

(No Model.)

2 Sheets—Sheet 1.

A. STIRLING.  
STEAM BOILER.

No. 491,451.

Patented Feb. 7, 1893.

Fig. 1.

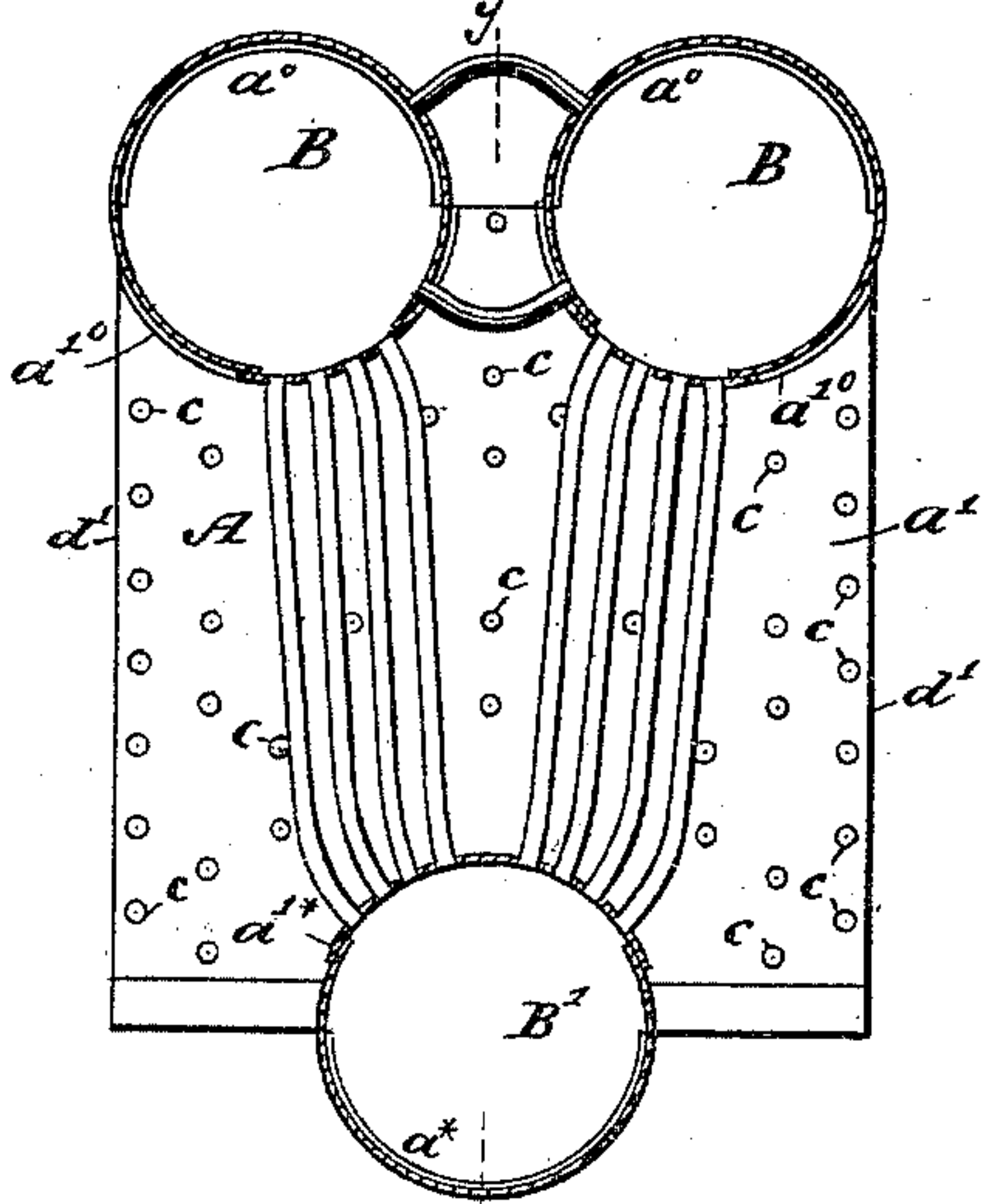


Fig. 2.

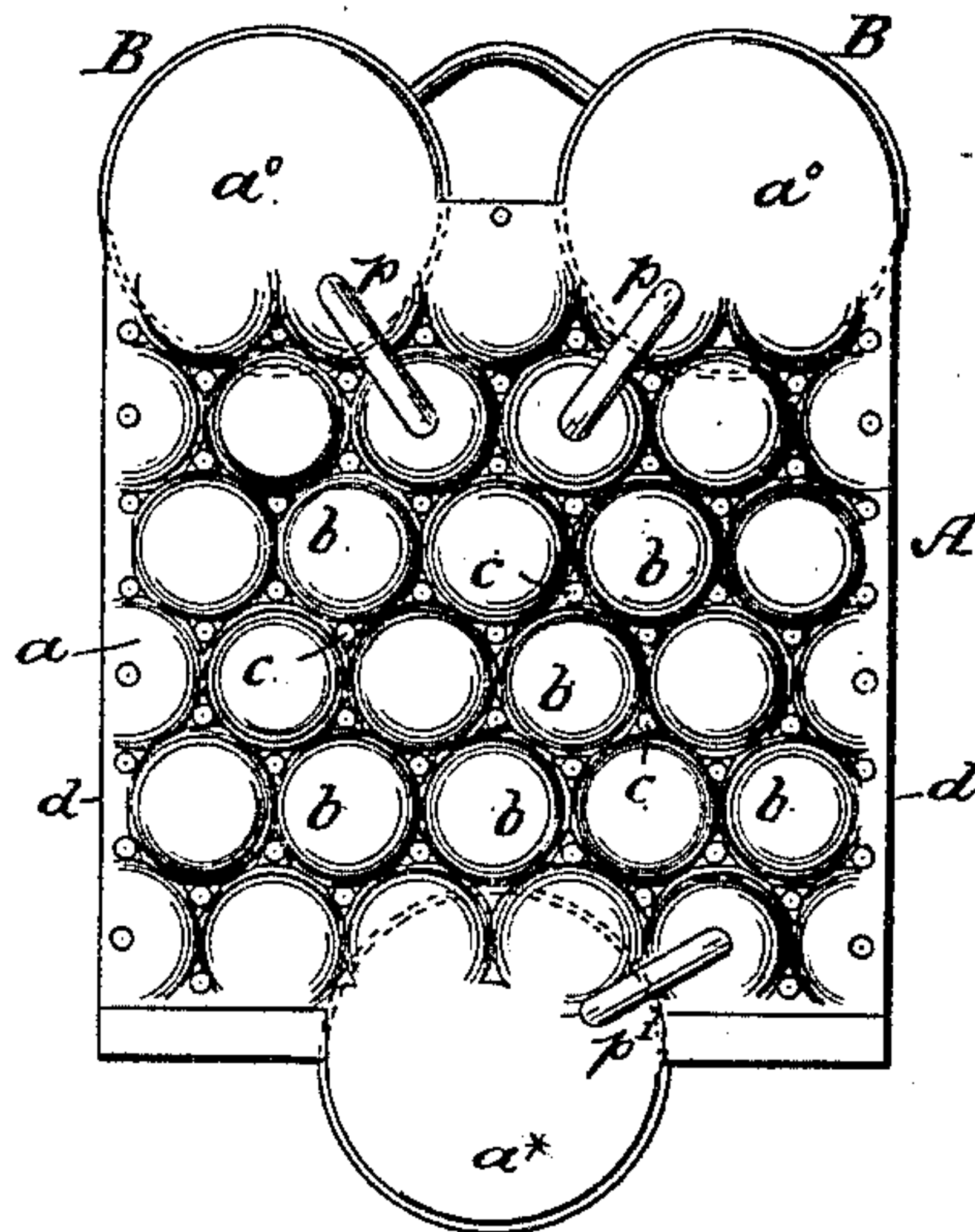


Fig. 3.

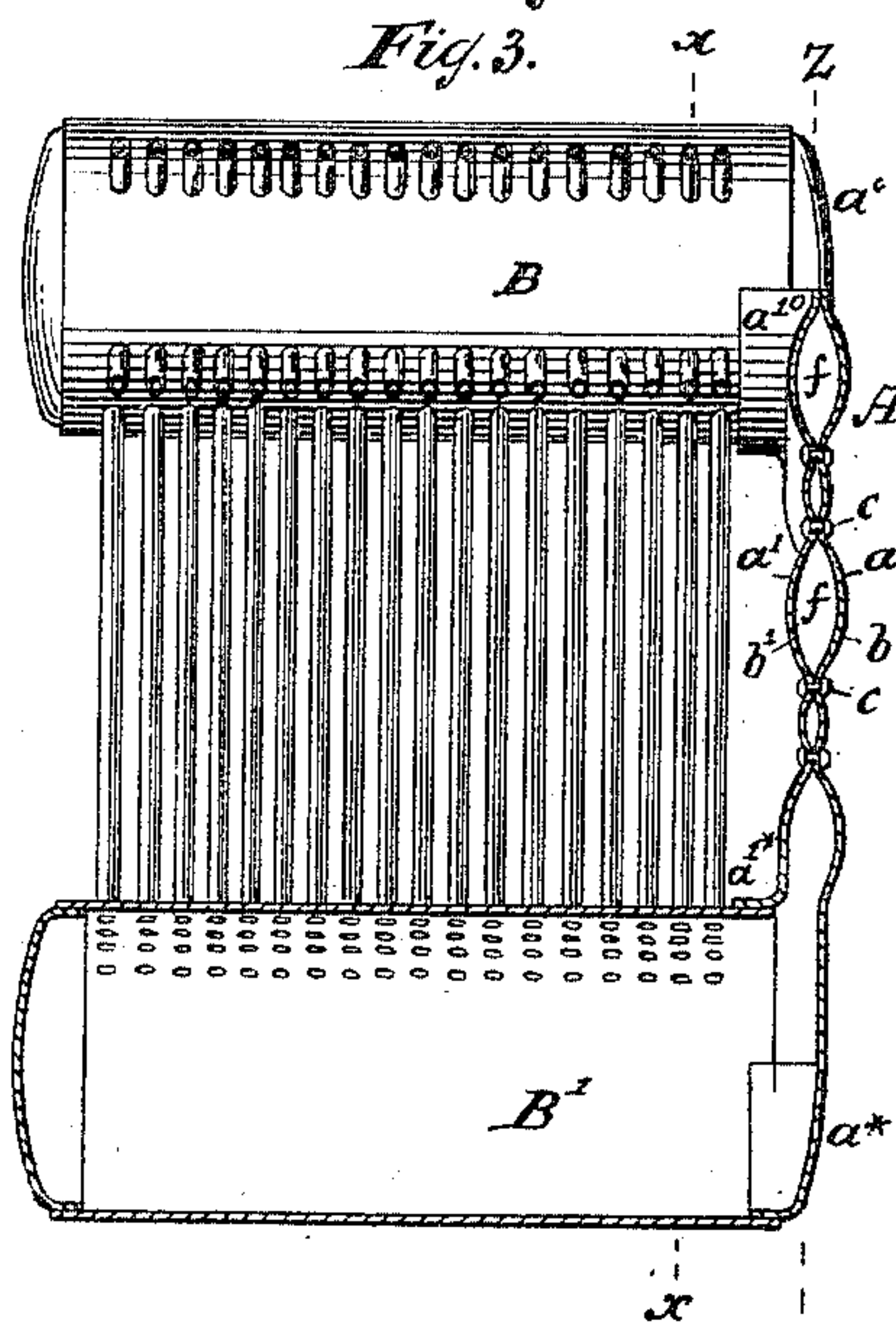


Fig. 4.

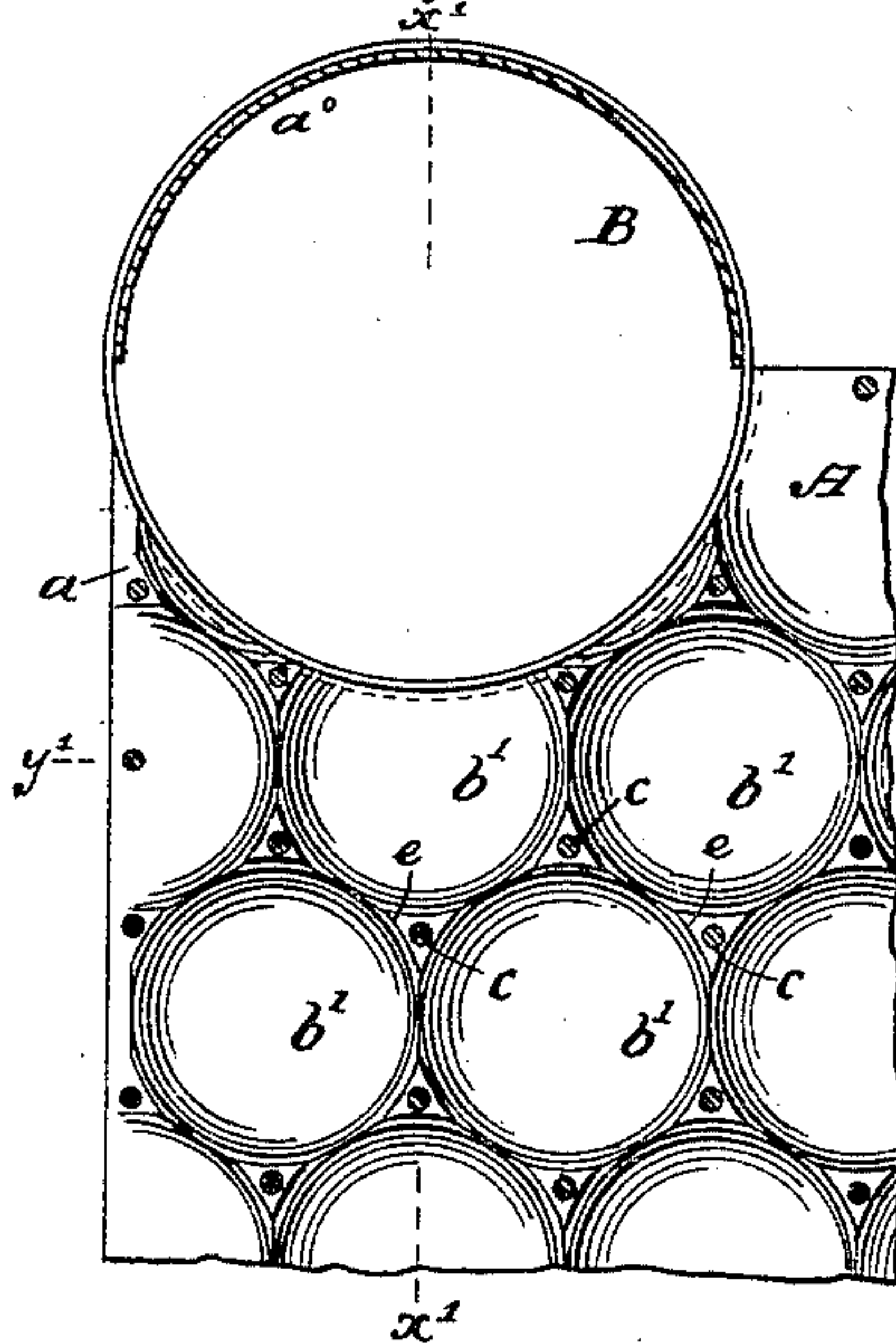


Fig. 5.

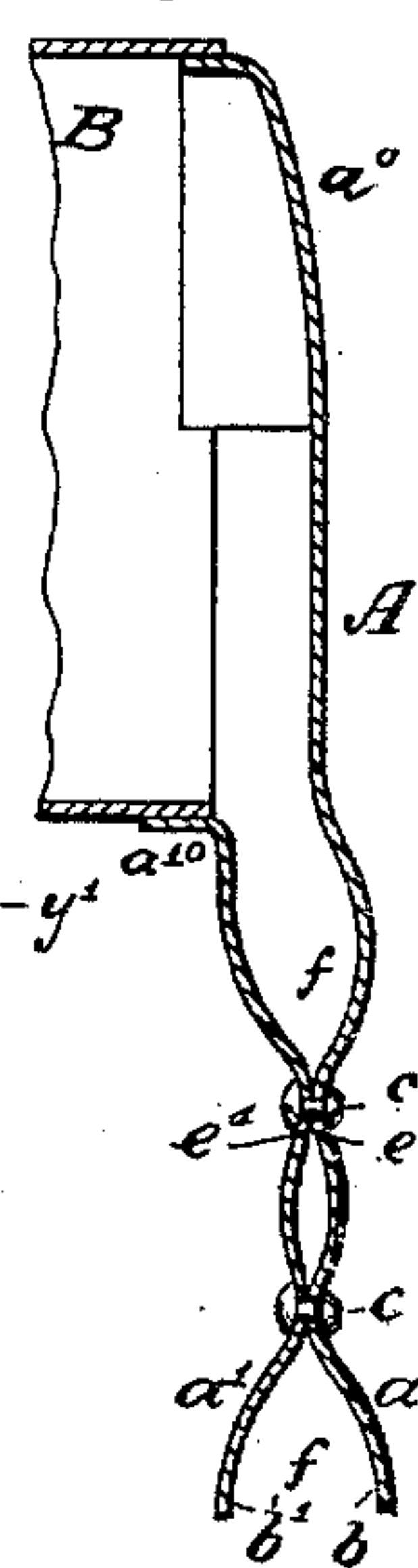


Fig. 7.

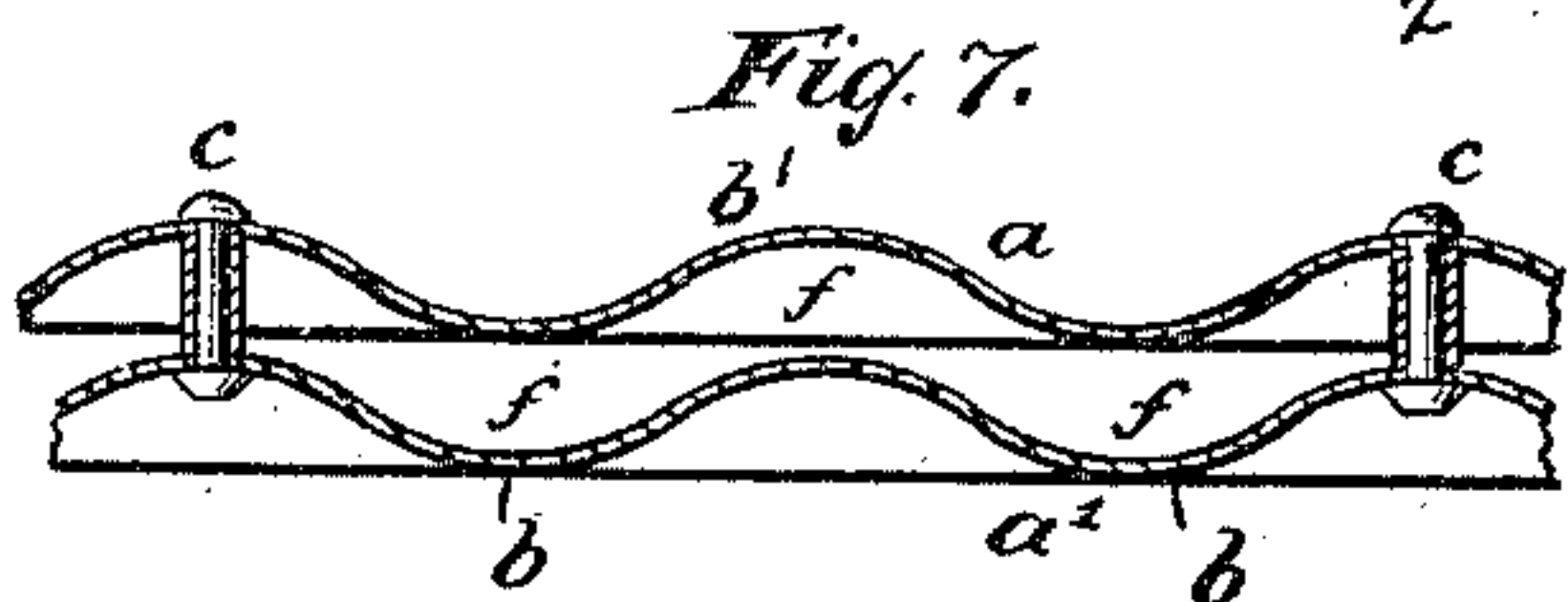
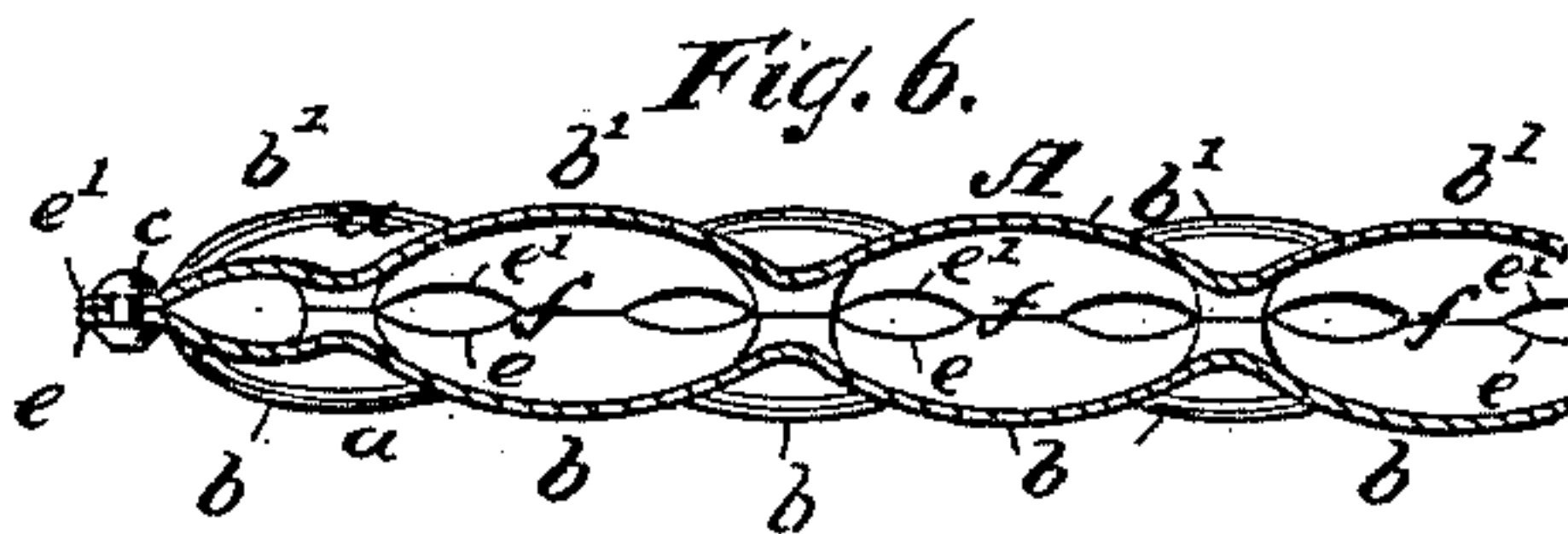


Fig. 6.



WITNESSES:

Edvard Wolff.  
William Miller

INVENTOR:

Allan Stirling.

BY

Vandervoord Thauff  
his ATTORNEYS.

(No Model.)

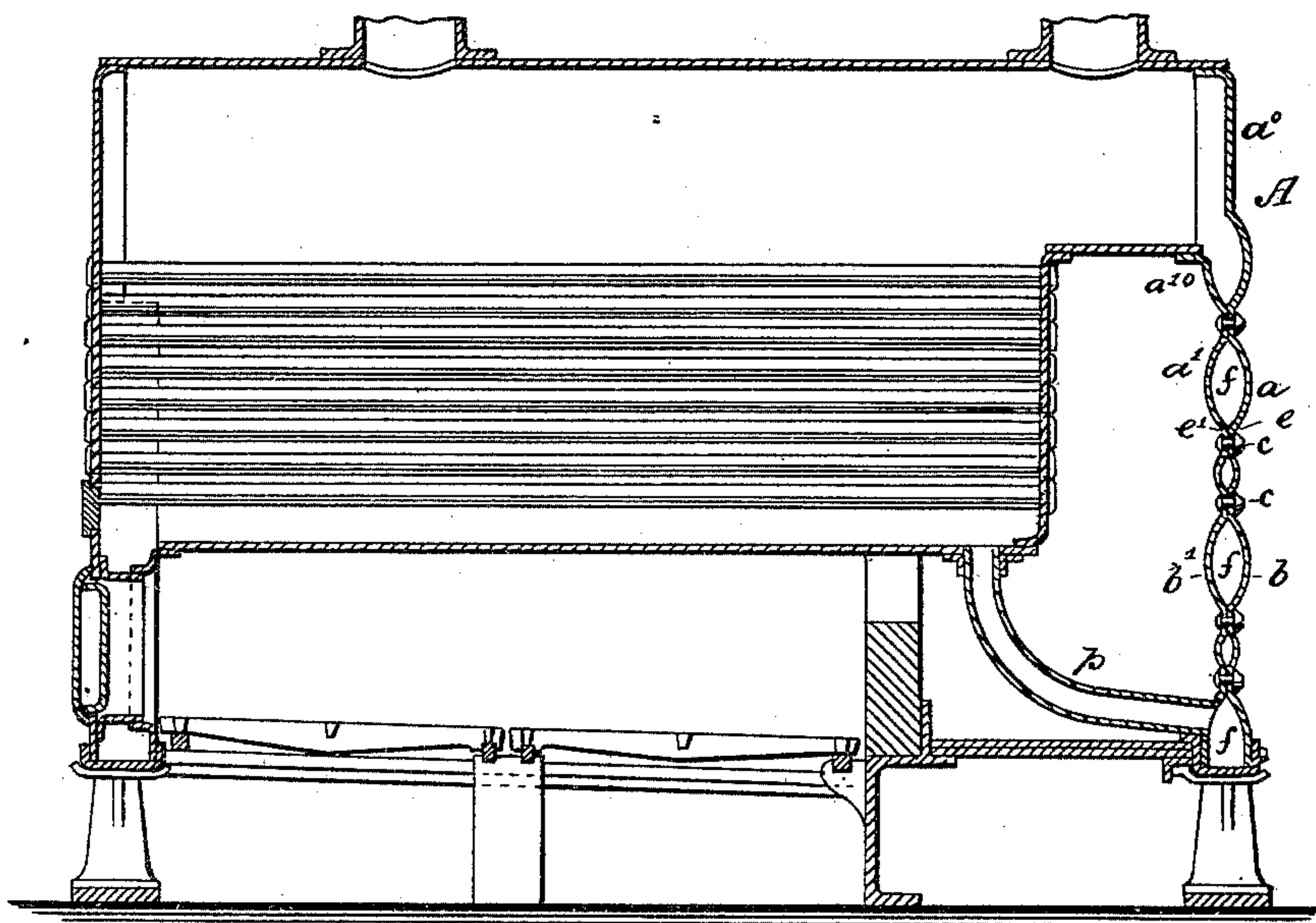
2 Sheets—Sheet 2.

A. STIRLING.  
STEAM BOILER.

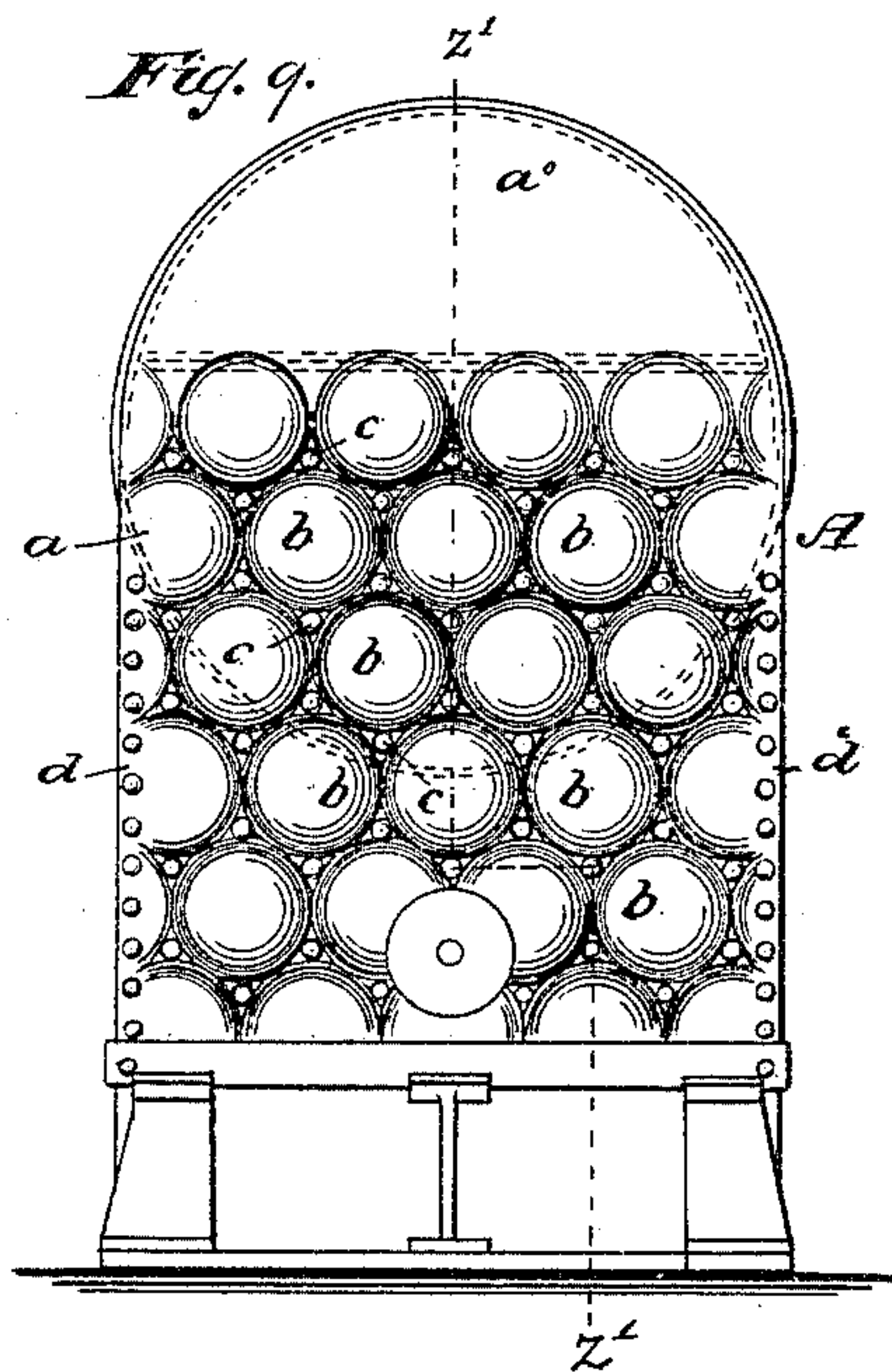
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*Fig. 8.*



*Fig. 9.*



WITNESSES:

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*William Miller*

INVENTOR:

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his ATTORNEYS.



# UNITED STATES PATENT OFFICE.

ALLAN STIRLING, OF NEW YORK, N. Y., ASSIGNOR TO THE STIRLING BOILER COMPANY, OF CHICAGO, ILLINOIS.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 491,451, dated February 7, 1893.

Application filed June 9, 1892. Serial No. 436,125. (No model.)

*To all whom it may concern:*

Be it known that I, ALLAN STIRLING, a citizen of the United States, residing at New York, in the county and State of New York, have  
5 invented new and useful Improvements in Steam-Boilers, of which the following is a specification.

The object of this invention is to combine with a steam boiler a waterleg which is of superior strength while it can be made of comparatively thin metal plates and which can be readily and easily connected to steam boilers of different types.

The peculiar and novel construction of my  
15 water leg and its connection with different steam boilers is pointed out in the following specification and claims and illustrated in the accompanying drawings, in which—

Figure 1 represents a transverse vertical  
20 section of a steam boiler provided with my waterleg said boiler being of the type known as the Stirling boiler and described in Letters Patent No. 407,260 granted to me July 16, 1889, the plane of section being indicated by the  
25 line  $xx$  Fig. 3. Fig. 2, is an end view of the same. Fig. 3, is a longitudinal section in the plane  $yy$  Fig. 1. Fig. 4, is a transverse vertical section in the plane  $zz$  Fig. 3 on a larger scale than the previous figures. Fig. 5, is a  
30 longitudinal vertical section in the plane  $x'x'$  Fig. 4. Fig. 6, is a horizontal section in the plane  $y'y'$  Fig. 4. Fig. 7, is a similar section of a modification. Fig. 8, is a longitudinal vertical section of a return flue boiler provided with my waterleg, the plane of section  
35 being indicated by the line  $z'z'$  Fig. 9. Fig. 9, is an end view of the same.

In the drawings the letter A designates my water leg which is constructed of two metal  
40 plates  $a a'$  each of which is provided with a series of cup shaped cavities  $b b'$  and which are united by rivets or stay bolts  $c c$ . The edges  $d d'$  and certain portions  $e e'$  between the cavities  $b b'$  are flat so that when the two  
45 plates  $a a'$  are placed against each other in the manner indicated in Figs. 2, 3, 5, 6, 8 and 9, they can be firmly united by rivets  $c c$  extending through the flat edges  $d d'$  and the flat portions  $e e'$ , and the cup shaped cavities  
50 which come in juxtaposition toward each

other, form water spaces  $f$ , the cavities  $b b'$  in each plate being made to overlap each other (see Fig. 4), so that the water from each waterspace can freely flow into the adjacent waterspaces and a free circulation of the wa-  
55 ter through the waterleg can be effected. If the waterleg is to be attached to a Stirling boiler, the upper edge of the outer metal plate  $a$  is provided with extensions  $a^0$ , which are fastened in the ends of the steam and water  
60 drums B B and the lower edge of said metal plate is provided with a similar extension  $a^*$  which is fastened in the mud drum B', while the upper edge of the inner metal plate  $a'$  is provided with semicircular flanges  $a^{10}$  which  
65 are fastened to the steam and water drums B B and the bottom edge of said inner metal plate  $a'$  is provided with a similar flange  $a'^*$  which is fastened to the mud drum B'. The water spaces of the water leg A may be  
70 connected with the waterspaces of the steam and water drums B B by pipes  $p$  and with the mud drum B' by a pipe or pipes  $p'$ . The connection of my waterleg with a returnflue boiler is effected in a similar manner as will  
75 be readily seen by referring to Figs. 8 and 9 and the waterspaces  $f$  of the waterleg communicate with the waterspace of the boiler by means of one or more pipes  $p$ . In all cases my waterleg A extends across the entire width  
80 of the furnace structure (see Figs. 3 and 9.) The metal plates  $a a'$  instead of being fastened together as shown in Figs. 3, 5 and 6 may be fastened together as shown in Fig. 7 and in that case stay bolts  $c$  must be used in  
85 place of rivets.

From this description it will be seen that in my waterleg the internal pressure is supported by the curved surfaces of the cup shaped cavities while in waterlegs constructed of flat  
90 metal plates the internal pressure is supported by the flat surfaces of said plates and for this reason I am enabled to use metal plates of less thickness than those which must be used for the flat plate waterlegs.  
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What I claim as new and desire to secure by Letters Patent, is:

1. The combination with a steam boiler, of a water leg extending the entire width of the furnace structure at the rear portion of the  
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latter and composed of two metal plates each of which is provided with cup-shaped cavities made to overlap each other and with flat spaces  $d$  at the edges and between the cup-shaped cavities, substantially as described.

2. The combination with a steam boiler, of a water leg composed of two metal plates each of which is provided with cup-shaped cavities made to overlap each other and with flat spaces  $d$  at the edges and between the cup-shaped cavities, and a pipe  $p$  leading from one of the water spaces of the water leg into the water space of the boiler, substantially as described.

3. The combination with the steam and water drums B B and the mud drum B' of a waterleg composed of two metal plates each

of which is provided with cup shaped cavities substantially as described.

4. The combination with the steam and water drums B B and the mud drum B' of a waterleg composed of two metal plates, each of which is provided with cupshaped cavities and pipes  $p p'$  extending from the water-spaces of the waterleg into said drums substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALLAN STIRLING.

Witnesses:

WM. C. HAUFF,

E. F. KASTENHUBER.