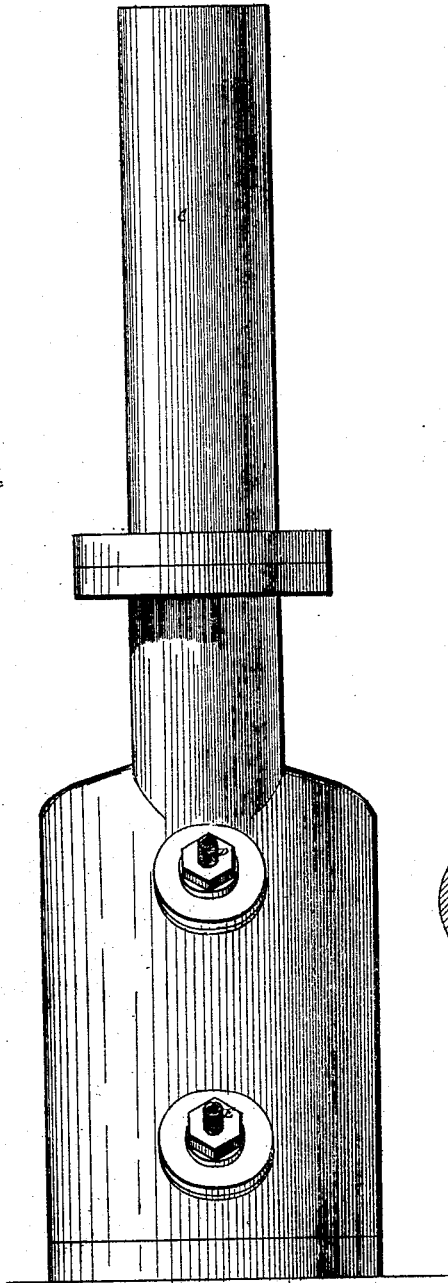


R. M. MARCHANT.  
PUMP.

No. 110,380.

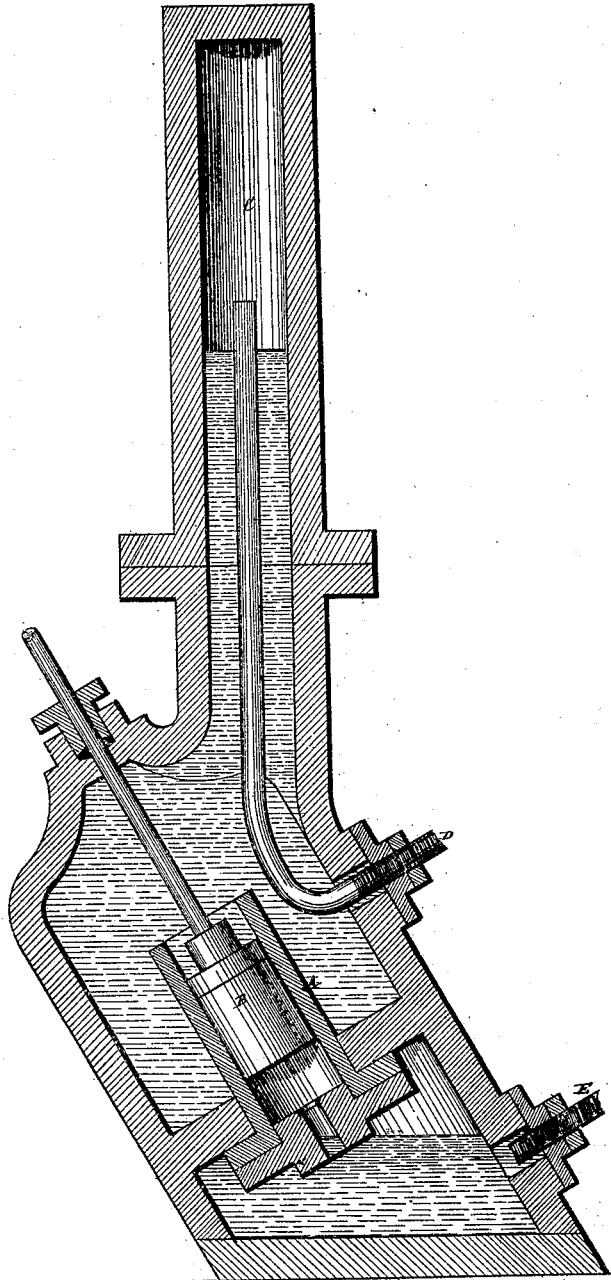
Patented Dec. 20, 1870.

Fig. 2



Witnesses  
Fred Haynes  
J. M. Cooruly

Fig. 1.



Robert Mudge Marchant  
per. Amos Combs  
Attorney

# United States Patent Office.

ROBERT MUDGE MARCHANT, OF LONDON, ENGLAND.

Letters Patent No. 110,380, dated December 20, 1870.

## IMPROVEMENT IN PUMPS.

The Schedule referred to in these Letters Patent and making part of the same.

### *To all whom it may concern:*

Be it known that I, ROBERT MUDGE MARCHANT, of London, England, have invented a new and useful Improvement in Pumps for the Compression of Air, Gases, and other Aeriform Fluids or Vapors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a vertical section of a pump constructed in accordance with my improvement, and

Figure 2, an outside view or elevation thereof at right angles to fig. 1.

Similar letters of reference indicate corresponding parts.

My invention consists in a pump for the compression of air, gases, and other aeriform fluids or vapors, the bucket of which works under water, and which water is confined and retained under or between a volume or volumes of the fluid being compressed, by causing said fluid to enter the pump below the water during the ascent of the bucket, and so that it is expelled through the bucket and the water above during the descent of the bucket, so soon as the pressure below, as produced by the action of the bucket, exceeds the pressure above, when the compressed aeriform fluid, aided by its lighter specific gravity, ascends through the water to a suitable receptacle or chamber from which it is conducted as required, and where, being stored, it aids the bucket in its succeeding descent.

Referring to the accompanying drawing—

A represents the pump-cylinder or barrel, which is preferably set to occupy an inclined position.

B is the bucket, provided, as usual, with a valve opening upward.

The barrel A is charged with water, within which the bucket works.

The volume of water above the bucket is permitted to have free play up and down with it, and made to partially fill a receptacle or chamber, C, which may be arranged in any suitable position, and which serves as a reservoir for the aeriform fluid as it is compressed, or it may be a part and continuation, as it were, of the transit-pipe that serves to conduct the aeriform fluid, subject to the control of a check-valve or not, as required.

A separate transit or eduction-pipe, D, however, is

here shown, the same communicating with the chamber C above the level of water therein.

E is the induction-pipe or inlet for the air, gas, or vapor to be compressed, and which is arranged to connect with the pump below the water therein, said air, gas, or vapor being derived from any suitable source, and under varied conditions of pressure.

In the operation of the pump the aeriform fluid enters the pump during the ascent of the bucket and is forced, by the beat of the latter in its descent aided by the lighter specific gravity of said fluid, through the bucket and water above it into the chamber C or transit-pipe whenever the pressure, as caused by the compressing action of the plunger in its descent, exceeds the pressure above the bucket.

In the succeeding ascent of the plunger, as it moves through the water in the barrel, a fresh charge is drawn in below, and the previous charge may be further compressed in the chamber C or transit pipe, the power to effect which will be returned in the next descent of the bucket. In such operation the water with which the pump-barrel is charged, and between which, as it were, that is, between the body of it lying above the bucket and that remaining below it, the aeriform fluid is compressed, performs an all-important part, the same sealing any communication between the induction and eduction-pipes except as due to the action of the bucket.

By arranging the pump-barrel in an inclined position a free space for the entry of the aeriform fluid below the bucket is effected and a better action generally insured.

What is here claimed, and desired to be secured by Letters Patent, is—

1. A pump for compressing aeriform fluids, in which the bucket is made to work under water, with the inlet E for said fluid arranged below the water, and the outlet or transit above in free communication with the water, substantially as specified.

2. The combination and arrangement, essentially as herein set forth, of the inclined water-barrel or pump-cylinder A, the bucket B, the inlet E for the fluid to be compressed, the receptacle or chamber C, and its pipe D, for operation, substantially as described.

Witnesses:

R. M. MARCHANT.

I. C. NEWBURN,  
G. BACON.