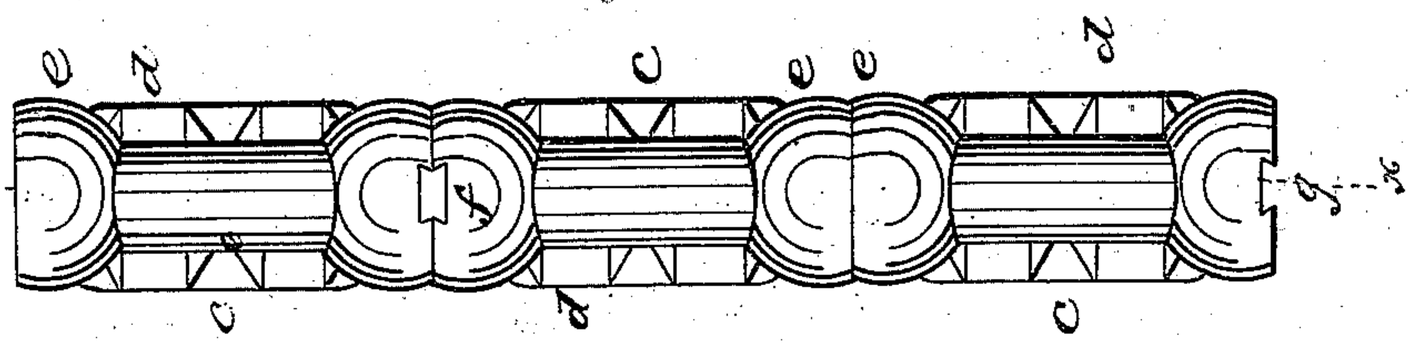
2 Sheets—Sheet 1.

C. WHITTIER.

Steam Heater.

No. 86,481. Patented Feb. 2, 1869.

Fig. 2



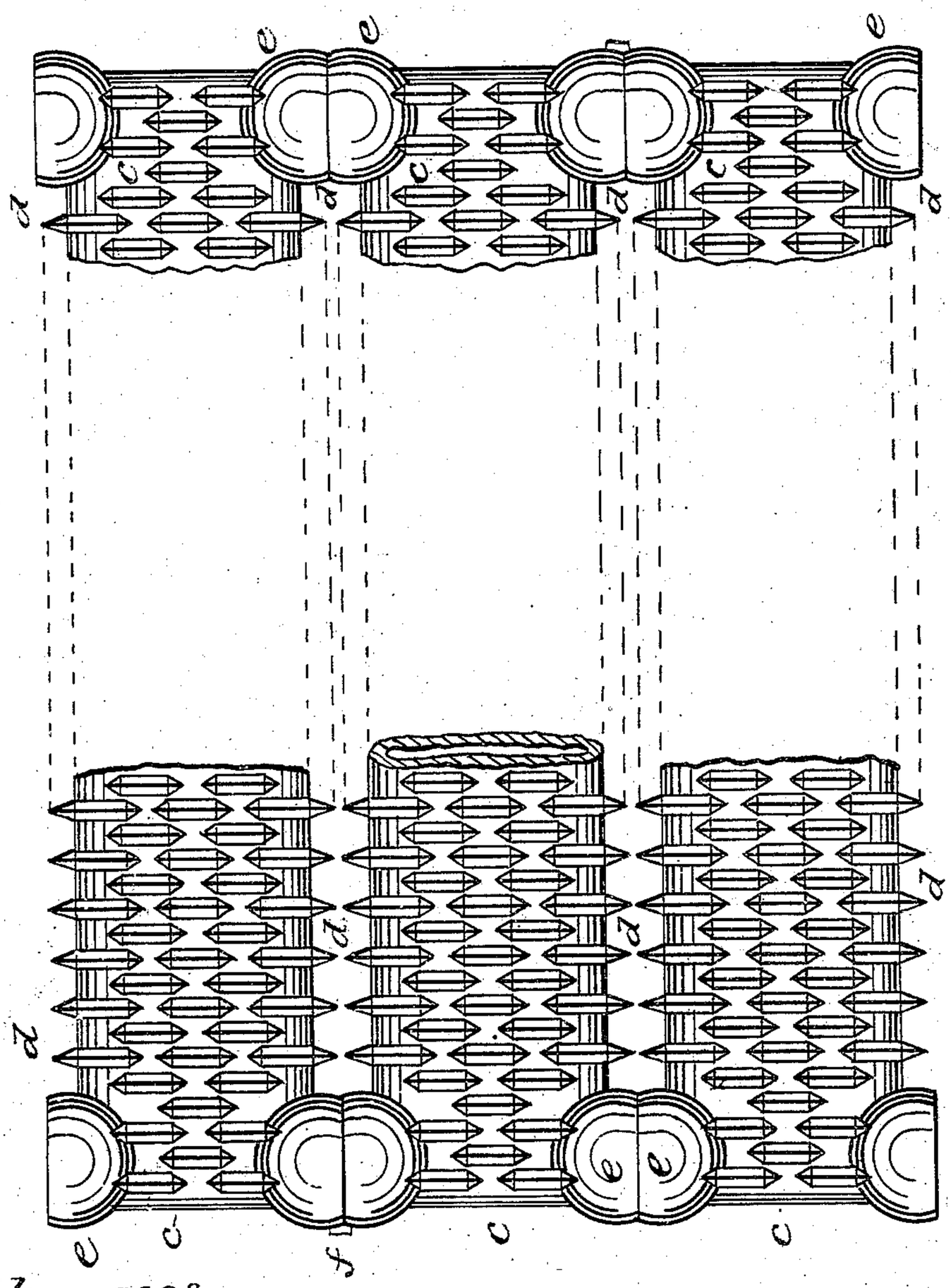


Fig. 1.

Witnesses

John W. Hudson

Frederic Dodge

Inventor

Charles Whittier

2 Sheets—Sheet 2.

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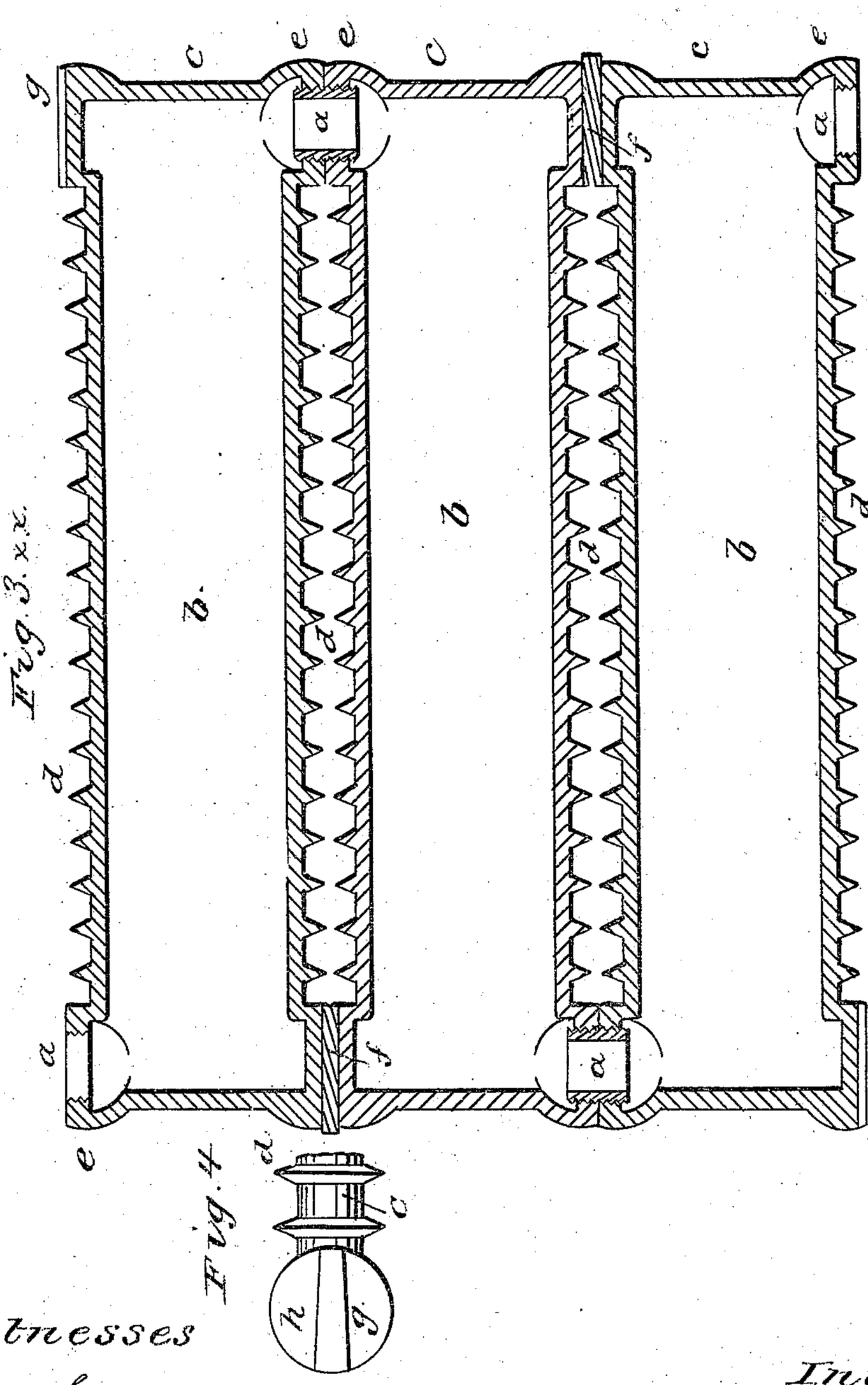

Fig. 3. x.x.

Fig. 4.

Witnesses

John W Hudson

Selvic Dodge

Inventor

Charles Whittier

United States Patent Office.

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

Letters Patent No. 86,481, *dated February* 2, 1869; *antedated November* 10, 1868.

IMPROVEMENT IN STEAM-HEATERS.

The Schedule referred to in these Letters Patent and making part of the same.

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 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 vertical side view of a series of radiators, constructed so as to operate according to my invention;

Figure 2 is a vertical end view thereof;

Figure 3 is a vertical longitudinal central section thereof, taken through the line *x x* of fig. 2; and

Figure 4 is a view of the slot or dovetailed opening in the end of one of the sections, along which the key passes in the connecting of two sections together.

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

My invention relates to an improved arrangement of heating and radiating-surfaces, by means of which there is more utility in the same, or a less amount of steam passed through the radiator; also, to an improved means for keying together the sections.

Radiators have heretofore been constructed in the trombone-form, in which the steam passed through the sections of round or square pipe in a zigzag direction, or in at one side, at the end, and out at the other and opposite side, near the other end. In this class of radiators, there was a great waste of steam, when compared with the radiating-surface employed. They have also been constructed by arranging the sections in layers of flatted pipe, and a series of openings or connections made through the centre, or all at one end of the series of sections, for the entry of the steam, thus giving an economical introduction of the steam, but a defective arrangement of pipe and passages combined therewith, for giving effectiveness to the steam thus introduced.

It is evident that, in this last arrangement of sections, the attempt to effect an economical use of such economical introduction of steam is frustrated, by reason of the pockets thus formed becoming receptacles for fixed air, this occurring occasionally on one end of the series, and again on the other; also with some pockets, then again with others; resulting, however, so far as the whole series is concerned, to a great extent, in the loss of such economical introduction of steam, or in a small amount of steam being distributed over a greater extent of heating-surface.

My improvement, in this particular, combines the most important features of both classes before referred to, namely, an economical passage of the steam into as well as a proper passage and direction or course through each section of the series composing the radiator. This also, in combination with increased heating-surface placed upon such an arrangement of pipe, gives still greater economy in the amount of steam used in the radiator for heating-purposes.

The manner of connecting the sections together has been in a variety of ways, and there have been serious objections made thereto, because they did not always permit of a steam-tight joint between the sections of radiators after they were used for a time, or were very inconvenient in manipulating, or in detaching or attaching any of the series of radiators.

By my improvement, in this particular, the steam-joints of the sections are never affected, and any one of the sections can be detached without disturbing the whole series or the adjacent ones, and it is easily and rapidly detached or again connected.

In the drawings—

a represents the passages for the steam into the respective sections.

b, the passages for the steam through the sections.

c, the flatted sections.

d, the projections or extra heating-surface, cast upon the exterior of said section.

e, the nipple upon each alternate end of the sections through the series.

f is a key, which is of a double-dovetailed form upon two of its sides, and tapering from its back to its front end, so as to pass into a dovetail, *g*, made in the face *h* of each of the ends of the adjoining sections that come together opposite to where the steam enters from one to the other of each section. This key, when it has passed back into the two sections thus brought together, securely locks them. There is, at the end of the sections, sufficient of the key left projecting to permit of a pair of pincers taking hold, for the purpose of withdrawing the same, and thus detaching the adjoining sections.

I do not mean to be understood as claiming a round pipe, of the trombone-form, as that is common and well known; but

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

1. Sections of radiators, of a flattened form, through which the steam passes in a zigzag direction, when such sections are placed together in a series, substantially as described.

2. The arrangement, upon sections of radiators of a flattened form, through which the steam passes in a zigzag course, and directly along each section of the series, of increased heating-surfaces, substantially as described.

3. The key *f*, for connecting together ends of sections, substantially as described.

CHARLES WHITTIER.

Witnesses:

JOHN W. HUDSON,

FREDERIC DODGE.