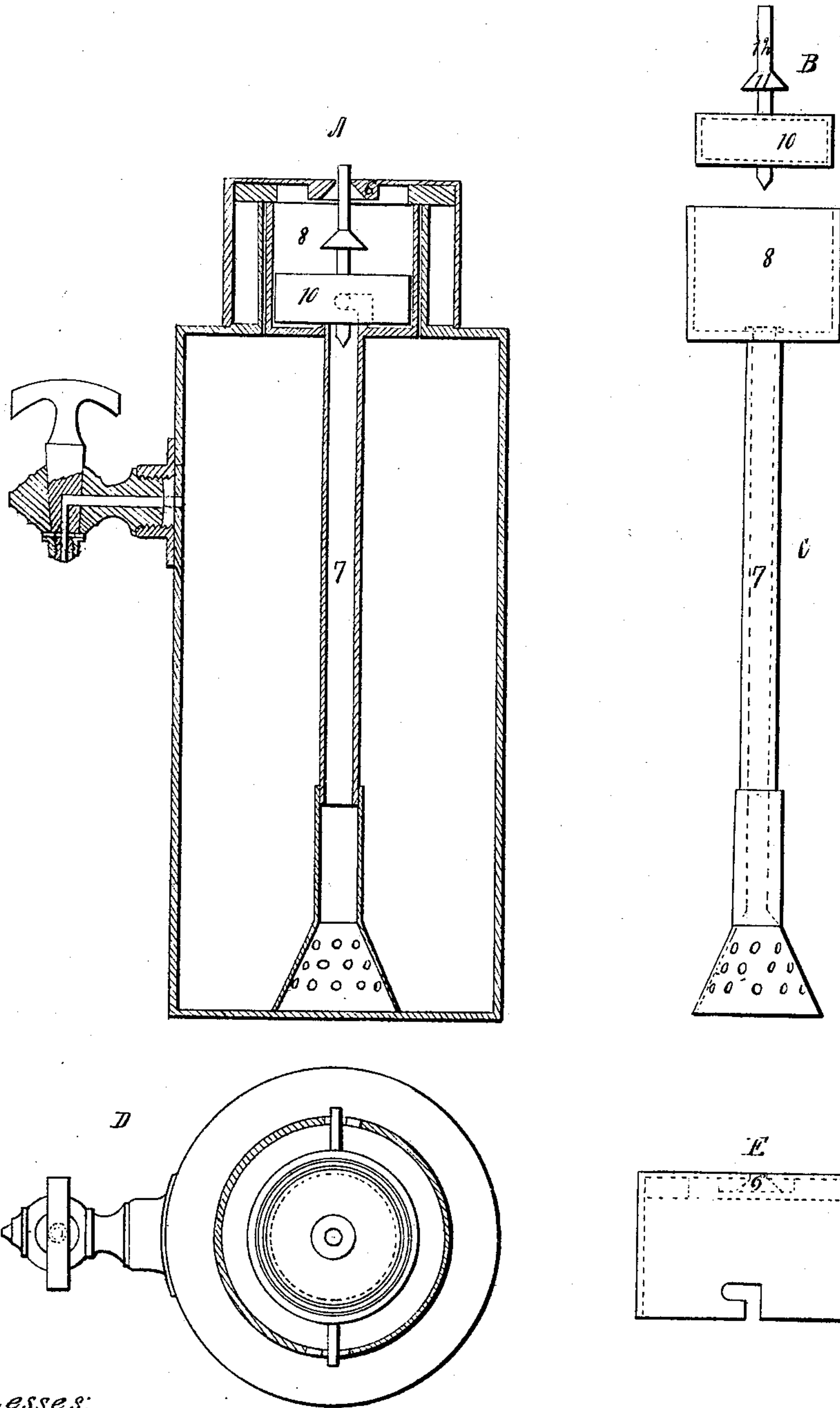


J. C. Cochrane, Steam Generator.

N^o 89,291.

Patented Apr. 27. 1869.



Witnesses:
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UNITED STATES PATENT OFFICE.

JAMES C. COCHRANE, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **89,291**, dated April 27, 1869.

To all whom it may concern:

Be it known that I, JAMES C. COCHRANE, of the city of Rochester, county of Monroe, and State of New York, have invented a new and Improved Mode of Preventing Steam-Boilers from Bursting, and of allowing the escape of steam from the boiler at low water; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Figure A is longitudinal sectional view. Fig. B is a longitudinal view of the valve, embracing the spindle and piston. Fig. C is a longitudinal elevation of the tube and the valve-chamber without the head. Fig. D is an end view. Fig. E is a view of the head of the valve-chamber and the valve-seat, with the cap to hold the chamber-head in place.

First. I construct a hollow cylinder, Fig. C, 8, of sheet brass or other metal, having a valve-seat in the head thereof, Fig. E, 6, and connected and communicating at the bottom with a tube extending into the boiler, Figs. C and A, 2 and 7. This cylinder I call the "valve-chamber."

Second. I construct a valve to play in this chamber, Fig. B, consisting of a spindle, 12, and piston 10, and on the spindle above the piston have a projecting bulb, 11. The spindle and piston are made of metal, and one or both should be hollow to reduce the specific gravity. The spindle is fixed in the piston, and both move together. The diameter of the piston is made a little less than that of the interior of the valve-chamber, so as to allow the water and steam from the tube to pass up around and above the piston in the valve-chamber. The lower end of the spindle is made to fit easily in the tube, and not so large as to prevent the flow of water or steam. The bulb on the upper section of the spindle is made to fit exactly the aperture in the valve-seat in the head of the valve-chamber, while the end of the spindle, above the bulb, is of a size to work freely in such aperture and allow of the escape of steam.

Third. I construct a metal head for the valve-chamber, Fig. E, with a valve-seat in the center, 6, so fitted with an aperture to match the the bulb on the spindle that when

the spindle is pressed up the bulb will enter and fill the aperture, and the valve is then closed. When the spindle descends the valve is open. The head of the cylinder is made tight with packing or otherwise, so that no steam can pass from the boiler into the valve-chamber except through the tube in the bottom of the chamber. The piston should be of about the specific gravity of water at the temperature of 212° Fahrenheit, and of sufficient weight to overcome the pressure of steam upon the spindle when the valve-chamber is filled with steam, but not when it is filled with water. If the spindle is too heavy, the specific gravity of the piston may be made as much less than that of the boiling water as is necessary.

Fourth. I construct a metal tube, Figs. C and A, 7, of sufficient length to extend from the valve-chamber to the bottom of the boiler. The lower part is somewhat enlarged and funnel-shaped, and pierced with holes to communicate with the water in the boiler as high up as the low-water mark. This tube may be made shorter, so as only to reach down to low-water mark, and then no holes would be pierced in the sides of the tube.

The valve, composed of the several parts above described is firmly fixed on the top of the boiler, as shown in Fig. A. It may be made to project above the boiler, or may be constructed within the same.

The cylinder has been adopted as a good shape; but the shape is not material.

The portion of the spindle projecting below the piston can be dispensed with, if desired.

Now, when the water in the boiler is above low-water mark, the pressure of steam will cause the water to rise from the boiler through the tube into the valve-chamber, and fill the same. The specific gravity of the water being about the same as the piston, the piston is sustained by the water, and the pressure of steam on the spindle causes it to rise in the valve-seat until the bulb presses into the aperture, and the valve is closed. On the other hand, when the water in the boiler gets below low-water mark, the valve-chamber is filled with steam instead of water. The steam, passing above the piston, equalizes the pressure of the steam below the piston, so that the only

unbalanced pressure of steam is upon the spindle. The weight of the piston, unsupported by water, overcomes this pressure and pulls the spindle down in the valve-chamber when the valve is open, and the steam escapes. A steam-whistle may be attached, if desired.

What I claim as my invention, and desire to secure by Letters Patent, is—

A low-water steam-port composed of the

valve-chamber, Fig. A, 8, the valve-seat, Fig. A, 9, and the valve, Fig. A, 10 11 12, in combination with the tube 7, all constructed and arranged substantially as described, for the purposes described.

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Witnesses:

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