No. 656,248. Patented Aug. 21, 1900.

J. F. HAUSER.

FEED WATER HEATER.

(Application filed Apr. 30, 1896.)

(No Model.)

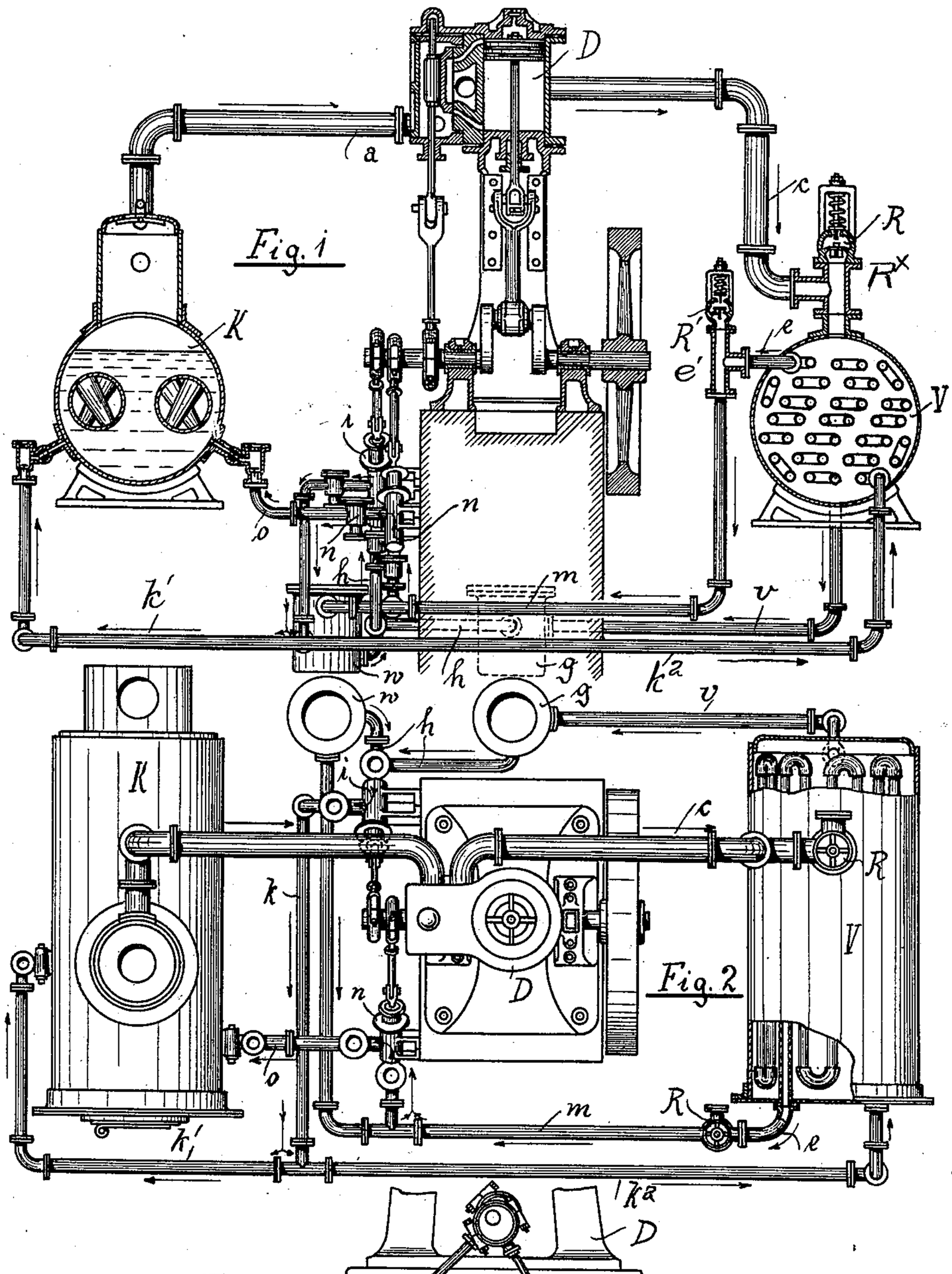

Fig. 1

Fig. 2

Fig. 3

WITNESSES
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JOHANN FRIEDRICH HÄUSER, OF NUREMBERG, GERMANY.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 656,248, dated August 21, 1900.

Application filed April 30, 1896. Serial No. 589,701. (No model.)

To all whom it may concern:

Be it known that I, JOHANN FRIEDRICH HÄUSER, a subject of the German Emperor, and a resident of Nuremberg, Bavaria, German Empire, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

The present invention relates to feed-water heaters of that class in which the waste or exhaust steam from the engine is used to accomplish the heating of the feed-water.

The object of the invention is to utilize to the highest degree the heat contained in the exhaust-steam, and I have accomplished this by an improved construction and arrangement of parts, as hereinafter described.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation of the improved apparatus. Fig. 2 is a plan view, and Fig. 3 is a detail view, partly in section.

Referring to the drawings, K represents the boiler from which a steam-pipe *a* leads to the steam-chest of the engine-cylinder D, and as the engine may be of any desired construction a more detailed description of it is not herein needed.

An exhaust-pipe *c* leads from the engine-cylinder in the usual manner, and this I connect with the dome or stand-pipe $R^{\times}$ of the feed-water heater V, which pipe is provided with a safety-valve R shown on the right of Fig. 1.

From the feed-water heater V the water of condensation passes by way of pipe *v* to an oil-filter *g*, from which it is drawn through the pipe *h* by a pump *i* and forced under pressure into a pipe *k*, from which it may pass by a branch *k'* direct to the boiler or through the feed-water heater, as hereinafter described. A branch pipe *h'* also connects the pump *i* with a vessel or tank *w*, to which fresh water is supplied by a pipe *w'*, and a cock w^2 is provided for the bottom of the filter *g*, so that, if desired, the water of condensation may be passed into the tank *w*, and thence to the pump *i* instead of through the filter. A branch k^2 from the pipe *k* passes into the feed-water heater, within which it is extended back and forth to provide as much surface as possible, and finally leads out again at *e*, where it is provided with a safety-valve R', and is connected by a pipe *m* with the pump *h*, which in its turn connects by pipe with the boiler. By this means the water of condensation taken from the heater V through pipe *v* is forced back by pump *i*, through pipe *k* k^2 into the heating-coil therein under pressure and extracts heat from the exhaust-steam which is condensing therein, said water passing then through pipe *m* to the pump *n*, by which it is forced through pipe *o* into the boiler.

Having thus described my invention, what I claim is—

1. In combination with a boiler and engine, a feed-water heater having circulating-pipes therein, a pipe for the exhaust-steam leading from the engine to said heater, a pump having pipe connections to the heater and to the circulating-pipes therein, said pump drawing water from the heater and forcing it mixed with fresh water through the circulating-pipes of the heater, and a second pump having pipe connections with said circulating-pipes and with the boiler for forcing the water into the boiler, substantially as described.

2. In combination with a boiler and engine, a feed-water heater having circulating-pipes therein, a pipe for the exhaust-steam leading from the engine to said heater having a relief-valve, a pump and connecting-pipes for drawing water from the heater and forcing it mixed with fresh water through the circulating-pipes of the heater, and a second pump having pipe connections with said circulating-pipes and with the boiler for forcing the water into the boiler, and a relief-valve in the pipe connection between said pump and circulating-pipes, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

JOHANN FRIEDRICH HAUSER.

Witnesses:

ANDREAS STICH,

OSCAR BOCK.