No. 885,301. PATENTED APR. 21, 1908.

J. W. SIEPERMANN & E. FUDICKAR.

AIR PUMP.

APPLICATION FILED AUG. 27, 1904.

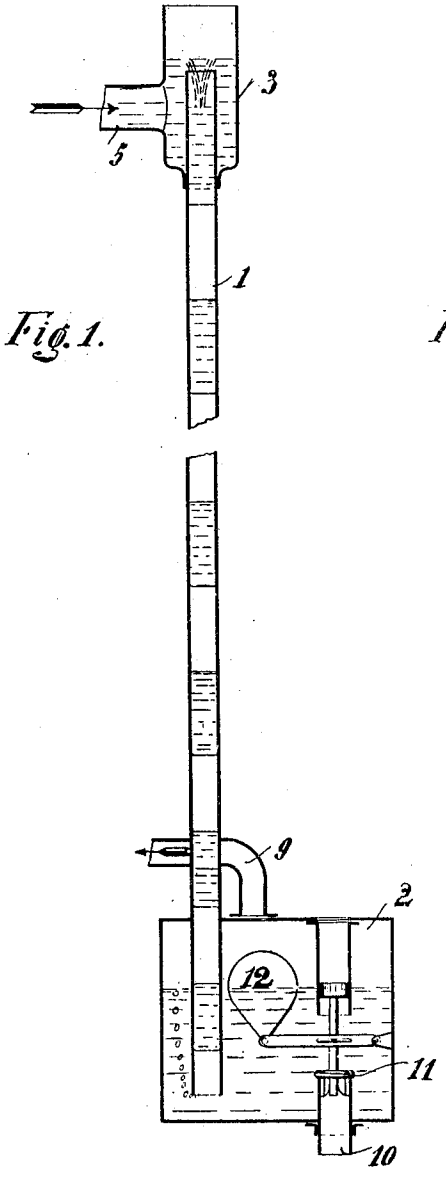


Fig. 1.

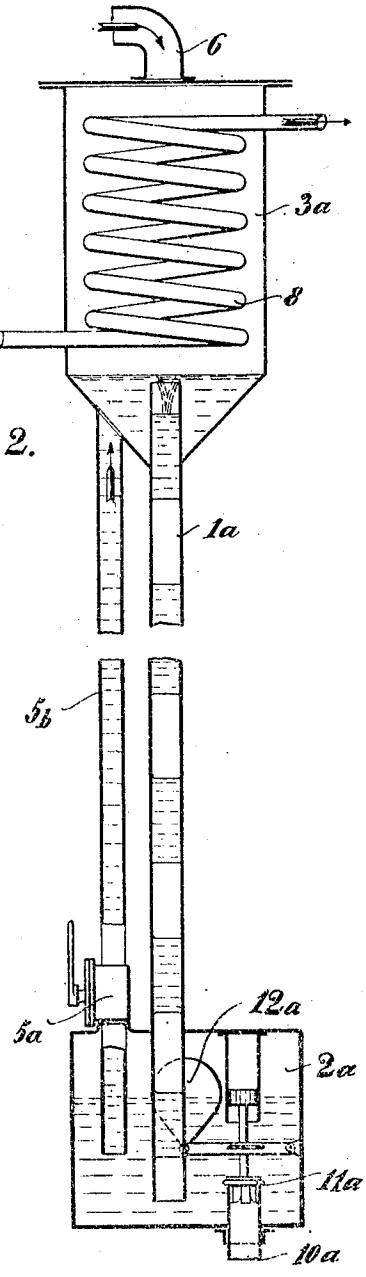


Fig. 2.

Witnesses.

L. H. Staaden.

M. L. Hamm.

Inventors.

Johann Wilhelm Siepermann

and Emil Fudickar

by Alfred Mueller

Atty.

UNITED STATES PATENT OFFICE.

JOHANN WILHELM SIEPERMANN AND EMIL FUDICKAR, OF ELBERFELD, GERMANY.

AIR-PUMP.

No. 885,301. Specification of Letters Patent. Patented April 21, 1908.

Application filed August 27, 1904. Serial No. 222,400.

To all whom it may concern:

Be it known that we, JOHANN WILHELM SIEPERMANN and EMIL FUDICKAR, citizens of the German Empire, residing at Elberfeld, in the Province of Rhenish Prussia and Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Air-Pumps, of which the following is a specification.

Our invention relates to a new type of air pump, which we call a water piston pump.

The new pump is based on the novel use of the physical property of the water, or other similar liquids, and may be constructed either to act as a suction pump or as a suction and compression pump.

On the accompanying drawing Figure 1 shows the new pump constructed to operate as an air compressor, Fig. 2 shows a construction of the pump capable of distilling spirits under a vacuum with a view to saving aromatic products, the condensed fluid forming the operating liquid in this instance.

1 indicates the piston or fall pipe, of suitable diameter, and 2 is the discharge vessel at the foot of the said fall pipe. The diameter of the fall pipe should be small enough to maintain an integral liquid piston, by bringing the operation within the limits of cohesion of water. The discharge vessel 2 is closed, having only an outlet pipe 9, at the top, which pipe leads to another vessel, not shown in the drawing, in which vessel air is to be stored and compressed.

3 is the head or suction chamber of the pump, and 5 the feed or admission pipe leading the operating liquid into the suction chamber 3. The fall pipe 1 enters the latter at its bottom and is extended therein a little above the open end of the admission pipe 5. The level of the liquid in the chamber 3 will be always a little above the upper end of the pipe 1, so that the liquid will flow equally over the circumferential edge and toward the center of this pipe and seal it at the top. The liquid, which for instance may be water, forms what we call a water piston in the pipe. By the law of gravity this water piston sinks downwards in the pipe with accelerated velocity. The result is that as sufficient water cannot follow, the piston will be broken or torn apart at the entrance of the pipe 1, and air will be drawn into the pipe for a certain length of time. Thereby the speed of the torn off water piston in the fall pipe will be slackened, provided that pipe 1 is made long enough, so that the torn off water piston will not have reached the outlet of the pipe at the bottom thereof, before the top end of the pipe has been closed again by an additional quantity of water flowing into the pipe. This may be regulated at will by regulating the amount of the water, admitted through pipe 5. Thus alternately an air and a water piston is formed in the pipe 1, as shown in Fig. 1, and it will be readily understood that the air which is thus discharged into the vessel 2 at the bottom of pipe 1, will collect at the top of the vessel and pass out through the pipe 9 into the storage chamber above referred to. The compression takes place progressively in the lower portion of the fall pipe, after the previously accelerated movement of each liquid piston has begun to be retarded by the arrest of those below it; as they pass from the lower end of the fall pipe into the stationary body of liquid in the vessel 2. The water flows out through a pipe 10, which, as shown, is provided with a float valve 11, the position of which is controlled by the float 12. In order to relieve the valve 11 of the pressure which would otherwise be exerted upon it by the compressed air in the chamber 2, so that it may be readily actuated by the float, the stem is provided with a second piston 13, working freely, but forming a liquid-tight fit in the tube 14, which is open at its upper end 15 to the atmosphere. The air discharged through the pipe 9 will gradually be compressed in said storage chamber to a degree proportionate to the head of the water in the pipe 1. This compression will be carried on with absolute certainty and without any loss, because no air can escape.

The device shown in Fig. 2 may be used for distilling spirits under a vacuum with a view to saving aromatic products. The distilled fluid in this case, forms itself the operating liquid for producing alternately liquid and gaseous pistons. The gas in this case is the aromatic gas emanating from the distilled product, or at least such gas mixed with air. The liquid flows also into the closed vessel 2^a at the bottom of the fall pipe 1^a, but instead of being allowed to flow away, it is forced back by a pump 5^a through a pipe 5^b into the suction chamber 3^a, wherein it is first admitted from the still by a pipe 6. A pipe coil 8 containing a cooling fluid, is arranged in the suction chamber. From time to time, however, the liquid collected in the vessel 2^a is allowed to escape through the

float valve 11^a, and is conveyed to a cask or some storage vessel through a pipe 10^a. The valve 11^a is controlled by the float 12^a. Both pumps shown in Figs. 1 and 2 operate alike, the only difference being that in the pump illustrated in Fig. 2 the liquid, being more valuable than water, is not permitted to flow away, but is pumped back again into the suction chamber to serve anew as an operating piston.

What we claim and desire to secure by Letters Patent is:—

1. A pump comprising an elevated receptacle, means for supplying regulated quantities of liquid to said receptacle, a vertical pipe of relatively small diameter extending upwardly through the bottom of said receptacle and terminating within it, a closed vessel surrounding the lower end of said pipe; said receptacle, pipe and vessel being constructed and arranged to form descending alternate pistons of liquid and gas in the pipe when liquid is supplied to the receptacle; and means for intermittently discharging the liquid from said closed vessel; substantially as described.

2. A pump comprising an elevated receptacle, means for supplying regulated quantities of liquid to said receptacle, a vertical pipe of relatively small diameter extending upwardly through the bottom of said receptacle and terminating within it, a closed vessel surrounding the lower end of said pipe, said receptacle, pipe and vessel being constructed and arranged to form descending alternate pistons of liquid and gas in the pipe when liquid is supplied to the receptacle, means for discharging the compressed gas from said closed vessel, and a balanced valve for intermittently discharging the liquid therefrom; substantially as described.

3. A pump comprising an elevated receptacle, means for admitting liquid thereto, a vertical pipe of relatively small diameter extending upwardly through the bottom of said receptacle and terminating within it, a closed vessel surrounding the lower end of said pipe, means for discharging compressed gas and a portion of the accumulated liquid from said closed vessel, and means for returning the remainder of said liquid to the elevated receptacle; substantially as described.

In testimony whereof we have affixed our signatures in presence of two witnesses.

JOHANN WILHELM SIEPERMANN
EMIL FUDICKAR.

Witnesses:
OTTO KÖNIG,
J. A. RITTERSHAUS.