

No. 869,669.

PATENTED OCT. 29, 1907.

M. TOLTZ.
SUPERHEATER.

APPLICATION FILED JAN. 25, 1907.

2 SHEETS—SHEET 1

Fig. 1.

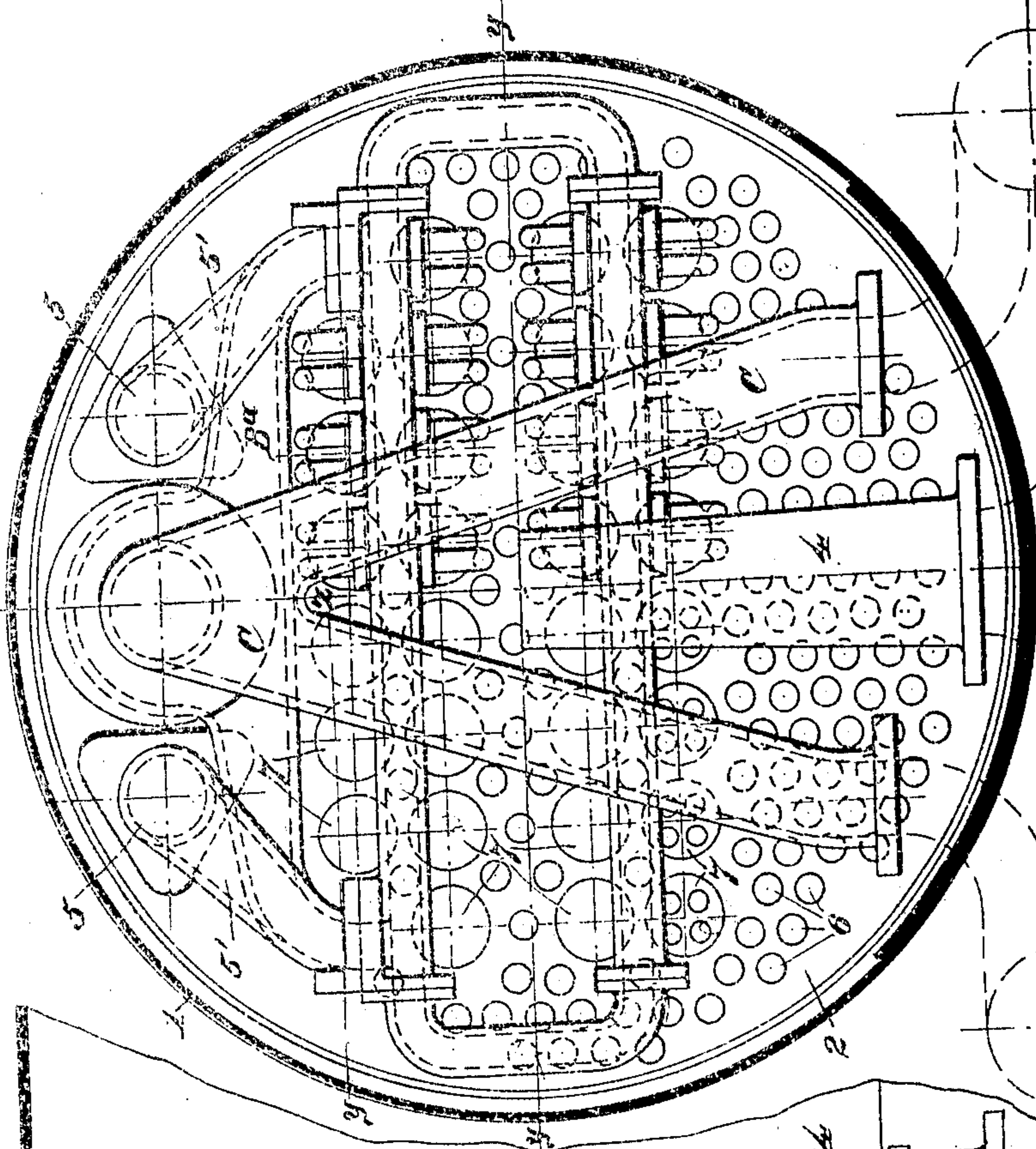
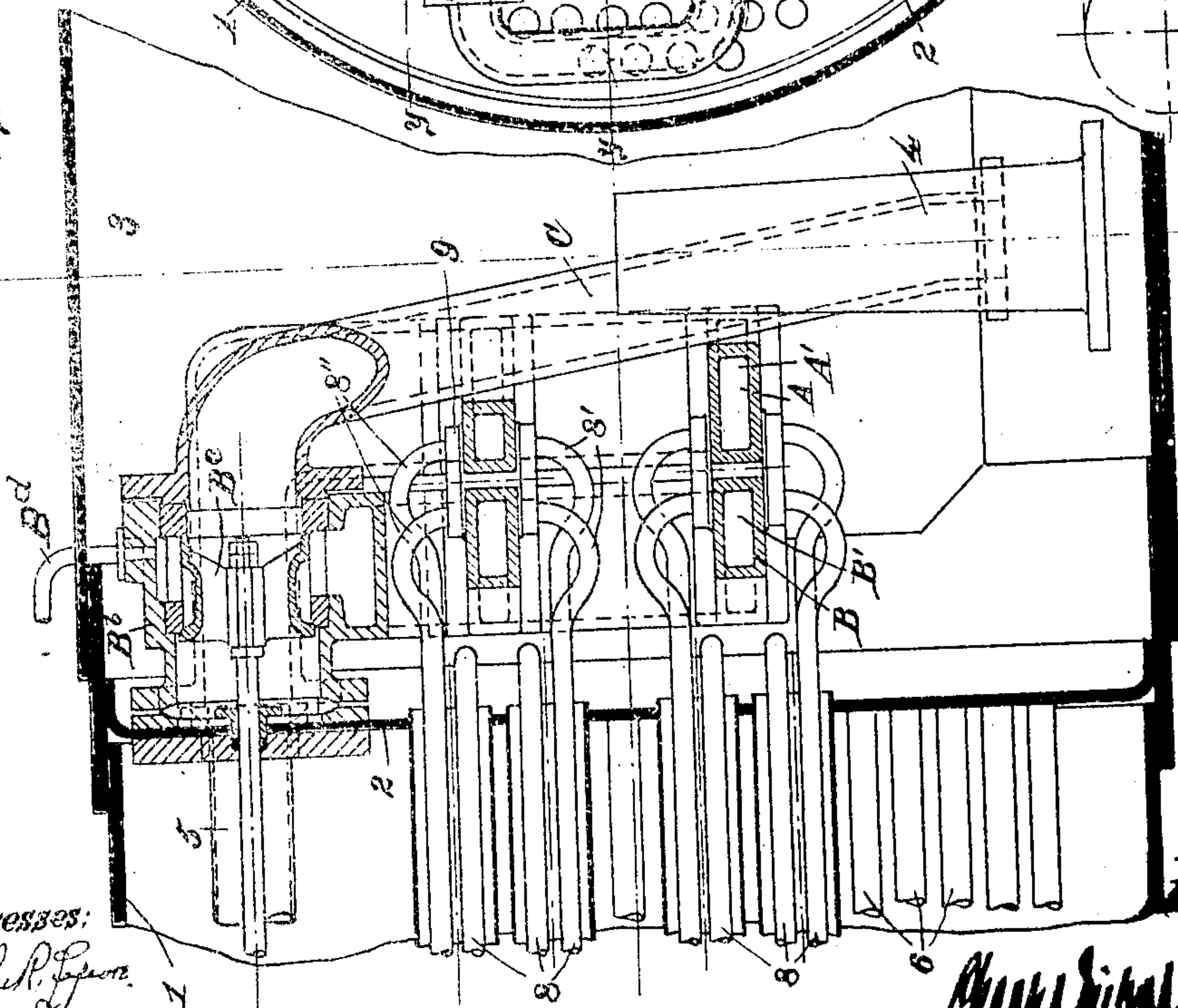


Fig. 2.



Witnesses:

John P. Simon
at
M. Simon

Inventor:
M. Toltz

Charles Simon
att'y

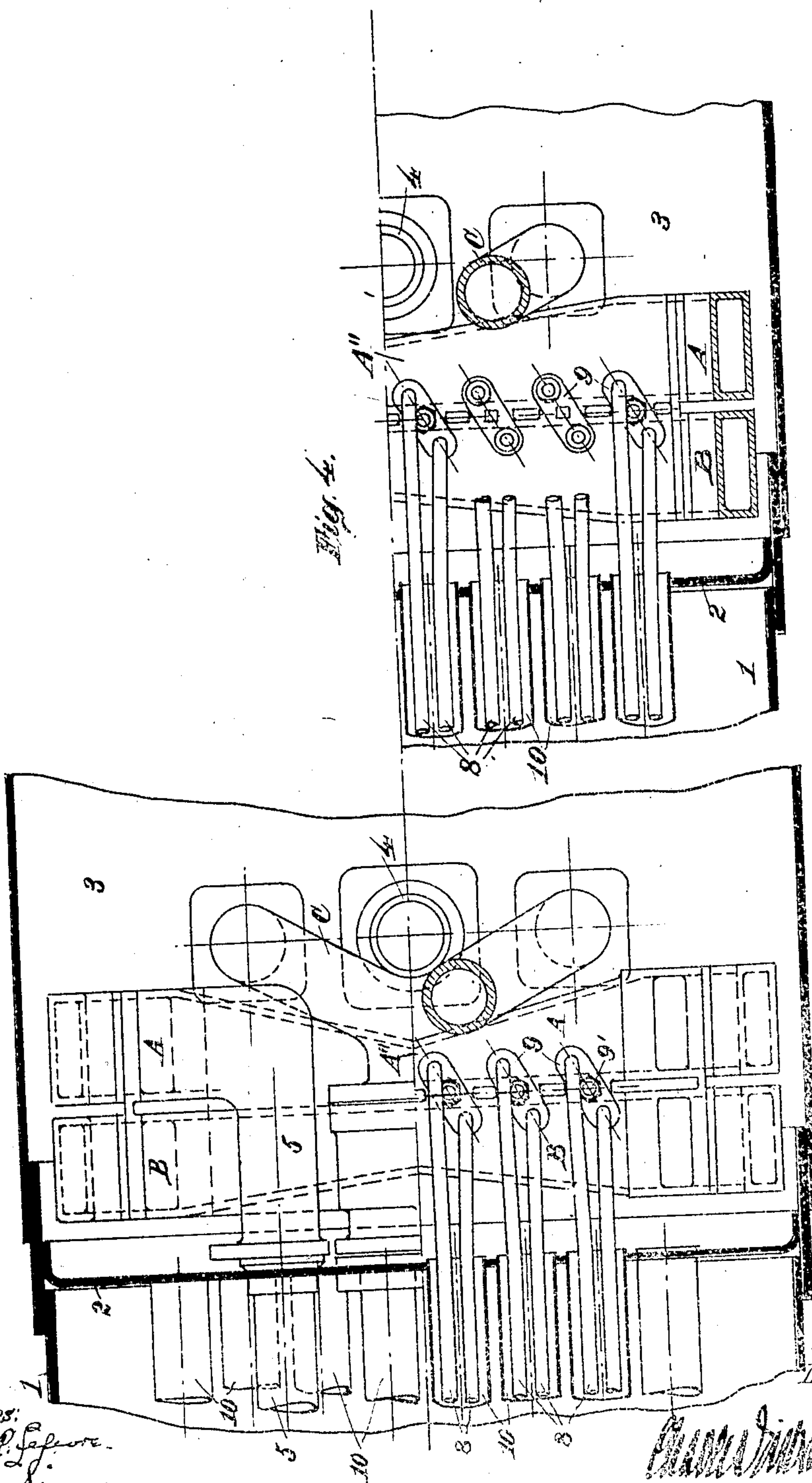
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2 SHEETS--SHEET 2.



Witnesses:
John R. Safford.
M. Simon

Inventor,
Max Holtz
by
Nat. H. H. H.
Att'y.

UNITED STATES PATENT OFFICE.

MAX TOLTZ, OF ST. PAUL, MINNESOTA, ASSIGNOR OF ONE-FOURTH TO CHARLES GILBERT HAWLEY, OF CHICAGO, ILLINOIS.

SUPERHEATER.

No. 869,669.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed January 26, 1907. Serial No. 354,155.

To all whom it may concern:

Be it known that I, MAX TOLTZ, a citizen of the United States, and a resident of St. Paul, county of Ramsey, and State of Minnesota, have invented a certain new, useful, and Improved Superheater, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in steam superheaters, and has particular reference to improvements in locomotive steam superheaters of the class wherein a large number of superheating elements or loops are arranged in the flues of the locomotive boiler, and are connected with headers which are located in the front end, or smoke box of the boiler. The saturate steam header of such a superheater is connected with the dry pipe of the boiler and the superheated steam header is connected to the steam chests of the locomotive engines. The steam flowing from the dry pipe of the boiler, is distributed to the superheater elements by the saturate steam header, and being superheated in the elements, is collected in the superheated steam header.

The purpose of my invention is to provide a superheater for locomotive boilers which shall occupy minimum space within the smoke box of the boiler, and leave substantially all of the boiler flues exposed and open for inspection and cleaning.

A further object of the invention is to provide a steam superheater of the class mentioned which shall oppose a minimum of obstruction to the flow of gases from the boiler flues to the smoke stack, and a further object of the invention is to provide a superheater which will possess the advantage of presenting the maximum number of superheater elements within a minimum space or area, measured upon the flue sheet of the boiler.

Still other objects of my invention will appear hereinafter.

My invention consists generally in a steam superheater for locomotive boilers, of the construction and combination of parts hereinafter described, and particularly pointed out in the claims.

The invention will be more readily understood by reference to the accompanying drawings forming a part of this specification, and in which:—

Figure 1, is a front end elevation of a locomotive boiler equipped with a superheater embodying my invention. Fig. 2, is a vertical section thereof, substantially on the line X, X, of Fig. 1. Fig. 3, is a partial plan view and partial horizontal section on the

right angled line, Y, Y, of Fig. 1, and, Fig. 4, is a similar horizontal section on the line Y, Z, of Fig. 1.

As shown in the drawings, 1 represents the shell of the boiler;—2, the front flue sheet of the boiler;—3, the front end or smoke box;—4, the exhaust nozzle;—5, the two part, or divided dry pipe. The boiler contains a large number of small fire flues, 6, and also four horizontal rows of enlarged fire flues, 7, 7, the pairs of rows being preferably separated by one or more rows of small flues. The enlarged flues accommodate and contain the double return superheating elements or loops, 8, 8, the ends 8' and 8'' of which are first outwardly and then inwardly turned, and joined in anchoring bars 9.

A and B represent the saturate and superheated steam headers. These headers occupy horizontal positions, and each of them comprises an elongated rectangular member, composed of one or more parts, and containing a steam passage, A' B'. The upper and lower parts of the headers occupy positions relatively between respective pairs of enlarged flue rows. The saturate and superheated steam headers are arranged one in front of the other, and the anchoring bars, 9, of the superheater elements are bolted, or otherwise clamped upon the upper and lower sides of the headers, to connect respective ends of said elements therewith. The particular form of the anchor blocks, and the manner of connecting the same to the headers is well illustrated in Fig. 3, wherein the clamping bolts, 9', appear. The headers are separated by straight slots, or spaces, their adjacent or abutting ends or edges being parallel with the flue sheet of the boiler. By reason of this construction the superheater elements are made uniform in length and other dimensions, from which fact it follows that said elements are interchangeable. Short legs, or connections, 5', extend from the dry pipes, 5, 5, to the ends of the upper part of the saturate steam header. To insure proper distribution of the steam to the many superheater elements I constrict the middle portion A'' of the header, making the opening or passage smaller in the upper part of the header than in the lower portion thereof. (See Figs. 2, 3, and 4). I prefer to form the superheated steam header B in substantially the same manner. The superheated steam leaves the header B at points near the ends of the upper part thereof, passing through a tee or yoke, B^a, to a valve casing B^b, preferably integral with the tee or yoke B^a. The valve casing is secured upon the flue sheet of the boiler and contains a throttle valve B^c. When the throttle valve is opened the superheated steam passes to the engine steam chests through a Y, or divided steam feed pipe, C. B^d represents a bleeder pipe

which is connected to the valve casing to maintain a minimum flow of steam in the superheater at times when the throttle valve is closed.

The operation of my novel superheater is as follows:

- 5 When the throttle valve B^c is opened to free the passage through the superheater steam will flow from the dry pipes into the horizontal, rectangular headers A, and filling both the upper and lower parts thereof will pass into the numerous superheater elements or loops, 10 8. These being within the flues of the boiler are heated to a high temperature, hence the steam is superheated. The superheated steam collected in the rectangular header B passes through the tee to the throttle valve casing and thence past the valve to the steam feed 15 pipes and engine cylinder.

- The advantages of this superheater arise from the division of the headers into two horizontal parts, each of which parts being arranged between the rows of enlarged flues occupy very little of the face of the flue sheet and leave the flues and superheater elements exposed in such manner that the same may be readily inspected and cleaned. Furthermore, the employment of the two pairs of horizontal rows of enlarged flues, together with headers of corresponding form, admits of 25 the employment of the required number of superheater elements, so that, although the headers occupy little space before the flue sheet, the superheater, nevertheless, is of great capacity. The arrangement of the superheaters one in front of the other between the rows of 30 enlarged flues, giving them the appearance of horizontal plates, positions them in such manner that they oppose the least possible resistance to the flow of gases in the smoke box, and are less apt to become loaded with cinders.

- 35 As various modifications of the particular superheater herein described will readily suggest themselves to one skilled in the art, I do not confine my invention to the specific constructions herein shown and described.

Having thus described my invention, I claim as new 40 and desire to secure by Letters Patent:

1. A locomotive boiler containing two horizontal rows of enlarged flues, in combination with superheater elements arranged in said flues, saturate and superheated steam headers arranged edge to edge one in front of the other 45 between said rows of flues and connected to said elements, said headers being respectively connected to the dry pipe of the boiler and the steam feed pipe or pipes thereof, substantially as described.

2. A locomotive boiler containing two pairs of horizontal rows of enlarged flues, in combination with horizontally disposed and divided saturate and superheated steam headers having their upper and lower parts relatively between the flues of the upper and lower rows of flues respectively, suitable dry pipe and steam feed connections to said saturate and superheated steam headers respectively, and superheater elements arranged in said flues and having their ends connected to adjacent portions of respective headers, substantially as described.

3. A superheater for locomotive boilers, comprising substantially rectangular saturate and superheated steam headers arranged edge to edge one in front of the other and provided with respective inlet and outlet connections, in combination with parallel rows of superheater elements connected in pairs to opposite sides of respective portions of said headers, substantially as described.

4. A steam superheater, comprising substantially rectangular loop-like, saturate and superheated steam headers

arranged edge to edge one in front of the other and respectively provided with inlet and outlet connections, in combination with a plurality of superheater elements, the top and bottom surfaces of the upper and the lower portions of said headers being provided with straight rows of holes whereto the ends of said elements are connected, substantially as described. 70

5. A steam superheater comprising substantially rectangular horizontal loop like saturate and superheated steam headers arranged edge to edge, and respectively provided with inlet and outlet connections, in combination with four rows of superheater elements having their ends connected with respective headers, the middle portions of said headers being constricted as and for the purpose specified. 75 80

6. A locomotive boiler provided with four horizontal rows of enlarged fire flues, in combination with horizontally divided or loop like saturate and superheated steam headers, having their upper and lower parts arranged between the rows of flues and suitably connected, inlet connections for said saturate steam header, outlet connections for said superheated steam header, said headers being in substantial abutment upon a single vertical plane, and superheater elements arranged in said flues and having their ends connected with respective headers at points adjacent to said plane, substantially as described. 85 90

7. A steam superheater, comprising substantially rectangular loop-like saturate and superheated steam headers arranged edge to edge, in combination with suitable inlet connections for the said saturate steam header, a tee connected with said superheated steam header, and provided with a valve casing, a throttle valve provided in said casing, and a plurality of superheater elements having outwardly and inwardly bent ends, detachably connected to the sides of said superheaters, substantially as described. 95 100

8. A locomotive boiler provided with four horizontal rows of enlarged fire-flues in combination with horizontally divided or loop-like saturate and superheated steam headers having their upper and lower parts arranged between the rows of flues and suitably connected, a dry-pipe connection for said saturate steam header, a tee provided at the top of said superheated steam header, a throttle valve arranged in the upper portion of said tee, and a plurality of superheater elements arranged in said flues and having their ends connected with holes in respectively adjacent portions of said headers, substantially as described. 105 110

9. A locomotive boiler having two rows of enlarged fire-flues, in combination with a saturate steam header arranged relatively between said rows of fire-flues, a like superheated steam header also arranged between said rows of fire-flues and between the flue sheet and said saturate steam header, a throttle valve at the outlet of the superheated steam header, a plurality of superheater loops or elements arranged in said fire-flues, and having their ends connected with said headers, and said saturate and superheated steam headers being respectively connected with the boiler dry-pipe and the steam feed pipe, substantially as described. 115 120 125

10. A locomotive boiler having two rows of enlarged fire-flues, in combination with a saturate steam header arranged relatively between said rows of fire-flues, a like superheated steam header also arranged between said rows of fire-flues and between the flue sheet and said saturate steam header, a throttle valve at the outlet of the superheated steam header, a plurality of superheater loops or elements arranged in said fire-flues, and having their ends connected with said headers, said saturate and superheated steam headers being respectively connected with the boiler dry-pipe and the steam feed pipe and a bleeder pipe leading from said superheated steam header, substantially as described. 130 135

11. A locomotive boiler containing two rows of enlarged fire-flues, in combination with superheater elements arranged in said flues, saturate and superheated steam headers arranged parallel with said rows of flues and 140

relatively between them, means connecting the ends of the superheater elements to said headers, a throttle valve controlling the flow of steam from the superheated steam header, a bleeder pipe leading from said superheated steam header, and means connecting the saturate steam header with the dry-pipe of the boiler, substantially as described.

12. A locomotive boiler containing two rows of enlarged fire-flues, in combination with a plurality of double return superheater elements arranged in said flues and having
10 curved ends, saturate and superheated steam headers ar-

ranged relatively between said rows of flues and elements, and means connecting the curved ends of said elements to opposite sides of said headers, substantially as described.

In testimony whereof, I have hereunto set my hand, this 17th day of January, 1907, in the presence of two
15 subscribing witnesses.

MAX TOLTZ.

Witnesses:

M. SIMON,

A. W. NELSON.