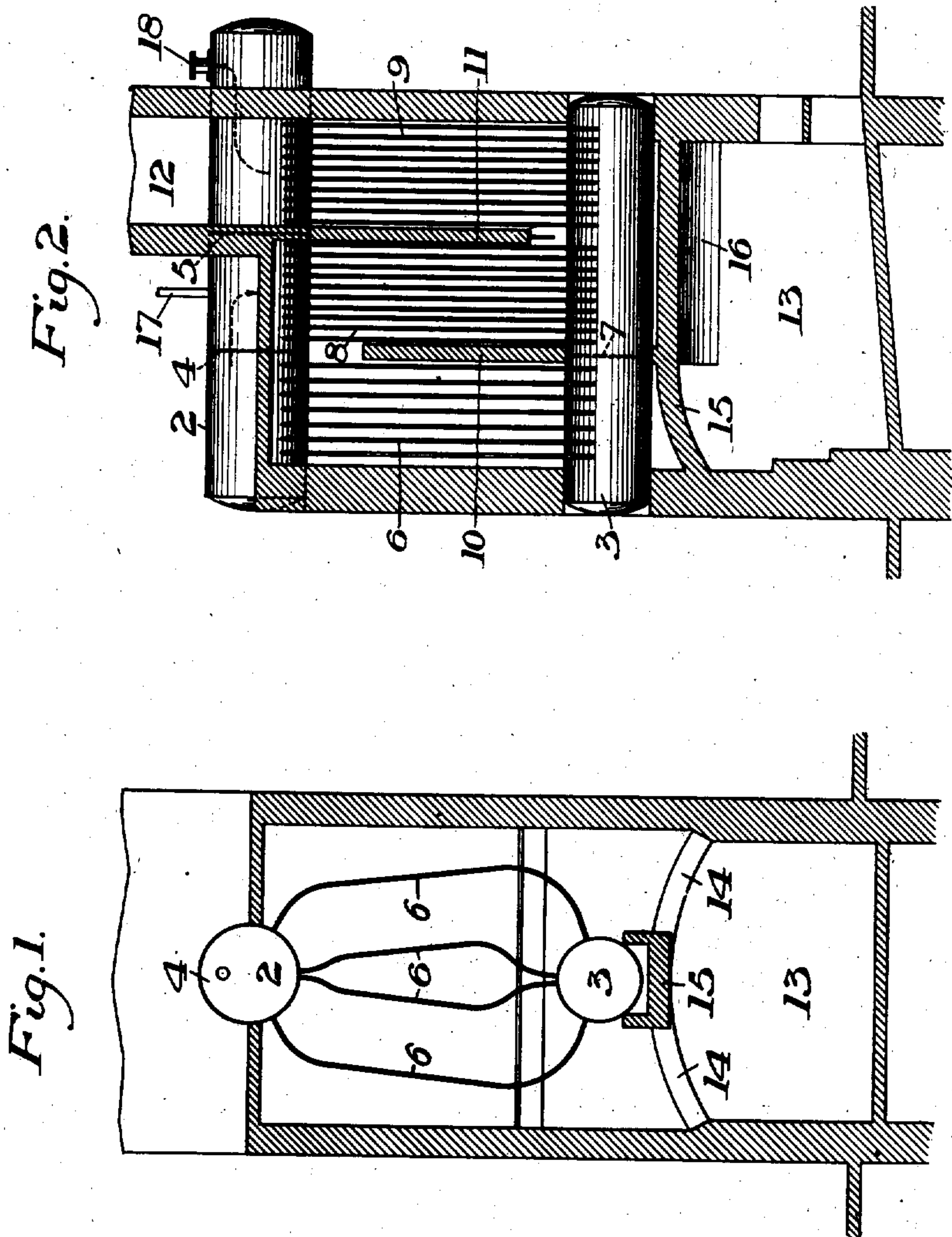


J. E. BELL.
INDEPENDENTLY FIRED SUPERHEATER.
APPLICATION FILED FEB. 26, 1907.

973,743.

Patented Oct. 25, 1910.

7 SHEETS—SHEET 1.



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7 SHEETS—SHEET 2.

Fig. 4.

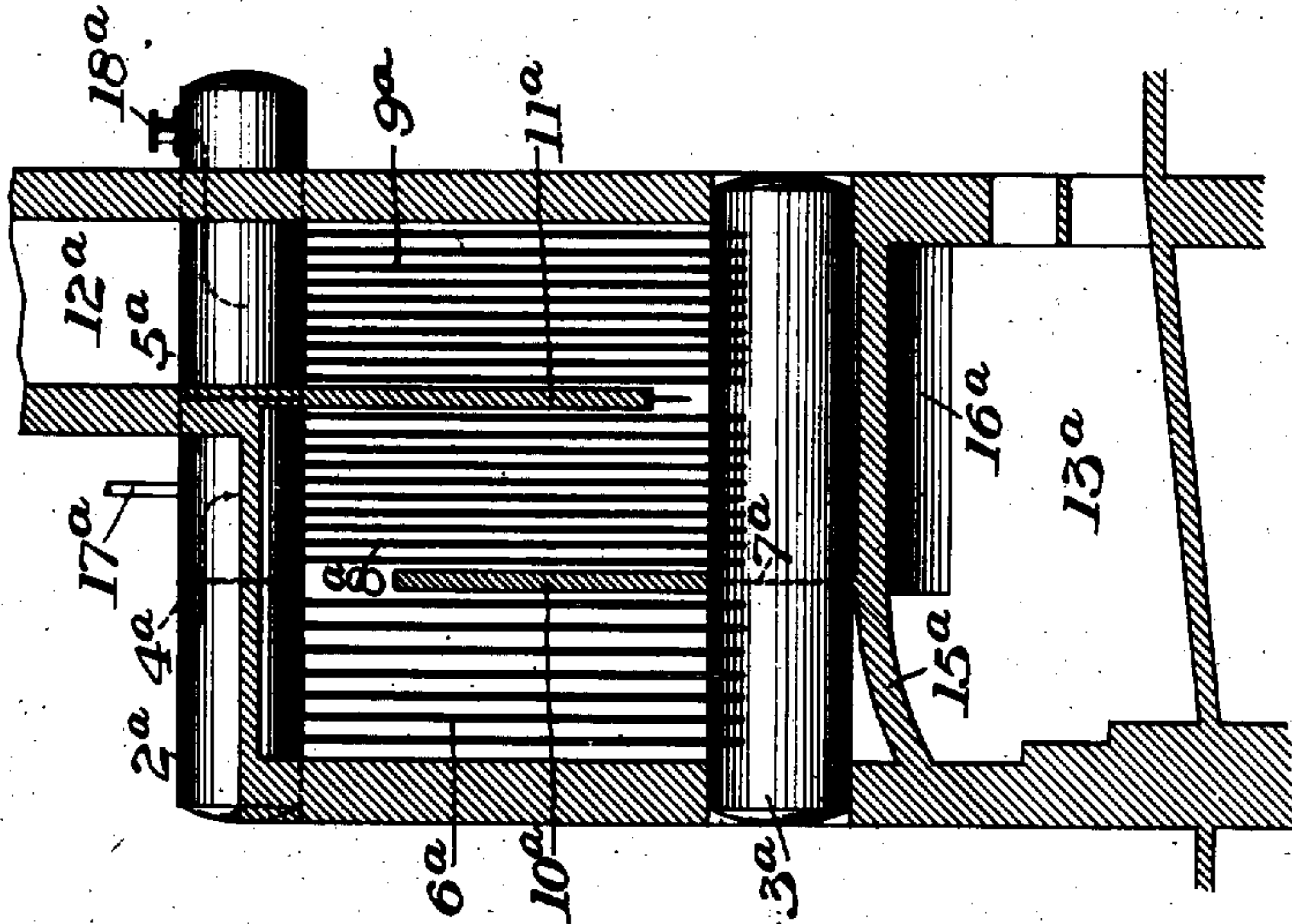
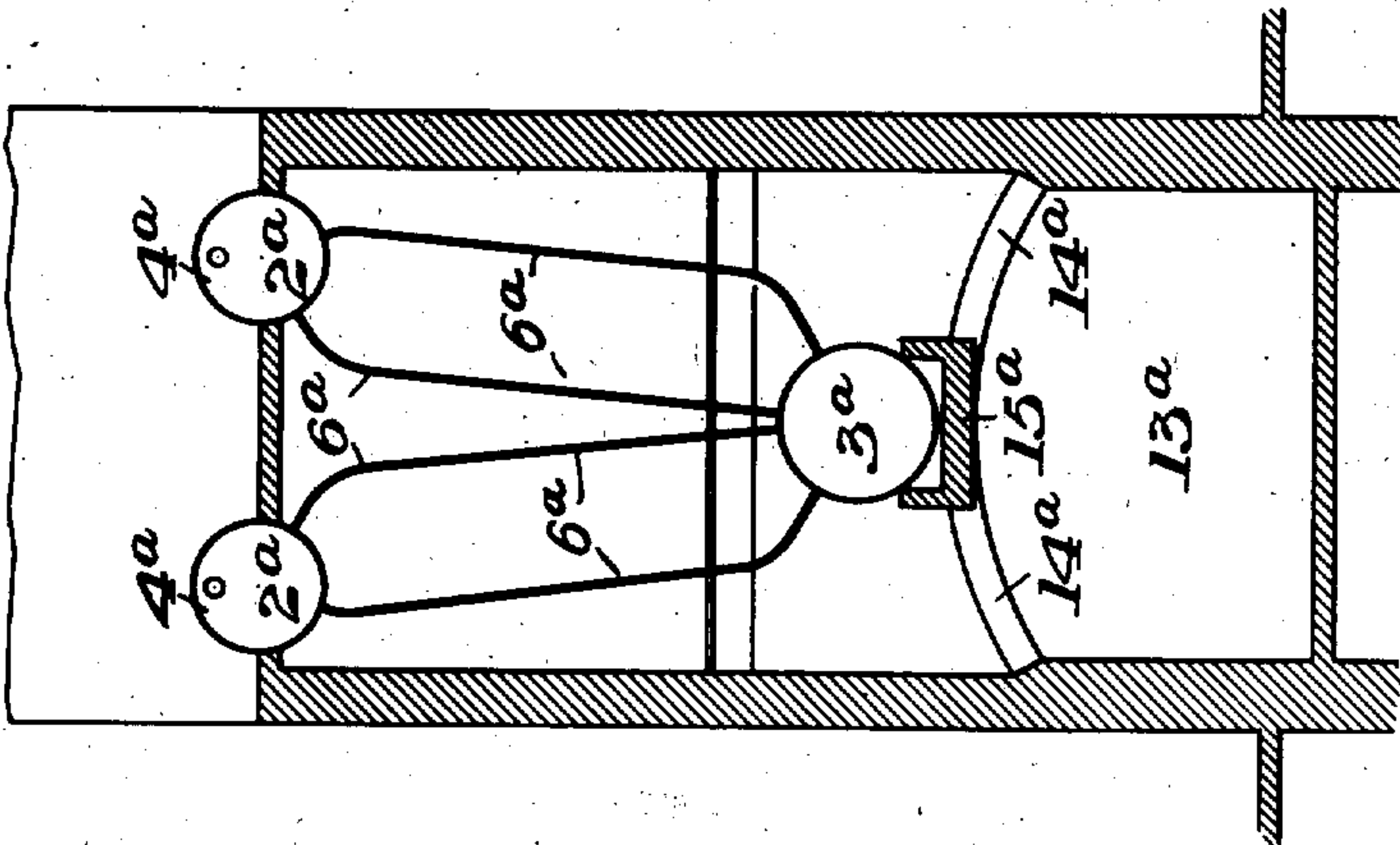


Fig. 3.



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7 SHEETS—SHEET 3.

Fig. 6.

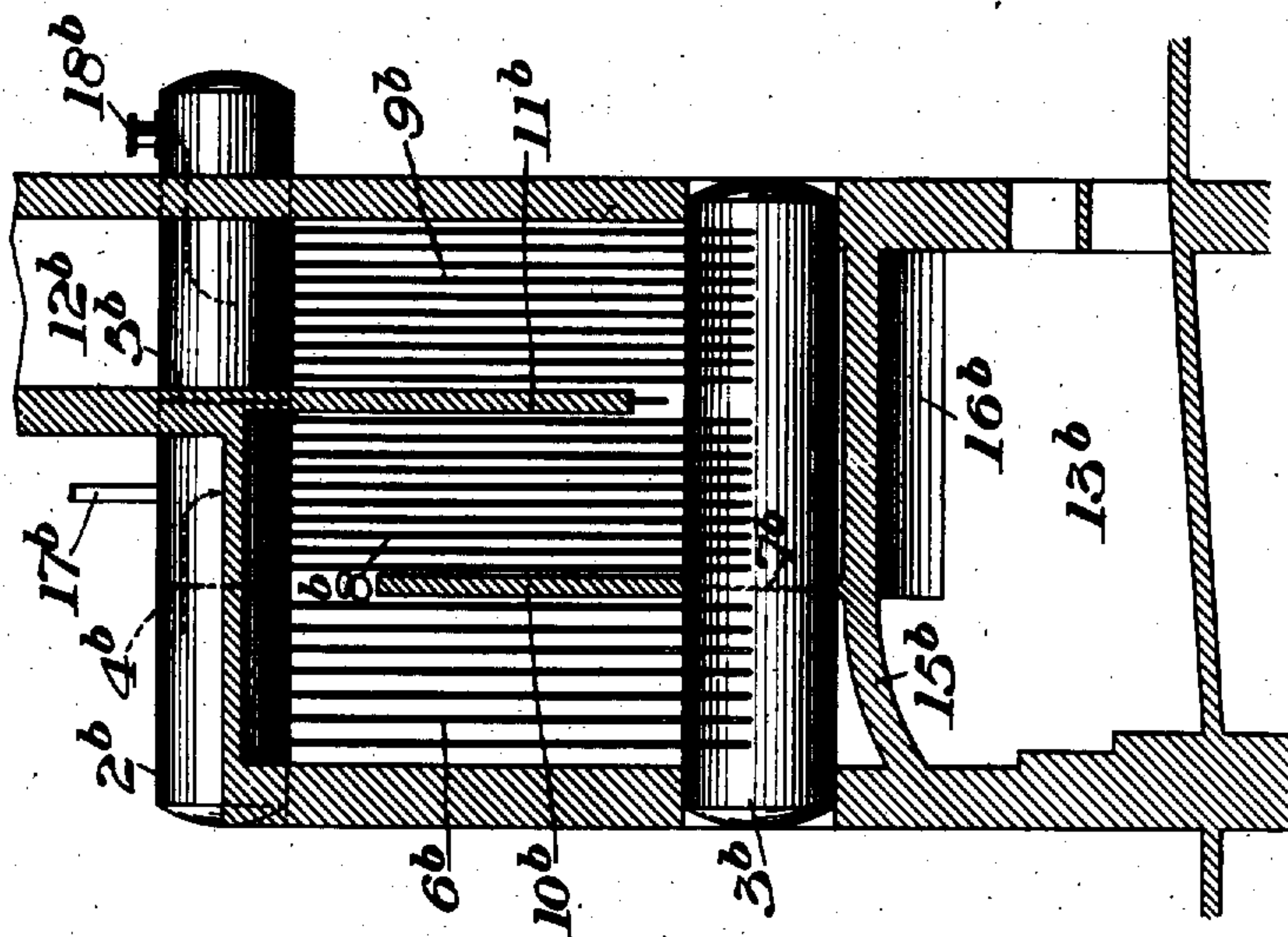
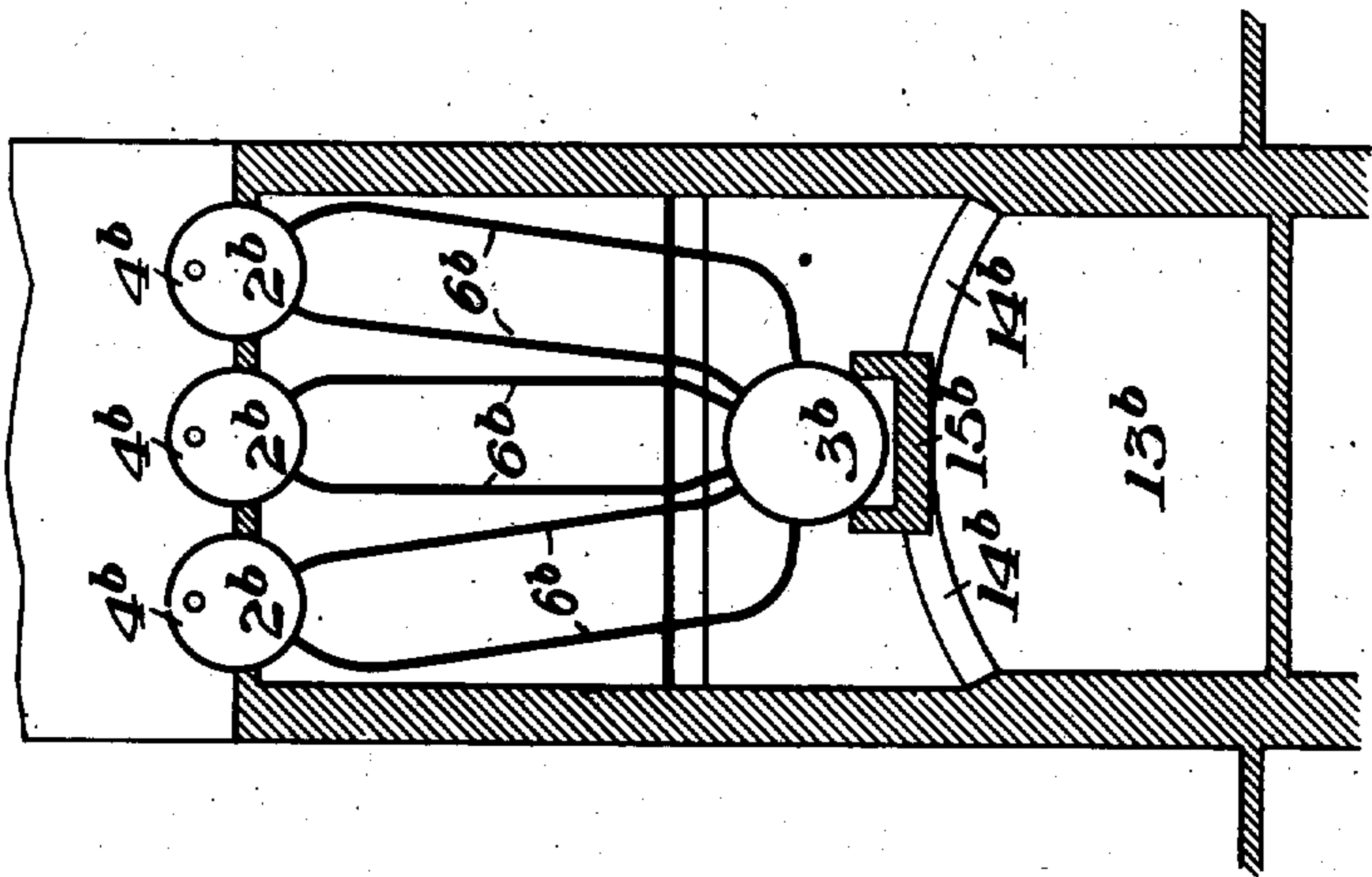


Fig. 5.



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7 SHEETS—SHEET 4.

Fig. 8.

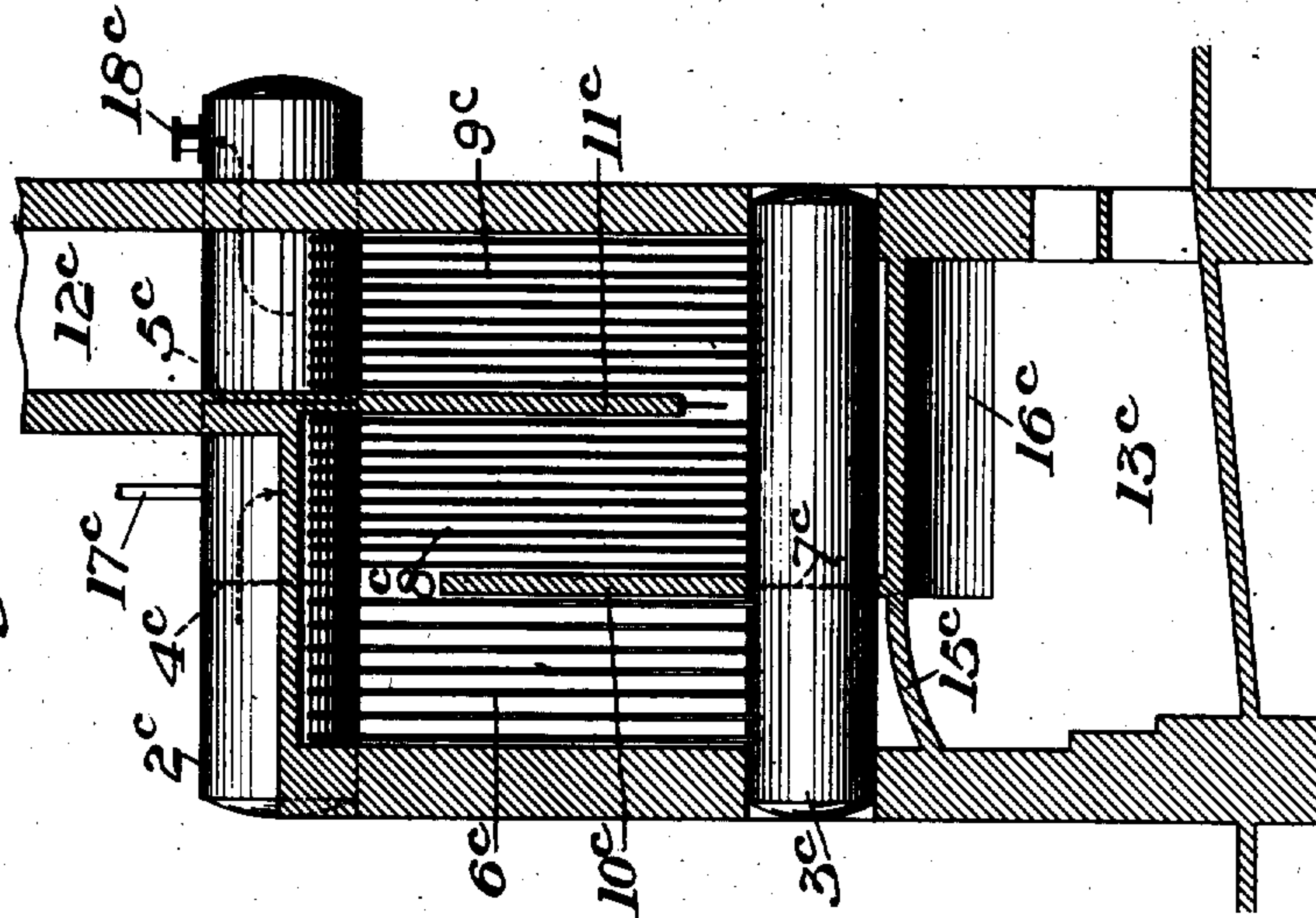
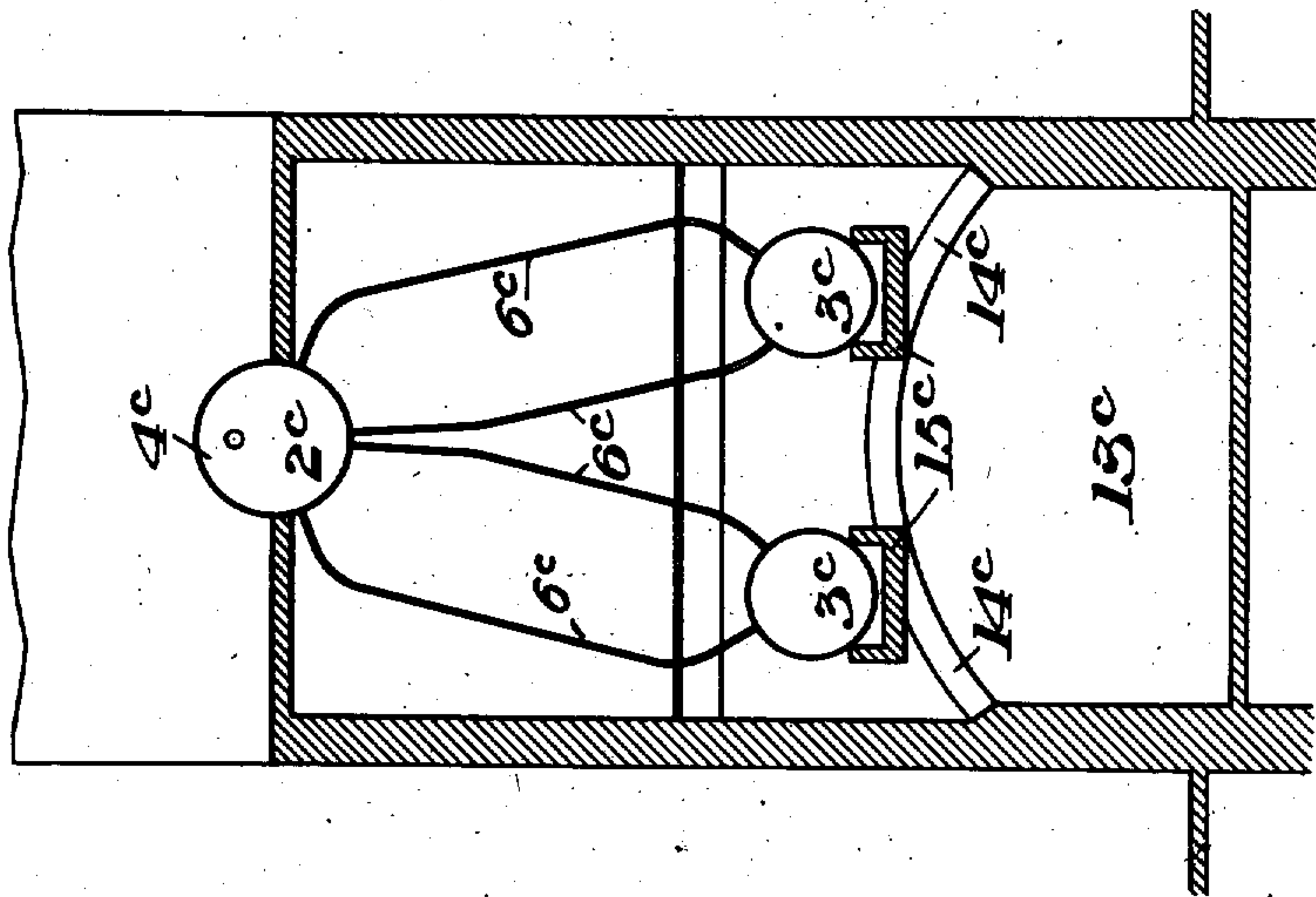


Fig. 7.



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7 SHEETS—SHEET 5.

Fig. 10.

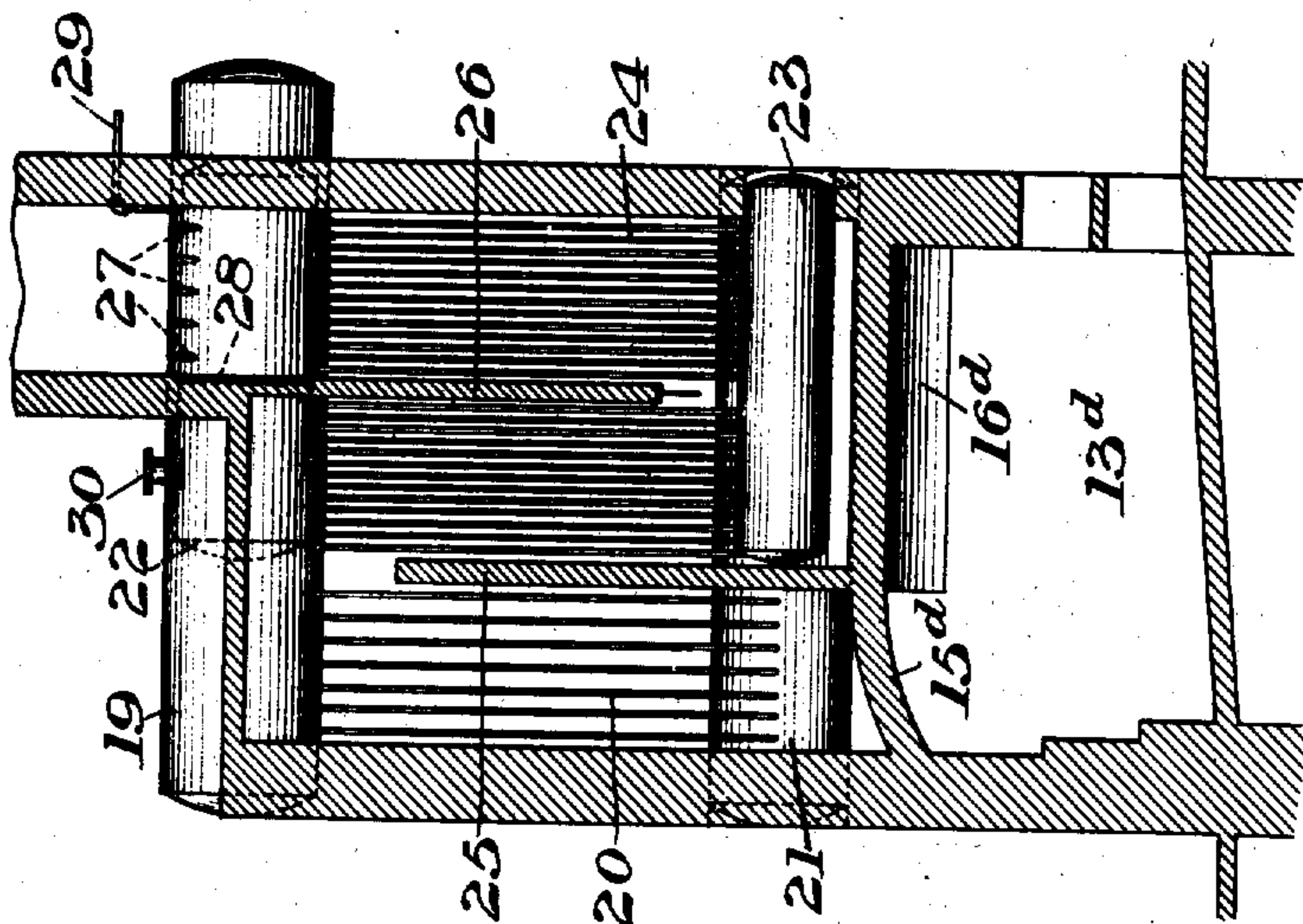
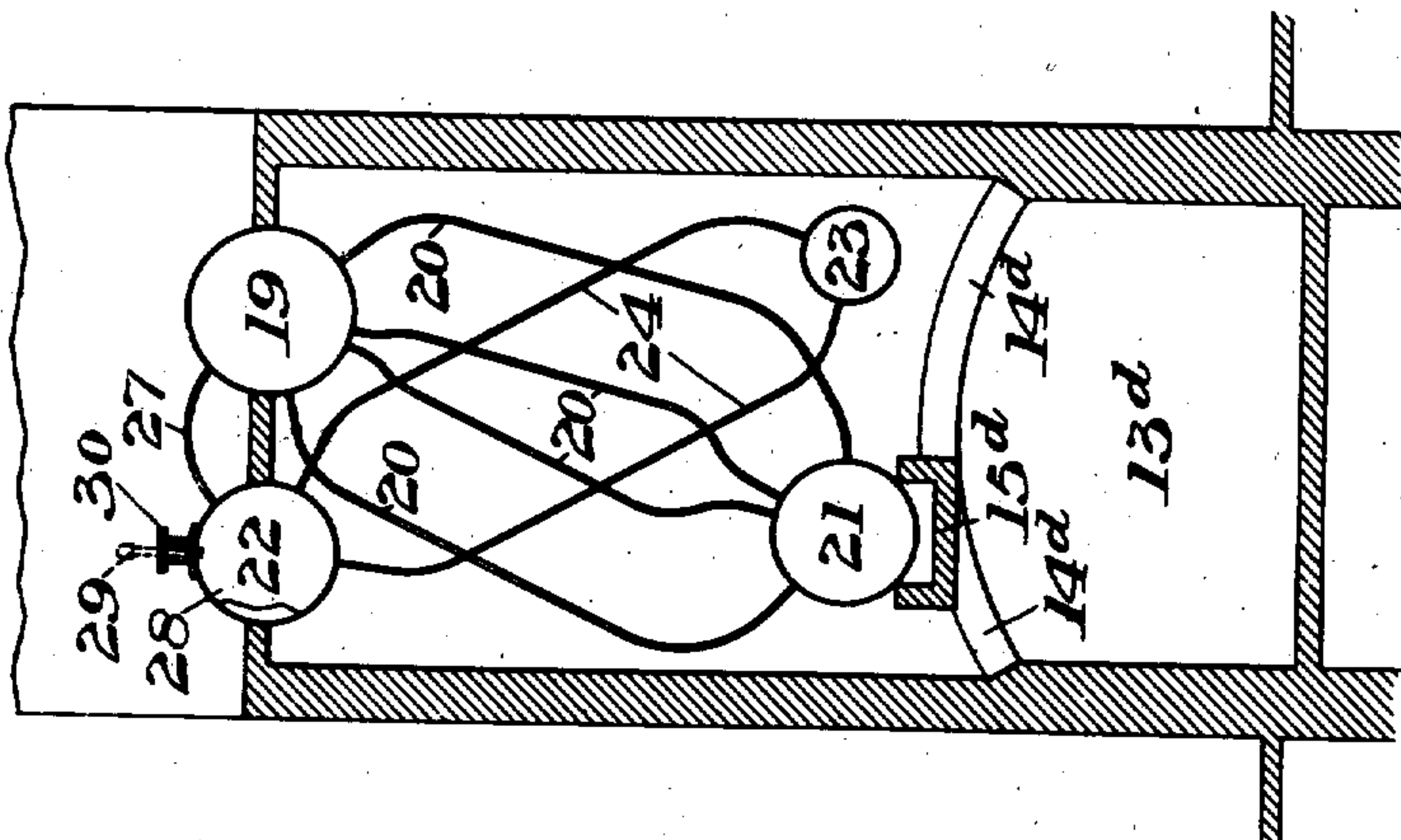


Fig. 9.



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7 SHEETS—SHEET 6.

Fig. 12.

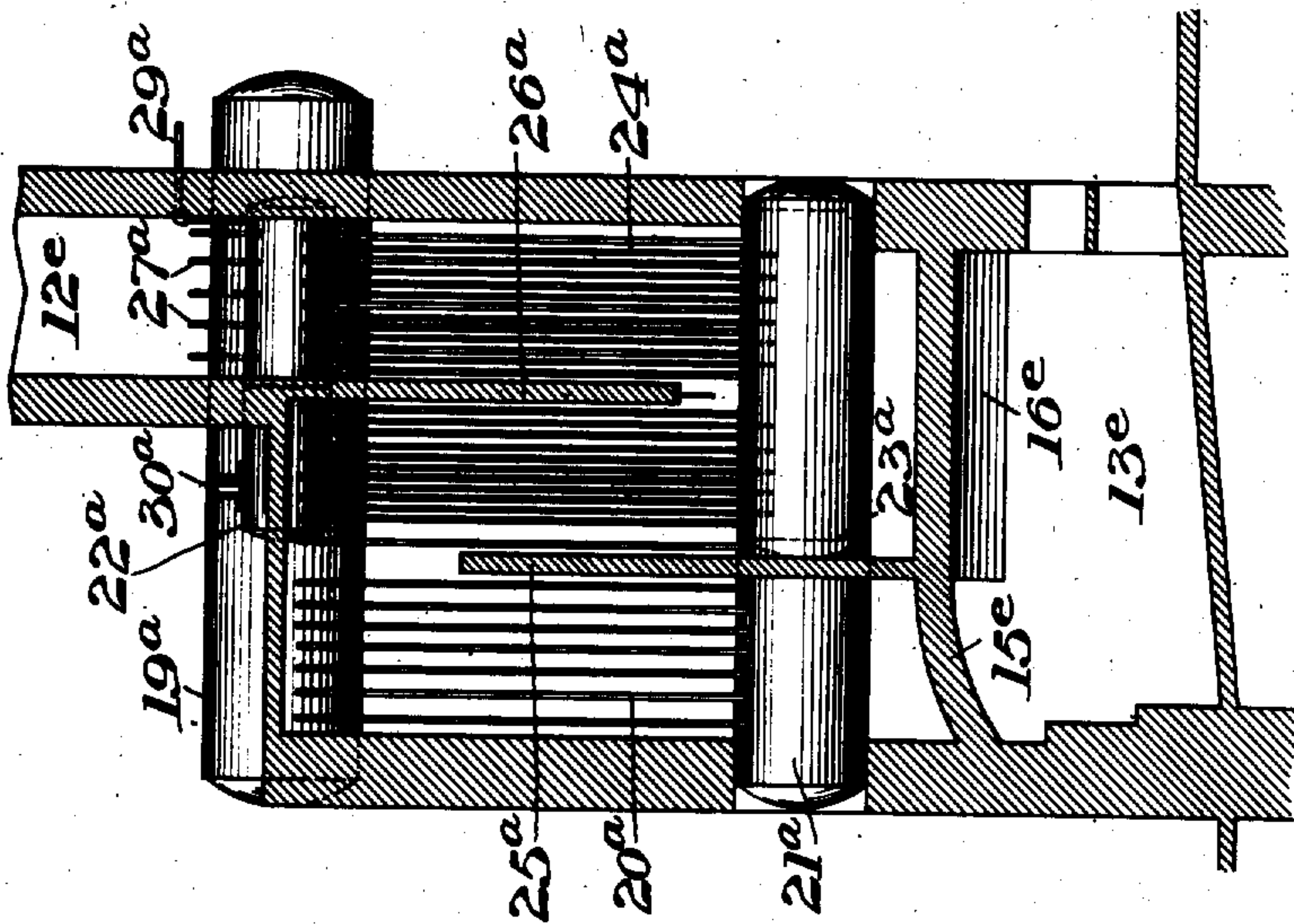
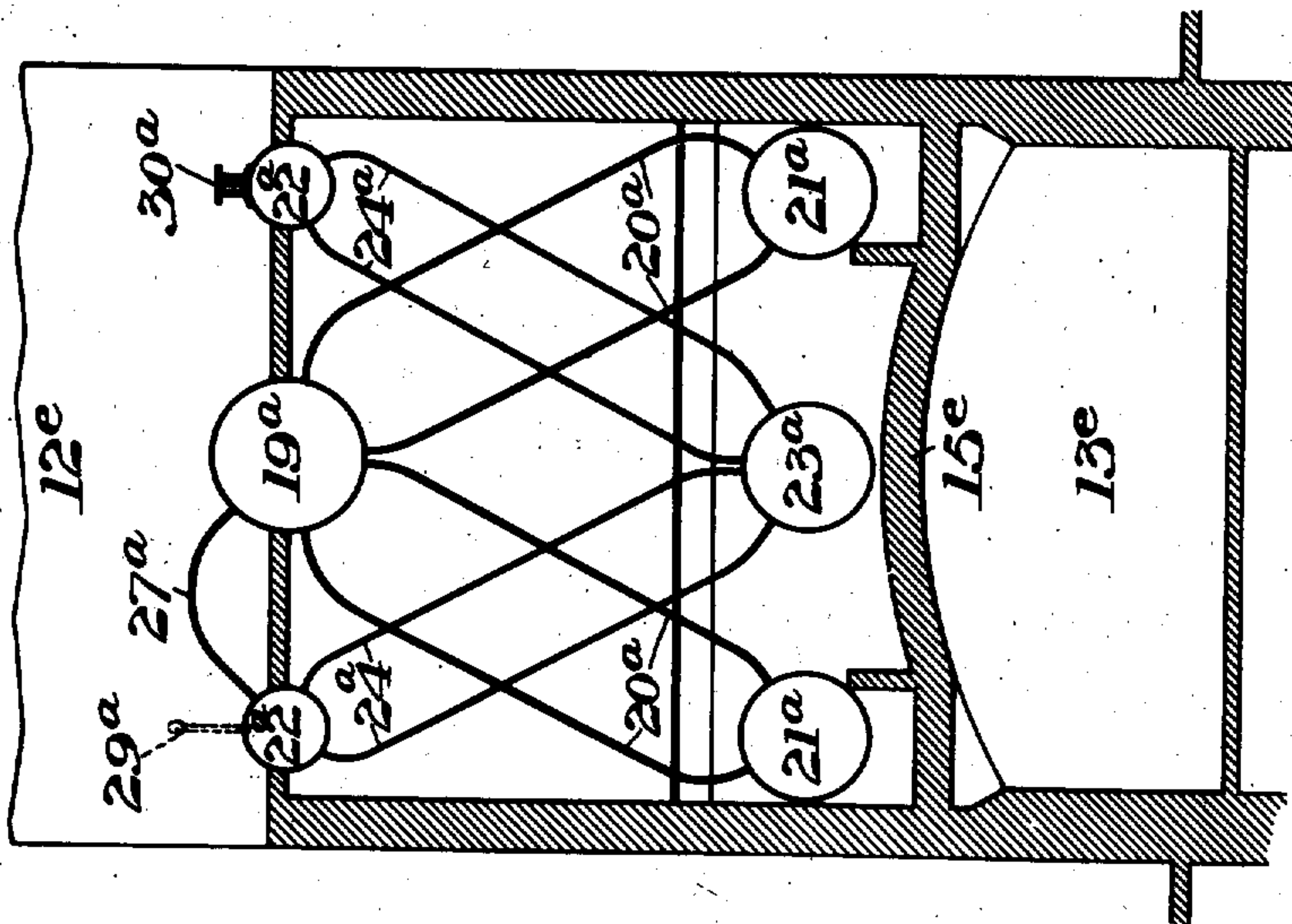


Fig. 11.



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7 SHEETS—SHEET 7.

Fig. 14.

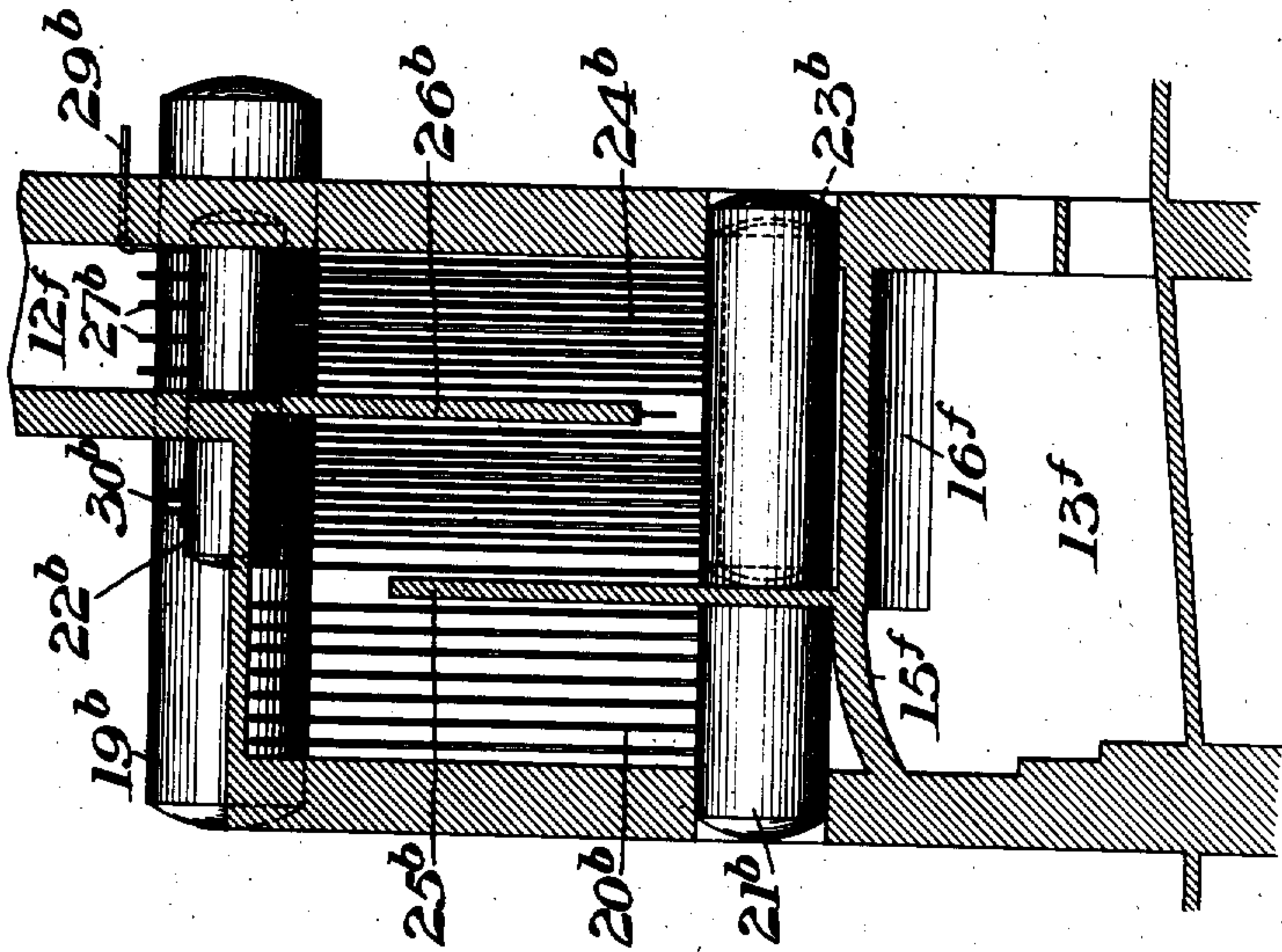
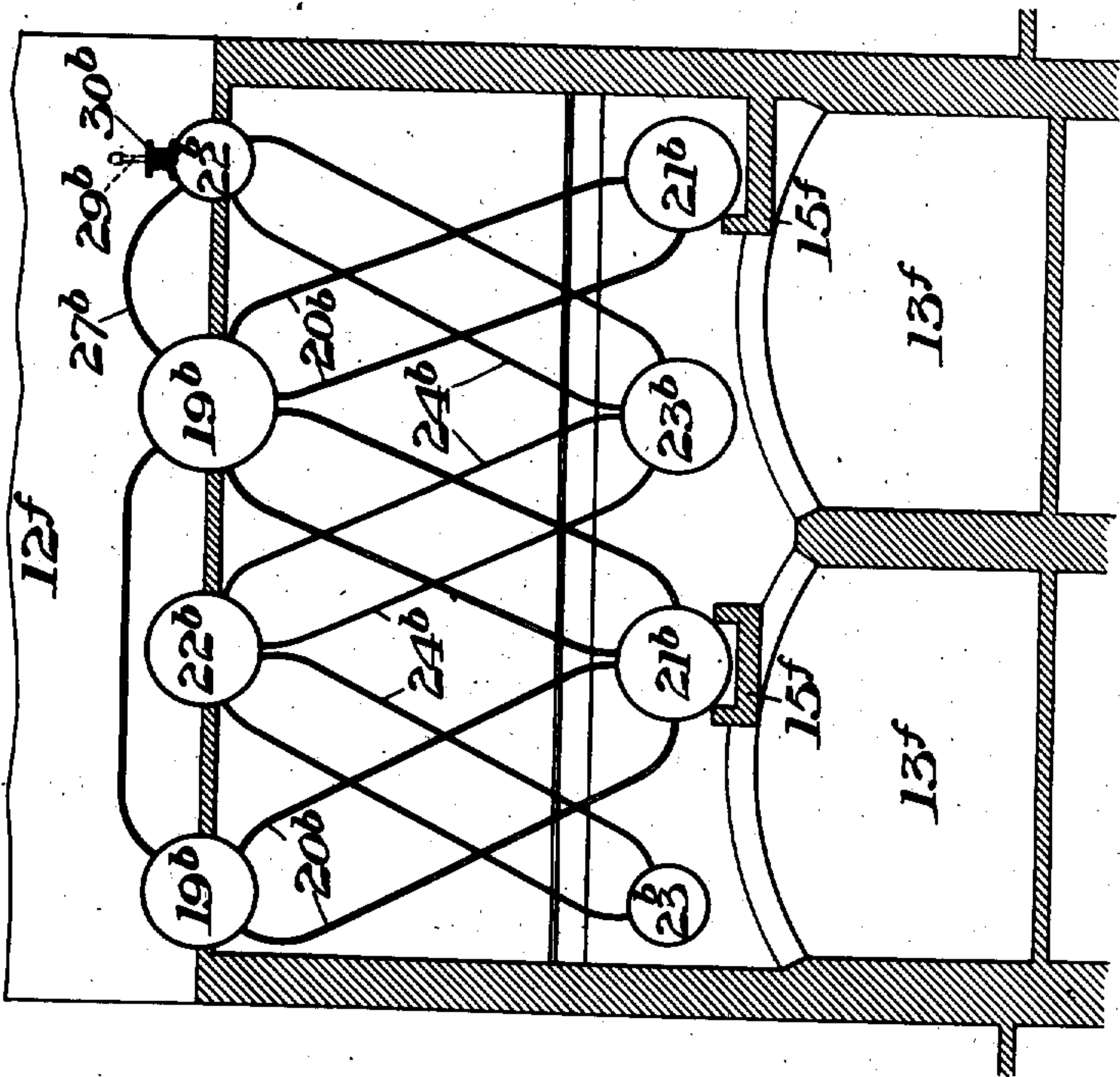


Fig. 13.



WITNESSES

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UNITED STATES PATENT OFFICE.

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INDEPENDENTLY-FIRED SUPERHEATER.

973,743.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed February 26, 1907. Serial No. 359,402.

To all whom it may concern:

Be it known that I, JOHN E. BELL, of New York city, in the county and State of New York, have invented a new and useful
5 Independently-Fired Superheater, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

10 Figure 1 is a vertical cross-section, and Fig. 2 is a sectional side elevation; and Figs. 3 and 4, 5 and 6, 7 and 8, 9 and 10, 11 and 12, 13 and 14, are respectively views similar to Figs. 1 and 2, showing a modified form.

15 My invention relates to the class of independently fired superheaters, and is designed to provide an improved superheater of such type wherein the superheater drums or chambers extend longitudinally of the
20 setting, while at the same time water-heating surface is interposed between the superheating tubes and the furnace. In the preferred form, this water-heating surface occupies the first of the serial passes for the
25 gases, the superheating tubes being in the rear of this pass.

The invention may be embodied in two different types; in the one type the superheating chamber is in the rear of the water
30 drum or drums; while in the other type the superheater chamber or chambers extend alongside the water drum or drums for at least a part of their length.

The first type is shown in Figs. 1 to 8,
35 inclusive. In Figs. 1 and 2, 2 represents an upper and longer drum, and 3 a lower and shorter drum; both drums extending longitudinally of the setting. The upper drum is provided with a partition 4 having a hole
40 or holes above the water level to allow passage of steam from the steam and water chamber into the superheater chamber, between partition 4 and a complete diaphragm or partition 5, which forms a steam chamber
45 between it and the head of the drum. The upper water chamber is connected by water tubes 6 with a water chamber formed in the lower drum by the partition 7, the remainder of this drum being a steam chamber.
50 The steam chambers of the upper drum are connected with the steam chamber of the lower drum by superheater tubes 8 and 9. 10 and 11 are baffles to direct the gases in up and down passes on their way
55 to the chimney flue 12. 13 is the furnace

having the rear ports 14 on the sides of the baffle or shield 15 for the lower water chamber, this extending rearwardly from the protecting arch 16. 17 is a steam pipe arranged to lead steam from a boiler into the
60 central chamber of the upper drum, and 18 is the outlet for superheated steam.

In Figs. 3 and 4, I show a form similar to that of Figs. 1 and 2, except that two upper
65 drums 2^a are employed, with a single lower drum 3^a. In these figures parts similar to those of Figs. 1 and 2 are designated by similar numbers 1 with the letter *a* applied.

In Figs. 5 and 6, I show a form similar to that of Figs. 1 and 2, except that three
70 upper drums 3^b are employed, connected by the water and superheating tubes to the lower drum 3^b. In these figures similar numerals are employed with the letter *b* applied.
75

In Figs. 7 and 8, I show a form similar to that of Figs. 1 and 2, except that two
80 lower drums 3^c are employed, connected by water tubes and superheating tubes to a single upper drum 2^c. In this case two of the protecting baffles 15^c are employed. In this form similar numerals are employed with the letter *c* applied.

The second type is shown in different
85 forms in Figs. 9 to 14, inclusive. In Figs. 9 and 10, 19 is an upper steam and water drum, connected by water tubes 20 to a mud drum 21 located diagonally with reference to the drum 19. These drums extend longi-
90 tudinally and preferably from the front to the rear wall of the setting; and within this setting are also provided the diagonally arranged superheater drums 22 and 23 connected by the superheater tubes 24. These
95 superheater tubes preferably extend through and between the water tubes in the second and third passes of the gases between the baffles 25 and 26; and the drums 22 and 23 extend only a part of the length of the set-
100 ting, as shown in Fig. 10. The steam space of the drum 19 is connected by tubes 27 with one chamber of the drum 22, which is separated from the other chamber by a parti-
105 tion 28. Into this same chamber steam is led from a boiler through the supply pipe 29. The steam flows down through the superheating tubes in the third pass to the lower drum 23, and thence up to the other
110 steam chamber of drum 22 to the outlet 30.

In Figs. 11 and 12, I show a form similar

to that of Figs. 9 and 10, except that a more symmetrical arrangement of drums is afforded by providing the boiler with two mud drums 21^a between which is arranged the lower steam drum 23^a connected by the two banks of superheater tubes 24^a to the upper steam drums 22^a. The steam tubes extend through the two banks 20^a in the second and third passes thereof. In this case the steam is led from drum 19^a through tubes 27^a to one of the drums 22^a, into which enters the supply pipe 29^a from a boiler. The steam may flow down through one set of tubes 24^a to the drum 23^a and thence up to the other drum 22^a provided with the outlet 30^a; or each bank may have a double pass as provided in the form of Figs. 9 and 10.

In Figs. 13 and 14 there are two upper drums 19^b and two mud drums 21^b. The superheater is also provided with two upper drums 22^b and two lower drums 23^b. The outer upper drum 22^b receives the steam from the drums 19^b, this steam flowing through the four banks of tubes 24^b to the lower opposite drum 23^b; or each bank may have an up and down pass as above described.

The advantages of my invention result from the combining of the superheating tubes with water heating tubes between them in the furnace, while using longitudinal drums. A simple and efficient form of independently fired superheater is thus obtained, using longitudinal drums with superheater chambers either beyond or alongside them. The superheater tubes are not liable to burn out, owing to the water heating surface between them and the source of heat. This water heating surface also adds to the boiler capacity of the plant.

Many changes may be made in the form and arrangement of the superheater, the furnace, water-heating surface, etc., without departing from my invention.

I claim:—

1. An independently fired superheater

having a longitudinal steam and water drum or receptacle, with water tubes extending downwardly therefrom and forming the first pass for the gases, means for giving the gases back and forth passes longitudinally of the said drum, and a superheater having tubes forming the succeeding heating surface and constituting the major portion of the entire heating surface, said superheater having an inlet arranged to supply steam thereto from a separate boiler, substantially as described.

2. An independently fired superheater having upper and lower longitudinal drums or receptacles baffles arranged to cause back and forth passes to the gases longitudinally of the drums, water heating surface forming the major part of the heating surface in the first pass, the superheating tubes being located in the succeeding pass or passes, and constituting the major part of the heating surface, the superheater having an inlet arranged to supply steam thereto from a separate boiler and being arranged to receive water and itself act as a steam generator, substantially as described.

3. An independently fired superheater having longitudinal upper and lower drums connected by water tubes and superheating tubes, the water tubes forming substantially the entire first pass for the gases, and superheating tubes in the successive passes constituting the major portion of the heating surface, and baffles arranged to give the gases back and forth passes to the gases longitudinally of the drums, the superheater having an inlet from the steam space of its upper water chamber, and also an inlet to supply steam thereto from a separate boiler, substantially as described.

In testimony whereof, I have hereunto set my hand.

JOHN E. BELL.

Witnesses:

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