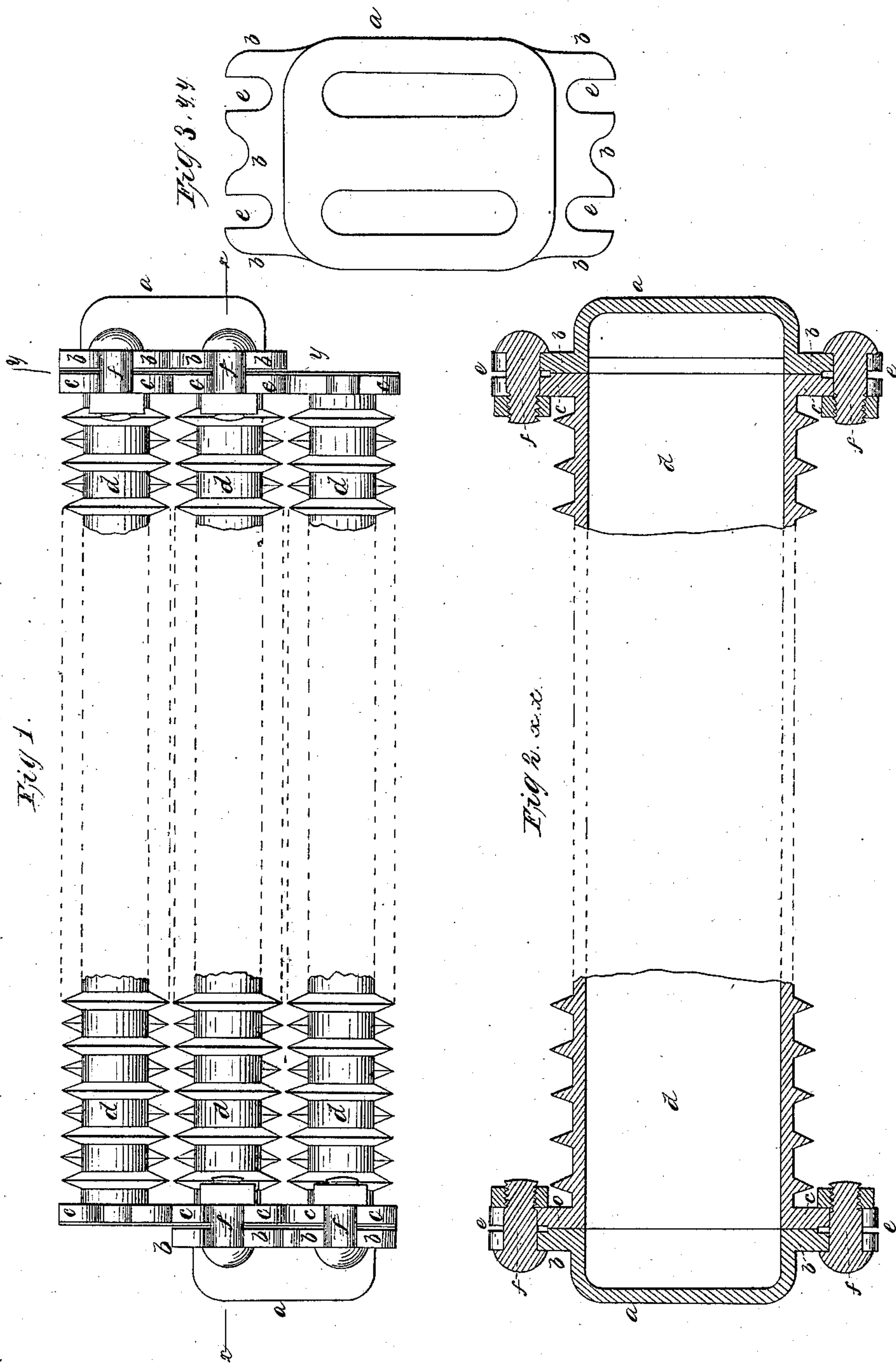


Whittier & Campbell,

Steam Heater.

N^o 86,480.

Patented Feb. 2, 1869.



Witnesses.
John W. Hudson
Frederic Dodge.

Inventor.
Charles Whittier

UNITED STATES PATENT OFFICE.

CHARLES WHITTIER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HIMSELF
AND BENJAMIN F. CAMPBELL, OF SAME PLACE.

IMPROVEMENT IN STEAM-HEATERS.

Specification forming part of Letters Patent No. **86,480**, dated February 2, 1869; antedated
November 10, 1868.

To all whom it may concern:

Be it known that I, CHARLES WHITTIER, of the city of Boston, in the State of Massachusetts, have invented certain new and useful Improvements in Steam-Radiators; and do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the figures and letters marked thereon.

Of these drawings, Figure 1 is a plan view of a number of sections of a radiator. Fig. 2 is a longitudinal vertical section taken through the line *x x* of Fig. 1, and Fig. 3 is a cross vertical section taken through the line *y y*, or, in other words, a view of the cap, connecting two sections, removed.

Similar letters of reference indicate corresponding parts in the several figures.

My invention relates to an improvement in radiators intended for indirect radiation, the sections being placed horizontally together or side by side, and one or more layers being properly connected and incased.

In my application for Letters Patent for improvements in radiators, filed contemporaneously with this, I find it difficult to cast perfectly the sections therein mentioned more than four feet long. It is therefore necessary, when sections are required of a greater length, to cast the pipe separately, and then attach caps upon the ends of these sections, in pairs or alternately.

The round pipes have heretofore been at-

tached to the caps by being screwed up to the latter. This was, however, found quite inconvenient and expensive.

For my class of radiator I cast a cap, *a*, as shown in Fig. 3, with four lugs, *b b b b*, and also have corresponding lugs *c c c c* on the ends of the pipes *d d*, &c., and these lugs contain slots *e e e e* at their outer ends, into which are inserted bolts *f f f f*, each lug on the cap being opposite to its corresponding one on the pipe. These bolts are provided with nuts, so that they will, upon being tightened, draw closely together the cap and pipes.

The cap is constructed internally so as to permit of the passage, from one section of pipe to the other, of the thin body of steam in about the same condition as it is while passing through such sections of pipe.

I do not mean to be understood as claiming the round pipe connected to caps with screws and nuts, as ordinarily practiced; but

What I do claim as new, and desire to secure by Letters Patent, is—

Sections of flattened pipes, the ends attached, in pairs, by caps *a*, such caps being connected to the pipes by the lugs *b b b b*, *c c c c*, and bolts *f f f f*, substantially in the manner described.

CHARLES WHITTIER.

Witnesses:

JOHN W. HUDSON,
FREDERIC DODGE.