G. KRATZ.

FEED-WATER HEATERS FOR STEAM-BOILERS.

No. 195,614. Patented Sept. 25, 1877.

Fig 3

Fig 4

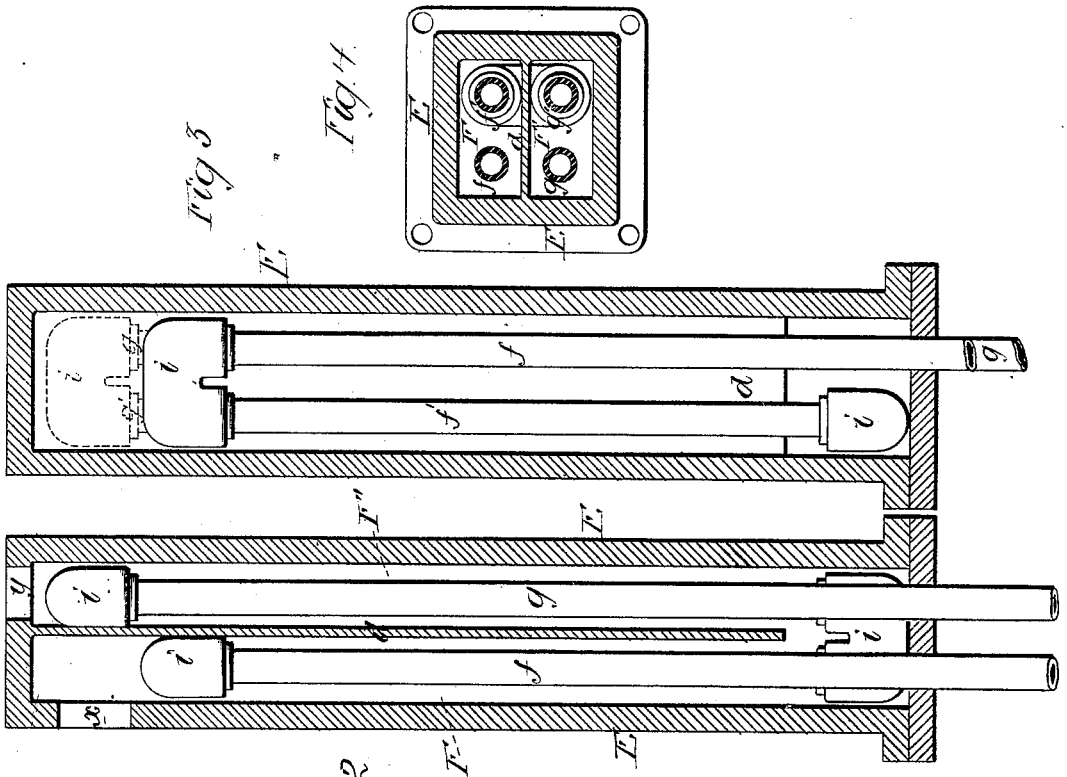
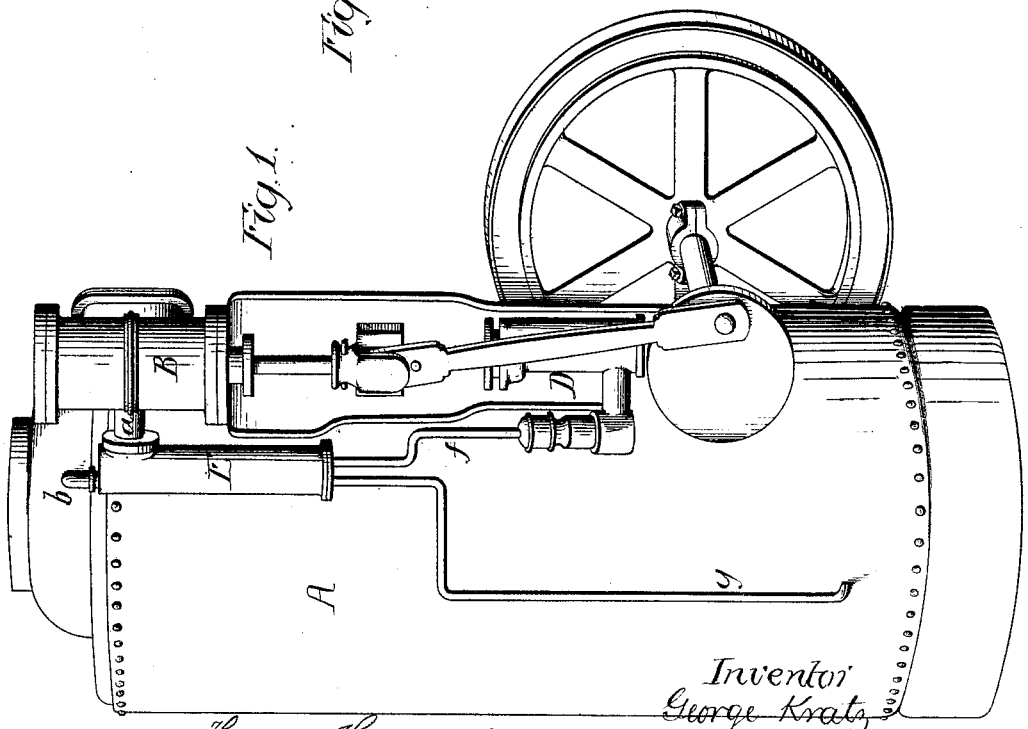


Fig 2

Fig 1.



Witnesses

Henry Howson Jr.
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UNITED STATES PATENT OFFICE.

GEORGE KRATZ, OF EVANSVILLE, INDIANA.

IMPROVEMENT IN FEED-WATER HEATERS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **195,614**, dated September 25, 1877; application filed August 20, 1877.

To all whom it may concern:

Be it known that I, GEORGE KRATZ, of Evansville, Vanderburg county, Indiana, have invented a new and useful Improvement in Feed-Water Heaters for Steam-Boilers, of which the following is a specification:

The object of my invention is to make an effective feed-water heater, occupying but a limited amount of space, and, therefore, especially applicable to portable engines; an object which I attain in the following manner, reference being had to the accompanying drawing, in which—

Figure 1 is a view, showing the application of my improved feed-water heater to a portable engine and boiler; Figs. 2 and 3, longitudinal and transverse sections of the heater; and Fig. 4, a sectional plan view.

A is the boiler of a portable steam-engine; B the cylinder, D the feed-pump, and E the casing of the feed-water heater, which is of the long and narrow form shown, and is preferably made of a square section, as shown in Fig. 3. This, however, is not essential.

In one side of the casing E, near the upper end of the same, is formed an opening, *x*, communicating with the exhaust-pipe *a* of the engine; and in the top of the said casing E is an opening, *y*, communicating with a pipe, *b*, leading to the smoke-stack of the boiler.

Within the casing E is a central partition, *d*, extending from the top to within a short distance of the bottom of the casing, so as to divide the interior of the latter into two chambers, F and F′, communicating with each other at the bottom.

The opening *x* communicates with the top of the chamber F, and the opening *y* with the top of the chamber F′, so that exhaust steam from the engine enters the chamber F at the top, passes down through the same, thence into the chamber F′, to the top of which it passes, finally escaping through the opening *y*.

In the chamber F are two vertical pipes, *f f′*, and in the chamber F′ two similar pipes, *g g′*. The pipes *f′* and *g′* are contained entirely within the casing E; but the pipes *f* and *g* extend through the lower end of the same, the pipe *f* communicating with the feed-pump D, and the pipe *g* with the water-space of the boiler, near the bottom of the same.

The pipes *f f′*, *g g′*, and *f′ g′* are connected together by means of ordinary U-couplings *i*, so that a continuous passage for the water through the steam-chambers F and F′ is afforded.

As the casing E is a simple casting, and the pipes and couplings the ordinary ones of commerce, it will be evident that the heater can be constructed at a slight cost; that it can be readily put together and taken apart; and that any one of its parts, when worn or injured, can be removed and replaced by a new one without necessitating the discarding of any of the other parts.

The compactness of the heater is another advantage, which renders it especially applicable to portable steam-engines, which it is desired to render as compact and convenient as possible.

I claim as my invention—

The within-described feed-water heater, consisting of a casing, E, having a steam inlet and outlet, and a partition, *d*, combined with water-pipes *f f′* and *g g′*, connected together by U-couplings *i*, substantially as set forth.

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

GEORGE KRATZ.

Witnesses:
W. H. BRUNING,
WM. KRATZ.