

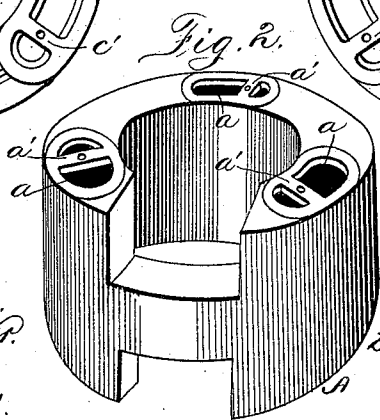
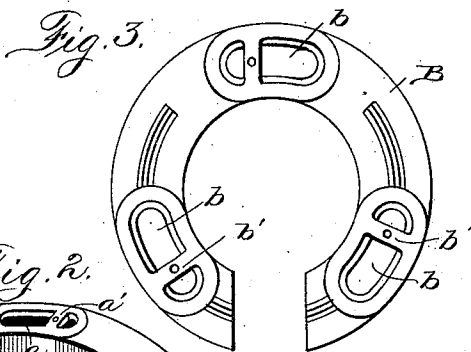
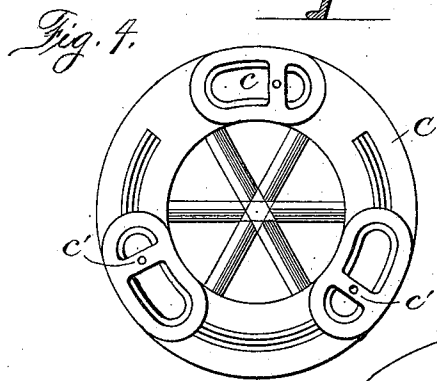
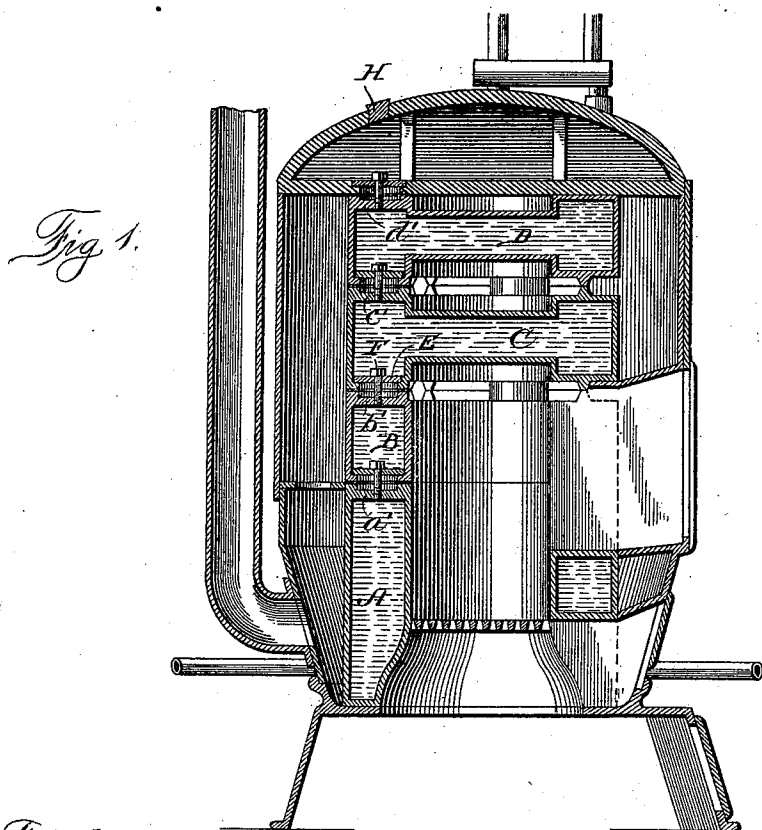
(No Model.)

3 Sheets—Sheet 1.

C. C. MULFORD.
HEATING APPARATUS.

No. 554,713.

Patented Feb. 18, 1896.



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(No Model.)

3 Sheets—Sheet 2.

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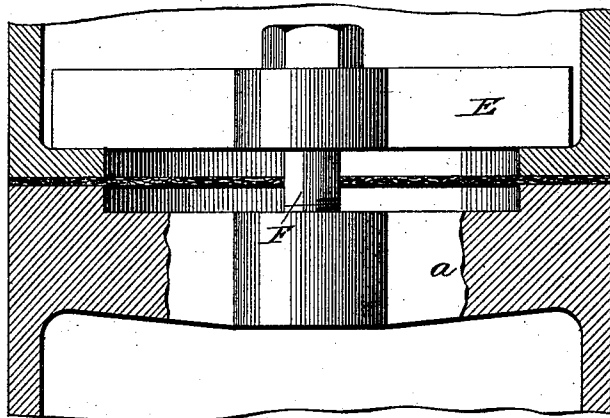


Fig. 5.

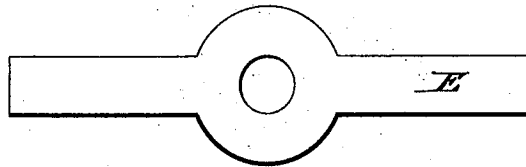


Fig. 6.

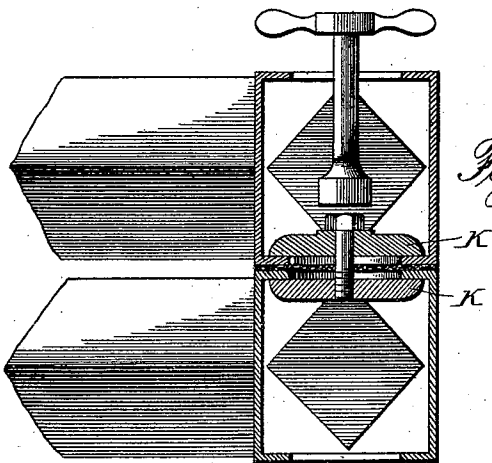


Fig. 8.

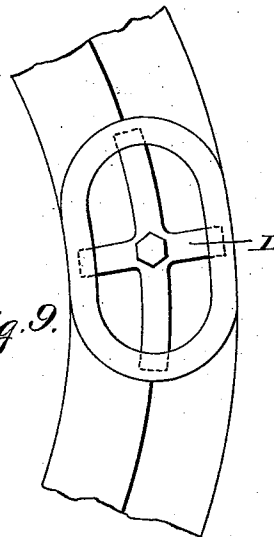


Fig. 9.

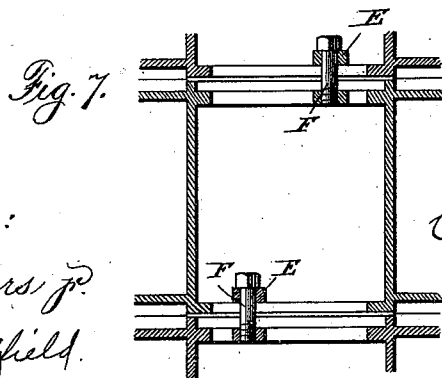


Fig. 7.

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3 Sheets—Sheet 3.

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Fig. 13.



Fig. 12.

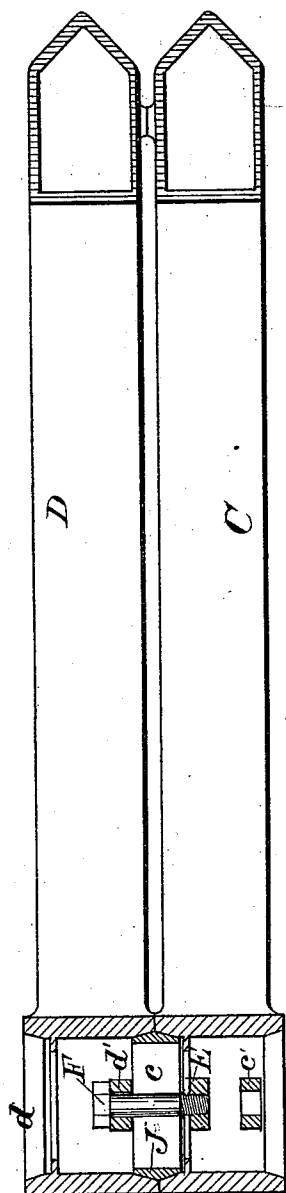


Fig. 10.

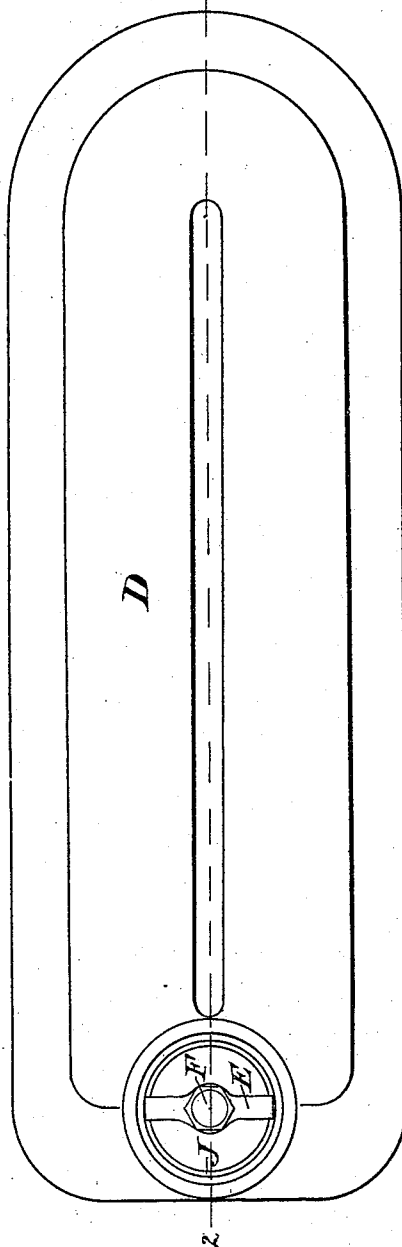


Fig. 11.

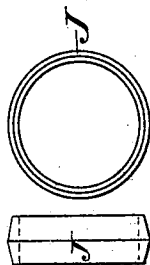


Fig. 14 Fig. 15.

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UNITED STATES PATENT OFFICE.

CLARENCE C. MULFORD, OF ST. LOUIS, MISSOURI.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 554,713, dated February 18, 1896.

Application filed March 22, 1895. Serial No. 542,834. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE C. MULFORD, a citizen of the United States of America, residing in St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Heating Apparatus, of which the following is a clear, full, and exact description, reference being made to the accompanying drawings, forming a part of this specification.

My invention relates to steam and hot-water generators, heaters, and radiators and similar apparatus requiring the union of sectional parts; and its object is to provide a method of constructing such apparatus so that all leakage may be prevented, and the simplest and most durable construction obtained.

In the construction of apparatus for containing water or steam, composed of sections, it is common to secure the several parts together by means of a tie rod or bolt which extends through all the sections and at one or both ends extends or projects from the section forming the outer part of the construction. Experience shows that this is objectionable, as, by reason of contraction and expansion of the parts, it is very difficult to prevent leakage at the point where the rod passes out of the water or steam sections. It is also very difficult to lay up an entire heater in this way without displacing or injuring the packing between the sections, thus causing a leak.

My invention is intended to avoid the objectionable features referred to, and also to facilitate the assembling of the several sections to form an integral whole. For this purpose my improvement consists in so constructing and arranging the several sections that short bolts may be employed to firmly secure adjacent parts of the two sections, while the bolts are entirely within the water or steam way at all points.

I will now describe my invention in connection with the accompanying drawings, wherein like reference-letters indicate like or corresponding parts, in which—

Figure 1 is a vertical section of my improvement as applied to a heater. Fig. 2 is a lower section or water-jacket fire-pot of said heater. Fig. 3 is a second section of said heater designed to rest upon the fire-pot. Fig. 4 is a plan of the preferred form of additional sec-

tions of said heater. Fig. 5 is an enlarged sectional view showing the preferred way of securing the sections together. Figs. 6, 12, 55 and 13 show the removable bars used in my improved constructions. Fig. 7 is a sectional view showing one way in which the tie-bolts may be arranged so as not to interfere with the use of a wrench. Figs. 8 and 9 are views 60 of modifications. Fig. 10 is a longitudinal section at the line 2 2 of Fig. 11 of my improvement as applied to a radiator. Fig. 11 is a plan of said radiator, and Figs. 14 and 15 are views of the preferred way of forming the 65 packing in said radiator to prevent leakage.

In the drawings, A represents the water-jacket fire-pot of a heater; B, the adjoining section, and C and D successive sections of heaters, radiators, &c. In each of the sections are water-openings *a b c d*, so arranged 70 as to register with similar openings on other sections. Extending across the said openings, either at the bottom of the sections, or the top, or both, as preferred, is constructed a 75 bar, bridge or anchor *a' b' c' d'*. These bars, bridges or anchors are preferably not constructed so as to all come in the same straight line, but those upon separate sections which will become adjacent to each other in putting 80 together the apparatus register with each other, as shown. (See Fig. 7.) This permits a wrench to be used without hinderance in tightening the bolts.

In the preferred form only one anchor or 85 bridge is cast integral with the section, and on only one side of the section, as in Figs. 1, 5, 7 and 10, and a separate bar E is used to complete the connection. This is found in practice to be most convenient in construct- 90 ing the apparatus.

The mode of operation is as follows: A section (in the case of a heater, the fire-pot) is placed in position, and a proper gasket fitted about the water-opening. Another section 95 is then placed upon the first, and the bar E is laid against projections forming part of the section. The bolt F is then inserted, and by any preferred way, as by screw-thread, screw-nuts, keys or hooks, the adjacent sections are 100 drawn closely together and firmly held. Water may then be introduced to nearly the top of the second section to test the joint. Succeeding sections, as C and D, may then be

placed in position and in like manner secured in place, packing being placed between the meeting portions.

The last section in a heater may be a dome 5 G, which I prefer to secure in a similar manner, closing the outer opening therein by a plug H.

The pipe connections are the same as those usually employed and need no explanation.

10 In the modified form shown in Fig. 8 both the fastening-bars K K are separable from the sections, while in Fig. 9 a spider L is used in place of a single bar for the same purpose. Fig. 7 shows plainly how the anchors or bridges 15 are offset one from the other to permit the insertion and use of the wrench.

The preferred method of applying my improvements to radiators, &c., is shown in Figs. 10 to 15, inclusive. As an additional security 20 against leakage, I prefer to use the packing-ring J in such radiators. In other respects the method of connecting the adjacent sections is similar to that already described.

Having thus described my invention, what 25 I claim as new, and desire to secure by Letters Patent, is—

1. In a heating apparatus, a plurality of sections having openings therein, and bridges 30 extending across said openings; a series of removable bridges adapted to extend across

said openings, and means for preventing leakage between said sections; in combination with a series of short bolts adapted to extend from the bridge in one section to the adjacent bridge in the next succeeding section and to 35 be secured thereto; and means for placing a strain on said bolts; substantially as described.

2. A heating apparatus, consisting of a water-jacket adapted for use as a fire-pot; a series of openings formed in the upper surface 40 thereof to permit the passage of water, and having bridges extending across the same; one or more water-rings constructed substantially as described, having similar openings 45 formed therein; similar bridges formed integral with the section extending across some of the openings; removable bridges adapted for use in the remaining openings; means for preventing leakage between the sections; and 50 a suitable dome or top therefor; in combination with a series of short bolts adapted to extend from the bridge in one section to the adjacent bridge in the next succeeding section; and means for placing a strain on said 55 bolts; substantially as described.

CLARENCE C. MULFORD.

In presence of—

W. H. H. MULFORD,
W. C. FLICK.