

No. 695,869.

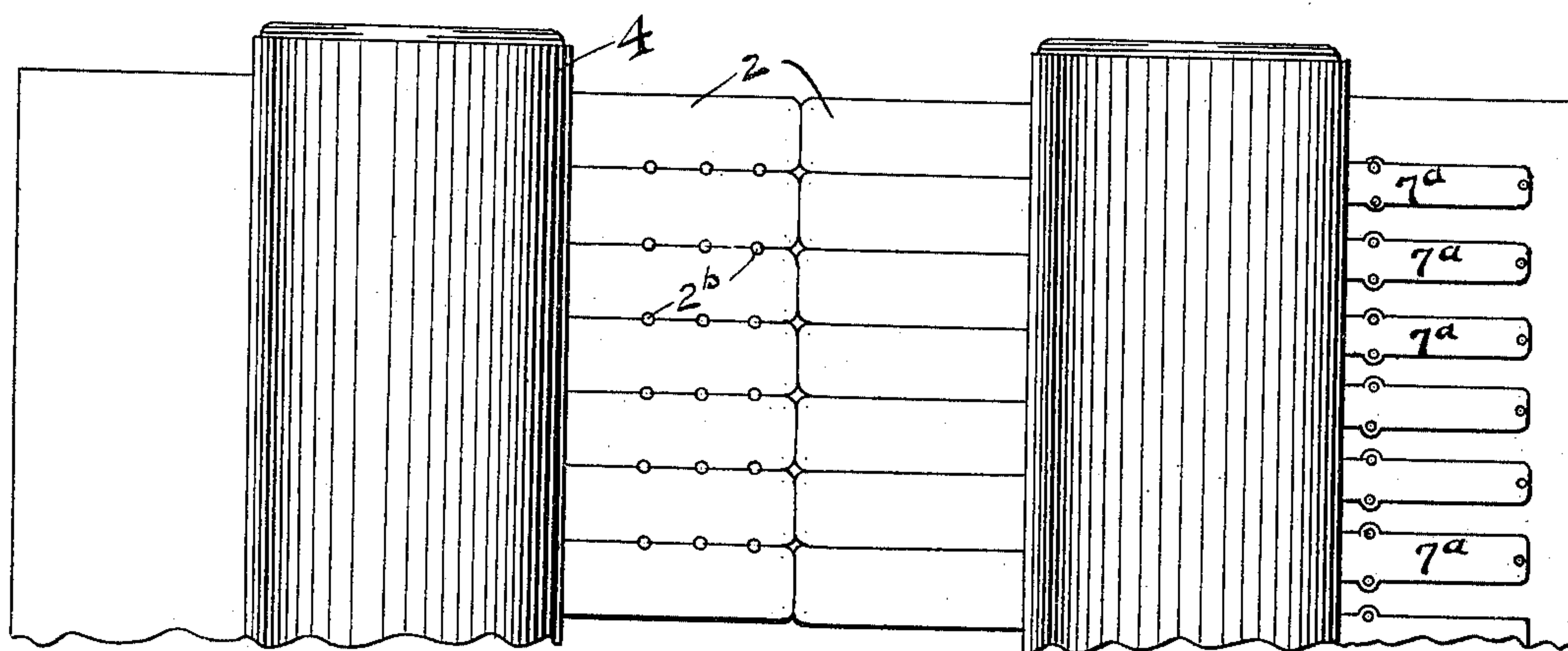
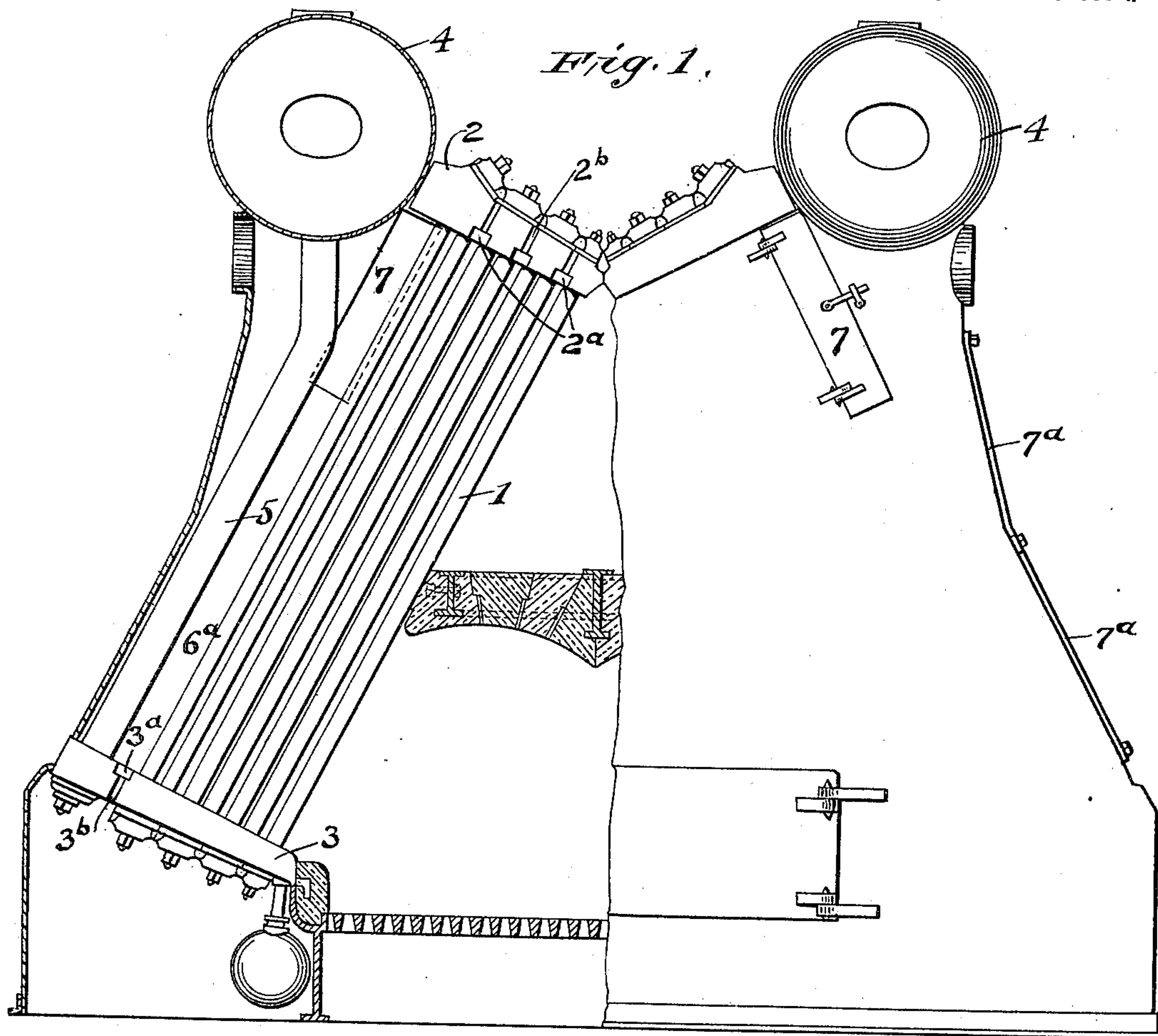
Patented Mar. 18, 1902.

C. B. REARICK.  
WATER TUBE STEAM BOILER.

(Application filed May 22, 1901.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES  
*C. W. Benjamin*  
*J. C. Reiser*  
*S. H. Fullager*

*Fig. 2.*

INVENTOR  
*Chas. B. Rearick*

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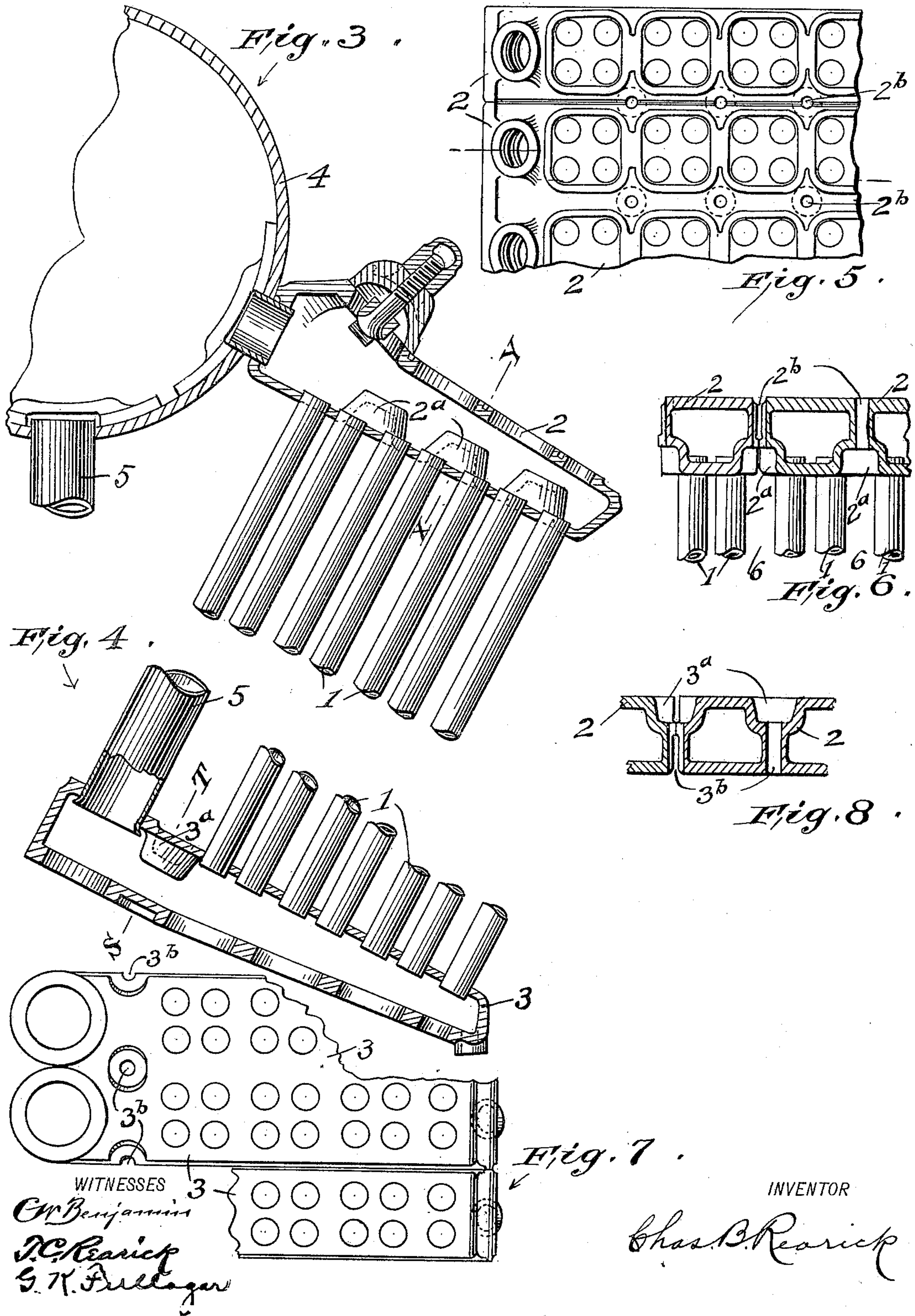
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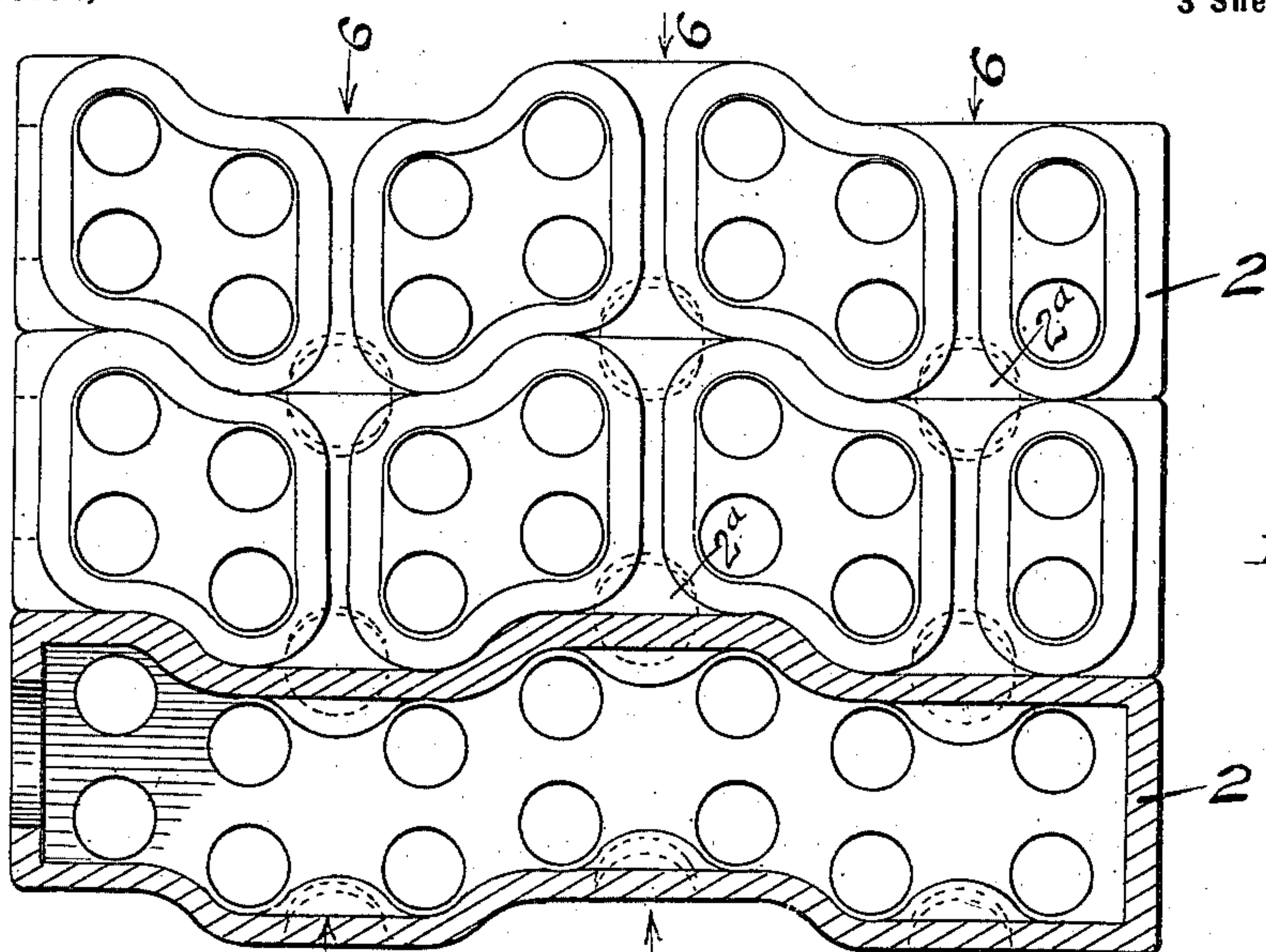


Fig. 9.

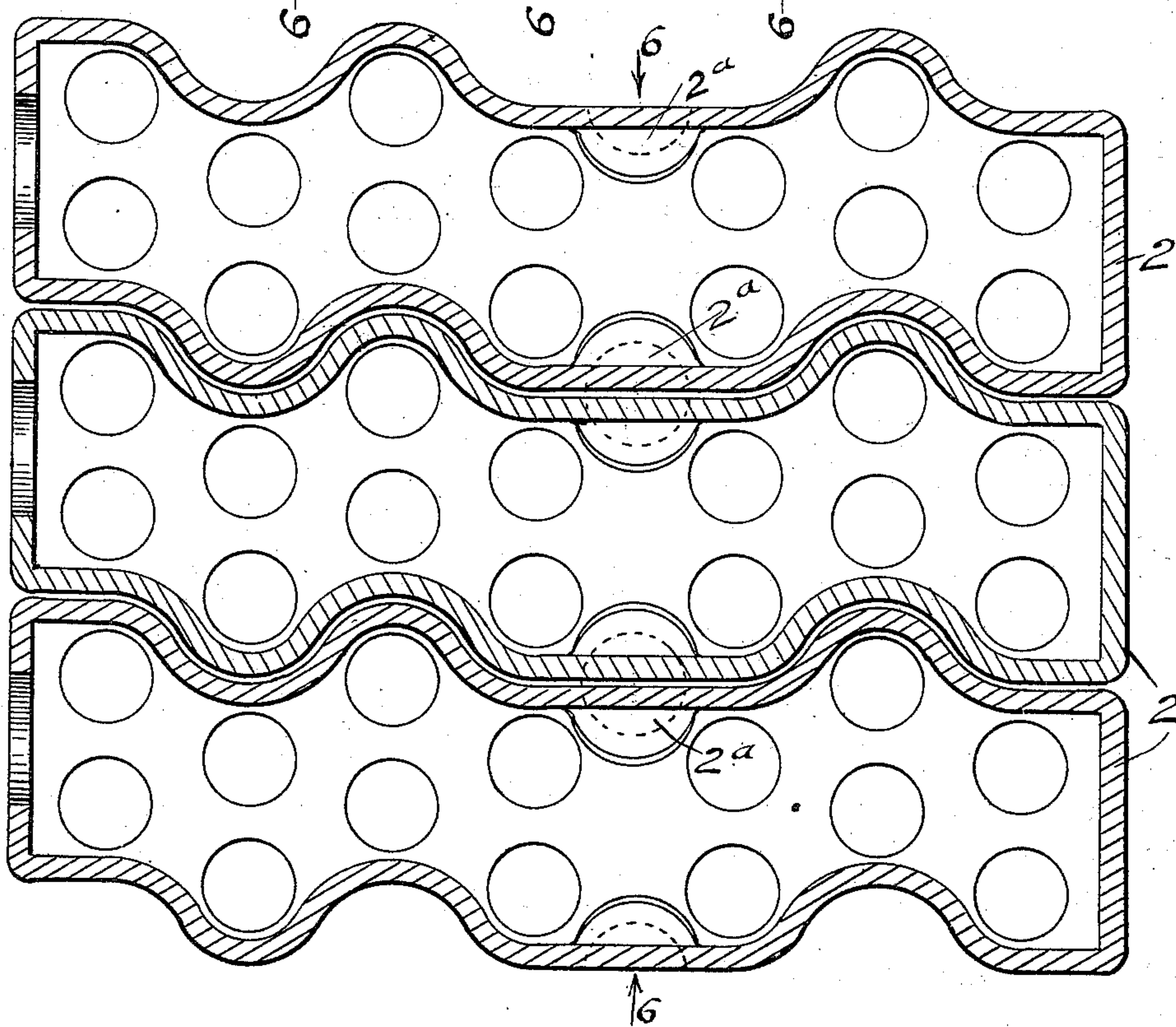


Fig. 10.

WITNESSES  
C. W. Benjamin  
J. C. Rearick  
S. K. Muller

INVENTOR

Chas. B. Rearick



# UNITED STATES PATENT OFFICE.

CHARLES B. REARICK, OF NEW YORK, N. Y.

## WATER-TUBE STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 695,869, dated March 18, 1902.

Application filed May 22, 1901. Serial No. 61,455. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES B. REARICK, a citizen of the United States, residing in New York, county of New York, State of New York, have invented a new and useful Improvement in Water-Tube Steam-Boilers, of which the following is a specification.

The invention relates to the form and arrangement of headers and tubes connected thereto which comprise the heating-surface of a water-tube boiler.

The purpose of my invention is to provide safe means for quickly removing injured tubes and for replacing same with perfect ones in the type of water-tube boiler composed of manifolds or headers connected by tubes, the object being to accomplish the same without passing the injured or new tubes through the said headers or manifolds and without disturbing the other tubes, as is now most generally the practice.

Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is an end elevation, partly in section, of a boiler of the general design as set forth in my pending application, Serial No. 734,314, filed October 21, 1899, with the exception that the headers, arrangement of tubes, &c., have been improved with a view to quickly removing and replacing same. Fig. 2 is a plan view of said boiler; Figs. 3 and 4, vertical sectional views of upper and lower headers; Fig. 5, plan view of upper header; Fig. 6, cross-sectional view on line X Y, Fig. 3, of upper headers; Fig. 7, plan view of lower headers; and Fig. 8, cross-sectional view of lower headers on line S T, Fig. 4. Figs. 9 and 10 are alternative constructions of headers.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

Figs. 1 and 2 show two boilers or units set with one furnace in common to both, so for further consideration I shall only describe one of these units.

The boiler, as shown in the several views, consists of banks of water-tubes 1; upper and lower headers 2 and 3, respectively, into which said tubes open at their respective ends; a steam and water drum 4, into which upper headers 2 open, and downflow-pipes 5 from

steam and water drum 4 to lower headers 3. The upper headers 2 and lower headers 3 are provided with pockets 2<sup>a</sup> and 3<sup>a</sup>, respectively, in the tube-sheet faces of such headers, such pockets being in diameter somewhat larger than the water-tubes 1 and a depth somewhat greater than the difference between the length of such tubes and the distance between the headers 2 and 3. When the headers 2 and 3 are arranged to take only two tubes in width, the pockets 2<sup>a</sup> and 3<sup>a</sup> are arranged half in each header, as shown. Through each of the headers 2 and 3 I may have holes 2<sup>b</sup> and 3<sup>b</sup>, respectively communicating with the pockets in such headers. The water-tubes 1 may be arranged with reference to the steam and water drum in double transverse rows, as shown in Fig. 5, with spaces 6 between each pair, as shown in Figs. 5 and 6, such spaces 6 being somewhat greater in width than the diameter of the tubes 1, or tubes 1 may be arranged in sets of double or multiple rows, with spaces 6 between each set, and such spaces lying parallel to the axis of the steam and water drum 4. This latter arrangement is shown in Figs. 9 and 10. In the sides and ends of the casing are doors in or openings through the casing, (designated as 7 and 7<sup>a</sup>, respectively.) When the openings 7 in the ends are used, those in the sides 7<sup>a</sup> may be omitted, and vice versa, or both may be used in conjunction.

When it is desired to remove an injured tube, (see Fig. 1,) the operation consists of loosening the tube at both ends from the respective headers to which it is fast, then lower it until its upper end will swing clear of the lower face of this upper header, next swing this upper end into the nearest pocket 2<sup>a</sup> in such upper header, and raise the tube until its lower end is clear of the lower header 3. Then swing the lower end of the injured tube outward through the passage 6 to opening 7<sup>a</sup>, opposite the said passage 6, and remove it through such opening 7<sup>a</sup>. The operation of putting in a new tube is the reverse of the above-described operation of removing an injured one. By inserting a rod through the opening 2<sup>b</sup>, that communicates with the pocket 2<sup>a</sup>, that was made use of in the above-described operations, the injured as well as the new tube can be more easily and quickly guided



to the said pocket, although the operation can be performed without so doing. In cases where it is not convenient to have the openings in the sides of the boiler-casing and where the tubes are arranged as in the above-described case the tube when it has reached the point where its upper end is in the pocket 2<sup>a</sup> and the lower end swings clear of the lower header can be swung into pocket 3<sup>a</sup> in the lower header and the top end of the tube swung out until it is in the passage 6<sup>a</sup>, (see Fig. 1,) when it can be passed out into the fire-room through passage 7. The reverse operation applies to the inserting of a new tube. A rod may be inserted through the hole 3<sup>b</sup> in lower header for guiding the tube into pocket 3<sup>a</sup>.

Where the passages 6 are parallel to the axis of the steam and water drum, there would be an opening 7 in the casing opposite each such space, (see Figs. 1 and 9,) and the operation of removing a tube would consist of getting the injured tube into the pocket 2<sup>a</sup> and to swing clear of the lower header, as before, and then swinging the lower end of the tube away from the end casing in which the openings 7 are until the top end of the tube came clear of the upper header, which will then permit such tube to be passed out through the said opening 7 opposite the respective passage 6. A new tube would be put in in the reverse manner.

In order to make the boiler more compact, one pocket in the header may be arranged to receive more than four tubes (see Fig. 10)—as, for example, any tube in either of the second rows of tubes from the space 6 can be removed by first removing one or two of the tubes in the rows adjacent to the passage 6.

While I have shown my invention as used in connection with a vertical type of boiler, I desire it to be understood that it can be used equally as well in the types of boilers where the tubes are inclined or horizontal, and, furthermore, that changes in and variations from the specific constructions shown and described would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention, and I do not, therefore, desire to confine myself to the exact constructions and arrangements as shown and described; but,

Having set forth the object and nature of my invention and a form of apparatus embodying the principle thereof, what I claim as new and useful, and desire to secure by Letters Patent, is—

1. In a water-tube boiler, the combination of two headers, banks of tubes in communication at their respective ends with such headers, free spaces between the banks of tubes, such free spaces having a width greater

than the diameter of the tubes, with pockets or indentations in the headers, such pockets opening into the said free spaces.

2. In a water-tube boiler, the combination of two headers, banks of tubes in communication at their respective ends with such headers, free spaces between the banks of tubes, such free spaces having a width greater than the diameter of the tubes, pockets in the headers, such pockets opening into the said free spaces, with suitable openings through the headers and communicating with the said pockets, as and for the purpose set forth.

3. In a water-tube boiler, the combination of two headers, banks of tubes in communication at their respective ends with such headers, free spaces between the banks of tubes, such free spaces having a width greater than the diameter of the tubes, pockets in the headers, such pockets opening into the said free spaces, with openings through the boiler-casing and in communication with the said free spaces.

4. In a water-tube boiler, the combination of banks of tubes in communication at each of their respective ends with a series of headers, free spaces between the banks of tubes, such free spaces having a width greater than the diameter of the tubes, with pockets or indentations formed by the said headers, such pockets opening into said free spaces.

5. In a water-tube boiler, the combination of banks of tubes in communication at each of their respective ends with a series of headers, free spaces between the banks of tubes, such free spaces having a width greater than the diameter of the tubes, pockets formed by the said headers, such pockets opening into the said free spaces, with suitable openings formed by the headers and establishing communication between such pockets and the free space without the boiler, as and for the purpose set forth.

6. In a water-tube boiler, the combination of banks of tubes in communication at each of their respective ends with a series of headers, free spaces between the banks of tubes, such free spaces having a width greater than the diameter of the tubes, pockets formed by the said headers, such pockets opening into the said free spaces with openings through the boiler-casing and in communication with the said free spaces.

Signed at New York, in the county of New York and State of New York, this 15th day of May, A. D. 1901.

CHAS. B. REARICK.

Witnesses:

T. C. REARICK,  
G. K. FULLAGAR.