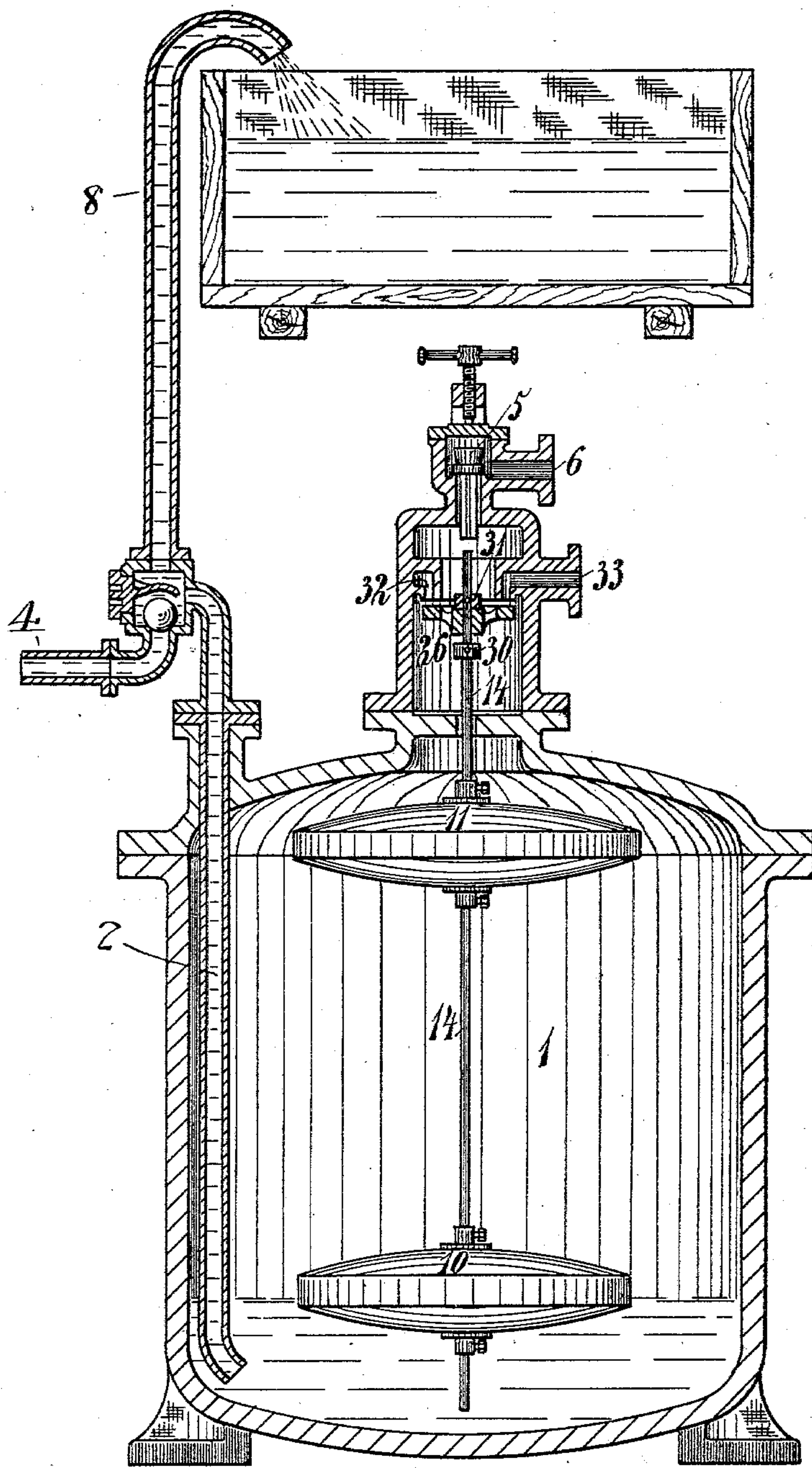


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V. SCHWANINGER.  
APPARATUS FOR RAISING LIQUIDS.  
APPLICATION FILED APR. 4, 1902.

NO MODEL.



Witnesses  
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# UNITED STATES PATENT OFFICE.

VITUS SCHWANINGER, OF OGGERSHEIM, NEAR MANNHEIM, GERMANY.

## APPARATUS FOR RAISING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 745,529, dated December 1, 1903.

Application filed April 4, 1902. Serial No. 101,427. (No model.)

*To all whom it may concern:*

Be it known that I, VITUS SCHWANINGER, a subject of the Emperor of Germany, residing and having my post-office address at Oggersheim, near Mannheim, Germany, have invented certain new and useful Improvements in Apparatus for Raising Liquids, of which the following is a specification.

In apparatus for raising liquids by means of steam or compressed air, in which the alternate opening and closing of the steam or compressed-air valve are effected by means of a double-bodied float, the upper and lower parts of which are connected by a rod on which they are adjustable, the quantity of liquid to be raised during each stroke or period can be exactly regulated by adjusting the height of the upper part of the float. It follows, however, that when the said part of the float is placed in a low position the portion of the chamber above it cannot be utilized, since during the period of inlet of liquid the said chamber can only be filled up to the upper part of the float, whereupon the pressure-valve is opened and the period of pressure begins. For this reason the free space existing above the liquid-level until shortly before the period of pressure begins must be filled with compressed air before the forcing out of the liquid can begin. The said space is therefore injurious with regard to the consumption of pressure and causes a greater consumption of pressure the smaller the quantity to be raised at each stroke. To remove this disadvantage, I have found that it is preferable to make the lower part of the float adjustable instead of the upper part and to prevent expansive action by the pressure agent, in consequence of the distance between the lower part of the float and the end of the rising pipe, by causing an exhaust-valve to be opened by the descending float at the same time as the compressed-air valve is closed. The buoyancy of the two parts of the float is so proportioned that it takes the buoyancy of both to open the pressure-medium-supply valve, but that of the lower one only to keep it open. The said exhaust-valve allows the cut-off compressed air contained in the vessel to escape into the open air, so that the equalization of pressure need

not take place through the rising pipe and liquid-conduits.

In the annexed drawing the apparatus is shown in vertical section.

The pressure-chamber 1 is connected by the pipe 2, controlled by an antireturn valve, with the supply-pipe 4 of the liquid to be raised, the pipe 2 being connected in a suitable manner with the pipe 8, leading to the tank.

The float in the receptacle 1 consists of a lower part 10 and an upper part 11, which are both rigidly attached to the rod 14, the lower float part 10 being adjustable upon the rod 14. Upon the latter two rings 30 and 31 are pivoted, and between these rings 30 31 the plate of the air-exhaust valve 26 is arranged slidably on the rod, the air-exhaust valve 26 being provided with a series of perforations, as indicated in section in the drawing. The compressed-air valve 5 is not connected with the float-rod 14 and is kept closed by its own weight and the pressure of the pressure medium entering from pipe 6. The air-exhaust valve 26 shuts off the annular space and the tube 33, arranged for the exit of the air contained in the receptacle 1.

The apparatus operates in the following manner: The level of the liquid flowing in through the pipes 4 and 2 rises to the height of the upper part 11 of the float, so that the rod 14 is lifted by reason of the buoyancy of the float 10 11 and carries along the lower ring 30, attached to it. This ring 30 thereby comes up against the air-exhaust valve 26, and the plate of the latter shuts off the annular space 32 and the pipe 33 for the air-escape. Just after the air-exhaust is closed the pressure-medium valve 5 is opened by the rod 14 coming up against the latter and lifting it, so that compressed air can enter the pressure-chamber 1 through the pipe 6 and the perforations of the air-exhaust valve 26. The pressure medium now forces the liquid from the receptacle 1 through conduit 2 8 to its place of consumption, and the pressure-medium valve 5 is kept open by means of the buoyancy of the lower float 10 till the level of liquid sinks so far as to allow the float 10 11 to gain overweight, when the float-rod 14 falling down releases the valve 5, which



closes by gravity. Almost simultaneously, but a short moment later, the upper ring 31 on the descending rod 14 pushes down the body 26 of the exhaust-valve and opens the latter, as shown in the drawing. During the then renewed inflow of liquid the exhaust-valve allows the air in the vessel to escape through the annular space 32 and the tube 33 until the level of the liquid has risen so high as to cause the float to ascend again, whereupon the operation is repeated.

What I claim is—

1. Apparatus for raising liquids comprising in combination a chamber having inlet for pressure fluid and inlet and outlet for liquid, a pressure-valve controlling said inlet for pressure fluid, a closing device therefor comprising a rod and a float attached to said rod and formed of two rigidly-connected bodies 10 and 11, the lower one of the said float-bodies being adjustable upon said rod and an air-exhaust valve for said chamber positively controlled by the float, said exhaust-valve being closed by the upward movement of the float and opened by the downward movement of the float, means for enabling the rod during its upward movement to first act upon the pressure-medium valve by its direct thrust previous to its action upon the air-exhaust valve, and means for enabling said rod during its downward movement first to set free

the pressure-medium valve to allow it to close, and secondly to open the air-exhaust valve, substantially as set forth.

2. Apparatus for raising liquids comprising in combination, a chamber having inlet for pressure fluid and inlet and outlet for liquid, a pressure-valve controlling said inlet for pressure fluid, a closing device therefor comprising a float formed of two bodies 10 and 11, and a rod connecting said bodies, the lower one of said float-bodies being adjustable upon said rod, and an air-exhaust valve for said chamber positively controlled by the float, said exhaust-valve comprising a valve-body 26 movably arranged between two adjustable collars 30 and 31 on the float-rod 14, which valve-body is pressed against and removed from its seat by the collars 30 and 31 respectively during the upward and downward movement of the rod 14 connected to the float 10 11, and a compressed-air valve 5 adapted to be opened by the direct thrust of the rod 14 after the air-exhaust valve is closed and adapted to be closed before the air-exhaust valve is opened; substantially as set forth.

In witness whereof I have signed this specification in the presence of two witnesses.

VITUS SCHWANINGER.

Witnesses:

H. W. HARRIS,  
JACOB ADRIAN.