

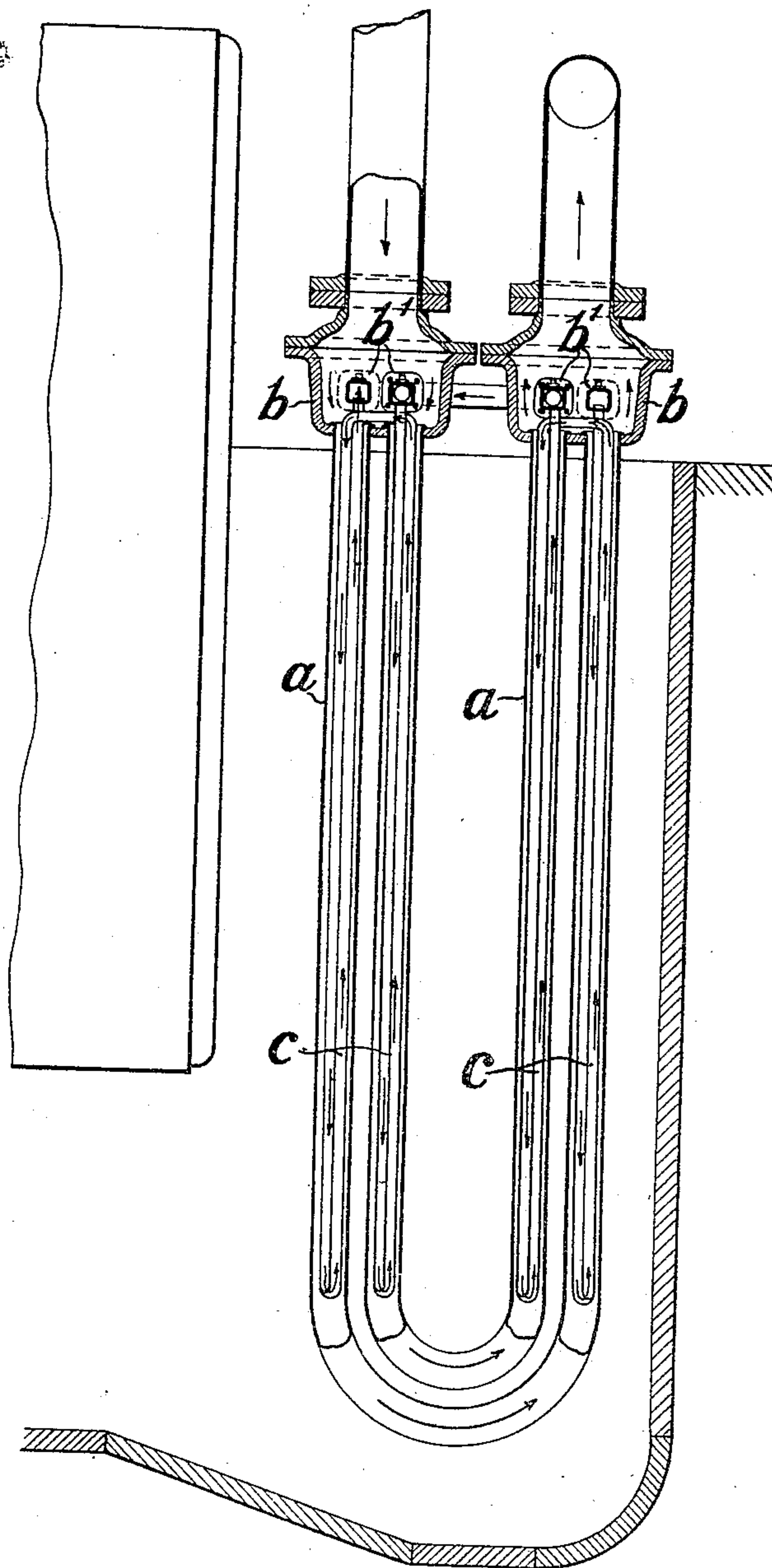
954,501.

H. CRUSE.  
APPARATUS FOR SUPERHEATING STEAM.  
APPLICATION FILED SEPT. 20, 1909.

Patented Apr. 12, 1910.

4 SHEETS—SHEET 1.

*Fig 1.*



WITNESSES

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INVENTOR

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BY Mr. Wallace White

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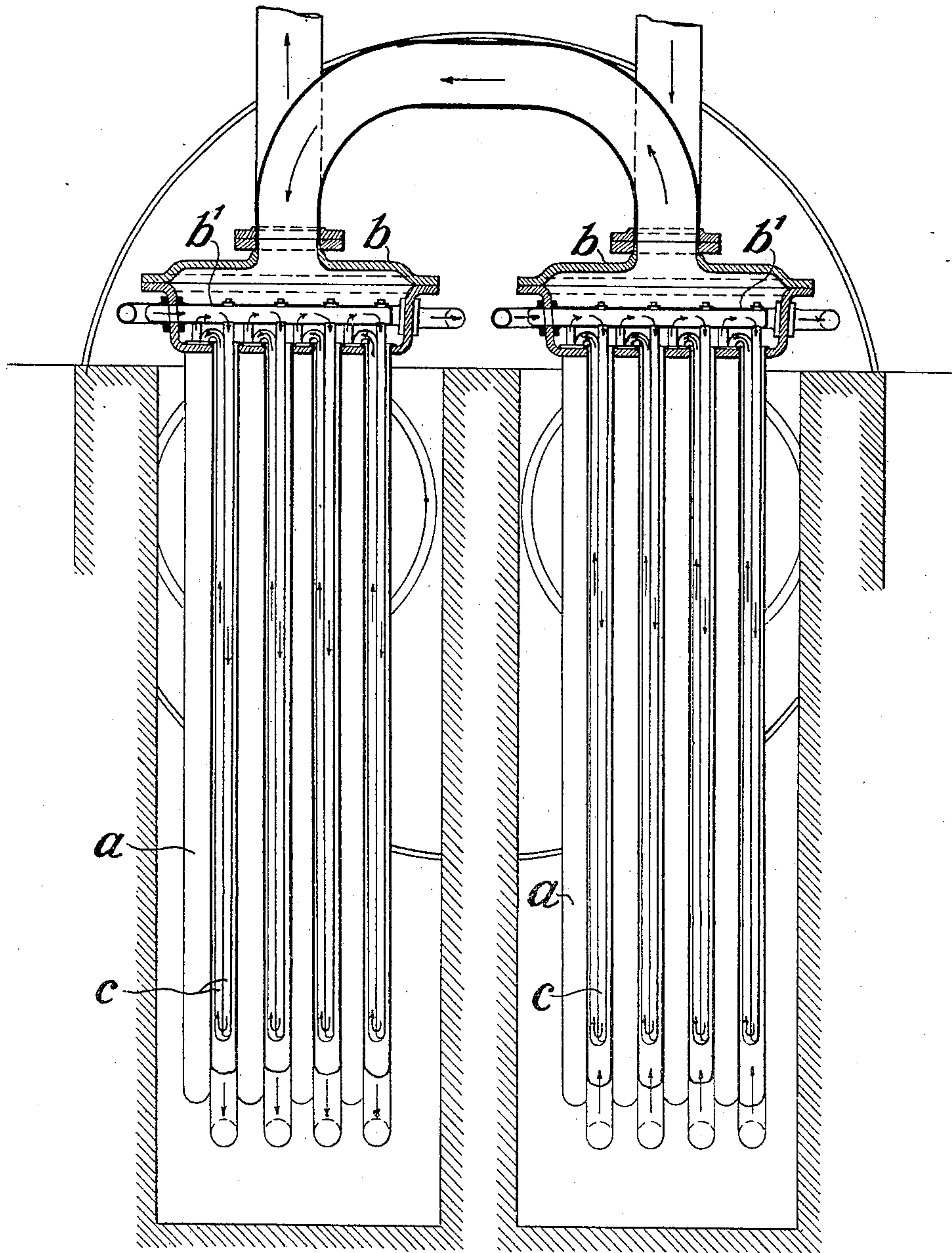
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4 SHEETS—SHEET 2.

Fig 2.



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4 SHEETS—SHEET 3.

Fig 3.

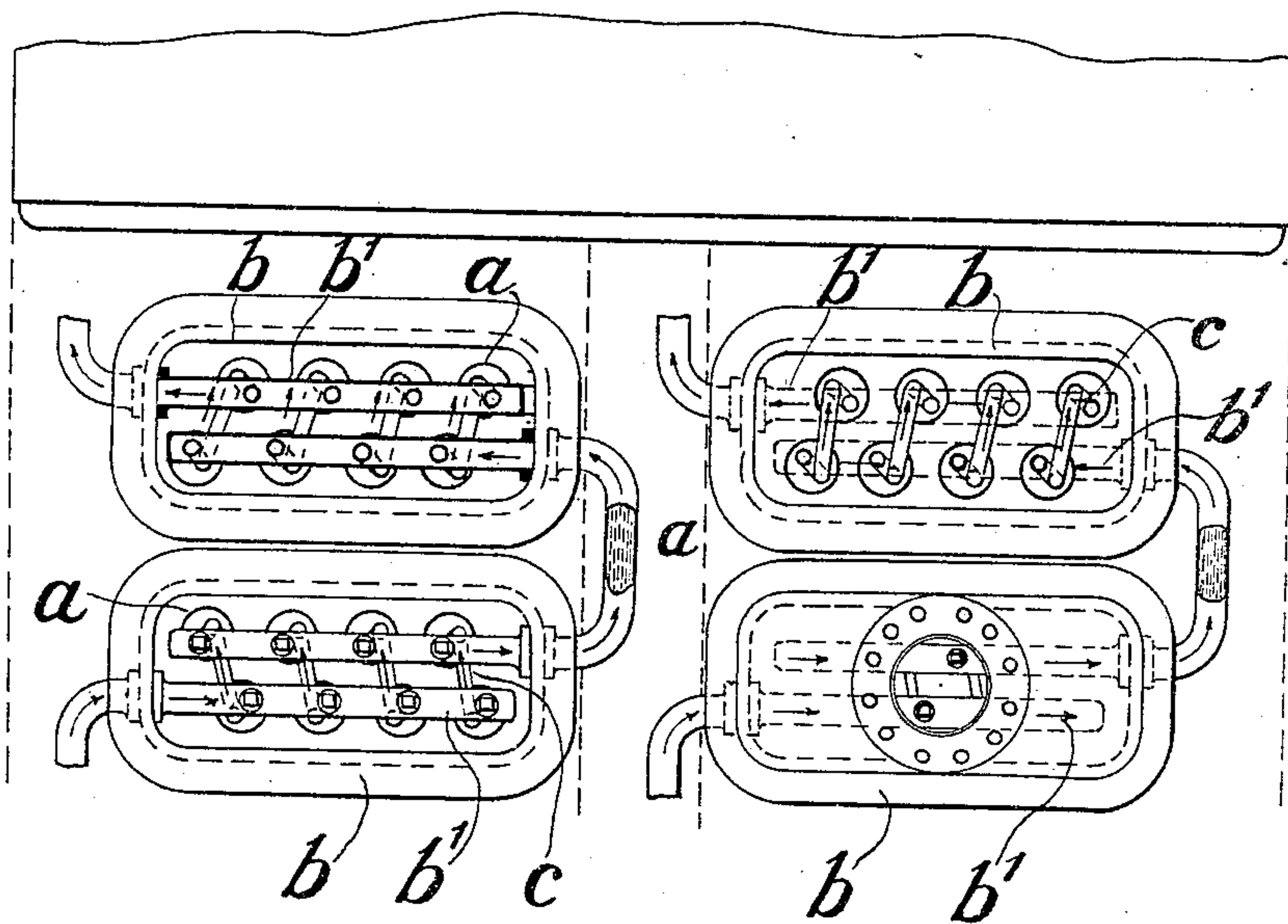
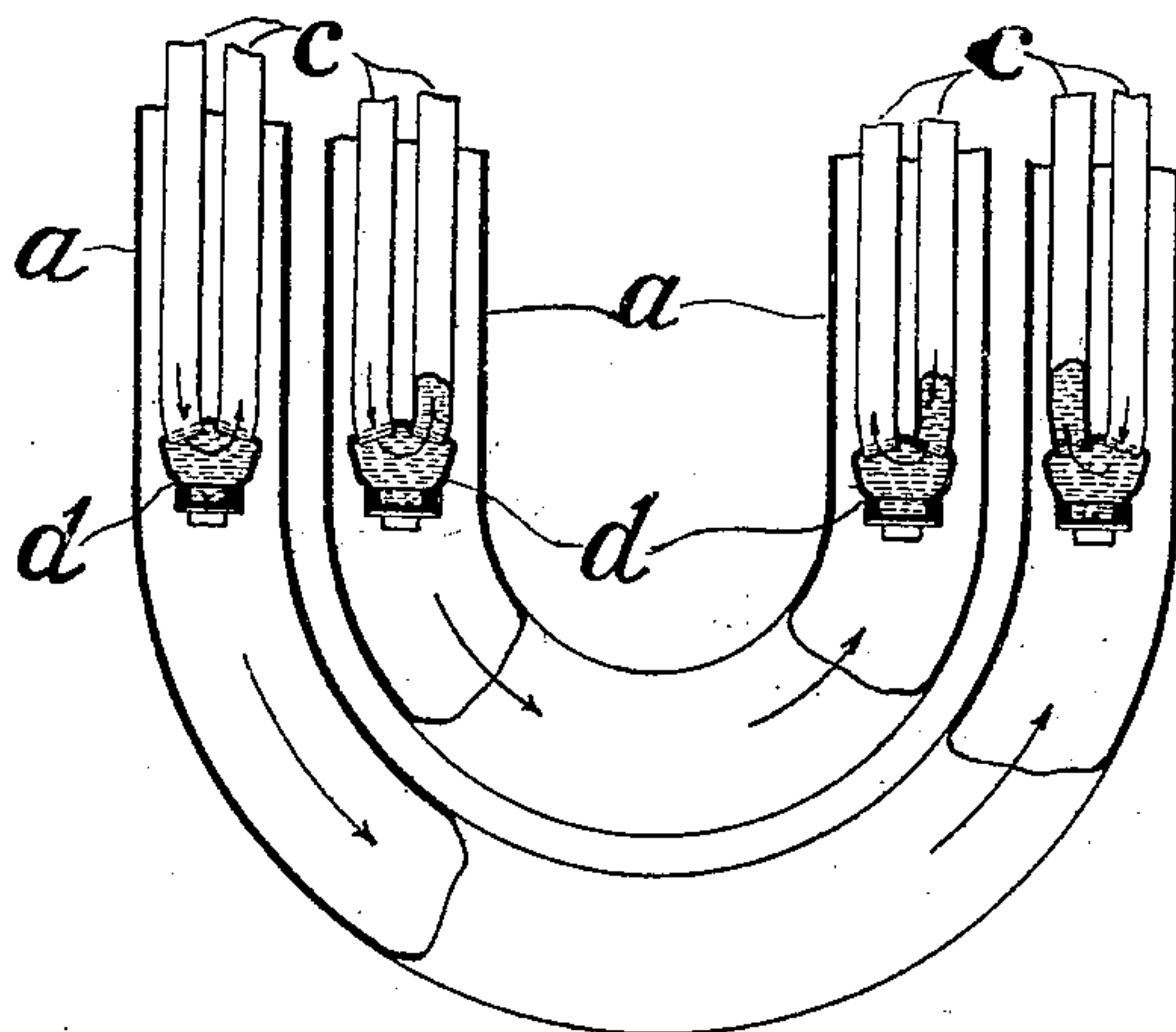


Fig 4.



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4 SHEETS—SHEET 4.

Fig 5.

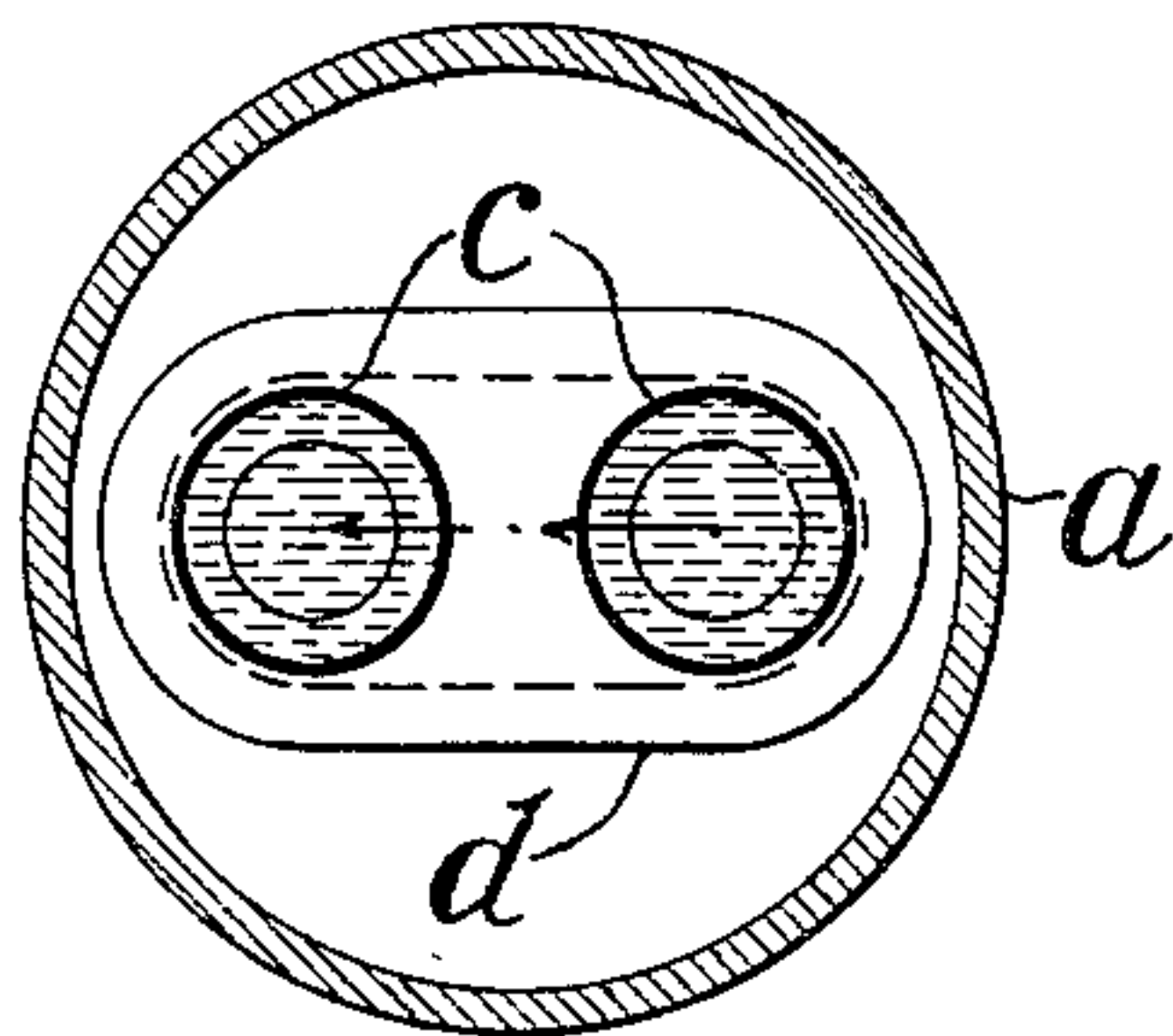


Fig 7.

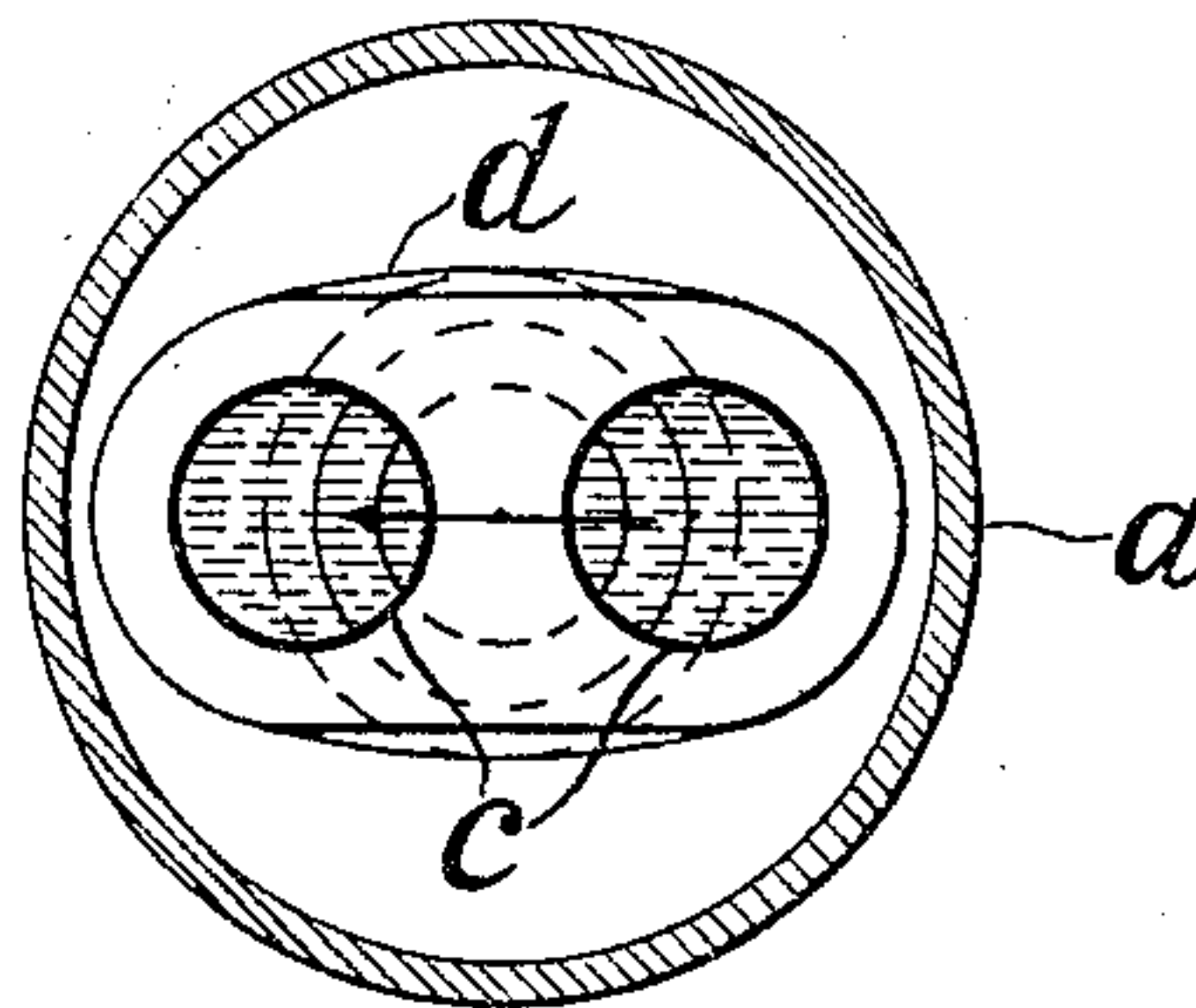


Fig 6.

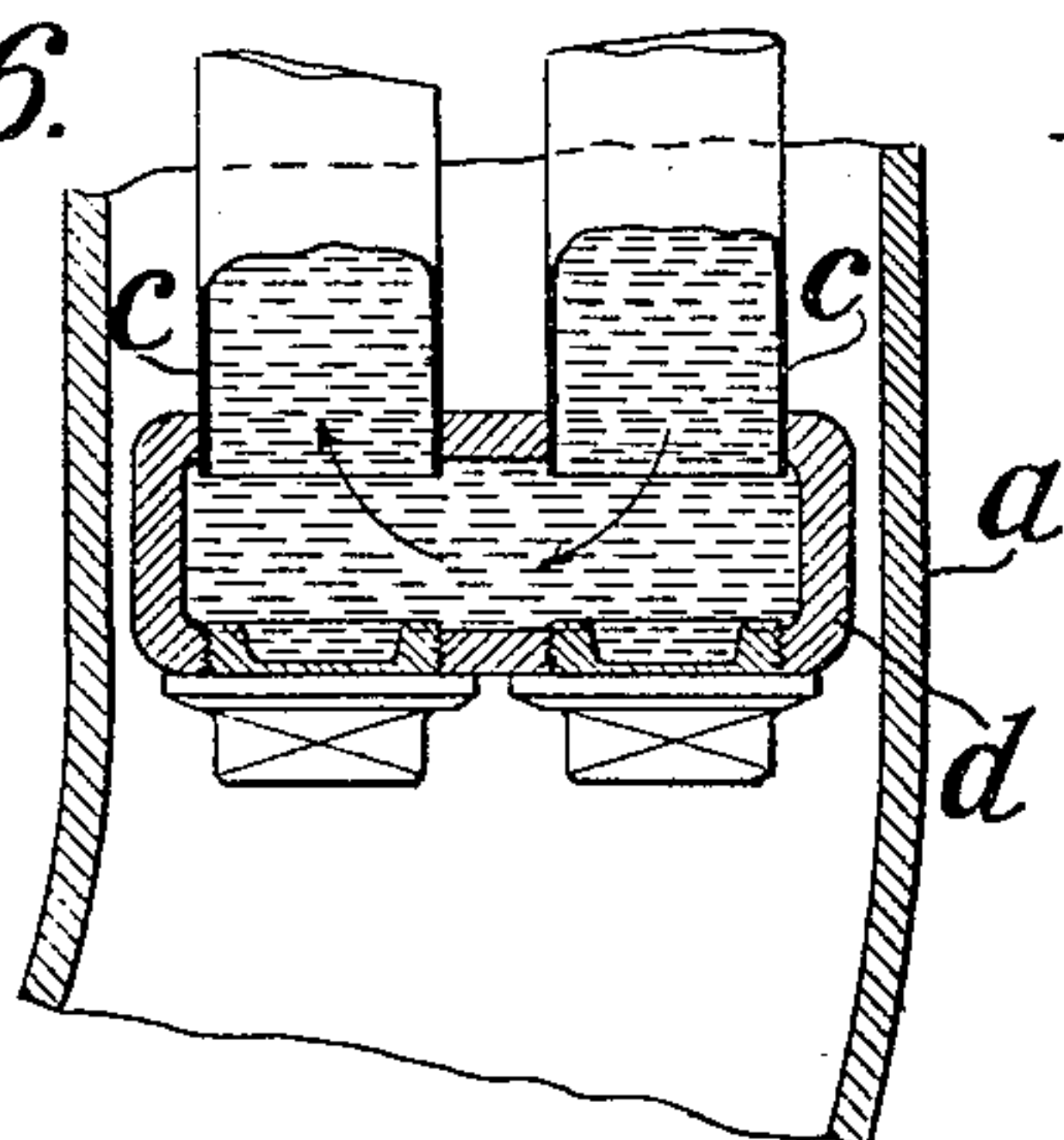


Fig 8.

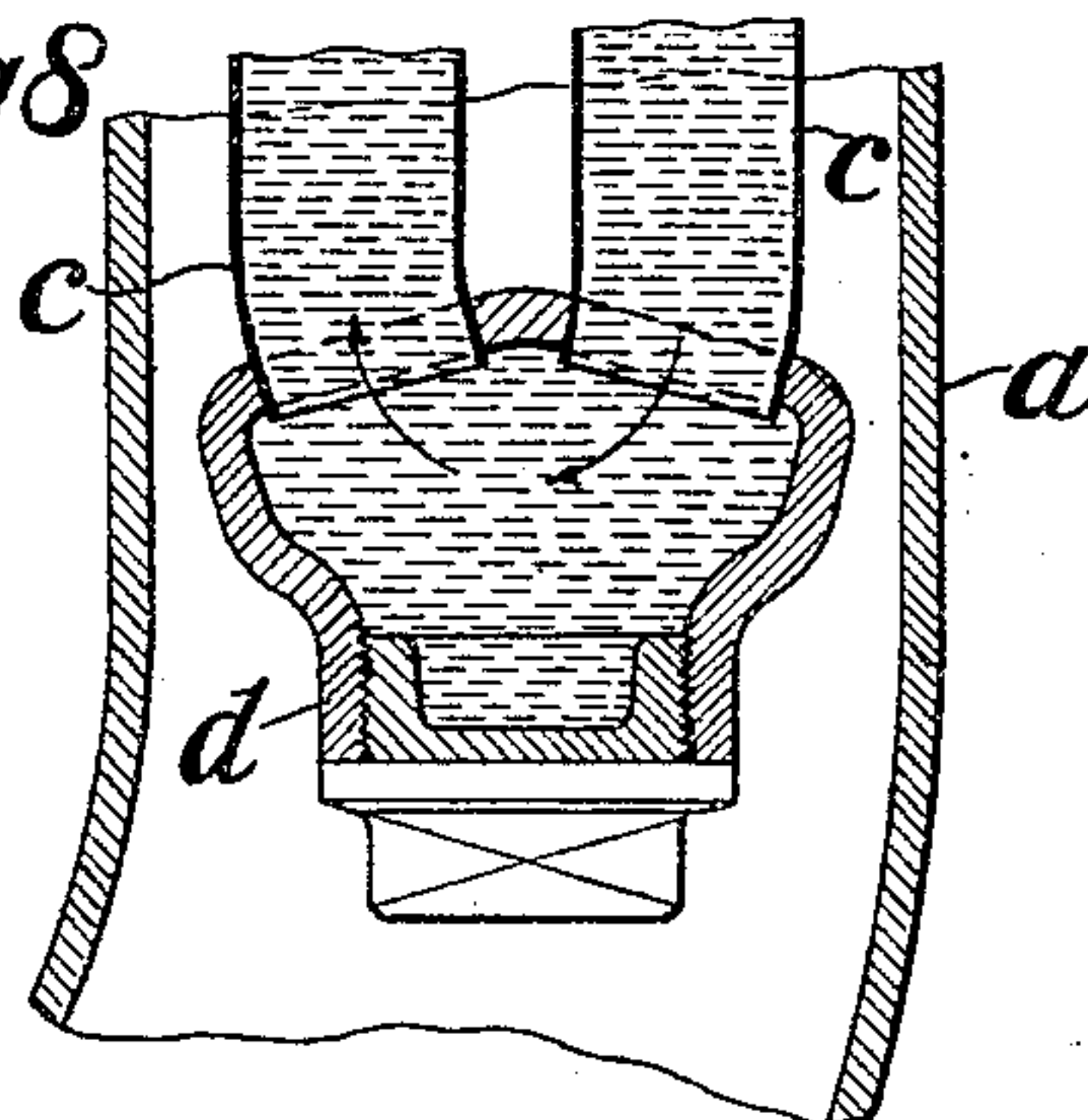


Fig 9.

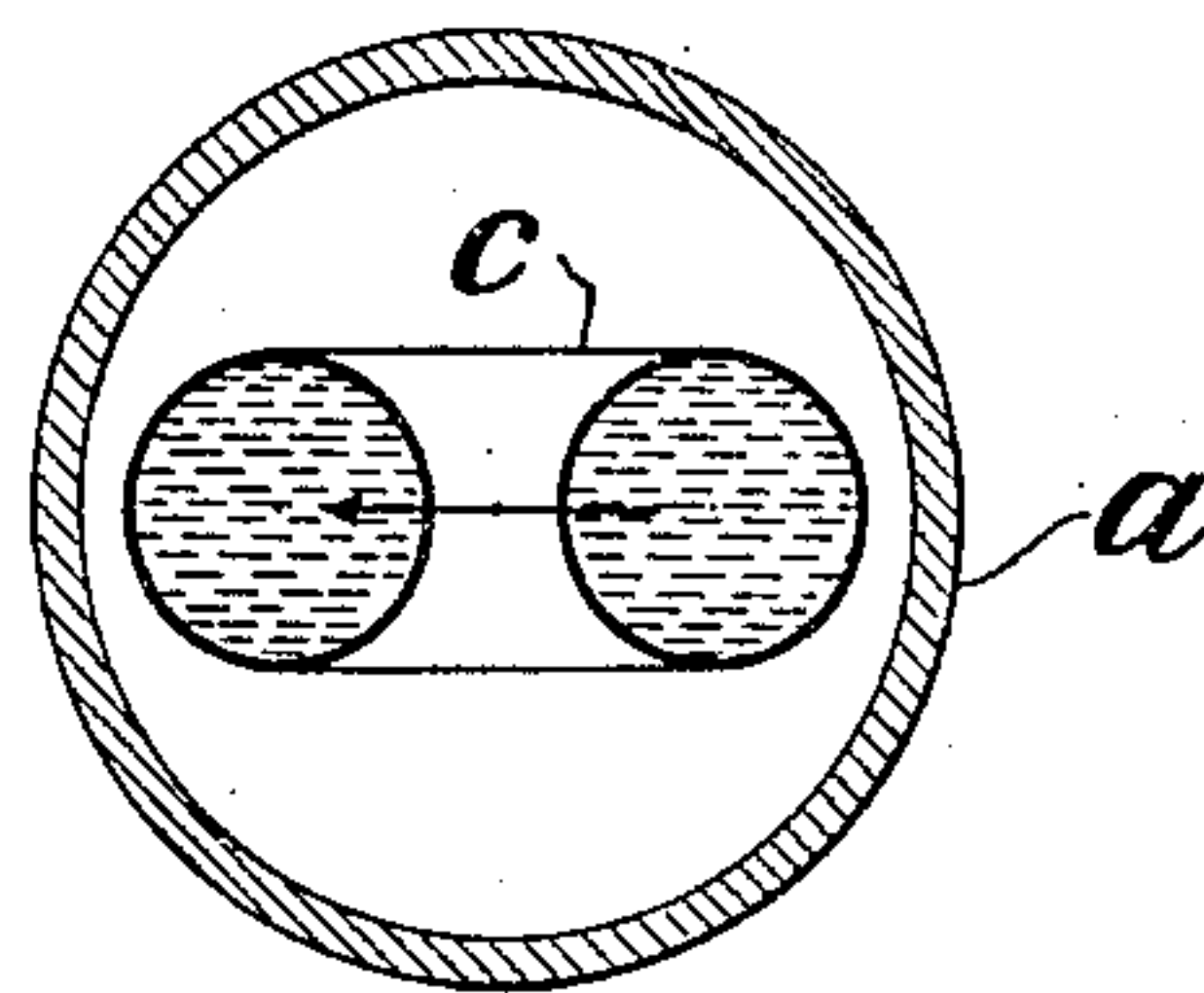
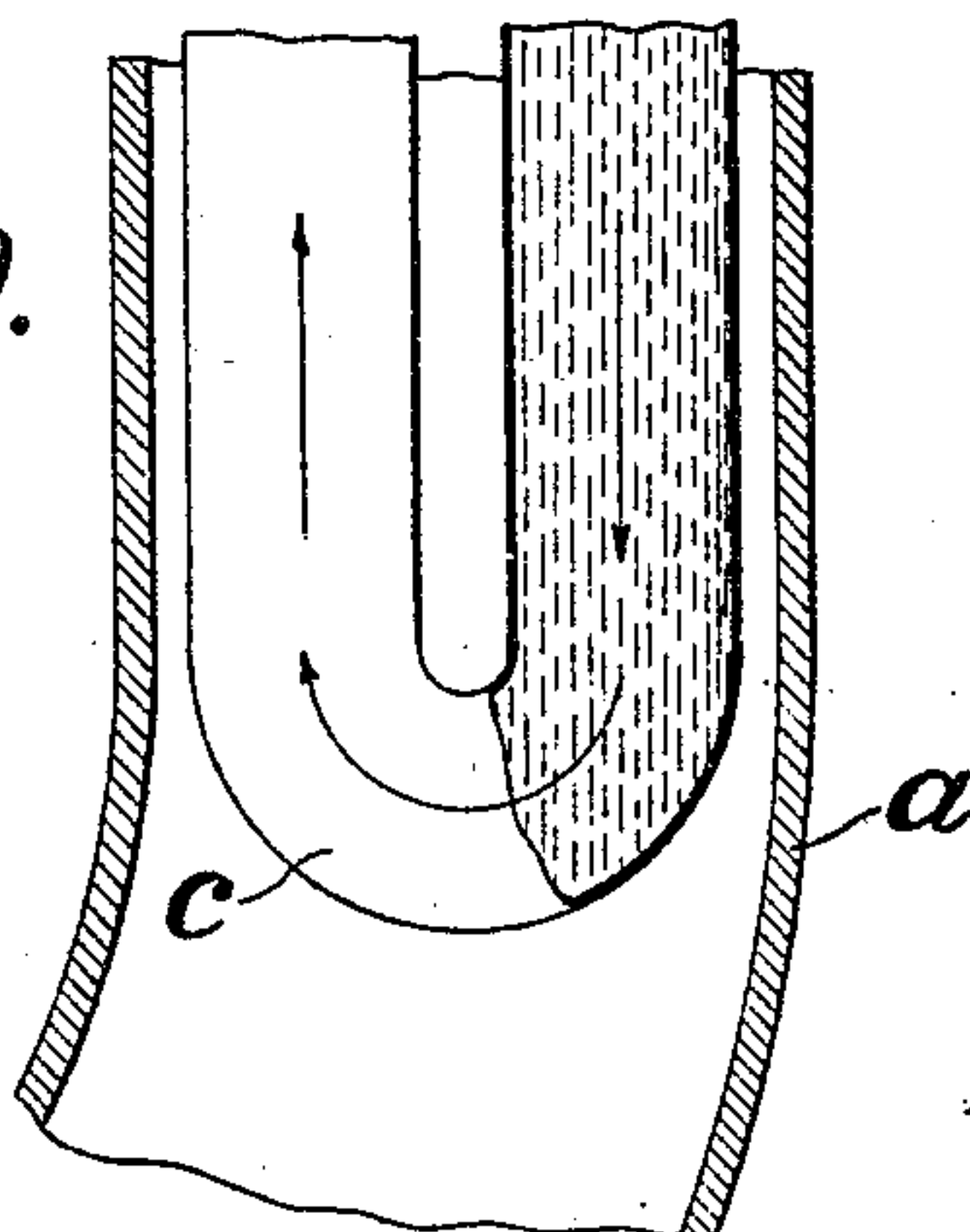


Fig 10.



WITNESSES

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# UNITED STATES PATENT OFFICE.

HENRY CRUSE, OF SALFORD, ENGLAND.

APPARATUS FOR SUPERHEATING STEAM.

954,501.

Specification of Letters Patent.

Patented Apr. 12, 1910.

Application filed September 20, 1909. Serial No. 518,653.

*To all whom it may concern:*

Be it known that I, HENRY CRUSE, a subject of the King of Great Britain, residing at 5 Blackfriars street, Salford, in the county of Lancaster, England, have invented new and useful Improvements in Apparatus for Superheating Steam, of which the following is a specification.

My invention relates to improvements in apparatus for superheating steam, and particularly to apparatus known as the Cruse controllable superheater, as patented by me in Great Britain under Number 5103 of 1898 and subsequent patents.

In the original apparatus and in subsequent forms it has been the practice to employ two sets of headers or boxes one set at each end of the tubes for the steam. The water tubes have either formed loops at one end running from one steam tube to another steam tube through the steam boxes or the water tubes have been connected at both ends by independent water boxes inside the steam boxes.

In another arrangement without headers the steam to be superheated, circulated from the boiler through a series of cylinders divided by diaphragms or equivalents, such as U shaped pipes, up and down and through coupling tubes from one cylinder to another and finally into the steam supply pipe, while an arrangement of pipes for heating the feed water passed up one side and down the other side of the diaphragm in each cylinder and forward through coupling pipes between the cylinders to the boiler.

My present improvements consist essentially in a novel combination and structural arrangement of the steam superheating tubes and water controlling tubes whereby I am enabled to dispense with one set of headers.

In the accompanying 4 sheets of drawings,—Figure 1 is a longitudinal sectional elevation of my improved controllable superheater. Fig. 2 is a sectional end elevation, and Fig. 3 a sectional plan of the same. Fig. 4 is a view on a larger scale of the looped steam tubes and the internal coupled water tubes. Figs. 5 and 6 are sectional plan and elevation respectively of one form of coupling for the internal water tubes. Figs. 7 and 8 are similar views respectively

of another form and Figs. 9 and 10 are two similar views of a U tube.

In carrying my improvements into effect I form each steam tube *a* of U or equivalent loop shape as shown best in Figs. 1 and 4, so that the steam passes from say for convenience of description, one of the top set of headers *b*, down one leg of the tube *a* and returns upward through the other leg to one of the same set of headers *b*, thus enabling the bottom or other set of headers to be dispensed with. In like manner I form each water tube *c* of U shape as shown in the detail views Figs. 9 and 10, and place one such U shaped water tube *c* in each leg or it might be in one leg only of each steam tube *a*, so that the water in each tube *c* returns up the same leg to one of the same set of water headers *b'* inside the steam header *b* from which it descended; or alternatively as the equivalent for the U shape I may make each water tube loop from two separate pipes *c* and couple them at their bottom or inner ends by a box or hollow coupling *d*, as shown in either of the two ways illustrated by Figs. 5 and 6 and Figs. 7 and 8.

The steam and water circulation may be arranged in any convenient manner but in all cases both steam and water return to the one set of steam and water headers, at the top in the example illustrated, and the water always returns up the same leg of the steam tube down which it descended.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. A superheater comprising a single set of steam and water boxes, external tubes of loop shape having their ends connected with the steam boxes, and internal water tubes of loop shape located within the legs of said steam tubes.

2. A superheater comprising a single set of steam and water boxes, external steam tubes of loop shape having their ends connected with the steam boxes, and internal water tubes of loop shape within the legs of the steam tubes having their ends connected with the water boxes, so that both steam and water return to one set of boxes, and the water flows up and down the same steam tube.

3. A superheater comprising a set of steam  
boxes, a set of water boxes within the steam  
boxes, steam tubes of U shape having their  
ends connected with the steam boxes, water  
5 tubes of loop shape located within each  
steam tube and having their ends connected  
with the water boxes.

In testimony whereof I have signed my  
name to this specification in the presence of  
two subscribing witnesses.

HENRY CRUSE.

Witnesses:

S. W. GILLETT,

HERBERT ROWLAND ABBEY.