

J. BRUNDRIT.  
PUMP, CIRCULATOR, AND LIKE APPLIANCE.  
APPLICATION FILED OCT. 17, 1907.

908,738.

Patented Jan. 5, 1909.

2 SHEETS—SHEET 1.

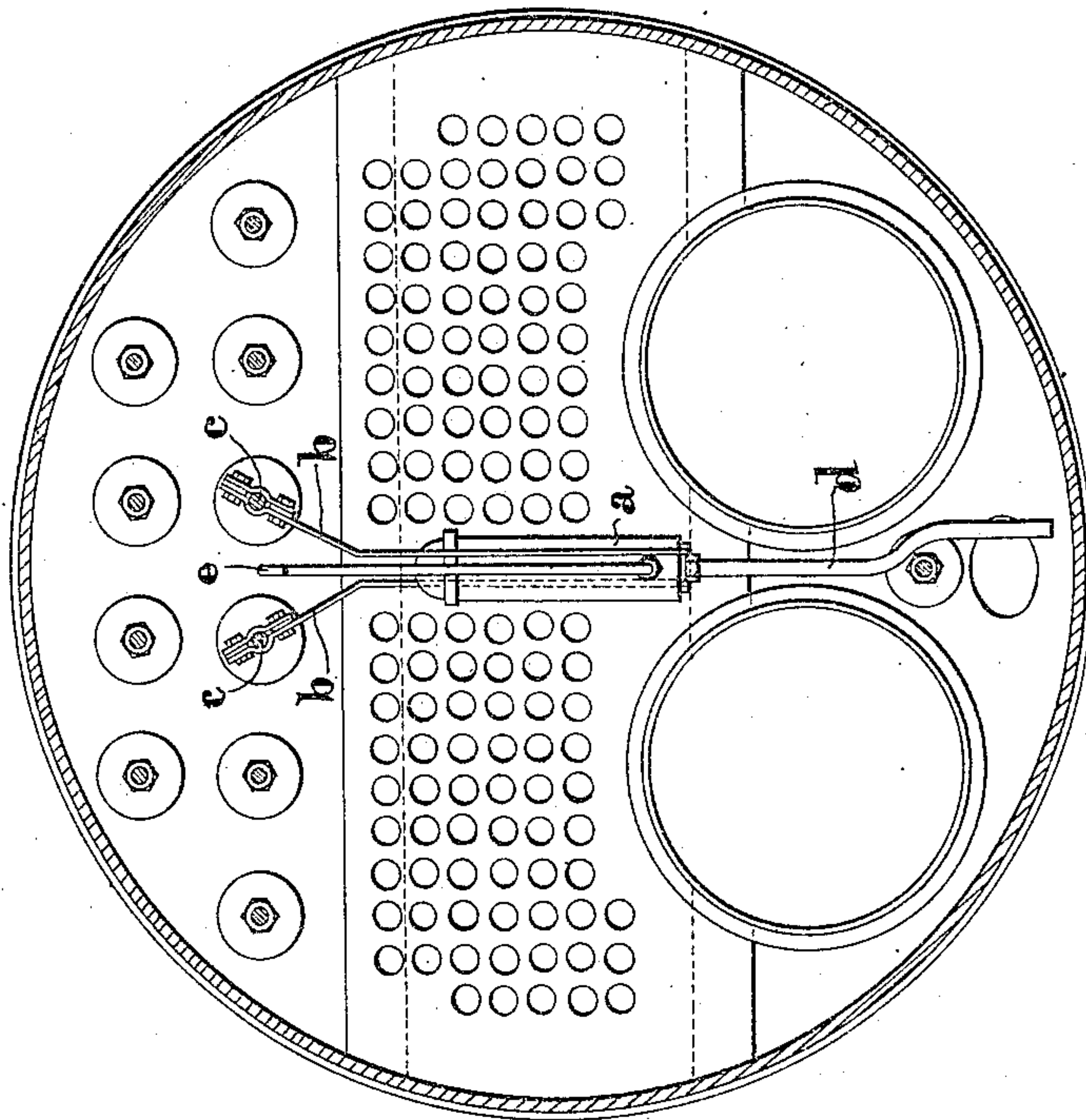


Fig. 1.

Attest.  
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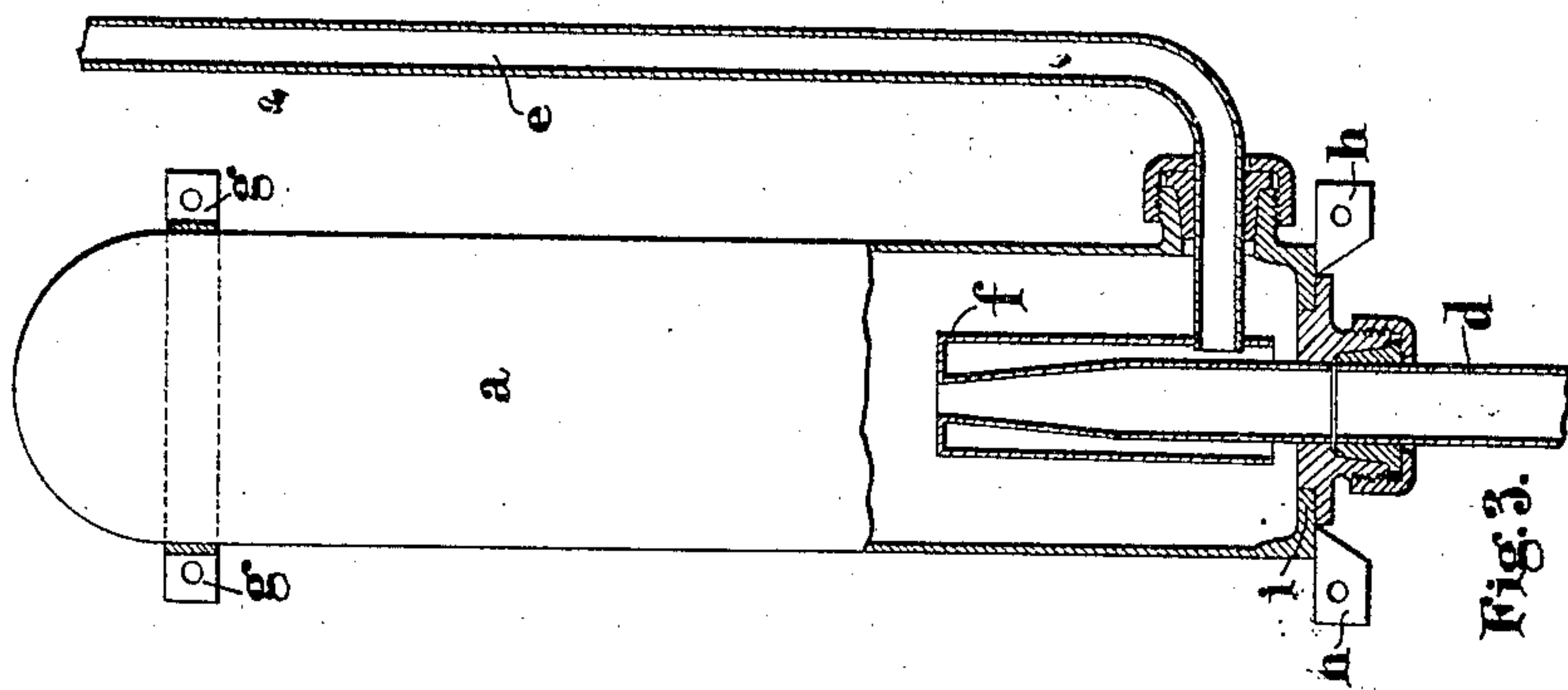


Fig. 3.

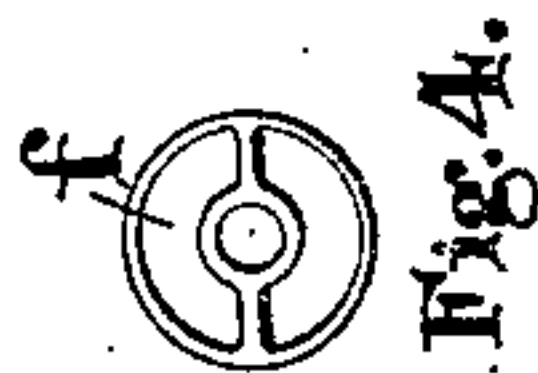


Fig. 4.

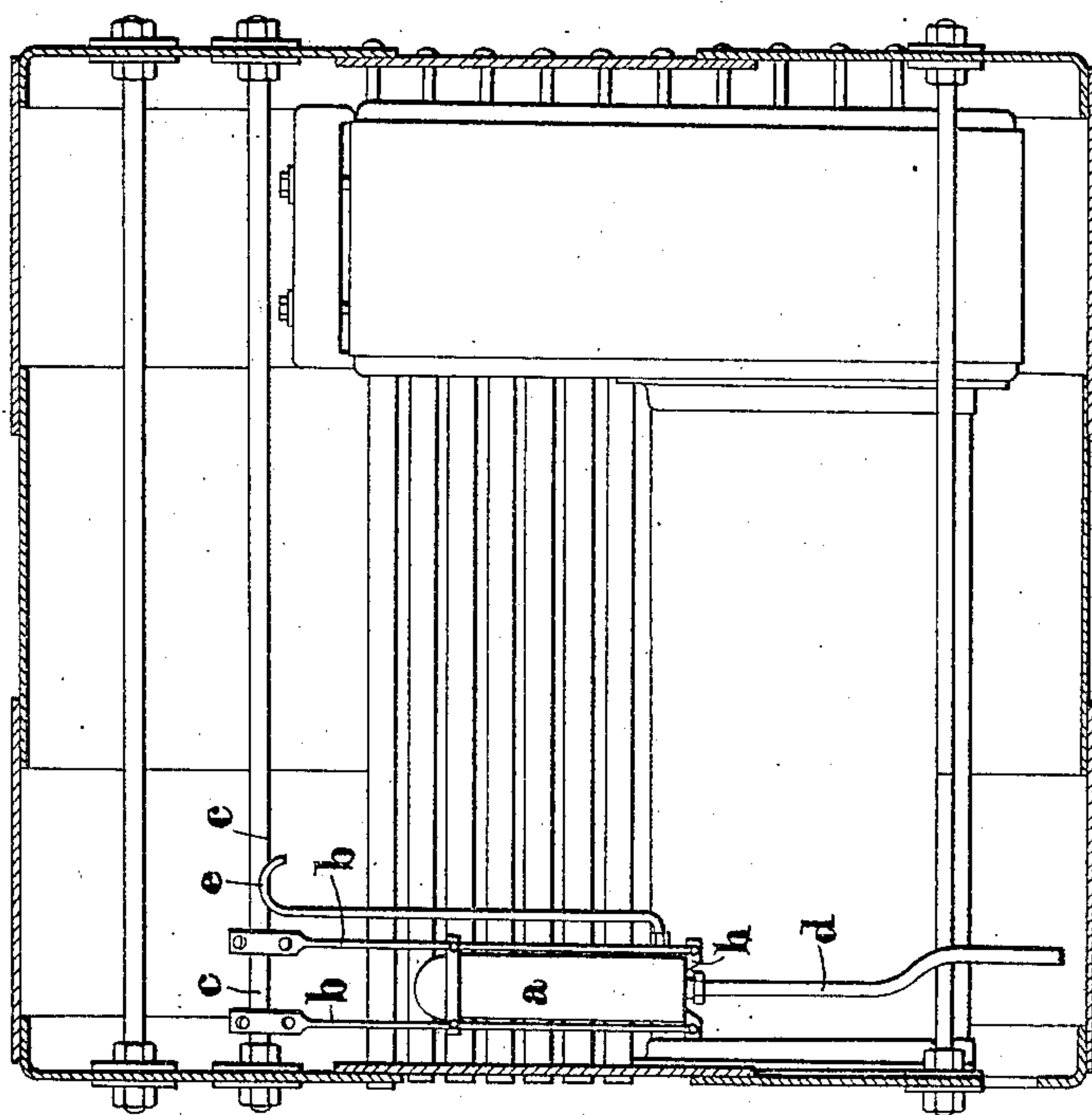


Fig. 2.

Attest.

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# UNITED STATES PATENT OFFICE.

JOSEPH BRUNDRIT, OF LIVERPOOL, ENGLAND.

PUMP, CIRCULATOR, AND LIKE APPLIANCE.

No. 908,738.

Specification of Letters Patent.

Patented Jan. 5, 1909.

Application filed October 17, 1907. Serial No. 397,902.

*To all whom it may concern:*

Be it known that I, JOSEPH BRUNDRIT, a subject of the King of Great Britain and Ireland, residing at 6 Oriel Chambers, in the city of Liverpool, England, have invented certain new and useful Improvements in Pumps, Circulators, and Like Appliances, of which the following is a specification.

This invention relates to pumps, circulators and like appliances and comprises the arrangement of parts hereinafter described, whereby water or other liquid is pumped or elevated by the expansive action set up by heat, in conjunction with the exhausting effect produced in a closed vessel by the momentum of an out-running stream.

Referring to the accompanying sheet of explanatory drawings;—Figures 1 and 2 show in sectional front elevation and sectional side elevation respectively a marine boiler of the Scotch or return flue type having a pump or circulator constructed according to my invention applied thereto. Fig. 3 is a detail view of the circulator drawn to a larger scale than Figs. 1 and 2. Fig. 4 is a plan view of the mouth of the suction tube, to be hereinafter referred to.

The same reference letters in the different views indicate the same parts.

In the form illustrated, my device is arranged for circulating the water in a boiler so as to prevent it remaining stagnant at the bottom of the boiler. The device is fitted entirely within the boiler, being quite independent of external fittings or of an external operating medium. It consists of a tubular receptacle *a* forming what may be termed a pulsating chamber. The said chamber is supported by hangers *b, b* from the stays *c, c* and is connected by a tube or pipe *d*, which may be termed the suction pipe, with the lower or cold part of the boiler water space; it is provided also with what may be termed a discharge pipe *e*, terminating in the steam space of the boiler, or well above the water level. The upper end of the suction pipe *d*, as shown in the illustrations, projects within the pulsating chamber *a*, but terminates below the top of the same and below the normal water level of the boiler; the lower end of the discharge pipe *e* terminates a little above the bottom of the said chamber *a*. Or, instead of actually entering the pulsating chamber, the respective pipes, the suction pipe *d* and the discharge pipe *e*, may be connected to the exterior of the chamber *a*.

I preferably arrange the suction pipe *d* with a conical upper end, as shown, so that when water is forced up such pipe *d* it will be projected towards the top of the chamber *a* and so rapidly cool the vapor contained therein. Around such conical end of the suction pipe *d*, I form a casing *f*, open at the bottom and also at the top (as shown in Fig. 4), and I cause the lower end of the discharge pipe *e* to enter such casing, so that should any vapor be drawn down the pipe *e* during the working of the circulator, it will be cooled by contact with the relatively cool pipe *d*.

The hangers *b, b* before referred to are connected to lugs *g, g* and *h, h* formed on or secured to the chamber *a*; the lugs *h* are preferably cast in one with the base piece *i* of the chamber.

I may provide the chamber *a* with a blow-off cock connected with the outside of the boiler or steam generator for the purpose of removing any sediment which may collect in such chamber.

The action of the apparatus is as follows;— On filling the boiler, the water rises in the suction pipe *d* at the same rate as in the boiler, until it reaches the top of the said pipe when it overflows into the pulsating chamber *a*. As the discharge pipe *e* is connected a little above the bottom of such chamber *a*, air can escape therefrom until the water has risen sufficiently to seal the pipe opening. The air in the chamber *a* is now compressed. When the pulsating chamber becomes heated, the air expands and drives the water out of the chamber through the discharge pipe *e* until the pressure inside the chamber *a* is less than the pressure in the boiler plus head of water due to the height between the bottom of the discharge pipe and the water level in the boiler. Water now rushes up the suction pipe *d* into the chamber and by cooling the vapor within the chamber produces a vacuum or further reduction of pressure therein, causing an additional inflow of water up the suction pipe *d*. A certain amount of air leaves the pulsating chamber at each pulsation and it is all ejected after a few pulsations. But, as the water becomes hotter, instead of working with compressed air, steam or vapor is generated in the chamber *a* and serves to maintain the pulsating action. An alternate filling and discharge of the chamber in an automatic manner is thus provided for; such alternations will recur in a rapid pulsating manner and sufficient to set up a



thorough circulation in the boiler. Such pulsating pumping action continues until the water is at a uniform temperature throughout the boiler.

5 The fact that the pressure in the chamber *a* falls below the pressure in the boiler plus head of water as aforesaid can be described as due to the momentum of the outflow producing what may be termed an over-running  
10 effect, and setting up an exhausting or ejector action in the chamber *a*.

I may arrange my device when used as a boiler circulator in any convenient place, either within the boiler or on its exterior.  
15 For example, it may be fitted with the pulsating chamber *a* in the smoke box of a marine or other boiler, provided that the pulsating-chamber can be subjected to a sufficient temperature to produce the action before described. The pulsating chamber may be  
20 fitted with cross tubes or it may itself consist of a nest of tubes.

My device can be made and arranged in many forms, and may be used as a pump, or  
25 as a circulator in connection with the cooling systems of internal combustion engines and the like, the only requisite being that the chamber *a* can be subjected to a sufficient temperature to produce the action before described.  
30

Having now described my invention what I claim as new and desire to secure by Letters Patent is;—

1. In apparatus for the circulation of water or other liquid, the combination consisting of a closed chamber, suction and discharge pipes external to the said chamber both of which are connected at one end with the lower part of the chamber, while the  
35 other end of the suction pipe opens below the

chamber and into the liquid to be circulated and the other end of the discharge pipe opens above the chamber, and means for heating the chamber, as set forth.

2. In apparatus for the circulation of water or other liquid, a liquid containing heated receptacle, a closed chamber immersed in the liquid in the said receptacle, and suction and discharge pipes both of which are connected at one end with the lower part of the said chamber, while the other end of the suction pipe is open to the liquid near to the bottom of the receptacle and the other end of the discharge pipe to the upper portion of the receptacle, as set forth.  
45 50 55

3. In combination, a boiler, a closed chamber immersed in the water in said boiler, and suction and discharge pipes both of which are connected at one end with the lower part of said chamber while the other end of the suction pipe is open to the water in the lower or cold part of the boiler water space and the other end of the discharge pipe to the steam space of the boiler, as set forth.  
60

4. In combination, a boiler, a closed chamber immersed in the water in said boiler, a suction pipe projecting into the lower part of the said chamber and extending to the lower or cold part of the boiler water space, a conical nozzle on the end of the said suction pipe within the chamber, an open ended casing surrounding the said nozzle, and a discharge pipe entering the said casing and extending to the steam space of the boiler, as set forth.  
65 70 75

In testimony whereof, I affix my signature in presence of two witnesses.

JOSEPH BRUNDRIT.

Witnesses:

VIVIAN ARTHUR HUGHES,  
CHARLES CONRAD.