

(No Model)

F. EDWARDS.
STEAM ENGINE AIR PUMP.

No. 584,306.

Patented June 8, 1897.

Fig. 1.

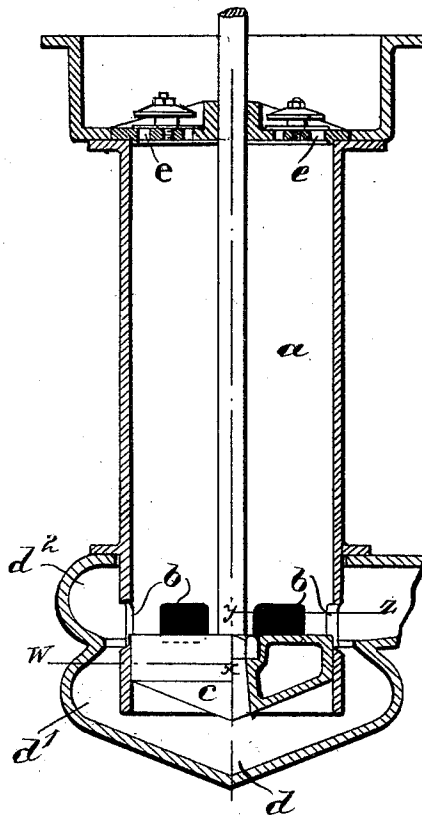
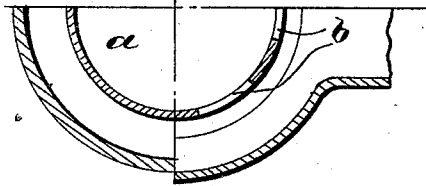


Fig. 2.



Witnesses,
Geo & Trech
Hubert & Beck

Inventor,
Frederick Edwards,
by Pattison Nesbit,
Att'y

UNITED STATES PATENT OFFICE.

FREDERICK EDWARDS, OF LONDON, ENGLAND.

STEAM-ENGINE AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 584,306, dated June 8, 1897.

Application filed February 9, 1897. Serial No. 622,640. (No model.) Patented in England March 12, 1894, No. 5,175.

To all whom it may concern:

Be it known that I, FREDERICK EDWARDS, a subject of the Queen of Great Britain and Ireland, residing at London, England, have invented Improvements in Steam-Engine Air-Pumps, (for which an English patent was granted March 12, 1894, No. 5,175,) of which the following is a specification.

My invention has reference to a new and improved construction of steam-engine air-pumps, in which construction the air and vapor are admitted to the pump-barrel without having to be forced through the water in the barrel or in the chamber which supplies the barrel, and less pressure is required in the condenser than is necessary to cause the air and vapor to enter the barrel of an ordinary air-pump.

My said pump comprises a barrel with valveless inlet-openings in its lower part, a valveless bucket adapted to serve as a piston-valve in relation to said openings, and a bottom that constitutes around and below the lower part of the barrel a chamber into which water, air, and vapor can flow, said chamber being made internally of a configuration which gradually rises from the bottom outward and afterward gradually proceeds inward and upward toward the inlet-openings of the barrel, so that when the bucket strikes the water below it the water thereby displaced is guided and caused to pass through the valveless openings and enter the barrel above the bucket and to assist air and vapor to also enter the barrel through the said openings. In combination with the said formation the bottom is constructed with an upper part made sufficiently large to afford ample space for the air and vapor and so arranged that air and vapor can flow through it to all the inlet-openings of the barrel, and in order that others skilled in the art may be enabled to make and use my invention I now proceed to more particularly describe the same, with the aid of the accompanying sheet of illustrative drawings, whereof—

Figure 1 shows in central vertical section so much of a steam-engine air-pump constructed according to my invention as is needful to an understanding of my improvements; and Fig. 2 is a half-horizontal section, partly on line W X and partly on line Y Z of Fig. 1.

The construction represented, as will be seen, is such that the water, air, and vapor can flow into the barrel *a* of the pump at the same time through inlet-openings *b*, formed in the wall of the barrel, and which may be of the shape shown or of other convenient form—for example, diagonal. The bucket *c* acts as a piston-valve. Foot-valves are dispensed with, so that the inlet area can be very considerable, instead of being contracted, as is the area through the valve-seatings in ordinary steam-engine pumps such as I have above referred to and whose efficiency is thereby impaired. Bucket-valves are also dispensed with. The bottoms *d d' d''* of the pump and of the bucket *c* are so formed that water displaced by the descending bucket is caused, at a velocity depending on the speed at which the pump is worked, to flow into the barrel through the openings *b* above the bucket *c*, and the water in traveling through the openings *b* into the barrel *a* tends to assist the flow of the vapor and air into the barrel.

In the example the bottom of the bucket *c* is of conical form (to prevent or reduce shock) and the bottom *d d' d''* of the pump is a casing whose internal configuration at its lower part *d* corresponds to the external formation of the lower part of the bucket *c*, the base of the hollow cone *d* being succeeded by a curved part *d'*, adapted to guide the water toward the inlet-openings *b* when it is set in motion or displaced by the action of the descending bucket on the surface of the water within the lower part of the barrel *a*. The upper part *d''* is made sufficiently large to afford ample space for the air and vapor and is shown so arranged that water cannot lodge in it and that air and vapor can flow through it to all the inlet-openings *b* of the barrel. In the example the curved form is such that the air and vapor will be guided toward the openings *b*, the flow through which will in some cases be to some extent aided by the action of the streams of water passing to and through the said openings. The top of the bucket may be made flat, as shown, in which case the under sides of the seatings of the valves, of which one is shown at *e*, are also made flat. The form of the top of the bucket can, however, be varied. For example, it may be concave, in which case I consider it desirable

that the under side of the head-valve seat be made to correspond in form with the upper side of the bucket, so that the bucket may work up to the under side of the head-valve or head-valve seat as closely as is practically desirable.

My pump may be varied in form, but I consider the shape represented in the drawings hereto annexed preferable, especially for higher speeds.

What I claim is—

1. A steam-engine air-pump comprising a barrel with valveless inlet-openings in its lower part, a valveless bucket adapted to serve as a piston-valve in relation to said openings, and a bottom that constitutes around and below the lower part of the barrel a chamber into which water, air and vapor can flow, said chamber being of a configuration which gradually rises from the bottom and afterward gradually proceeds inward and upward toward the inlet-openings of the barrel, so that water displaced by the descent of the bucket is caused to pass directly into the barrel above the bucket through said openings as set forth.

2. A steam-engine air-pump comprising a barrel with valveless inlet-openings in its lower part, a valveless bucket adapted to serve as a piston-valve in relation to said openings, a bottom that comprises around and below the lower part of the barrel a chamber into which water, air and vapor can flow, this chamber being of a form gradually rising outward from its bottom and afterward gradually proceeding inward and upward and which bottom chamber has above it an upper part made sufficiently large as set forth to afford ample

space for air and vapor, whereby when the bucket strikes the water below it water thereby set in motion and guided by the wall of the chamber will be caused to enter by the openings into the barrel above the bucket and to assist air and vapor to also enter the barrel through those openings.

3. In a steam-engine air-pump, the combination of a barrel with valveless inlet-openings in its lower part, a valveless bucket adapted to serve as a piston-valve in relation to said openings, a bottom that comprises around and below the lower part of the barrel a chamber into which water, air and vapor can flow, this chamber being of a form gradually rising outward from its bottom a certain distance and afterward gradually proceeding inward and upward, and which bottom chamber has above it an upper part that is as herein set forth made sufficiently large to afford ample space for air and vapor and so arranged that air and vapor can flow through it to all the inlet-openings of the barrel, whereby when the bucket strikes the water below it water thereby set in motion and guided by the wall of the chamber will be caused to enter by the openings into the barrel above the bucket and to assist air and vapor to also enter the barrel through those openings, substantially as described.

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

FREDERICK EDWARDS.

Witnesses:

PERCY E. MATTOCKS,
EDMUND S. SNEWIN.