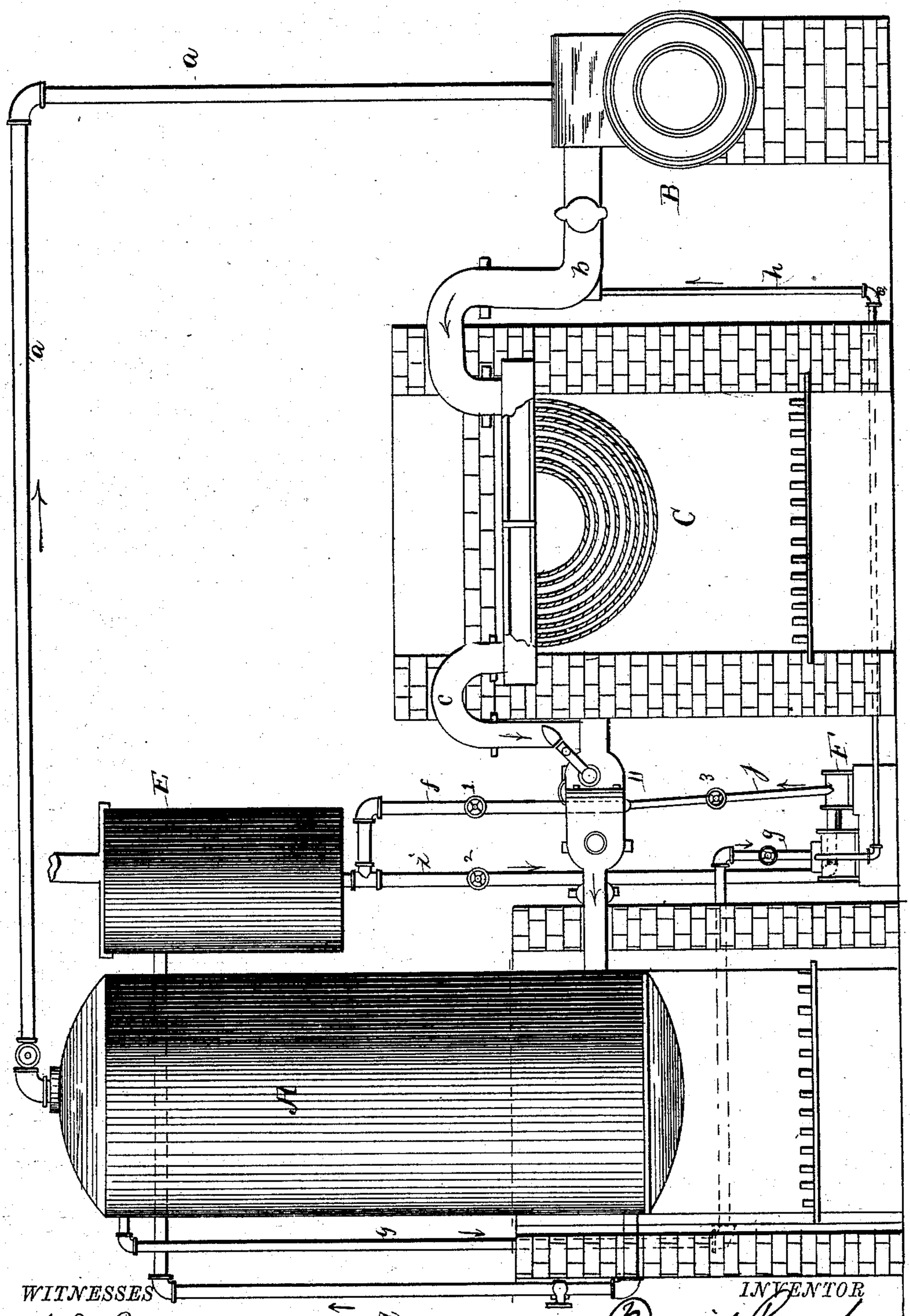
(No Model.)

D. RENSHAW.

UTILIZING THE EXHAUST OF ENGINES.

No. 274,971. Patented Apr. 3, 1883.



UNITED STATES PATENT OFFICE.

DAVID RENSHAW, OF BRAINTREE, MASSACHUSETTS.

UTILIZING THE EXHAUST OF ENGINES.

SPECIFICATION forming part of Letters Patent No. 274,971, dated April 3, 1883.

Application filed February 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, DAVID RENSHAW, of Braintree, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in the Process of Utilizing the Exhaust of Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which form part of this specification.

This invention has relation to a new and useful method of utilizing the exhaust of engines, and has for its object to return the exhaust of the engine into the boiler from which it was taken, thereby greatly saving fuel, preserving the boiler by lessening the degree of incrustation by the constant use of the same water, and generally economizing in motive power.

To this end my invention consists in introducing the exhaust to and passing it through a superheater, by which its temperature is greatly increased, then bringing it in contact, in an injector, with water which has been taken from the working-boiler and reduced to the pressure of the atmosphere, the temperature of such water being still further reduced or not, as may be required, whereby the exhaust is returned to the boiler, on the principle of the injector. A pump may be temporarily used, as will hereinafter more fully appear, when the current is broken.

Reference being had to the accompanying drawing, which shows a side elevation, and partly in section, of my improved apparatus, A is the boiler or vessel, and B the engine. C is the superheater; D, the injector, located between the superheater and the boiler. E is the cooling-tank for the reception of the boiler-water, which is subjected and reduced to atmospheric pressure and cooling action before its being utilized as injection-water.

It is well known that in operating injectors they are subject to intermittent action where there is much jar or concussion—such as on locomotives, marine engines, and the like—and when this intermittent action takes place it breaks the current, and thus destroys for the time being the regular action of the injector, when the pump has to be resorted to. For this reason I also provide a pump, F, which may be used as necessity may suggest. The boiler and superheater are each provided with a furnace for maintaining in them the required temperature.

a is the live-steam pipe to the engine, and *b* its exhaust, which leads to the superheater, where its temperature is increased, and then conveyed through pipe *c* to the injector D into the boiler, as will presently be explained.

d is the pipe that supplies the water-tank with water from the boiler, and *f* the water-pipe to the injector, which terminates therein, and which water, being in a comparatively cool state, is injected into the boiler with the superheated exhaust of the engine.

When the pump is to be used under the conditions before described, the cock 1 is closed and cocks 2 and 3 opened. Steam is let on to the pump through pipe *g* and exhausted through *h* into the main exhaust-pipe. The pump now being in operation, valve 2 on pipe *i* is opened and water flows from tank E. Valve 3 on pipe *j* is also opened, so that the pumped water comes in contact with the superheated exhaust in the injector and forces the entire mixture into the boiler.

I have in another application set forth the method of taking water from the boiler and cooling it for the purpose of injecting the exhausting steam by its own force without superheating it; but in this instance I prefer to superheat the exhaust before using it in an injector for injecting itself into the boiler from which it came.

Having thus described my invention, what I claim as new is—

1. The process herein described, consisting in first taking water from the working-boiler, then cooling it by exposing it to the atmosphere or otherwise, then superheating the exhaust of the engine, and then bringing the water from the boiler and the steam from the engine together in the injector and forcing the entire mixture into the boiler from whence it

came, on the principle of the injector, under the conditions named.

2. The combination of means for utilizing the exhaust of engines, consisting of the cooling-vessel, the injector or pump, the superheater, and the exhaust-pipes, with intervening mechanism, as described.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

DAVID RENSHAW.

Witnesses:

B. F. MORSELL,

EUGENE D. CARUSI.