

(No Model.)

2 Sheets—Sheet 1.

J. PIMBLEY.  
FEED WATER HEATER.

No. 589,364.

Patented Aug. 31, 1897.

FIG. 1.

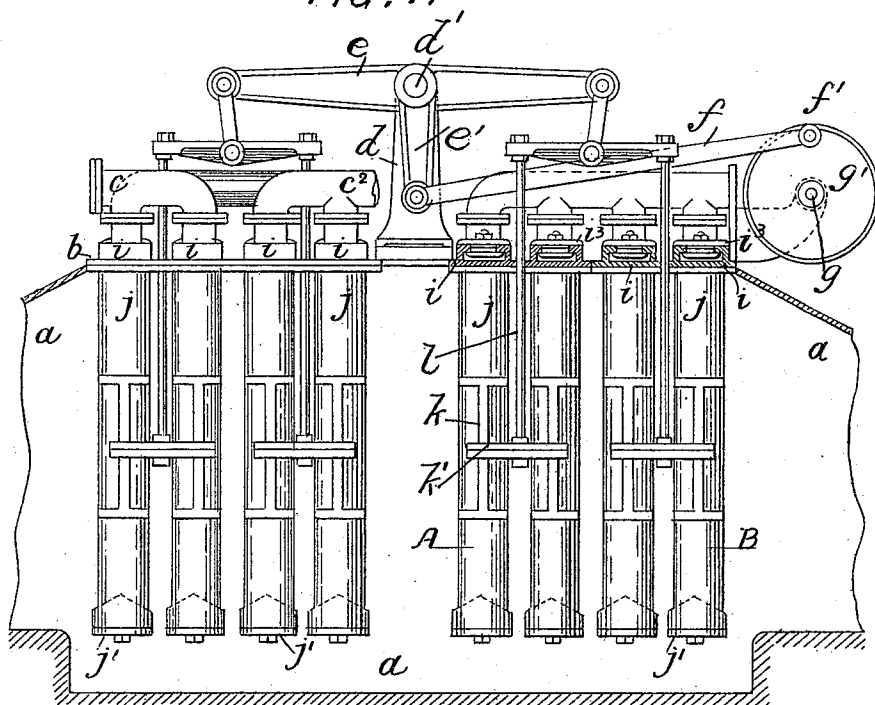
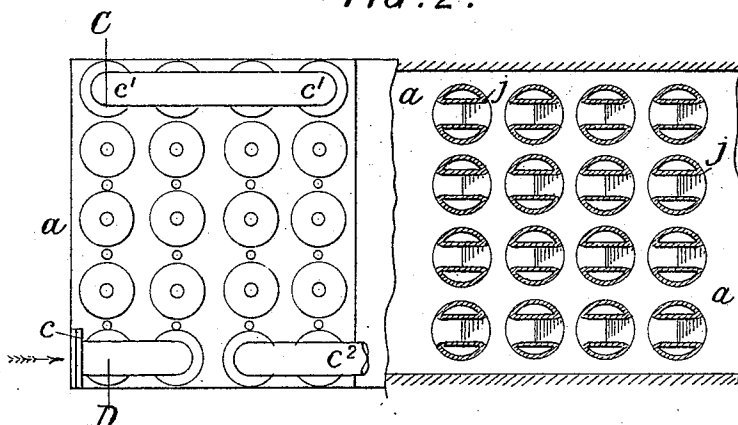


FIG. 2.



Witnesses  
H. van Olden  
E. A. Scott

Inventor  
Joseph Pimbley

by *Richard R.*  
Attorneys

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FIG. 3.

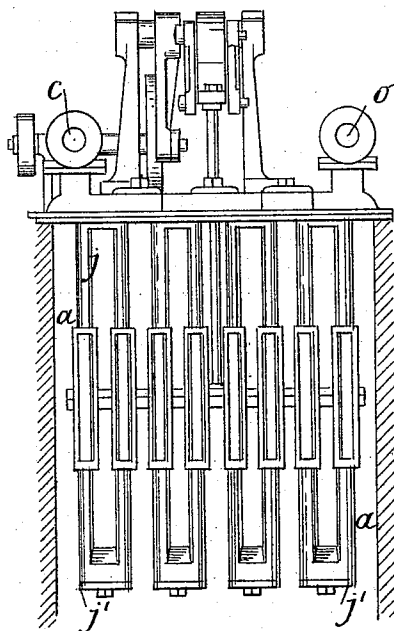
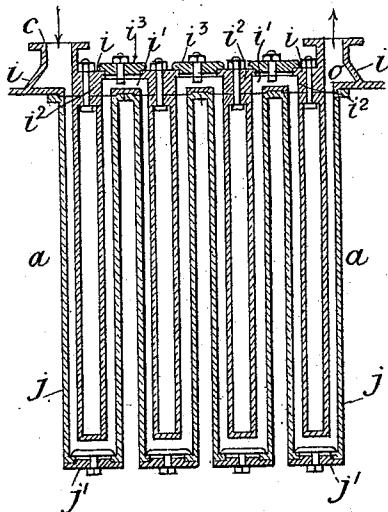


FIG. 4.



Witnesses  
H. van Oldenmeek  
E. A. Scott

Inventor  
Joseph Pimbley  
by *Richard R.*  
Attorneys

# UNITED STATES PATENT OFFICE.

JOSEPH PIMBLEY, OF BOLTON, ENGLAND, ASSIGNOR OF ONE-HALF TO  
WILLIAM ANDREW ROTHWELL, OF WALKDEN, ENGLAND.

## FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 589,364, dated August 31, 1897.

Application filed March 4, 1896. Serial No. 531,827. (No model.) Patented in England March 2, 1894, No. 4,404; in France January 26, 1895, No. 244,645; in Belgium January 26, 1895, No. 113,844, and in Germany January 29, 1895, No. 83,700.

*To all whom it may concern:*

Be it known that I, JOSEPH PIMBLEY, engineer, a subject of the Queen of Great Britain, and a resident of Bolton, in the county of Lancaster, England, have invented certain new and useful Improvements in Fuel-Economizers or Feed-Water Heaters for Steam-Boilers and the Like, (for which I have obtained Letters Patent in Great Britain, No. 4,404, dated March 2, 1894; in Belgium, No. 113,844, dated January 26, 1895; in France, No. 244,645, dated January 26, 1895, and in Germany, No. 83,700, dated January 29, 1895,) of which the following is a specification.

My invention relates to an improved form of pipe and top box for fuel-economizers or feed-water heaters, whereby increased circulation of water is obtained, and also to an improved means for actuating the scrapers for cleaning the pipes.

In order that my invention may be fully understood and readily carried into effect, I will describe the accompanying two sheets of drawings, reference being had to the letters marked thereon.

Figure 1 is a side elevation, the left-hand portion of the drawing showing the pipes at the front of the flue and the right-hand portion the pipes at the back of the flue. Fig. 2 is a plan view, partly in section, on the line A B, Fig. 1. Fig. 3 is an end elevation, and Fig. 4 a transverse section, taken on the line C D, Fig. 2, of a fuel-economizer or feed-water heater made according to my invention.

In the drawings, *a* represents that portion of the flue between the boiler-furnace and the chimney in which the economizer is placed; *b*, the top plate which supports water-pipes *c*; *d*, standards for a shaft *d'*, on which is mounted the center of a beam *e* and an arm *e'*, connected by a rod *f* to an eccentric-pin *f'*, fitted on a disk *g'*, keyed upon a shaft *g* and driven by a worm and worm-wheel from a rotating shaft *h*. To the top plate is cast or secured a number of special top boxes *i*, which are made with chambers *i'* and partitions *i<sup>2</sup>* and bonnets or caps *i<sup>3</sup>*, as shown in Fig. 4, while the economizer-pipes *j*, which are divided into two portions connected at the bottom, are bolted to and suspended from the

plate *b*. The interior shape of the pipes *j*, forming two branch pipes, is clearly shown in Figs. 2 and 4. The latter figure also shows that each pipe has a removable cover *j'* at the bottom.

In order to clean the whole surface of the pipes *j*, the scrapers *k* are made to lie in contact with the exterior and interior portions of the pipes, and the scrapers are connected to frames *k'*, which are suspended by rods *l* from the ends of the beam *e*, the rotation of the disk *g* giving a slow rocking motion to the beam *e* and thereby to the frames *k'* and scrapers *k*, thus dispensing with the necessity of a reversing motion. The top box *i* I prefer to make with bonnets *i<sup>3</sup>* over the chambers *i'*, each bonnet fitting over one division of two of the adjoining pipes *j*.

For the purpose of cleaning the interior water-space of the pipes *j* I remove the caps or bonnets *i<sup>3</sup>* from the top boxes and the caps *j'* at the bottom of the pipes *j*, when a brush can be passed through the tubes.

In operation the feed-water enters one range of pipes *j* through the pipe *c*, from which it flows (see Fig. 4) down one branch of a pipe *j* to the bottom, then up the other branch into one of the chambers *i'*, from which it passes into the top of a second pipe, down one of its branches, and up the other branch through a second chamber *i'* in the top box, and so on.

By dividing the pipes *j* into branches or compartments, as described, I obtain a greatly-increased heating-surface, and I obtain a greatly-increased circulation of water through the pipes *j* by coupling up, say, two transverse rows of pipes *j* by water-pipes *c* in the following manner, (see Fig. 2:) Where the feed-water enters the first pair of pipes *j*, through the pipe *c*, and is caused to circulate by the partitions *i<sup>2</sup>* in the top boxes through these two rows of pipes transversely across into a pipe *c'* on the other side of the flue or chamber *a*, the pipe *c'* conducts the water from the two first rows of pipes *j* into the next pair of pipes *j*, from which it travels back across these pipes into a pipe *c<sup>2</sup>*, and so backward and forward until it eventually is conducted away to the boiler through a pipe *o*.

In place of coupling up the series of pipes  
j in pairs three or more pipes might be coupled  
together.

5 Having now particularly described and as-  
certained the nature of my said invention and  
in what manner the same is to be performed, I  
declare that what I claim, and desire to se-  
cure by Letters Patent of the United States,  
is—

10 In combination with the flue, the top box  
having partitions and a series of downwardly-  
directed openings, the depending tubes each  
having two legs and provided with an open  
center for the circulation of the heat, the

lower ends of the said tubes having openings, 15  
and the box having openings over the junc-  
tures of the tubes, and covers for the lower  
tube-openings, and the upper box-openings  
whereby access into adjacent tube-legs may  
be had by removing the covers, substantially 20  
as described.

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

JOSEPH PIMBLEY.

Witnesses:

S. D. GILLET,  
II. B. BARLOW.