

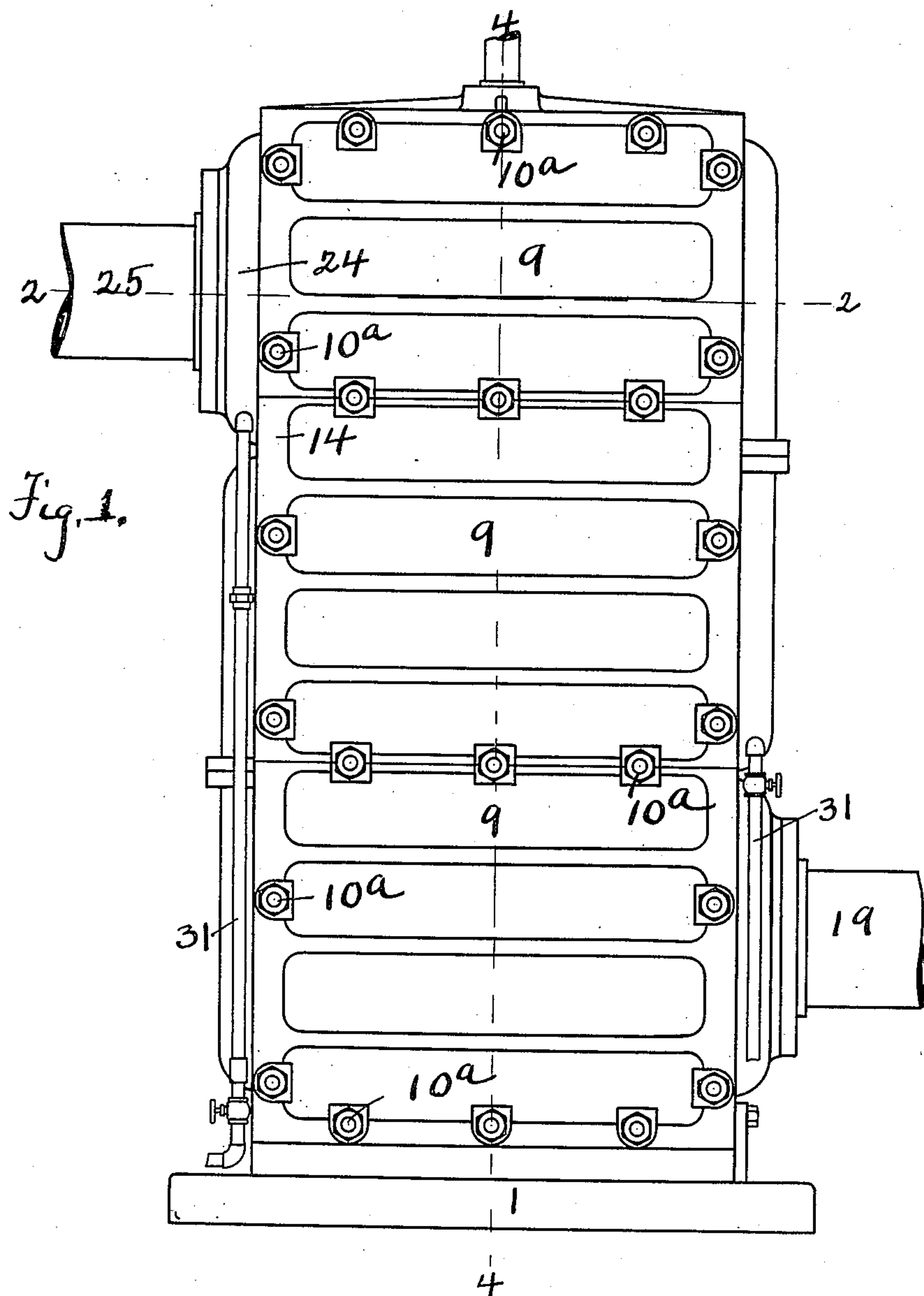
No. 859,012.

PATENTED JULY 2, 1907.

G. E. RIBLET.  
HEATER.

APPLICATION FILED NOV. 17, 1906.

4 SHEETS—SHEET 1.



Witnesses  
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*Birdena H. Phillips*

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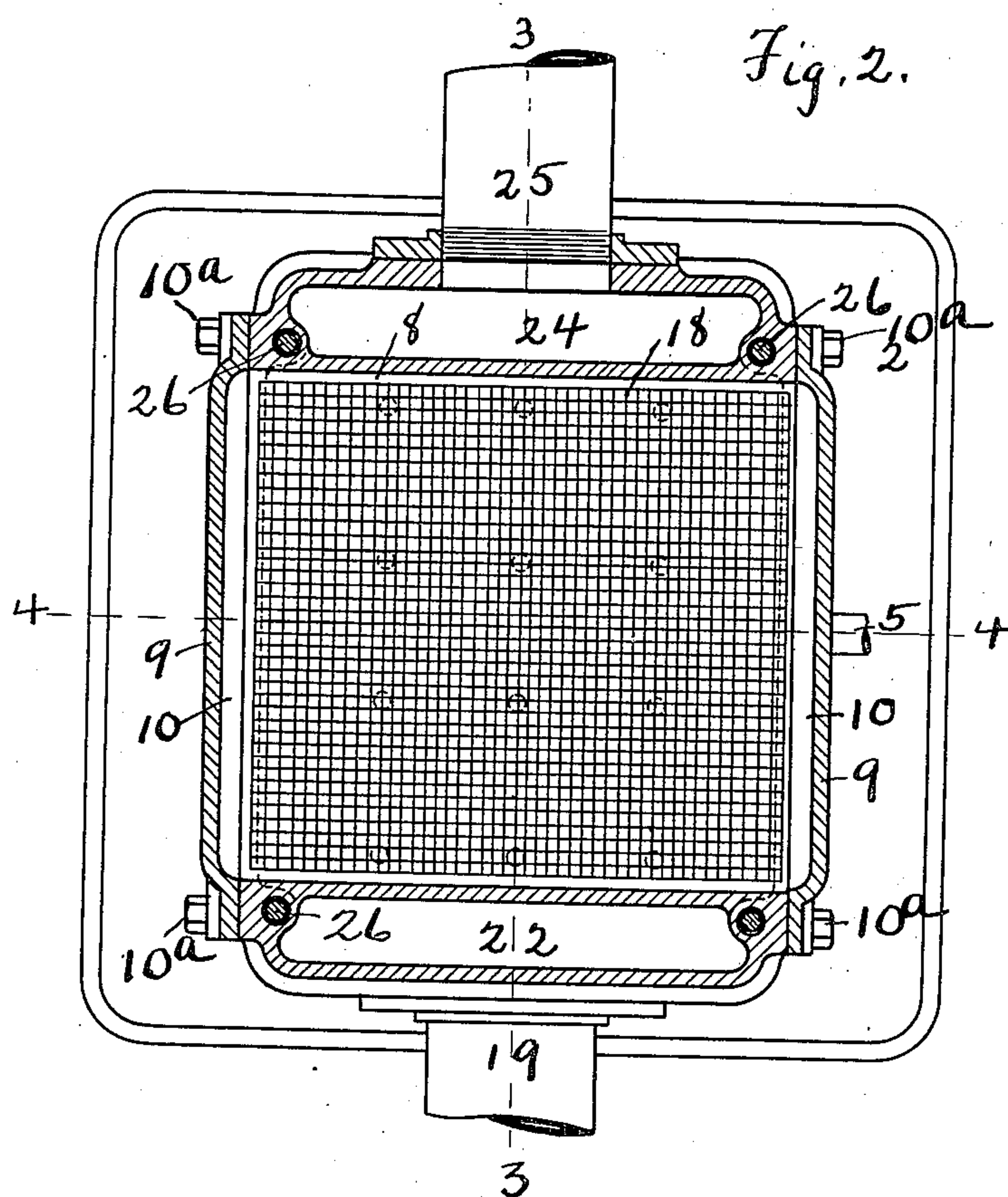
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

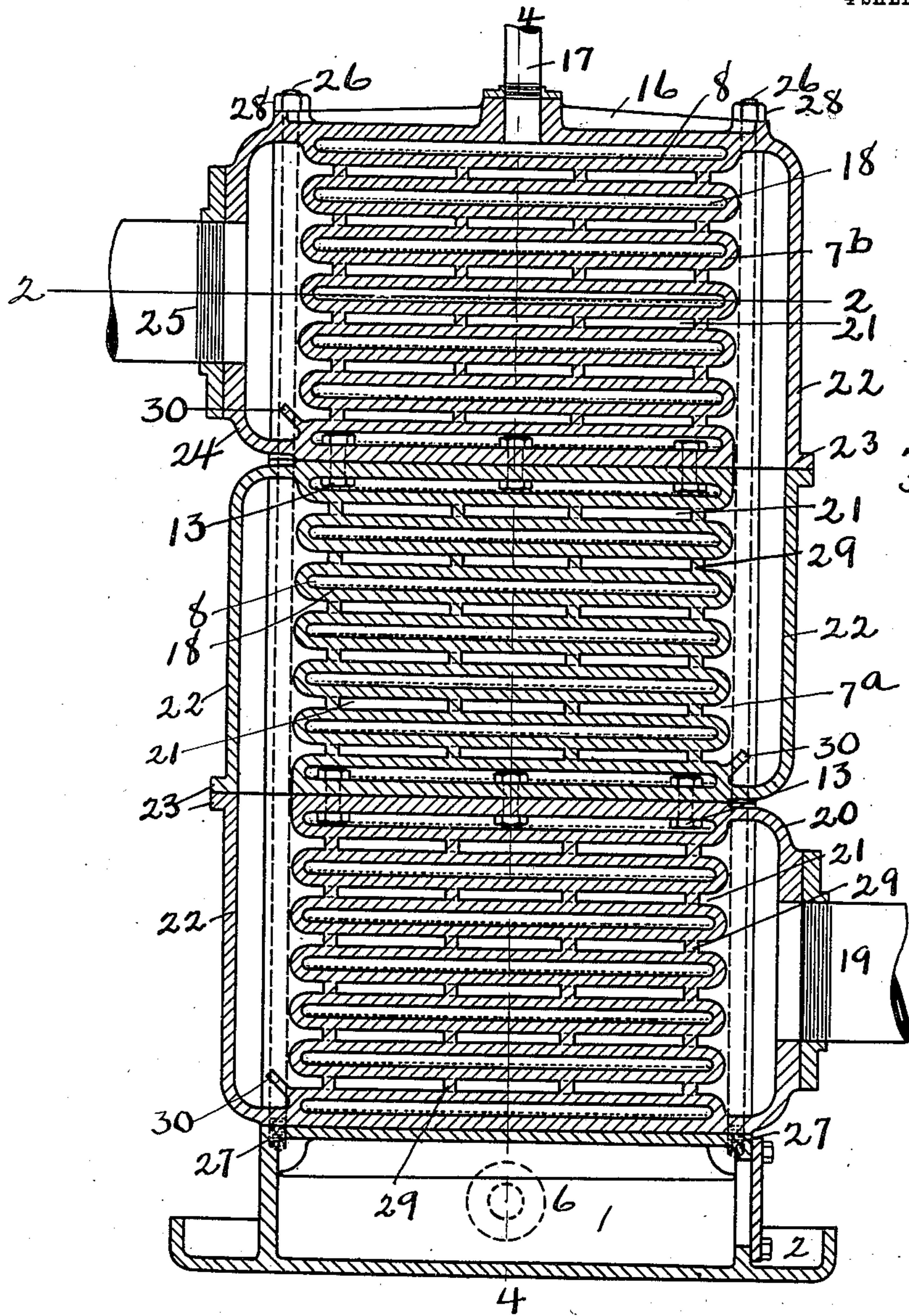


Fig. 3.

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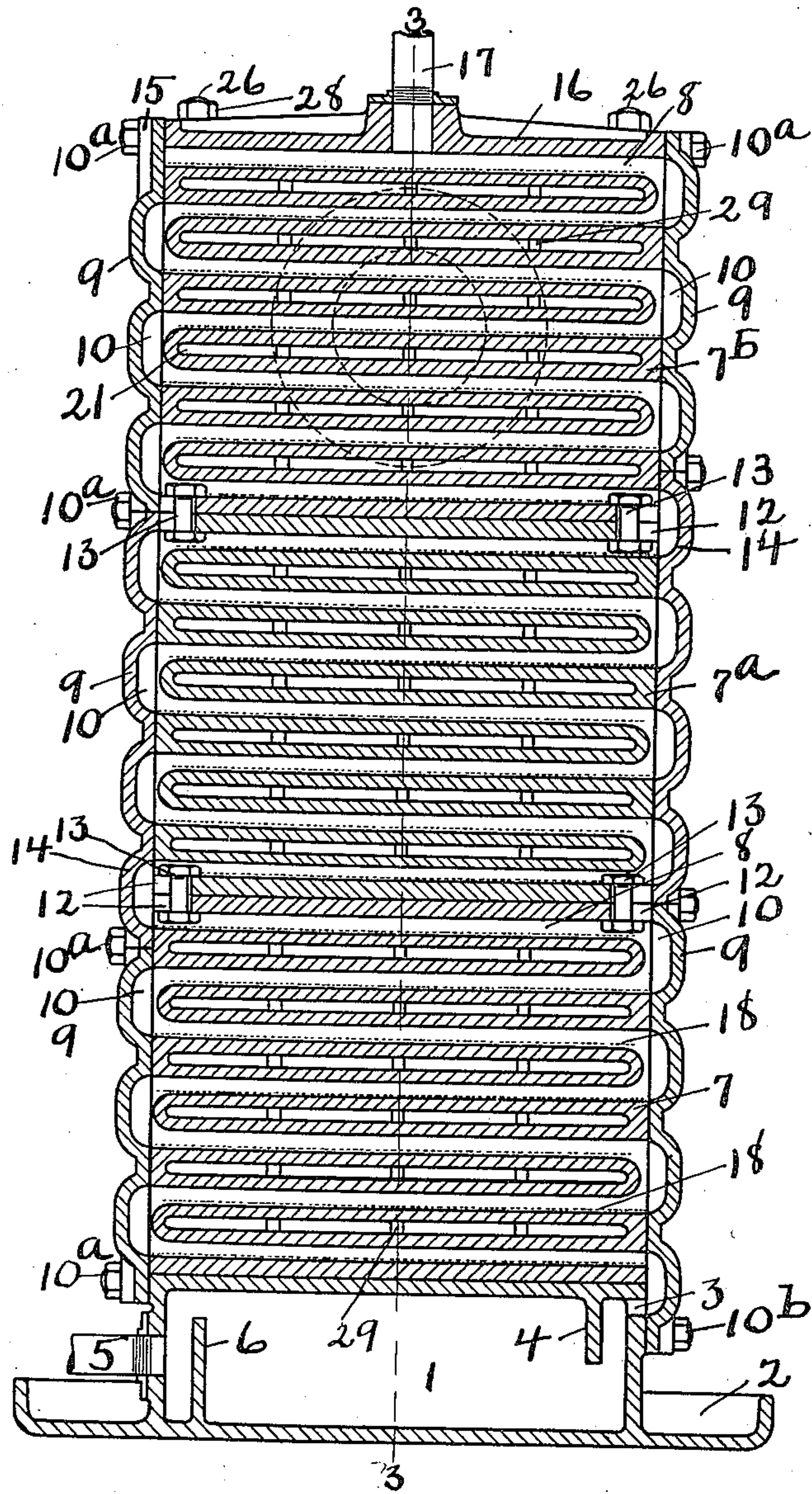
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4 SHEETS—SHEET 4.

Fig. 4.



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# UNITED STATES PATENT OFFICE.

GEORGE E. RIBLET, OF ERIE, PENNSYLVANIA.

## HEATER.

No. 859,012.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed November 17, 1906. Serial No. 343,817.

To all whom it may concern:

Be it known that I, GEORGE E. RIBLET, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in Heaters, of which the following is a specification.

This invention relates to heaters and consists in certain improvements in the construction thereof as will be hereinafter fully described and pointed out in the claims.

More particularly the invention relates to that type of heaters commonly used for supplying steam boilers and when so used are known as feed water heaters.

In carrying out my invention, I form the heater in sections. These sections are preferably formed of cast iron and the body of the section is made up of a series of passages, the steam passages being transverse to the water passages and the walls of the steam passages being integral with and forming also the walls of the water passages. The passages are properly connected at the sides so that there is a continuous passage for liquid, and also an inlet and outlet for all the steam passages from the main steam inlet and leading to the discharge outlet.

The invention is illustrated in the accompanying drawings as follows: Figure 1 is a side elevation of the heater. Fig. 2, a section on the line 2—2 in Figs. 1 and 3. Fig. 3, a section on the line 3—3 in Figs. 2 and 4. Fig. 4, a section on the lines 4—4 in Figs. 2 and 3.

1 marks the base. This is provided with the usual lip 2 for catching any leakage there may be from the heater. The liquid enters after passing through the heater at 3. A deflector 4 is arranged in front of the entrance 3 so as to prevent the agitation of the liquid in the base, the base forming a settling chamber for the liquid. The liquid passes out through the outlet 5. The deflector 6 is arranged in front of this outlet for preventing the agitation of the liquid in the body of the base. A heater section 7 is arranged immediately above the base; a section 7<sup>a</sup>, immediately above the section 7 and a section 7<sup>b</sup> above this. Sections may be added indefinitely to increase the capacity of the heater, or some sections may be omitted if less capacity is desired. The sections are preferably formed of cast iron and there are a series of liquid passages 8 extending entirely through the body of the sections from side to side. Plates 9 are arranged on the sides of the section and have the cavities 10 which connect the end of one passage with the next succeeding passage so that there is preferably one continuous passage extending back and forth through the heater as clearly shown in Fig. 4. This passage is shallow, but preferably the full width of the heater. It may be desirable to couple up different passages instead of making a single passage. This may be accomplished by varying the shape of the plates 9; that is, the cavity 10 which connects the pas-

sages 8 may be longer so as to include a greater number of passages if desired.

The plates are secured to the sections by means of studs 10<sup>a</sup>. One of the plates has a stud 10<sup>b</sup> which is secured to the base. The cavity 9 in this instance includes the inlet 3 so as to connect the base with the sections. The top plate of the section 7 and the top and bottom plates of the section 7<sup>a</sup> and the bottom plate of the section 7<sup>b</sup> are provided with slots 12 in which are arranged the bolts 13 for securing the bodies of the sections together. When a larger capacity of heater is desired, sections similar to 7<sup>a</sup> are inserted indefinitely. The plates 9 have an overlapping pocket 14 so as to connect the passages of the sections with the initial passage 8 of the succeeding section. This is clearly shown in Fig. 4. The upper plate 9 has an extension 15 as shown at the left of Fig. 4, which forms a closure for the upper passage 8. The top plate 16 inclosing the top passage 8 has an opening into which the pipe 17 leads. The liquid for the heater is delivered at this point.

In the use of these heaters settlings accumulate in the bottom of the passages. In order that they may be readily cleaned, I arrange a perforated plate 18, preferably in the form of gauze in each passage 8. It will readily be observed that by removing the plates 9, these passages are all exposed. This can be done without disturbing the other parts of the heater. The plates 18 can then be removed, carrying with them the body of the foreign matter that has settled in the bottom of the passage.

Steam is delivered to the heater through the pipe 19. It enters a chamber 20 which includes the whole side of the section. Passages 21 are arranged alternately with the passages 8 and extend transversely to the passages from side to side of the heater. Stud 26 extend through the sections and are secured to the base at 27 as clearly shown in Figs. 2 and 3. Nuts 28 are secured to the tops of these studs, delivering pressure to securely unite and close the joints between all the sections.

In order to strengthen the castings forming the body of the sections, as well as to increase the radiating surface, I prefer to arrange in the passages 21 numerous posts 29 preferably formed integrally with the castings.

What I claim as new is:

1. The combination of a heater section having liquid passages and steam passages alternately, and transversely arranged in an integral piece.
2. The combination of a heater section having liquid passages and steam passages alternately, and transversely arranged in an integral piece; and devices for connecting the liquid passages at the sides of the section to form a continuous passage backward and forward through the section.

3. A heater section comprising a body having alternating liquid and steam passages arranged transversely to each other; removable plates connecting the liquid pas-



sages at the sides; and devices connecting the steam passages.

4. A heater section comprising a body having alternating liquid and steam passages arranged transversely to each other; removable plates connecting the liquid passages at the sides to form a single continuous passage through the section; and devices connecting the steam passages.

5. A heater section comprising a body having alternating liquid and steam passages arranged transversely to each other; removable plates connecting the liquid passages at the sides; and devices formed integrally with the body of the section for connecting the steam passages.

6. A heater section comprising a body having alternating liquid and steam passages arranged transversely to each other; devices connecting the liquid passages; and means integral with the body for connecting the steam passages.

7. A heater section comprising the body 7, having the alternating passages 8 and 21; the plates 9 arranged at the sides of the section for connecting the passages 8 and forming a continuous passage backward and forward through the section; the plates 20 and 22 connecting all the steam passages together; and the inlet passage 19.

8. In a heater the combination of a series of sections having alternating steam and liquid passages transversely arranged; devices connecting the liquid passages in each section and the liquid passage of each section with another; and means for connecting the steam passages.

9. In a heater, the combination of a series of sections having alternating steam and liquid passages transversely arranged; devices connecting the liquid passages in each section and the liquid passages of each section with another to form a single continuous passage through the heater; and means for connecting the steam passages.

10. In a heater the combination of a series of sections having alternating steam and liquid passages transversely arranged; removable plates at the sides of the heater connecting the liquid passages in each section and the liquid passages of each section with another; and means for connecting the steam passages of one section with another.

11. In a heater the combination of a series of sections having alternating steam and liquid passages transversely arranged; devices connecting the liquid passages in each section and the liquid passages of one section with another so as to form a continuous passage through the heater; steam passages arranged to reverse through succeeding sections, the water inlet and steam inlet being arranged to give a general reverse direction to the liquid and steam.

12. In a heater the combination of a series of sections having alternating steam and liquid passages transversely arranged; devices connecting the liquid passages in each section and the liquid passages of one section with another to form a single continuous passage extending backward and forward through the heater; connections for the steam passages assembling all the steam passages of one section together; and connections for the steam passages of one section with that of another, the steam passing through one section in one direction and through the succeeding section in the reverse direction.

13. In a heater the combination of a series of sections having alternating steam and liquid passages transversely arranged; devices connecting the liquid passages in each section and the liquid passages of one section with another to form a single continuous passage extending backward and forward through the heater; connections for the steam passages assembling all the steam passages of one section together; and connections for the steam passages of one section with that of another, the steam passing through one section in one direction and through the succeeding section in the reverse direction, the inlets of

steam and liquid being so arranged as to give a general direction to the steam reverse to that of the general movement of the liquid.

14. In a heater the combination of the sections 7 and 7<sup>a</sup> having the alternating liquid and steam passages transversely arranged; the removal plates 9, one of said plates having an over lapping portion to connect the passages of one section with another; and connections for the steam passages.

15. In a heater the combination of a series of sections having alternating steam and liquid passages arranged transversely to each other; and bolts extending from the extremities through the heater for clamping all the sections together.

16. In a heater the combination of a series of sections having alternating liquid and steam passages; removable plates for connecting the liquid passages at the sides of the sections; plates arranged integrally with the sections for connecting the steam passages; and bolts extending through the sides of the sections connecting the steam passages from the extremities of the heater through all the sections for clamping all the sections together.

17. In a heater the combination of a body containing a liquid passage; devices for applying steam to the walls of the passage; and a perforated removable bottom in the passage.

18. The combination in a heater of a body containing a liquid passage with a substantially flat bottom; devices for applying steam to the walls of the passage; and a perforated removable bottom for the passage.

19. In a heater the combination of a body containing a liquid passage; devices for applying steam to the walls of the passage; and a removable bottom in the form of a wire gauze in the passage.

20. In a heater the combination of a body containing a liquid passage with a substantially flat bottom; devices for applying steam to the walls of the passage; and a removable bottom in the form of a wire gauze in the passage.

21. In a heater the combination of a heater section having a series of liquid passages therethrough; steam passages arranged in connection therewith removable plates 9 connecting the liquid passages and the removable plates 18 arranged in the passage for the purpose described.

22. In a heater the combination of a series of sections having a series of liquid and steam passages formed integrally therein, and having formed in the adjacent plates of the section the slots 12, and bolts 13 arranged in the slots for securing the bodies of the sections together.

23. A heater comprising alternating liquid and steam passages arranged transversely to each other, the walls of the steam passages being integral with the walls of the liquid passages.

24. A heater comprising alternating liquid and steam passages arranged transversely to each other, the walls of the steam passages being integral with the walls of the liquid passages, and said passages extending substantially the full width of the heater.

25. In a heater the combination of a heating chamber, the base forming an outlet therefrom, said base being provided with the inlet passage 3 and outlet passage 5 and settling chamber; the deflector plate 4 arranged in the path of the entering liquid; and the deflector plate 6 placed in the path of the outgoing liquid for the purpose described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE E. RIBLET.

Witnesses:

B. F. PARKER,  
HENRY LIPPOLD.