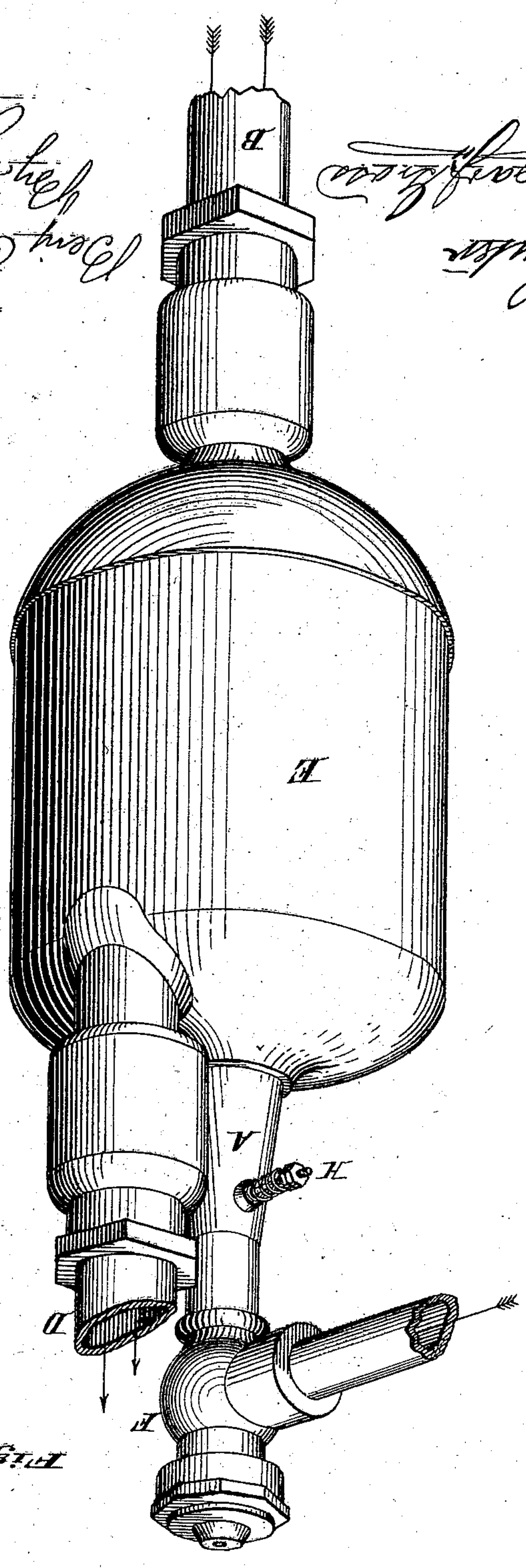


B. C. VAN DUZEN.
 Direct Steam-Pumps.
 No. 155,477.
 Patented Sept. 29, 1874.
 2 Sheets--Sheet 1.

Fig. 1



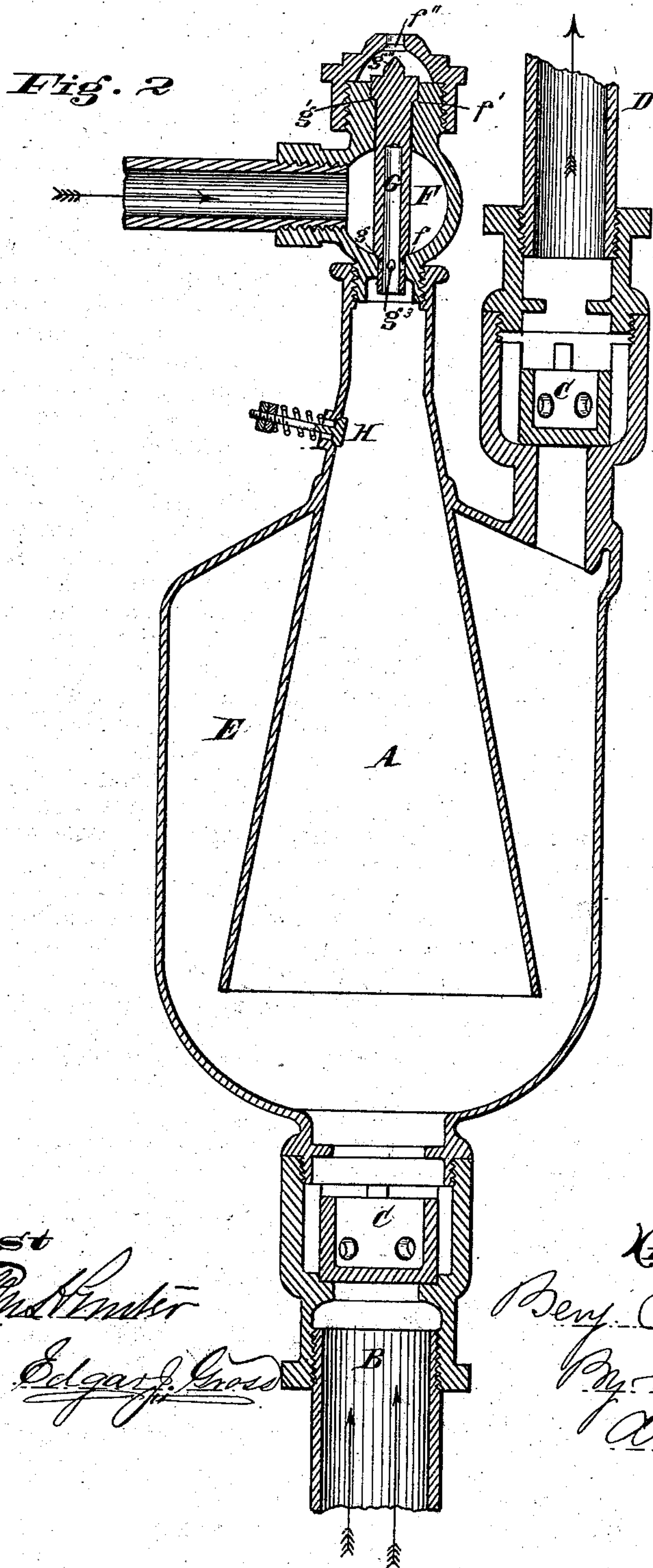
Inventor
 B. C. Van Duzen
 by J. M. Woodward
 Attorney

Attest
 J. M. Woodward
 J. M. Woodward

B. C. VAN DUZEN.
Direct Steam-Pumps.

No. 155,477.

Patented Sept. 29, 1874.



Attest
Edgar J. Cross

Inventor
B. C. Van Duzen
By F. Millward
Attorney

UNITED STATES PATENT OFFICE.

BENJAMIN C. VANDUZEN, OF CINCINNATI, OHIO.

IMPROVEMENT IN DIRECT STEAM-PUMPS.

Specification forming part of Letters Patent No. **155,477**, dated September 29, 1874; application filed July 1, 1874.

To all whom it may concern:

Be it known that I, BENJAMIN C. VANDUZEN, of Cincinnati, Hamilton county, State of Ohio, have invented a certain new and useful Improvement in Direct Steam-Pumps, of which the following is a specification:

My invention relates to the class of pumps in which the steam acts directly upon, and is in contact with, the upper surface of the body of water to be forced; and it consists, first, in a peculiar construction of steam-valve and seat, by which steam is automatically admitted to the surface of the water to be forced, when the chamber containing the water is sufficiently full, and is automatically shut off when the water has been forced to the lowest level, and it is necessary to produce a vacuum to enable the suction-water to refill the chamber; second, in the peculiar construction of the water-chamber, and combination with an annular chamber exterior to it, by the combined operation of which a more perfect vacuum is produced than is possible with direct steam-pumps heretofore used.

Figure 1 is a perspective view of a pump embodying my invention. Fig. 2 is an axial section of the same.

A is the chamber in which the forcing is done, the lower edge of the cone being the lowest level of the water in operation. B is the suction or supply pipe, fitted with the customary valve C. D is the discharge-pipe, fitted with the usual check-valve C. Entirely around this chamber A I provide an annular chamber, E, so that the lower edge of the cone may be exposed to the water exteriorly as well as interiorly. F is the steam-valve cage or chamber. It is bored, cylindrically, of different diameters, as shown, and has three valve-seats, f f' f'' . The steam-valve G is made to match. Its upper collar g' seats on the seat f' ; its upper central projection g'' seats up against the seat f'' ; and its lower shoulder g seats on the seat f . The valve G is hollow for the major part of its length, and is perforated at g^3 , for the passage of steam below the valve-face. An air-valve, H, opening inwardly, supplies sufficient air, during the time the vacuum in the pump is generated, to cushion the inwardly-flowing water, and prevent its concussive or ramming action.

In the operation of the pump, after it has been properly "primed," steam is admitted at

pipe J, and, owing to natural leakage between the cylindrical valve and its chamber below the seat f' , the valve-face g' is acted upon by the pressure, and the valve G is thereby raised sufficiently to admit steam at the perforations g^3 into cylinder A. By the pressure of steam upon the water in the chamber the water is then forcibly ejected through valve C, the chamber E being in this operation full of water. When the water originally in the chamber A has been forced out, so that its level is just below the lower edge of the cone A, the steam passes this edge entirely around the circle, and bubbles up into the chamber E, and causes the water in the latter to spout in an agitated manner into the chamber A, the effect of which is to cause the steam to condense in chamber A, and the valve G to fall by its gravity, and the presence of a vacuum below the valve. Until this vacuum takes place the steam-pressure admitted to the interior of valve G and lower edge is sufficient to support it against its gravity and other influences.

It will thus be seen that the valve has an entirely automatic action, to admit and shut off steam at the proper times, and that, owing to the presence of the annular chamber E, and the consequent exposure of the entire lower edge of the cone A, the creation of a vacuum, when the water has reached this lower edge, is so decisive and immediate that unnecessary use of steam is prevented, the valve G being instantly closed.

In order to render the pump continuous in its action, I make the pump double, treble, or as powerful as necessary for different kinds of work.

I claim—

1. The chamber E, in combination with the chamber F, having valve-seats f f' , the cap having valve-seat f'' , and the valve G, having faces g g' g'' and perforations g^3 , substantially as specified.

2. In combination with the cone A, the annular chamber E, operating substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

BENJAMIN C. VANDUZEN.

Witnesses:

R. M. HUNTER,
J. L. WARTMANN.