A. DE BEAUMONT.

Feed-Water Heater and Condenser.

No. 199,038. Patented Jan. 8, 1878.

Fig. 1.

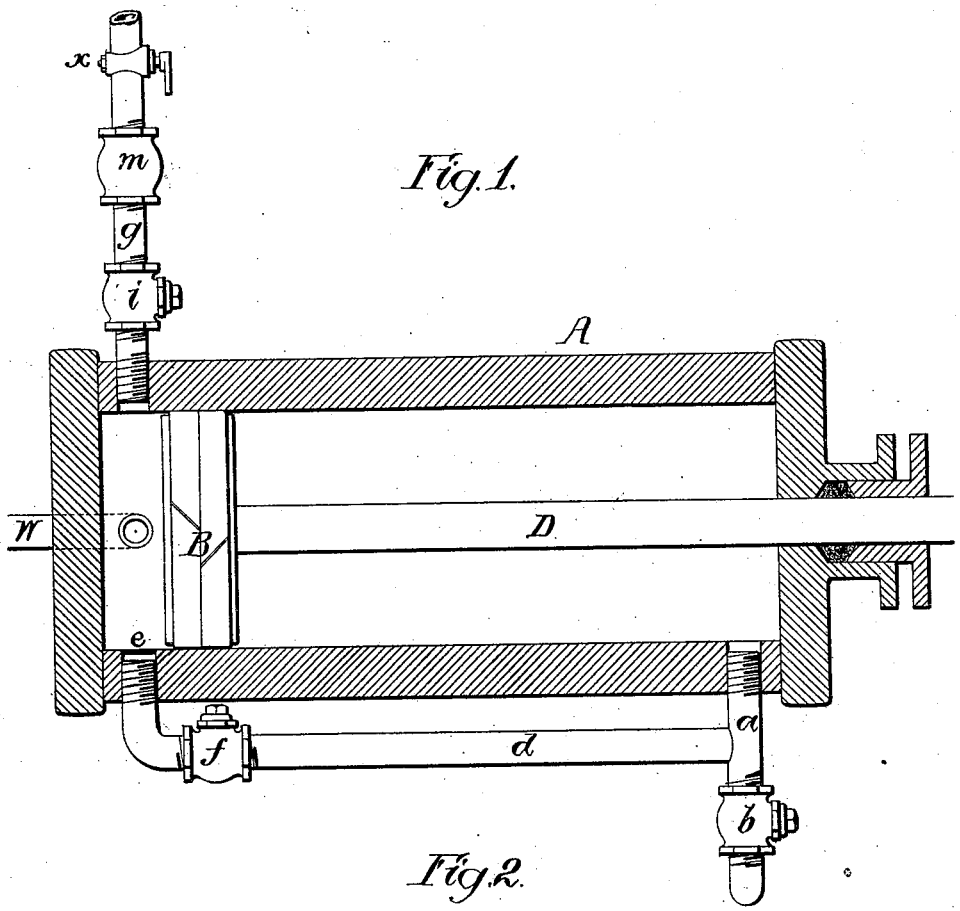
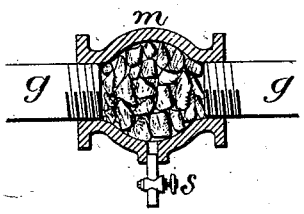


Fig. 2.



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UNITED STATES PATENT OFFICE.

ALEXANDRE DE BEAUMONT, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN FEED-WATER HEATER AND CONDENSER.

Specification forming part of Letters Patent No. **199,038**, dated January 8, 1878; application filed November 12, 1877.

To all whom it may concern:

Be it known that I, ALEXANDRE DE BEAUMONT, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Feed-Water Heater and Condenser, of which the following is a specification:

My invention relates to certain improvements in the feed-water heater and condenser for which Letters Patent of the United States No. 187,825 were granted on the 27th day of February, 1877, the object of my present improvements being to dispense with the use of a special pump for supplying water to the condensing-jet, or the maintenance of a continuous supply of water under pressure for the same purpose. This object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 is a sectional view of my improved feed-water heater and condenser, and Fig. 2 a detached section of a portion of the same.

The essential features of the patented invention above alluded to were a pump, a valved pipe for conveying exhaust-steam to the pump, a second valved pipe for permitting the passage of a jet of water into the said pump, in order to condense the steam, and a third valved pipe through which the condensing water and condensed steam were forced into the boiler as feed-water. This arrangement demanded a supplementary pump, or a supply of water under pressure for the jet. These requirements were not materially objectionable in the case of stationary engines, where a head of water under pressure is usually accessible, but proved in practice to be objectionable when the apparatus had to be applied to locomotives, portable engines, &c., where the desired head of water was not attainable, or where compactness was desirable.

In order to overcome this objection, I substitute a piston-pump for the usual plunger-pump, as shown in the drawing, A being the pump-cylinder, B the piston, and D the piston-rod.

With the front end of the cylinder communicates a pipe, *a*, leading to an adjacent supply of water, and provided with a check-valve, *b*, which opens inward to permit the passage of water into the cylinder A, but closes to prevent the escape of water therefrom through said pipe *a*.

Between the cylinder and the valve *b* the pipe *a* is furnished with a branch, *d*, which communicates with the rear end of the cylinder through a perforated plate, *e*, and is provided with a check-valve, *f*, the latter permitting the passage of water from the front to the rear end of the cylinder, but preventing its passage in the opposite direction.

With the rear end of the cylinder also communicates a pipe, *g*, which is connected to the exhaust-pipe of the engine in such a manner that it may be caused to convey the whole or any desired part of the exhaust-steam to the cylinder A, a check-valve, *i*, in the pipe permitting the entrance of steam to the cylinder, but preventing its escape therefrom. The pipe *g* is also provided with a casing, *m*, inclosing a chamber, which is preferably filled with material of a granular or cellular nature—pumice-stone, for instance—which will present an extended surface to the steam as it passes through the chamber, so that the oil with which the steam is more or less loaded when it escapes from the cylinder of the engine, will be deposited in said chamber, and will pass off from the same through a pet-cock, *s*. I thus prevent that "foaming" in the boiler which is sometimes caused by the admission of oil into the same with the feed-water.

One or more partitions, extending partly across the chamber, may be substituted for the granular material, if desired; but the latter is preferred.

W is the discharge-pipe of the pump, which communicates with the boiler, as usual, and is provided with a check-valve suitably located, and serving to prevent the backward flow of water from the boiler to the pump.

The operation of the device is as follows: On the backward stroke of the piston B water enters the cylinder A through the pipe *a*, and on the forward stroke the valve *b* is closed and the water forced from the front into the rear end of the cylinder, which it enters in the form of a number of fine jets, owing to the presence of the plate *e*. These jets of water come in contact with the steam, which is also caused to enter the cylinder from the pipe *g*, owing to the forward movement of the piston,

said steam being thereby condensed, and also caused to heat the water-jets, so that by the time the piston has reached the limit of its forward movement that portion of the cylinder behind the piston is filled with hot water, which, on the next rearward movement of the piston, is forced into the boiler.

The water forced from the front of the piston to the space in the rear of the same does not entirely fill the latter, owing to the space in the front of the cylinder occupied by the piston-rod during the rearward movement of the piston. The amount of water necessary to insure the complete filling of the cylinder on the forward stroke of the piston is supplied by the condensed steam.

Should the volume of steam which it is desired to condense be so large that the water produced by its condensation occupies a greater space than the piston-rod, the flow of water into the front end of the cylinder may be restricted by a suitable throttle-valve in the water-inlet pipe *a*, so that said cylinder only partially fills on the rearward stroke of the piston.

It is advisable also that the admission of exhaust-steam to the cylinder A should be under control; and for this purpose I provide the pipe *g* with a valve, *x*, preferably of such a character that a half-turn of its stem will suffice to completely open it when closed, or close it when open; and the operating-lever of this valve is so arranged as to be within convenient control of the engineer.

It is not absolutely essential, in carrying out my invention, that the valved branch *d* on the outside of the cylinder should be used, as one or more valved passages might be formed in the piston B, so as to answer the same purpose as the said valved branch *d*, in a manner which will be readily understood.

I claim as my invention—

1. The combination of the cylinder of a piston-pump, having valved communication between its opposite ends, with the valved water-inlet pipe *a*, valved steam-inlet pipe *g*, and valved discharge-pipe W, all substantially as specified.

2. The steam-pipe *g*, in combination with a casing, *m*, inclosing an obstructing-chamber, and provided with a pet-cock, *s*, all substantially as set forth.

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

ALEXANDRE DE BEAUMONT.

Witnesses:
RICHARD L. GARDINER,
HARRY SMITH.