

No. 666,156.

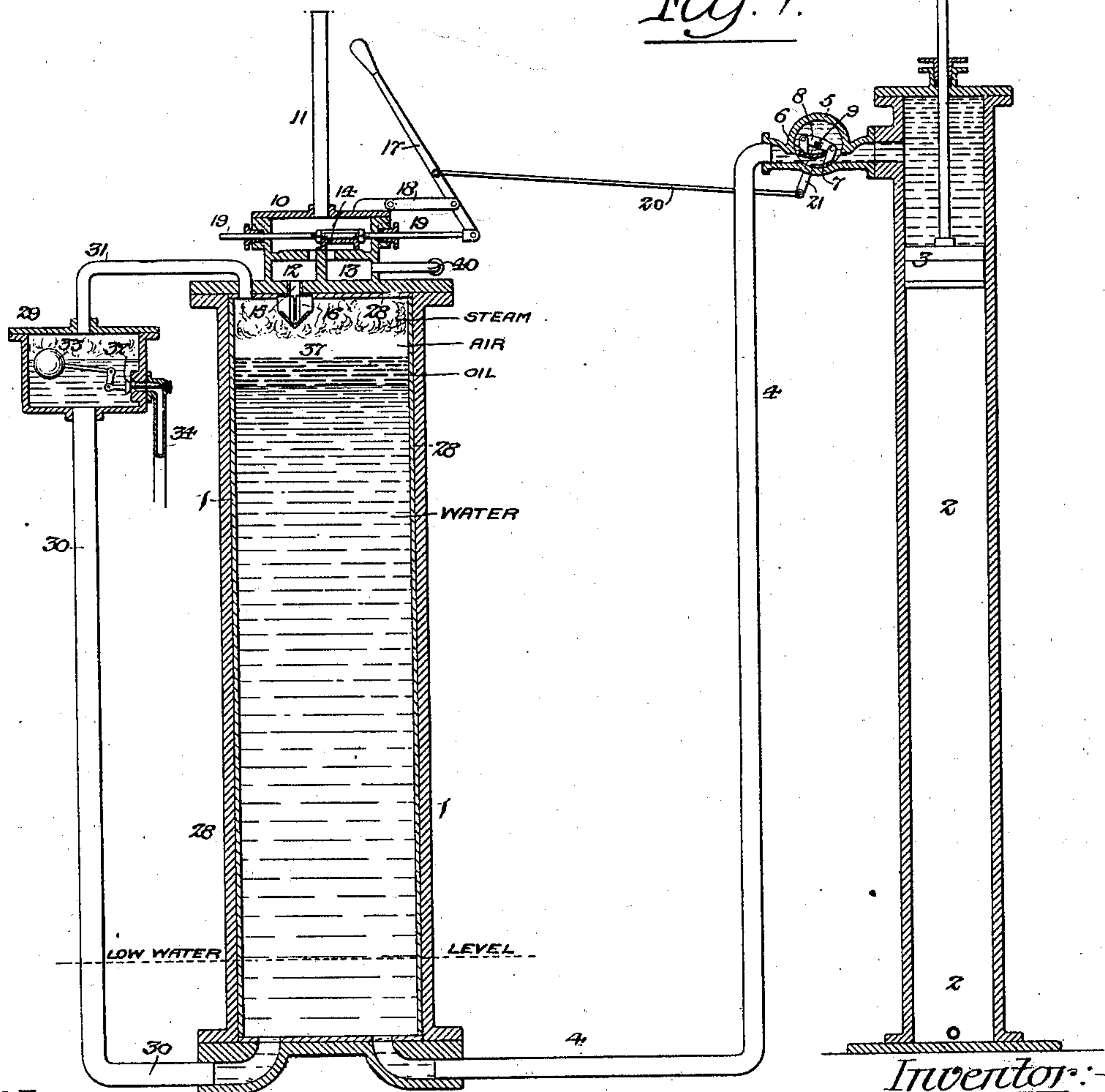
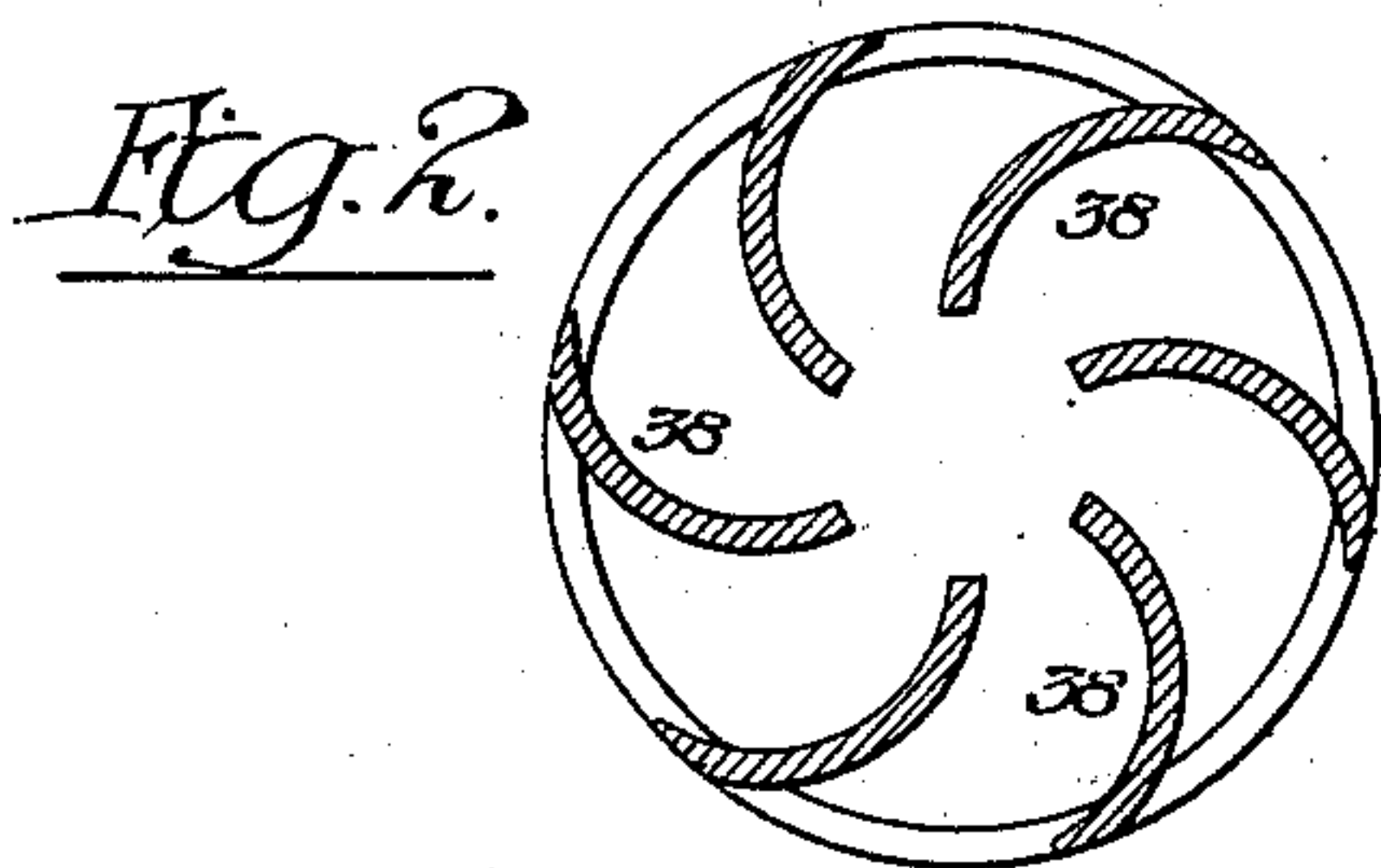
Patented Jan. 15, 1901.

E. B. RIDGWAY.  
STEAM HYDRAULIC ELEVATOR.

(Application filed Oct. 27, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:-  
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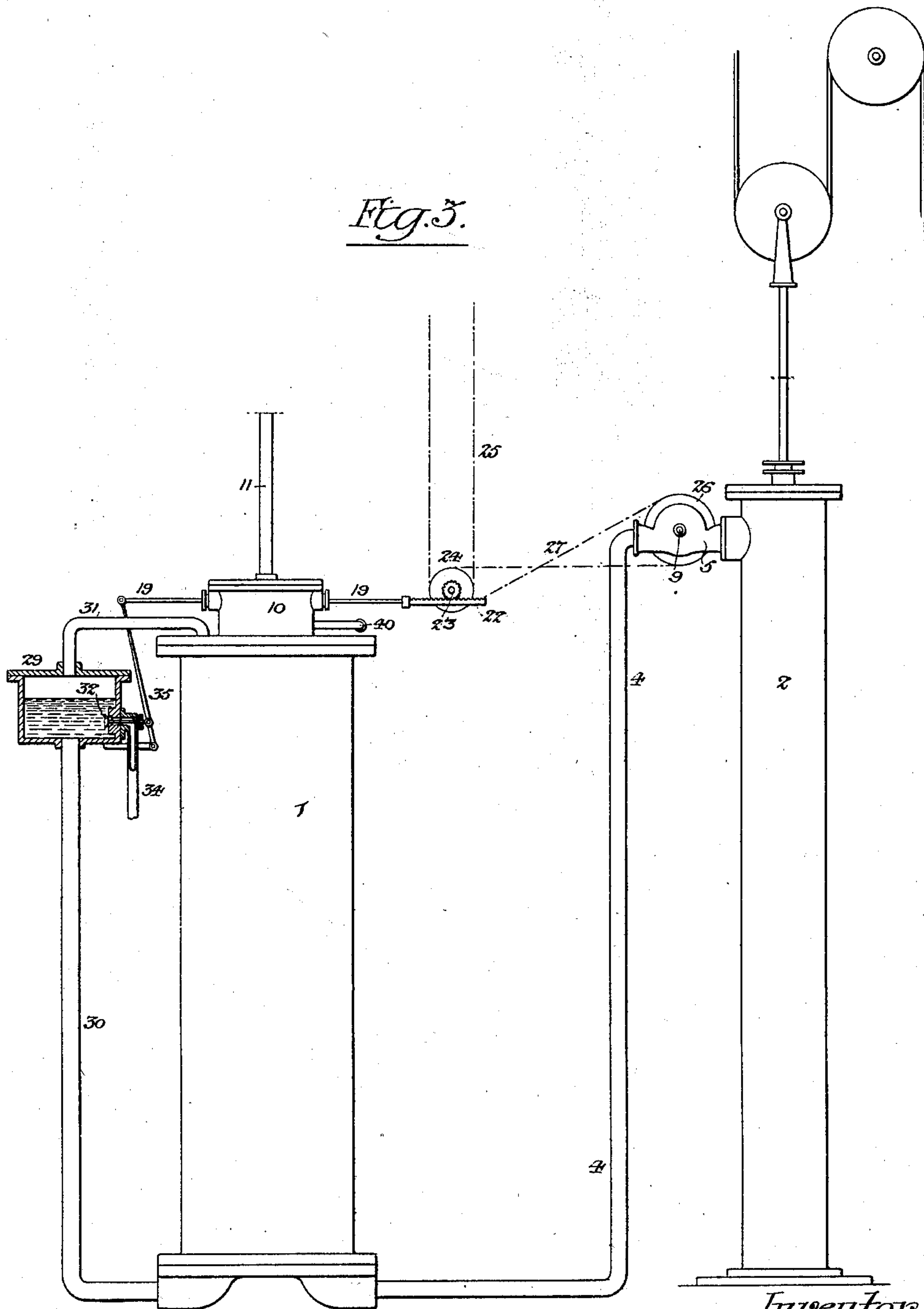
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2 Sheets—Sheet 2.

Fig. 3.



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# UNITED STATES PATENT OFFICE.

ELLIS B. RIDGWAY, OF COATESVILLE, PENNSYLVANIA.

## STEAM HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 666,156, dated January 15, 1901.

Application filed October 27, 1900. Serial No. 34,664. (No model.)

*To all whom it may concern:*

Be it known that I, ELLIS B. RIDGWAY, a citizen of the United States, and a resident of Coatesville, Chester county, Pennsylvania, have invented certain Improvements in Steam Hydraulic Elevators, of which the following is a specification.

My invention consists of a hydraulic elevator in which the motive fluid for operating the car or cage is water, which is acted on in a suitable cylinder by steam under pressure, a layer of oil being preferably disposed upon the surface of the column of water and a body of air being interposed between the steam and the layer of oil for the purpose of preventing, as much as possible, the condensation of the steam, the air and oil serving to insulate the steam from the water. Means are also adopted for preventing the escape of the oil from the cylinder and for so distributing the incoming volumes of steam that they will not penetrate the body of air superposed upon the body of water in the cylinder.

Apparatus embodying my invention is shown in the accompanying drawings, in which—

Figure 1 is a view of such apparatus mainly in section. Fig. 2 is a sectional plan view, on an enlarged scale, of a steam-distributor constituting one of the parts of the apparatus; and Fig. 3 is a side elevation, partly in section, of another form of the apparatus.

In the drawings, 1 represents a cylinder for containing a column of water, and 2 is the cylinder in which is located the piston 3, acted on by said column of water and controlling the movement of the elevator car or cage, a pipe 4 being provided for the passage of the water from the cylinder 1 to the cylinder 2. Interposed between the pipe 4 and the cylinder 2 is a valve-casing 5, having valves 6 and 7, which are pivotally hung from a cross-bar 8, carried by a suitable stem 9, and mounted on the top of the cylinder 1 is a valve-chest 10, having a steam-inlet pipe 11, a steam-chamber 12, and an exhaust-chamber 13, said chest 10 being provided with an ordinary D-valve 14, which controls the flow of steam into the top of the cylinder 1 through the chamber 12 and vaned distributor 16 or from the cylinder to the exhaust-chamber 13.

The valves 6 and 7, carried by the valve-

stem 9, and the D-valve 14 are operated simultaneously. This may be accomplished through the medium of a lever 17, pivotally hung to a link 18, carried by the valve-chest and connected at its lower end to the valve-rod 19 and also by means of the rod or link 20 and crank 21 to the valve-stem 9. When said lever 17 is moved in one direction, the valve 14 will be moved so as to admit steam to the cylinder 1, and the valve 7 will be opened to admit the water to the cylinder 2, as shown in Fig. 1, the valve 6 swinging open by reason of the pressure of the water against it, but permitting no backflow. When the lever 17 is moved in the opposite direction, the valve 14 will be moved so as to open communication between the cylinder 1 and the exhaust-chamber 13. The valve 6 will be opened, and the water will flow back from the cylinder 2 to the cylinder 1 for reuse, the valve 7 swinging open, but preventing any forward flow.

If it is desired to operate the valve from the elevator-car or other point remote from the valve-chest 10, the valve-rod 19 may have at its outer end a rack 22, engaged by a pinion 23, carried by a chain-wheel 24, which is turned from a wheel on the car through the medium of the chain belt 25, said chain-wheel 24 also operating a crossed chain 27, which drives a chain-wheel 26 on the valve-stem 9, as shown in Fig. 3.

The cylinder 1 is of metal and has its outer surface exposed to the air, and to prevent as much as possible radiation of heat and condensation of steam in the cylinder the interior of said cylinder is lined with a material, such as wood, which is a non-conductor or a poor conductor of heat, such lining being shown at 28 in Fig. 1.

In practice a layer of oil 37 is deposited upon the column of water in the cylinder 1, and as this layer of oil rises and falls with the column of water the wooden lining 28 of the cylinder 1 in time becomes thoroughly saturated with oil, whereby its non-conducting quality is increased, and, on the one hand, radiation of heat from the steam is prevented, while, on the other hand, the freezing of the water is rendered unlikely when the cylinder is used in an exposed situation. A water tank or trap 29 is located adjacent to the top of the



cylinder 1 and communicates with the bottom of said cylinder through a pipe 30 and also with the top of the cylinder 1 through a pipe 31 for the purpose of equalizing the pressure in the trap and cylinder.

The tank 29 has an outlet-valve 32, controlled by a float-lever 33, as shown in Fig. 1, or, if desired, by a lever connection 35 with the valve-stem 19, as shown in Fig. 3, so that the level of liquid in the cylinder 1 cannot rise to the top of the same, whereby an air-chamber is always maintained above the level of said liquid and the layer of oil on the water column is always preserved, as such oil cannot be withdrawn from the cylinder until all of the water has first been discharged therefrom, and the low-water level in the cylinder 1—that is to say, the level to which the water descends when the piston 3 has been forced to the bottom of the cylinder 2—is some distance above the bottom of the cylinder 1, as shown by the dotted line in Fig. 1.

Steam entering the cylinder 1 from the steam-chest does not enter directly, but impinges against the cup-shaped receptacle 16, which has a series of curved vanes 38, whereby the steam is discharged into the upper end of the cylinder 1 in a substantially horizontal plane and has a partial rotary motion imparted to it, so that it will not penetrate or materially disturb the body of air in the top of the cylinder, the steam and air forming practically two strata, so that a cushion is provided between the steam and water and condensation of steam such as would follow its contact with the water or oil is prevented.

As shown in Fig. 1, the D-valve is in position for steam to enter the cylinder 1, the other position of the valve serving to direct the steam into the exhaust-chamber 13, from which it may pass to the atmosphere or to a feed-water heater through the pipe 40.

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

1. The combination of power-applying apparatus, with an upright cylinder containing a liquid column which is in communication with said power-applying apparatus, means for preventing rise of the level of liquid in said upright cylinder to the top of the same so as to provide at all times an air-chamber above said liquid column, a valve-controlled inlet and discharge for steam, and means for directing the steam into the cylinder in a substantially horizontal plane close to the top of the cylinder, substantially as specified.

2. The combination of power-applying ap-

paratus, with an upright cylinder containing a liquid column which is in communication with said power-applying apparatus, means for preventing rise of the level of liquid in said upright cylinder to the top of the same so as to provide at all times an air-chamber above said liquid column, a valve-controlled inlet and discharge for steam and a steam-distributor located close to the top of the cylinder and having curved vanes whereby the steam will be discharged in curved paths in a substantially horizontal plane close to said top of the cylinder, substantially as specified.

3. The combination of power-applying apparatus, with an upright cylinder containing a liquid column which is in communication with said power-applying apparatus, a valved outlet for liquid outside of said cylinder, but communicating therewith at top and bottom, means for operating said valve so as to prevent rise of the level of liquid in said upright cylinder to the top of the same, and a valve-controlled inlet and discharge for steam communicating with the top of the cylinder, substantially as specified.

4. The combination of power-applying apparatus, with an upright cylinder containing a liquid column which is in communication with said power-applying apparatus, a valved liquid-outlet outside of said cylinder but communicating therewith at top and bottom, a valve-controlled inlet and discharge for steam communicating with the top of the cylinder, and means for connecting the said steam-valve and liquid-discharge valve so as to provide for their simultaneous operation, substantially as specified.

5. The combination of power-applying apparatus, with an upright cylinder consisting of a metallic casing lined with wood or other non-conducting material, and containing a liquid column which is in communication with said power-applying apparatus, means for preventing rise of the level of liquid in said upright cylinder to the top of the same so as to provide at all times an air-chamber above said liquid column, and a valve-controlled inlet and discharge for steam communicating with the top of the cylinder, substantially as specified.

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

ELLIS B. RIDGWAY.

Witnesses:

J. W. WINGARD,  
WM. H. RIDGWAY.