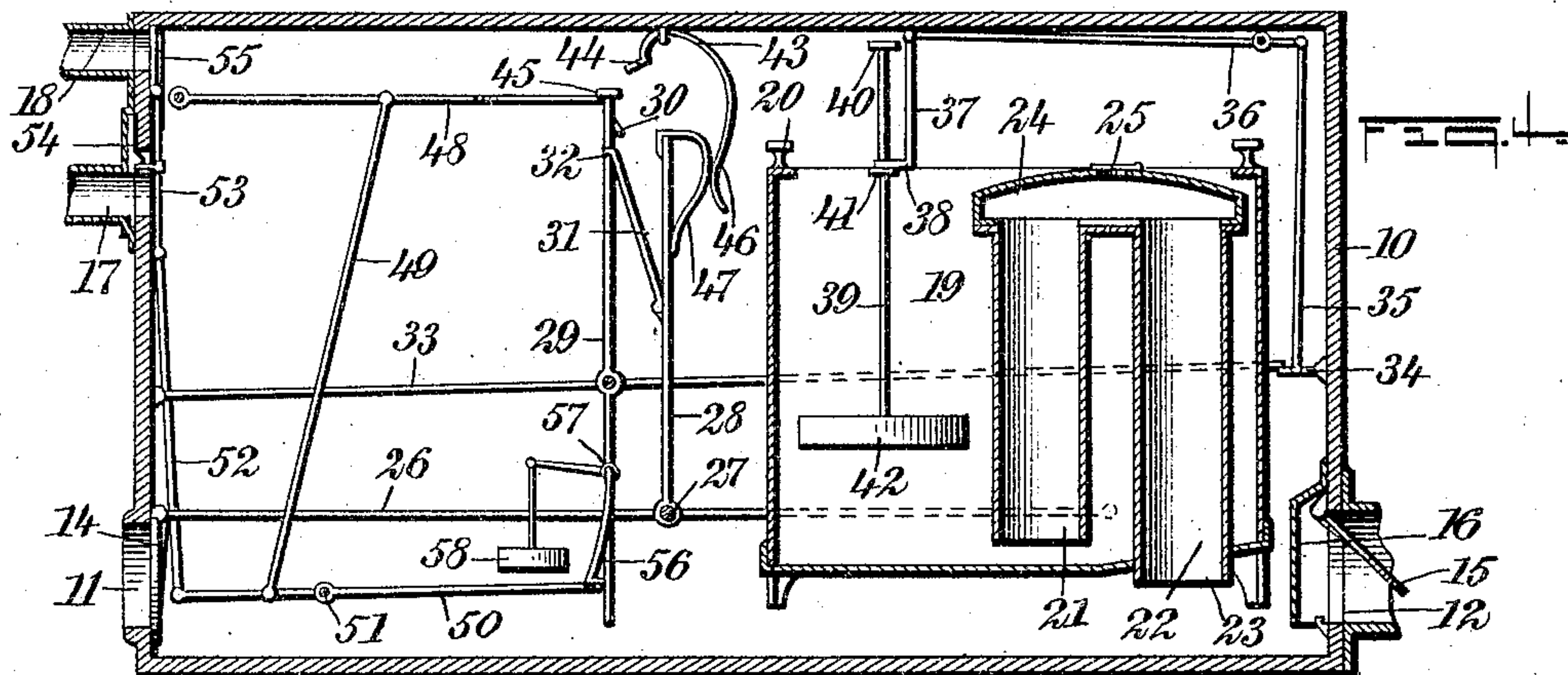
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2 SHEETS—SHEET 2.



10.6.

WITNESSES:

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UNITED STATES PATENT OFFICE.

OSCAR HERMANN STAKEMANN, OF CHRISTIANSTED, ST. CROIX ISLAND,
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APPARATUS FOR RAISING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 785,443, dated March 21, 1905.

Application filed October 26, 1904. Serial No. 230,105.

To all whom it may concern:

Be it known that I, OSCAR HERMANN STAKEMANN, a subject of the King of Denmark, and a resident of Christiansted, St. Croix Island, Danish West Indies, have invented a new and Improved Apparatus for Raising Liquids, of which the following is a full, clear, and exact description.

My invention relates to a device for raising liquids, and is especially designed for use in raising water from wells or other sources where ordinary pumps cannot be worked by windmills and other power not available at the particular point at which the wells are situated. It will be especially valuable where other power is already located at some distance from the source of water, as that can be used for compressing the air employed in my apparatus.

The main object of the invention is to provide for raising water by the use of compressed air.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal sectional view of a water-receptacle provided with a preferred embodiment of my invention. Fig. 2 is a view similar to Fig. 1 with the parts shown in different position. Fig. 3 is a sectional view on the line 3 3 of Fig. 1. Figs. 4 and 5 are sectional views similar to Fig. 1, showing the parts in two different positions; and Fig. 6 is a sectional view on the line 6 6 of Fig. 5.

10 represents a receptacle for water provided with an inlet 11 and an outlet 12, the latter being preferably provided with a pipe 13, by means of which the water is discharged from the receptacle and forced to any desired point. The inlet and outlet are provided with valves 14 and 15, respectively, which may be of any ordinary type, but are shown as flap-valves. They are so constructed as to be automatically opened and closed, according to the pressure upon their opposite sides. A guard 16 is provided for the valve 15 to cause the water to enter at the bottom thereof and

protect the valve, as in ordinary cases. The receptacle 10 is designed to be located at such a position with reference to the source of water as to permit the water to readily flow into the receptacle through the inlet 11 and completely fill it. In other words, the top of the receptacle should be below the level of the water in the well or the like from which the water is supplied. The receptacle is also provided with an inlet 17 and an outlet 18 for compressed air. The air is preferably supplied from a compressor operated from any desired source of power and is alternately introduced and discharged for the purpose of forcing the water from the receptacle through the discharge-pipe 13 and permitting the water to enter the receptacle through the inlet 11. Within the receptacle is located a tank 19. This is constructed of material having greater specific gravity than that of water, preferably metal, so that when the tank is filled with water it will sink in the water of the receptacle. Its sides and bottom, however, being constructed with water-tight joints it will when not containing water float upon the water in the receptacle. This tank is provided with spacing devices 20 to keep its upper edge from coming into close contact with the roof of the receptacle when it is floated by the water therein and to permit the water to overflow its top edges and enter the tank when in this position. For the purpose of emptying the tank after it is filled a siphon is provided. This comprises two vertical pipes 21 and 22, the latter extending through the bottom of the tank and below it, as shown at 23. The siphon is completed by a chamber 24, connecting the tops of the two vertical pipes and having an air-valve 25, which opens upwardly automatically when the pressure within is sufficient in order to permit the air to escape and closes by gravity or in any other ordinary manner under all other circumstances to prevent the admission of air to the siphon. Pivoted to the tank are a pair of levers 26. These levers are pivoted at their opposite ends to the wall of the receptacle, and a cross-bar 27 connects them at a point between their

ends. Upon this cross-bar is pivoted a bar 28, extending upwardly from the cross-bar in a general vertical direction. A second bar 29 is pivotally mounted on levers 33, substantially parallel to the bar 28, and is provided with a projection 30 near its top. An arm 31 is pivoted to the bar 28 and normally rests against the bar 29 with its end 32 directly under the projection 30, so as to support the bar 29 and hold it in elevated position, as shown in Fig. 2. It will be readily observed that the vertical movement of the tank 19, to which the levers 26 are pivoted, will cause the reciprocation of the bars 28 and 29. However, I provide means for modifying the motion of these bars so that the bar 29 will not follow exactly the movements of the tank 19. The bar 29 is pivotally mounted upon a pair of levers 33, which extend across the receptacle and are adapted to be engaged at the end by short levers 34, pivoted to the opposite wall of the receptacle. The levers 33 are themselves pivoted to the wall of the receptacle upon which the levers 26 are pivoted, so that the two pairs of levers at certain times are arranged parallel to each other. The short levers 34 are connected by links 35 to a lever 36, pivoted to the receptacle and having a depending arm 37, supporting a collar 38, through which slides a rod 39, provided with two stops 40 and 41. Upon the lower end of this rod is a float 42, located in the tank 19. It will be readily understood that the movements of the float 42 will operate the short levers 34 so as to cause them to be placed in a horizontal position, as shown in Fig. 2, where they will engage the ends of the levers 33 when the latter are brought down upon them or to cause them to assume an inclined position where the levers 33 will miss them upon being lowered. The control of the bar 29 is also aided by other mechanism, which will now be described.

When the parts 28 and 29 are brought to their most elevated position, means is provided for holding them there, comprising a spring 43, having a projection 44 engaging a head 45 upon the bar 29 and a curved extension 46 engaging a similarly-shaped extension 47 upon the upper part of the bar 28. It will be seen by reference to Fig. 2 that the coöperation of the parts 45 and 47 and the spring 43 will cause the bar 29 to be locked in elevated position after it is once forced into such position by the arm 31 until the bar 28 is pulled downward sufficiently to tilt the spring 43 and force the projection 44 out of engagement with the head 45. A lever 48 is pivoted to the receptacle, and its end is designed to be engaged by the lower portion of the head 45 for a purpose to be described. This lever is connected by a link 49 with another lever, 50, pivoted on a rod 51 and having links 52 and 53, connecting it with valves 54 and 55, which control the air inlet and outlet openings, respectively.

The lever 50 is controlled by a catch 56, pivoted to the bar 29 at the point 57, and having a counterweight 58, which will float on the water in the receptacle.

The various parts of the embodiment of my invention which I have chosen for illustrating the principle thereof having been described in detail, I will now proceed to describe the operation of the device. Assuming the parts to be in the position shown in Fig. 1, it will be observed that the valves 14 and 55 are open and the valves 15 and 54 are closed. Consequently water from the supply can freely enter the receptacle, the air therein freely escaping through the pipe 18. As the water rises in the receptacle it will soon reach a point where the tank 19 will float upon it, and the tank will consequently be carried up with the level of the water until the spacing devices 20 strike the roof of the receptacle, as shown in Fig. 2. As the tank rises it carries with it the bars 28 and 29, and when it strikes the roof the locking device 43 is brought into operation to lock the bar 29 in raised position. This operation will have no effect upon the parts 48, 49, 50, 52, and 53, but as the counterweight 58 floats on and rises with the water the catch 56 will be brought up to the top of the lever 50, so that any downward motion of the rod 29 will force down the outer end of the lever 50. The rise of the tank, taking with it the float 42, will cause the short levers 34 to be brought out into horizontal position, but not until after the ends of the levers 33 have passed them in their upward motion caused by the motion of the bar 29. This description of the parts applies to the positions shown in Fig. 2. The water in the receptacle when the parts first assume these positions will be at a certain level with respect to the tank 19, both upon the outside of the tank and in the tube 22. There is nothing so far to prevent the entrance of water into the receptacle, and consequently the water will continue to enter and the air to escape until the water reaches the level of the top of the tube 22, when it will flow over through the tube 21 into the bottom of the tank. This provision for the escape of the water from the receptacle into the tank, however, will not be sufficient to provide for all the water entering the tank at the inlet 11, and consequently the level of the water will continue to rise until it pours over the top edges of the tank. After this the water will continue to flow into the tank from above until sufficient weight is provided to sink the tank in the receptacle, and whether this occurs before the water in the tank reaches its top or not is immaterial. When the water reaches the top of the tank both inside and outside, the air contained in the tubes 21 and 22 will have been compressed in the chamber 24 and the valve 25 will have opened automatically to let this air out, and consequently this chamber will be completely filled with

water and there will be a continuous body of water from the lower end of the tube 21 to the point 23, and consequently this structure can from this point act as a siphon after the water outside the tank recedes to a lower level than that of the water in the tank. When the tank 19 starts to sink, it will of course take with it the lever 26 and the bar 28, as well as the arm 31. The descent of the bar 28 will force the upper portion 47 thereof to cause the locking device 44 to become disengaged from the head 45, and this will permit the bar 29 to descend after the bar 28 has dropped a certain distance. This descent, however, will soon be checked by the ends of the levers 33 coming into contact with the horizontal short lever 34, which are held in horizontal position by the float 42. The float is compelled to remain in an elevated position on account of the water in the tank 19. The pressure of the water in the receptacle is not sufficient at this point to open the valve 15 or to close the valve 14, but it requires the introduction of air-pressure into the receptacle to change the position of the water-valves in this manner. This is accomplished by the descent by gravity of the bar 29, which descent may be assisted in any desired manner. It will be seen that the catch 56 bears down upon the end of the lever 50, and consequently forces up its opposite end, so as to force the valves 54 and 55 upwardly. This opens the former and closes the latter, so that air-pressure is now brought to bear upon the water in the tank, and the flow of water into the tank is stopped by the shutting of the valve 14, while the water is permitted to flow out on account of the opening of the valve 15. The parts will now be in the position shown in Fig. 4. Whether the tank 19 is resting on the bottom or not is immaterial, as further motion of this tank downward will only pull down the bar 28 and arm 31 without affecting the position of the bar 29, and the amount of water in this tank is at the same time sufficient to keep the float 42 in its highest position irrespective of the position of the tank and to keep the short levers 34 in horizontal position, where they hold the levers 33, so as to prevent them from further downward motion. The parts will remain in this position while the water is running out of the receptacle, and it will be readily understood that the level of water in the receptacle will be lowered until it reaches the top of the tank without disturbing the condition of things in the tank. As the level of water outside the tank recedes from this position the siphon formed by the parts 21, 22, and 24 will operate to maintain the same level in the receptacle and tank, the valve 25 being kept closed by the pressure above it, aided by gravity. When the level in the tank reaches such a point as to permit the float 42 to descend so as to bring the stop 40 into contact with the collar 38, the

short levers 34 will be caused to assume an inclined position and permit the levers 33 to descend in the position shown in Fig. 1. The fall of the level of the water will lower the counterweight 58 and will cause the catch 56 to become disengaged from the end of the lever 50 and bring all the parts back to the position shown in Fig. 1, the head 45 acting upon the end of the lever 48 to close the valve 54 and open the valve 55 through the instrumentality of the parts 49, 50, 52, and 53. The high pressure in the receptacle will then be freely diminished on account of the opening of the valve 55. The excess of pressure behind the valve 14 will open it, and the valve 15 will be caused to close by the pressure in the pipe 13. The parts are now in their original position, as shown in Fig. 1, and the operation will be automatically repeated as long as compressed air is supplied to the pipe 17. The catch 56 may also be operated by the rise and fall of the rod 28 and its connections with the rod 29, as will be readily apparent.

It will be readily understood that many of the connections and details which I have described and illustrated will be capable of modification and that such modifications fall within the scope of my invention.

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

1. The combination with a receptacle for liquid having an air-inlet, of an open-top tank adapted to float on the liquid, a valve for said inlet, means for automatically opening said valve when the tank sinks and causing it to remain open for a limited period when the tank rests upon the bottom of the receptacle, and means for automatically closing the valve while the tank remains upon the bottom of the receptacle.

2. The combination with a receptacle for liquid having an air-inlet valve and an air-outlet valve, of a tank adapted to float on the liquid in the receptacle, means for automatically opening said inlet-valve and closing said outlet-valve when the tank sinks, and causing said valve to remain in that position after the tank has sunk to the bottom of the receptacle, and means for thereafter closing the inlet-valve and opening the outlet-valve while the tank rests upon the bottom of the receptacle.

3. The combination with a receptacle for liquid having a water-inlet, a water-outlet, an air-inlet valve and an air-outlet valve, means for automatically opening the air-inlet valve and closing the air-outlet valve, means for locking said means while the water in the tank remains above a certain level, means for unlocking said first-named means when the water recedes from said level, and means for then opening the air-outlet valve and closing the air-inlet valve.

4. In a water-raising apparatus, the combination with a receptacle for water, of a tank

adapted to float on the water in the receptacle, and having an inlet in its upper portion to receive water from the receptacle, said tank being adapted to sink when full of water, an air-inlet valve for the receptacle, means for opening said valve when the tank sinks, and causing it to remain open during a part of the time when the tank rests upon the bottom of the receptacle, and means for thereafter closing said valve.

5. In a water-raising apparatus, the combination with a receptacle for water, of a tank adapted to float on the water in the receptacle and having an inlet in its upper portion to receive water from the receptacle, said tank being adapted to sink when full of water, an air-inlet for the receptacle, a valve for said inlet, means for automatically opening said valve when the tank sinks, and causing it to remain open when the tank rests upon the bottom of the receptacle for a limited period, and automatic means for thereafter closing the valve while the tank remains upon the bottom of the receptacle.

6. In a water-raising apparatus, the combination with a receptacle, of a tank adapted to float on the water in the receptacle and having an inlet to receive water from the receptacle, said tank being adapted to sink when full of water, an air-inlet valve for the receptacle, an air-outlet valve, means for opening said inlet-valve and closing the outlet-valve when the tank sinks, and causing said valves to remain in that position for a limited period after the tank sinks to the bottom of the receptacle, and means for thereafter reversing the positions of said valves.

7. In a water-raising apparatus, the combination with a receptacle for water, of a tank adapted to float on the water of the receptacle and having an inlet for conducting water from the receptacle to the tank, said tank being adapted to sink when full of water, an air-inlet valve and an air-outlet valve for the receptacle, means for automatically opening said inlet-valve and closing said outlet-valve when the tank sinks, and causing said valves to remain in that position after the tank has sunk to the bottom of the receptacle, and means for thereafter automatically closing the inlet-valve and opening the outlet-valve while the tank rests upon the bottom of the receptacle.

8. In a water-raising apparatus, the combination with a water-receptacle having a water-inlet and a water-outlet, of means for conducting compressed air thereto to force water therefrom, a tank in said receptacle adapted to float on the water when empty and to sink when full of water, an air-inlet valve, an air-outlet valve, means for automatically opening the air-inlet valve and closing the air-outlet valve when the tank sinks, means for locking said means while the water in the tank remains above a certain level, means for unlocking said first-named means when the water recedes

from said level, and means for then opening the air-outlet valve and closing the air-inlet valve.

9. The combination with a water-receptacle, of a lever therein, a bar pivoted to said lever, a second bar supported in substantially a vertical position, an air-valve for the receptacle, connections between the bar and valve, and means for transmitting motion from the lever, through the other connections specified, to the valve, for operating the latter.

10. The combination with a water-receptacle, of a lever therein, a bar pivoted to the lever, a second bar arranged in substantially parallel position with respect to said first-mentioned bar and having a lug, an arm projecting from the first-mentioned bar and adapted to engage the lug, an air-valve, connections between the valve and the first-mentioned bar, and means for causing motion of the lever to operate the valve to close and open it.

11. The combination with a water-receptacle having an air-valve, of a reciprocable bar in the receptacle, a lever connected with the valve, means on the bar for engaging the lever, means for disengaging said means from the lever, and means for reciprocating the bar to open and close the valve through the connections set forth.

12. The combination with a water-receptacle having an air-valve, of a reciprocable bar mounted in the receptacle, a catch pivotally mounted upon the bar and having a counterweight, a lever connected with the valve and with which said catch is adapted to engage, means for reciprocating the bar in order to move the valve, and means for retaining the bar in an extreme position to prevent the valve from moving.

13. The combination with a water-receptacle having an outlet and an inlet, of a float in the receptacle, a short lever connected with said float, means for causing the lever to assume a horizontal position when the float is elevated and to assume an inclined position when the float is lowered, means for holding the short lever in one of its extreme positions, an air-valve for the receptacle, and means for causing said last-mentioned means to control the operation of said valve.

14. The combination with a water-receptacle, of a tank therein capable of vertical movement, a lever in the receptacle connected with the tank, a bar connected with the lever, a second bar located in substantially vertical position, means connected with the first bar for engaging with the second bar to lift it, an air-valve for the receptacle, and connections between the last-mentioned bar and the valve.

15. In an apparatus for raising liquids, the combination with a water-receptacle, of a tank therein capable of vertical movement, a lever pivotally connected with the receptacle and tank, an air-valve for the receptacle, connec-

tions between said lever and valve for operating the latter, and means for locking said connections in extreme position.

16. The combination with a water-receptacle, of a tank therein, capable of vertical movement, a lever pivotally connected with the tank and with the receptacle, a bar pivoted to said lever and extending upwardly therefrom, a second bar located in substantially vertical position and having a lug, an arm pivoted on the first bar and adapted to engage with said lug, an air-valve for the receptacle, and connections between said last-mentioned bar and said valve.

17. The combination with a water-receptacle, of a movable tank therein, a lever pivotally connected with the tank and the receptacle, a bar pivoted to said lever, a second bar arranged in substantially parallel position with respect to said first-mentioned bar and having a lug, an arm projecting from the first-mentioned bar and adapted to engage the lug, a second lever pivoted to the receptacle, connections between said last-mentioned lever and the second bar, an air-valve, and connections between the valve for the receptacle and said last-mentioned lever.

18. The combination with a water-receptacle, of a floating tank therein, a lever pivoted to the tank and receptacle, an air-valve for the receptacle, a second lever pivoted to the receptacle, a link for connecting the last-mentioned lever with the valve, a reciprocable bar, connections between said bar and the second lever, and connections between the bar and the first-mentioned lever.

19. The combination with a water-receptacle, of a floating tank therein, a lever pivotally connected with the receptacle and the tank, a second pivoted lever, an air-valve for the receptacle, connections between the second lever and the air-valve, a reciprocable bar, a catch pivotally mounted upon the bar and having a counterweight, said catch being adapted to engage the end of the second lever, and means for retaining the bar in an elevated position.

20. The combination with a water-receptacle having an outlet and an inlet, of a floating

tank, a lever pivotally connected with the tank and receptacle, an air-valve for the receptacle, a second pivoted lever, a link connecting one end of said lever with the valve, a third lever, a link connecting said third lever with the second lever at a point between that at which the first-named link is connected with it and its pivotal point, a reciprocable bar, means on said reciprocable bar for operating said second link, means also on said bar for operating the end of the second lever, and connections between said bar and the first-named lever whereby the motion of the bar in one direction will cause the second lever to be moved about its pivot in one direction, and the motion of the bar a farther distance in the same direction will cause the same lever to be turned about its pivot in the opposite direction.

21. The combination with a water-receptacle having an outlet and an inlet, of a floating tank therein, a float in said tank, a short lever connected with the said float whereby the lever is caused to assume a horizontal position when the float is elevated, and to assume an inclined position when the float is lowered, means adapted to move into operative connection with said short lever, an air-valve for the receptacle, and means whereby said means controls the operation of said valve.

22. The combination with a water-receptacle having an air-valve, of a reciprocable bar, a pivoted lever, means for connecting the valve with the lever for causing motion of the latter to be transmitted to the valve to open or close it, means for causing motion of said bar in one direction to turn the lever about its pivot, means for causing further motion of said bar in the same direction to turn said lever about its pivot in the opposite direction, a float, and connections between the float and the bar for causing the bar to move.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OSCAR HERMANN STAKEMANN.

Witnesses:

H. M. RUSSELL,
EDMUND ELLIS.