(No Model.)

W. R. BOERNER.

Air Pump.

No. 238,639. Patented March 8, 1881.

Fig 1.

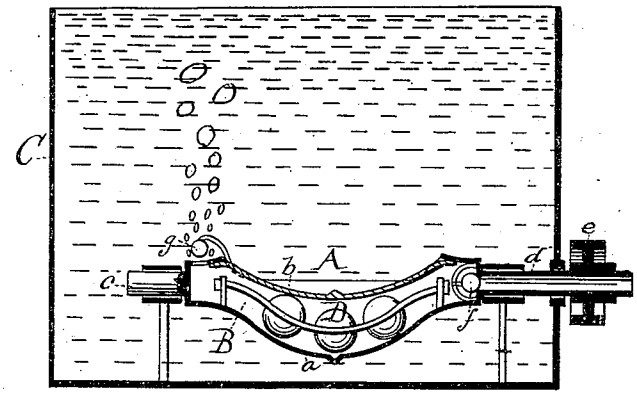


Fig 2.

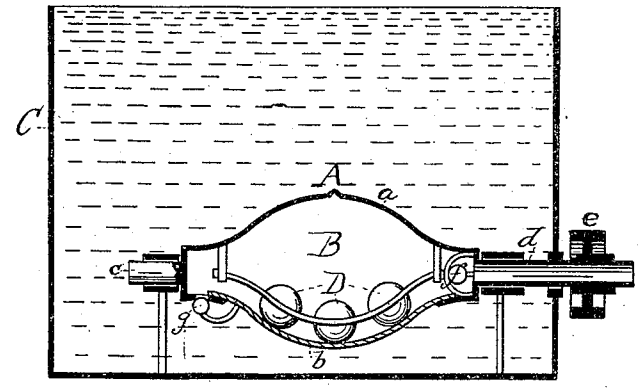
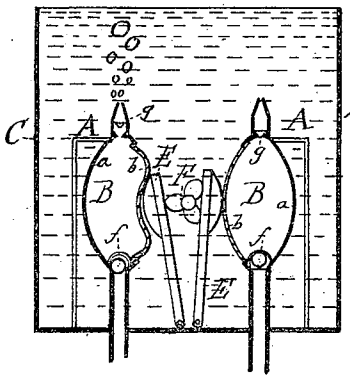


Fig 3.



Witnesses:
F. B. Townsend
Wm. Rotthoff

Inventor:
Kunibald R. Boerner
per Lothrop & Dyer
Attorneys.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WUNIBALD R. BOERNER, OF CHICAGO, ILLINOIS.

AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 238,639, dated March 8, 1881.

Application filed June 4, 1880. (No model.)

To all whom it may concern:

Be it known that I, WUNIBALD R. BOERNER, of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Air-Pumps, of which the following is a specification.

The object I have in view is to produce a pump for forcing air or gas into a body of water or other liquid, in which the said air or gas is to be used as a motive power, which pump will be simple in construction, effective in operation, and can be run at a low rate of speed; and my invention therein consists, first, in a submerged air or gas pump provided with suitable ingress and egress valves, and composed of a body inclosing an air-chamber, and made partly of rigid and partly of flexible material, so that it can be collapsed in one or more portions to draw in and force out the air or gas, such flexible portions being acted on directly by the pressure of the body of water in which the pump is submerged; and, second, in mounting such a pump on revolving journals and providing it with a weight within the air-chamber, which always remains in the lower part of the chamber and expands the flexible portion of the pump-body once during every revolution of the pump.

In the accompanying drawings, forming a part hereof, Figure 1 is a vertical longitudinal section of the pump and the tank in which it is placed, showing the flexible portion of the pump-body uppermost and collapsed; Fig. 2, a similar view with the parts reversed, and Fig. 3 a sectional elevation of a modification of the method of operating the pump.

The body A of my air-pump is of any suitable form, and is made partly of metal, wood, or other rigid and water-tight material, (shown by *a*,) and partly of flexible material—such as rubber, leather, or cloth—(shown by *b*,) and incloses an air-chamber, B. The pump-body has journals *c d*, which are mounted in suitable bearings in a tank, C, containing water or other liquid. The journal *d* is hollow and extends through the side of the tank, and has a pulley, *e*, keyed upon it outside of the tank, to which the power is applied for revolving the pump. The pump has valves *f g* for controlling the ingress and the egress of the air or gas.

Within the air-chamber B of the pump-body is placed a weight, D, which is composed of one or more metallic weights, secured in a pivoted frame, or one or more loose weights, or mercury, or other heavy liquid. This weight D rests centrally upon the lower side of the air-chamber B, and in the revolution of the pump retains that position by the action of gravity. When the flexible side *b* of the pump is turned upward the weight will rest on the rigid portion of the air-chamber, and the pressure of the water will press in or collapse the flexible portion of the air-chamber. This action will force part of the air out of the air-chamber B into the water. In the further revolution of the pump the collapsed flexible portion of the air-chamber will be brought under the weight D, and will be expanded by such weight, drawing in air through the valve *f*. Thus it will be seen that at every revolution of the pump air or gas will be drawn into the air-chamber and forced out of the same into the water or other liquid of the tank.

A modification of my pump is shown in Fig. 3. In this construction I use two pump-bodies, and mount them in stationary frames with the flexible portions facing each other. These flexible portions are too stiff to be overcome and collapsed by the water, but are pressed inwardly by pivoted arms E, worked alternately by cams F, and spring outwardly by their own elasticity. The pressure, however, of the body of water in which the pump is submerged acts directly upon the flexible portions of this pump, as it does on the flexible part of the pump first described; but while this pressure is not sufficient to collapse the air-chambers of the modified form of my air-pump, still it assists the operation of the pivoted arms, and makes the pump capable of being worked by less power than it would otherwise require.

This pump could also be used to force a specifically lighter liquid than that contained by the tank into the tank, the modified form of the pump being better adapted for that purpose.

What I claim as my invention is—

1. An air or gas pump submerged in water or other liquid, and having a body inclosing an air or gas chamber provided with ingress and egress valves, and composed of rigid and

flexible parts, such flexible parts being acted on directly by the pressure of the body of water in which the pump is submerged, substantially as described and shown.

2. An air or gas pump submerged in water or other liquid, and having a revolving body inclosing an air or gas chamber, and composed of rigid and flexible parts, and provided with ingress and egress valves, and with a weight which presses outwardly upon the lower side of such chamber, substantially as described.

WUNIBALD R. BOERNER.

Witnesses:
RICHD. N. DYER,
WM. ROTTHOFF.