

No. 819,382.

PATENTED MAY 1, 1906.

R. SCHULZ.  
STEAM GENERATOR.  
APPLICATION FILED JULY 22, 1905.

3 SHEETS—SHEET 1.

Fig.1.

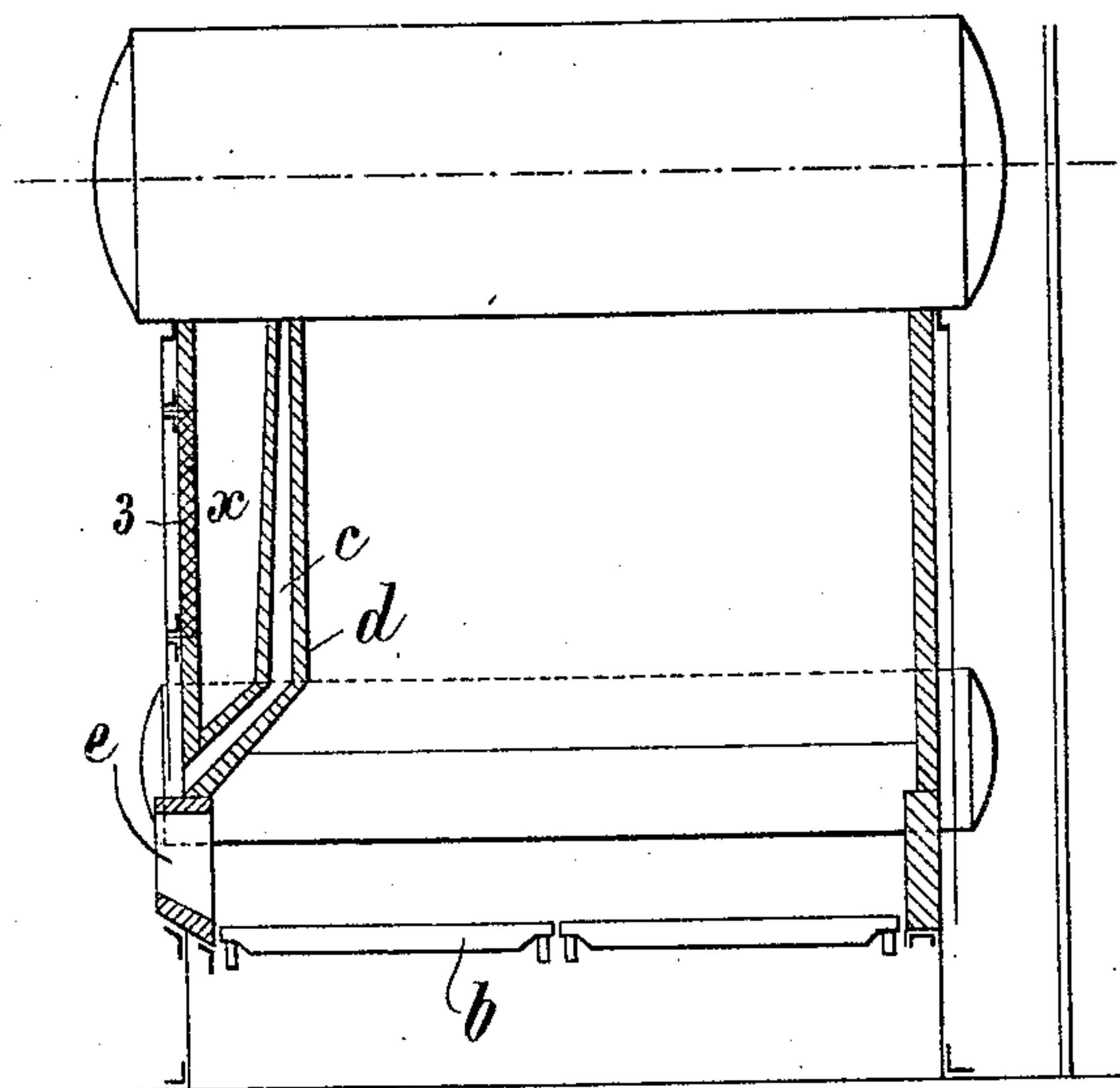


Fig.3.

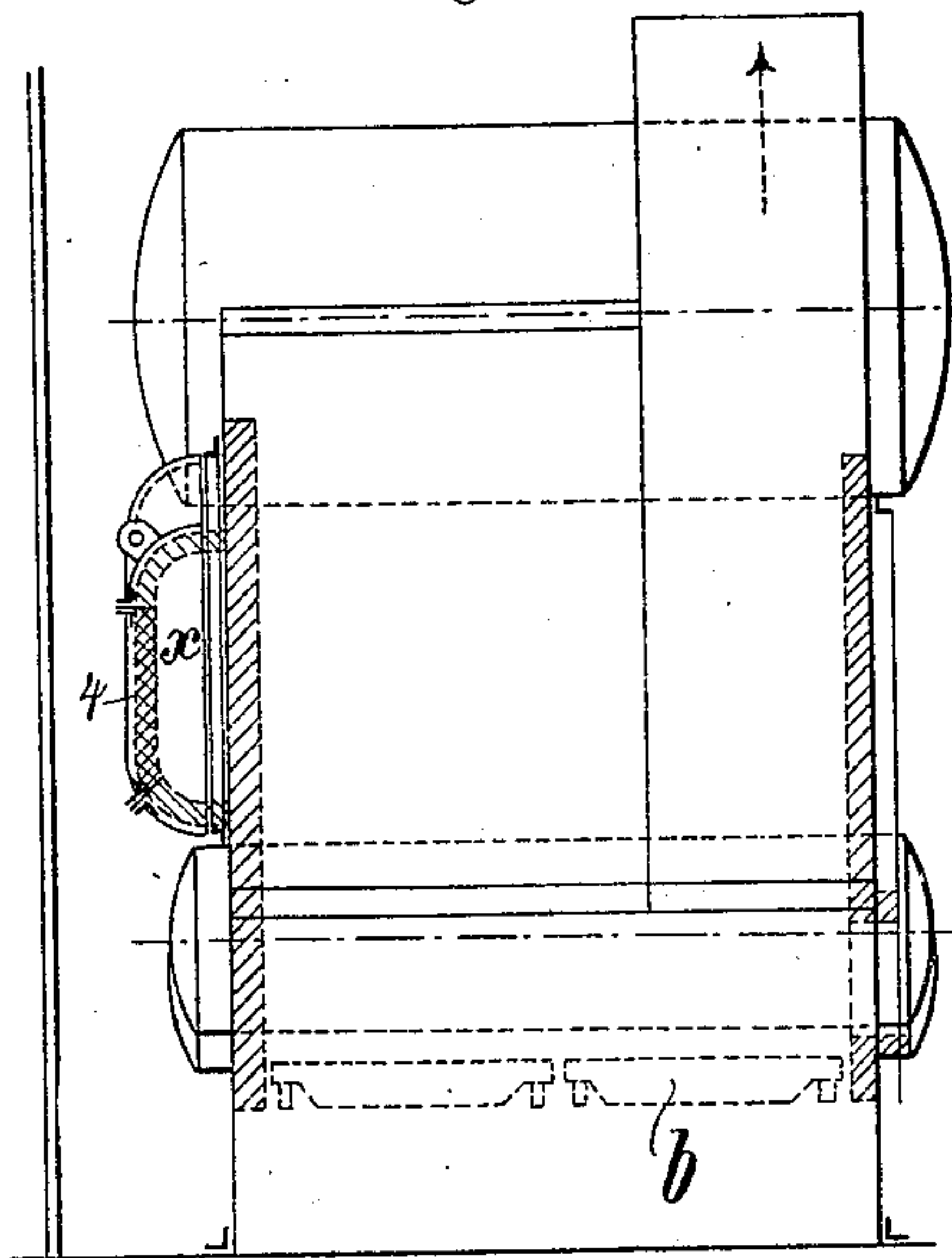
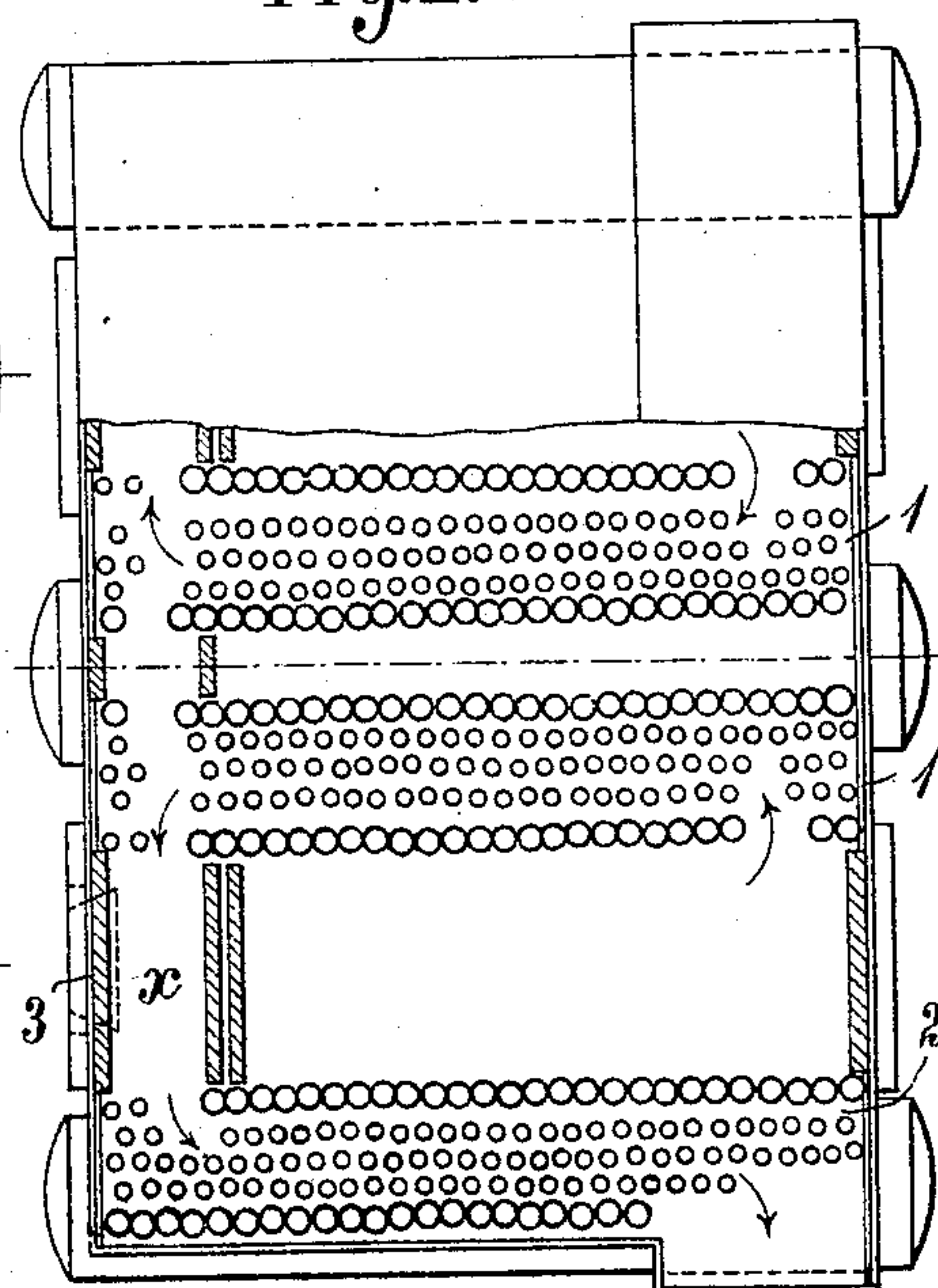


Fig.2.



Witnesses.

H. L. Amer.

B. Romm

Inventor.

Richard Schulz.

by Henry Orth atty.

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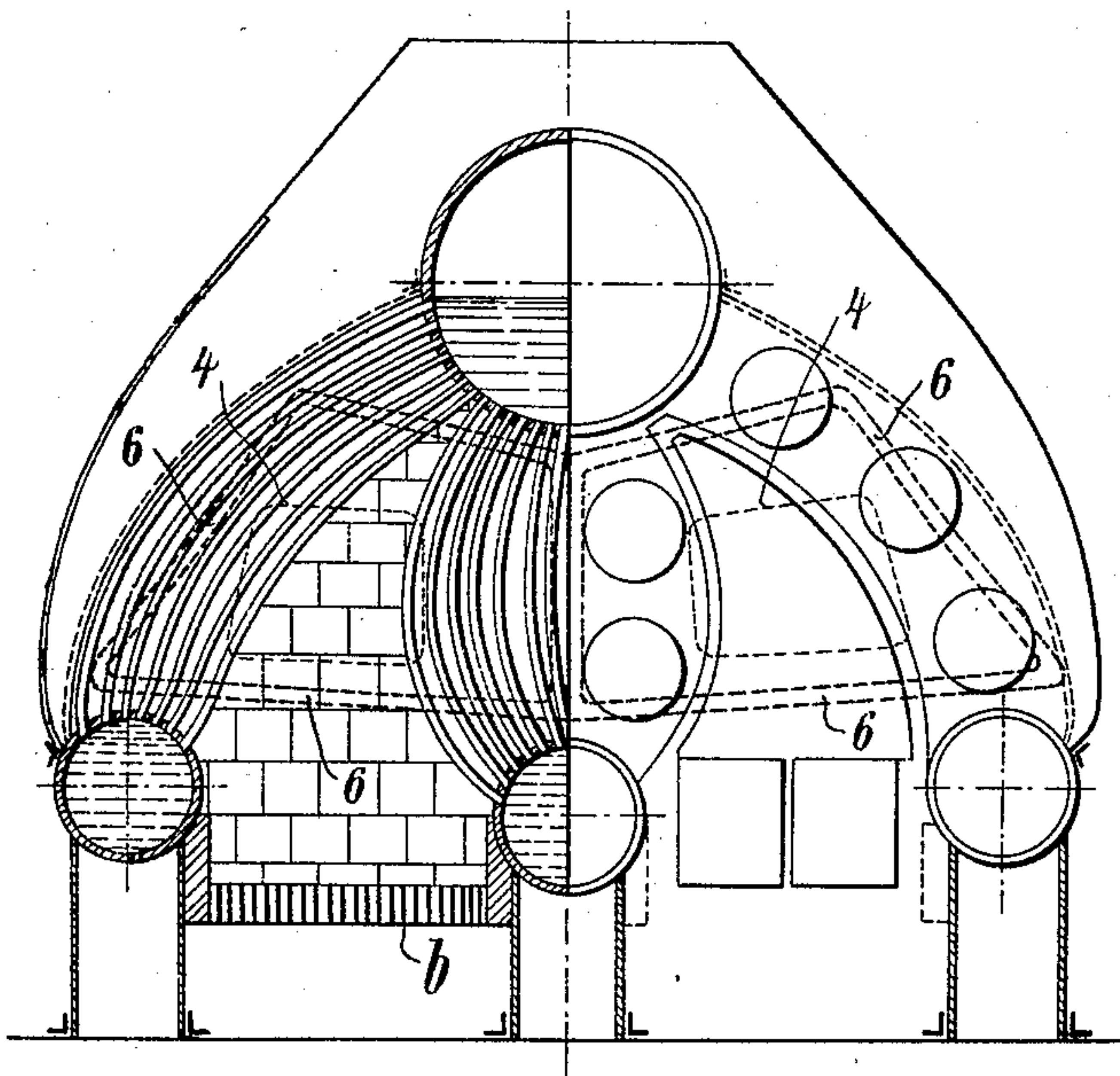
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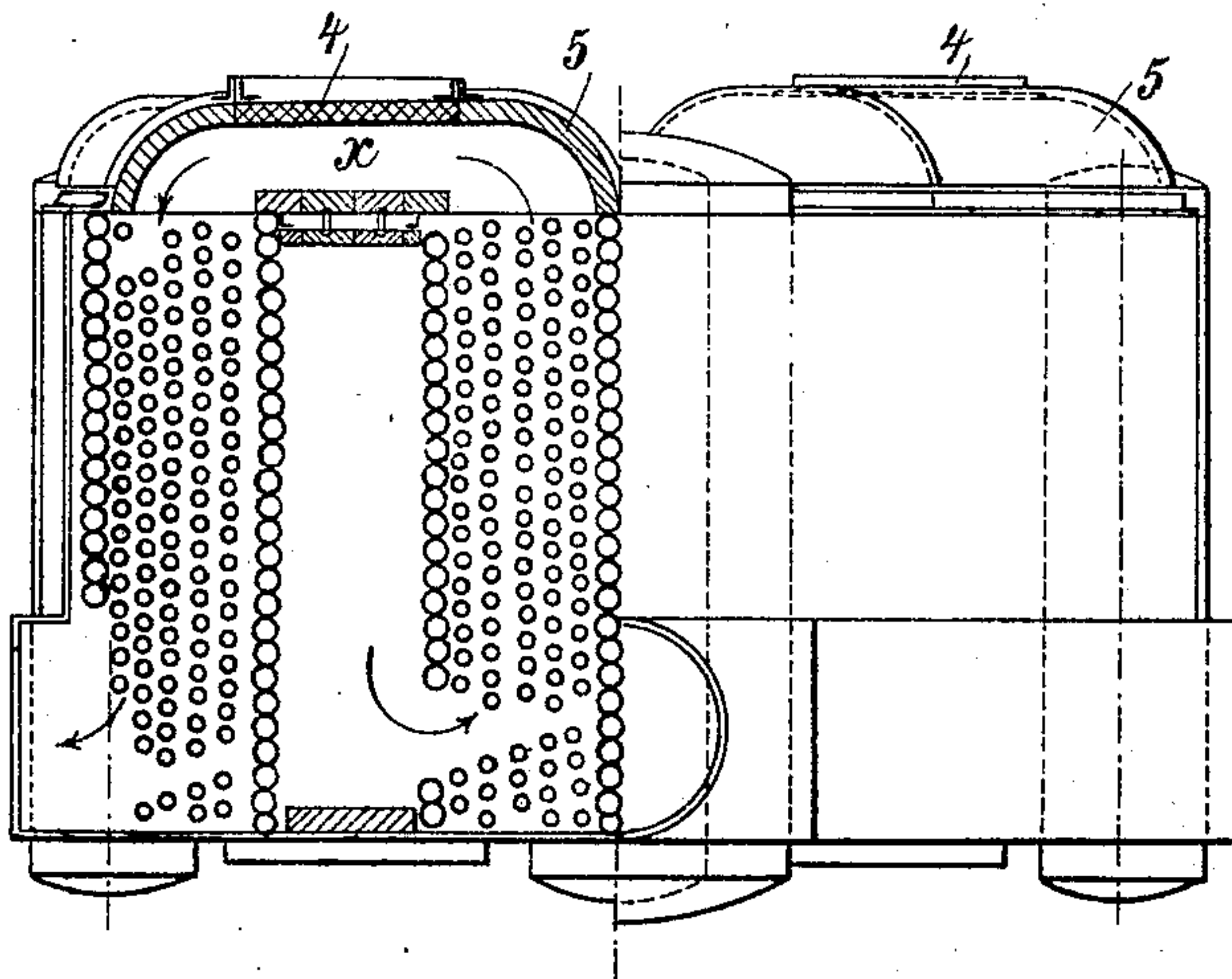
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3 SHEETS—SHEET 2.

*Fig.4.*



*Fig.5.*



*Witnesses.*

*H. L. Amer.*

*C. Rommels*

*Inventor.*

*Richard Schulz.*

*by Henry Orth J. Atty.*

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3 SHEETS—SHEET 3.

Fig. 6.

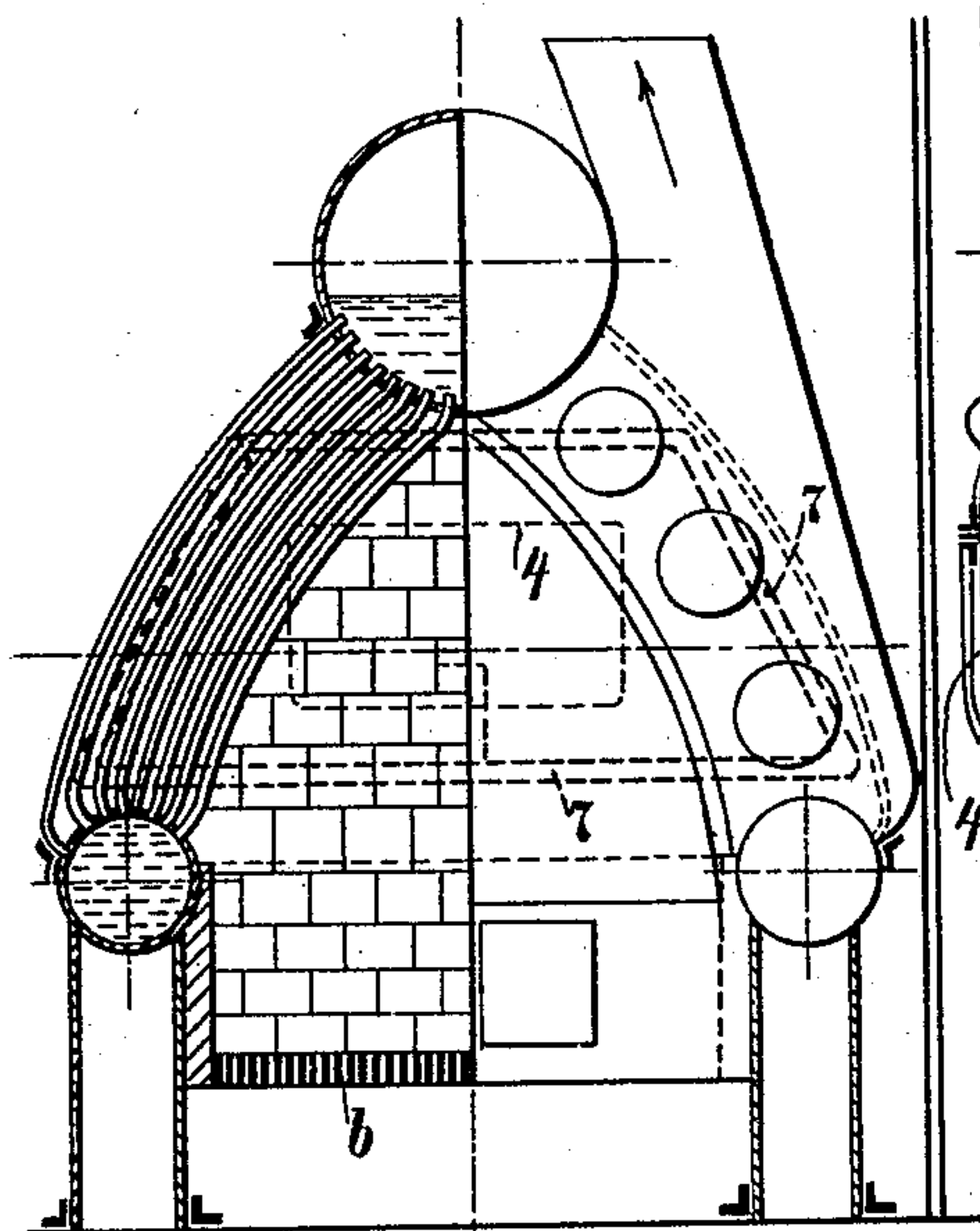


Fig. 7.

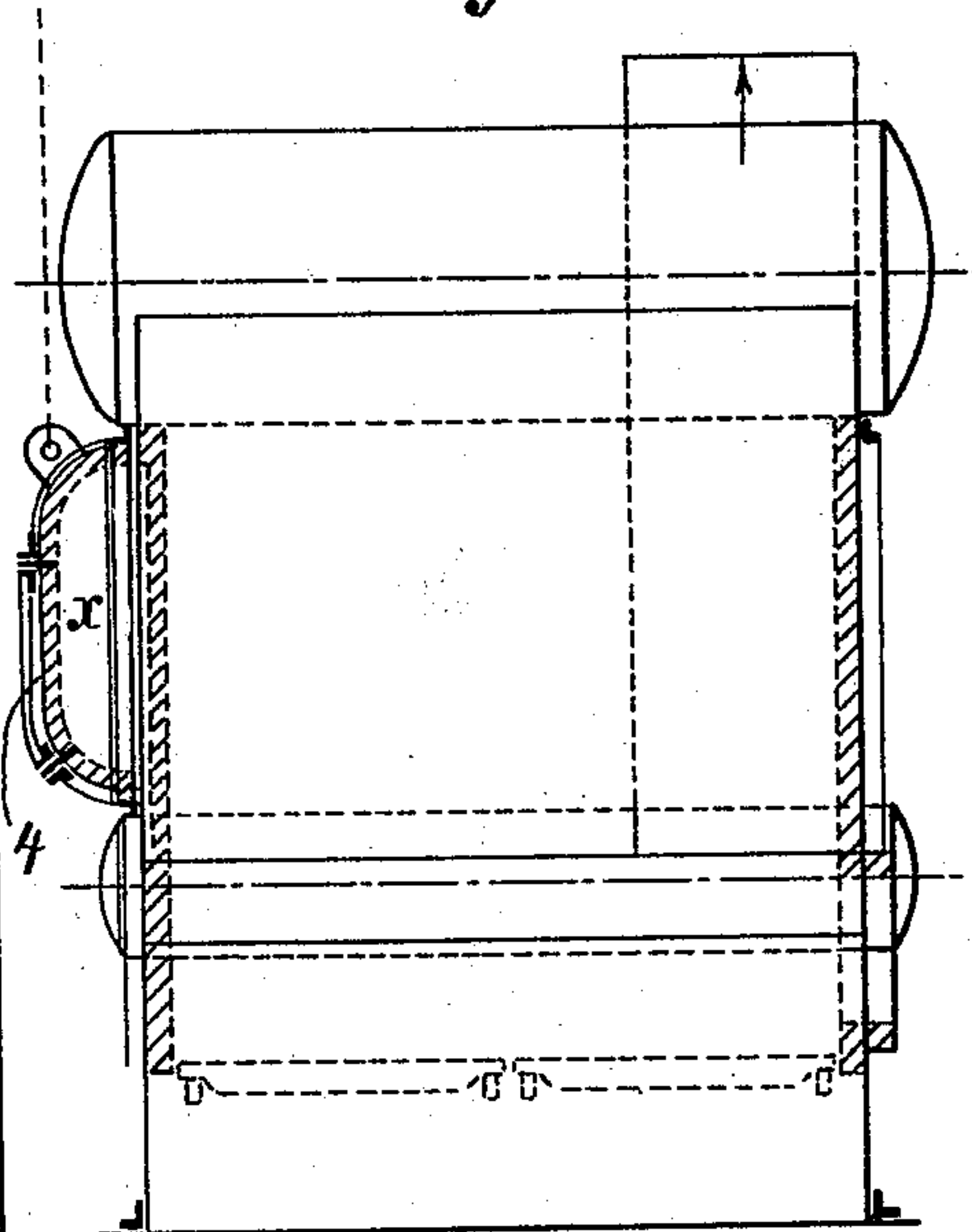


Fig. 8.

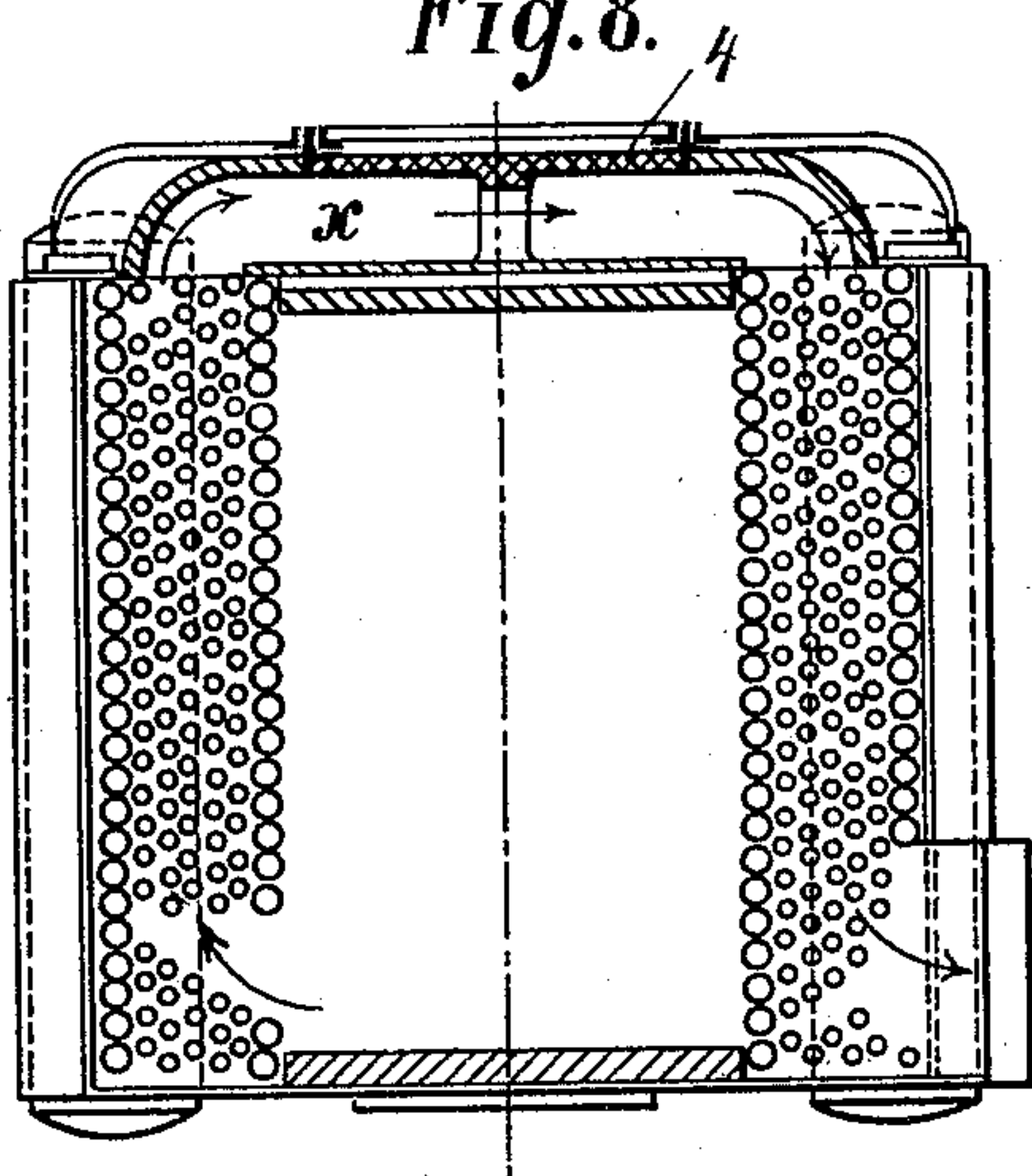
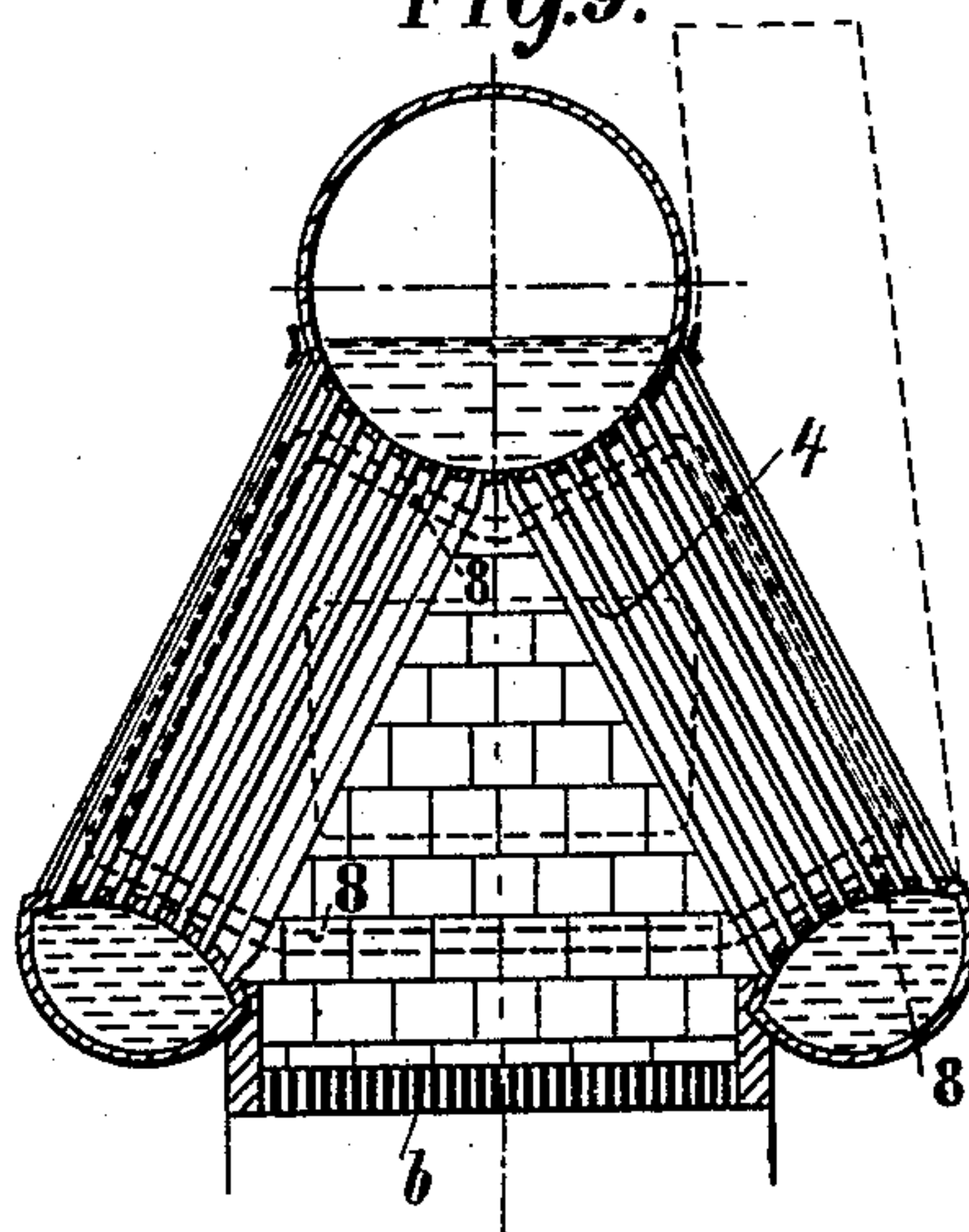


Fig. 9.



Witnesses.

H. L. Amer.  
O. Rommers

Inventor.

Richard Schulz.  
by Henry Orth atty.



# UNITED STATES PATENT OFFICE.

RICHARD SCHULZ, OF BERLIN, GERMANY.

## STEAM-GENERATOR.

No. 819,382.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed July 22, 1905. Serial No. 270,848.

*To all whom it may concern:*

Be it known that I, RICHARD SCHULZ, a subject of the King of Prussia, German Emperor, residing at Berlin, Germany, have invented certain new and useful Improvements in Steam-Generators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

The object of my invention is an improvement in steam-generators that have a continuous main passage for gases of combustion around the fire-box to enable the grate-surface to extend the entire length of the steam and water drums. This continuous passage is formed as shown in my prior patent, No. 737,782, granted September 1, 1903, by a chamber *x*, connecting the flues through the water-legs. In the present invention, this chamber is either inside or outside the casing, removable or not, and in any case clear of the grate, so as not to decrease the grate-surface.

Referring to the drawings, in which like parts are similarly designated, Figure 1 is a view, partly in vertical section and partly in elevation, of a twin furnace, showing the chamber *x* inside the furnace. Fig. 2 is a part plan and part section of the same. Fig. 3 is a view showing the chamber *x*, secured to one of the end walls of the furnace. Fig. 4 is an elevation, partly in section, showing the shape of the chamber *x* in dotted lines. Fig. 5 is a plan view, partly in section, of Fig. 4. Fig. 6 is a front elevation, and Fig. 7 a side elevation, both partly in section and showing a single furnace. Fig. 8 is a horizontal section thereof. Fig. 9 is a section showing a single furnace having straight instead of curved tubes.

In the drawings, the fire-box is formed between the walls of outer tubes set in juxtaposition and forming parts of the water-legs through which the furnace-gases pass. The passages 1 and 2 through the water-legs are connected at one of the end walls of the furnace by a chamber *x*, which may be either at the front, as shown in Fig. 1, or at the rear, Figs. 5 and 8, and either inside or outside of the furnace.

In Fig. 1 the connecting-chamber is shown contained within the furnace and is above the

grate *b*, so that the grate can extend the full length of the boiler, and the rear wall of the chamber forming one end *d* of the fire-box is of refractory material with an insulating space *c* within it that ends directly above the stoking door or opening *e*. This wall *d* is preferably, but not necessarily, inclined. A door 3 permits access to the chamber for the purpose of cleaning.

In Figs. 3, 4, and 5 I have shown the connecting-chamber located beyond an end wall of the furnace, thus enabling a most economical operation of the furnace without either restricting the grate area or diminishing the size of the fire-box and here shown as on the rear end wall of the furnace. This chamber is composed of a sheet-metal casing 5, lined with fire-brick or with a continuous refractory cement lining and provided with a door 4.

The entire sheet-metal casing can be detachably connected to the boiler-casing by means of bolts or other means, whereby the entire chamber can be detached, thereby giving plenty of room to give access to the boiler for giving it a thorough cleaning and repair. Such a detachable chamber is shown in Figs. 3 and 7. The general outline of the chamber for the several types of water-tube boilers herein illustrated is shown in dotted lines at 6, 7, and 8, Figs. 4, 6, and 9.

Besides the great advantage of permitting easy and ready access to the boiler parts for cleaning and repairs and the increased grate area, which ordinarily occupied only two-thirds the length of the boiler, there is a most decided advantage to the stokers for the reason that the gases from the fire-box have already lost part of their heat to one of the water-legs, and this chamber will necessarily be of lower temperature than the fire-box, so that the radiation from the end of the furnace will be decidedly diminished. These are features of importance where compactness and large grate area are required, as in marine furnaces.

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

1. A water-tube steam-boiler having a grate and a continuous fire-gas passage around three sides of the fire-box; comprising side passages formed between the boiler-tubes and a chamber above the grate connecting the ends of the side passages, said passages connecting longitudinally at their ends with

the chamber and said chamber inclined downward toward the grate, substantially as and for the purposes set forth.

2. A water-tube steam-boiler having a  
5 grate and a continuous fire-gas passage around  
the three sides of the fire-box; comprising  
side passages extending the length of the  
fire-box and formed between water-tubes,  
and a connecting-chamber outside of the fire-  
10 box and extending across the ends of said

passages and above the grate, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

RICHARD SCHULZ.

Witnesses:

JULIUS RÖPKE,

HEINRICH MÖLLER.