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907,762.

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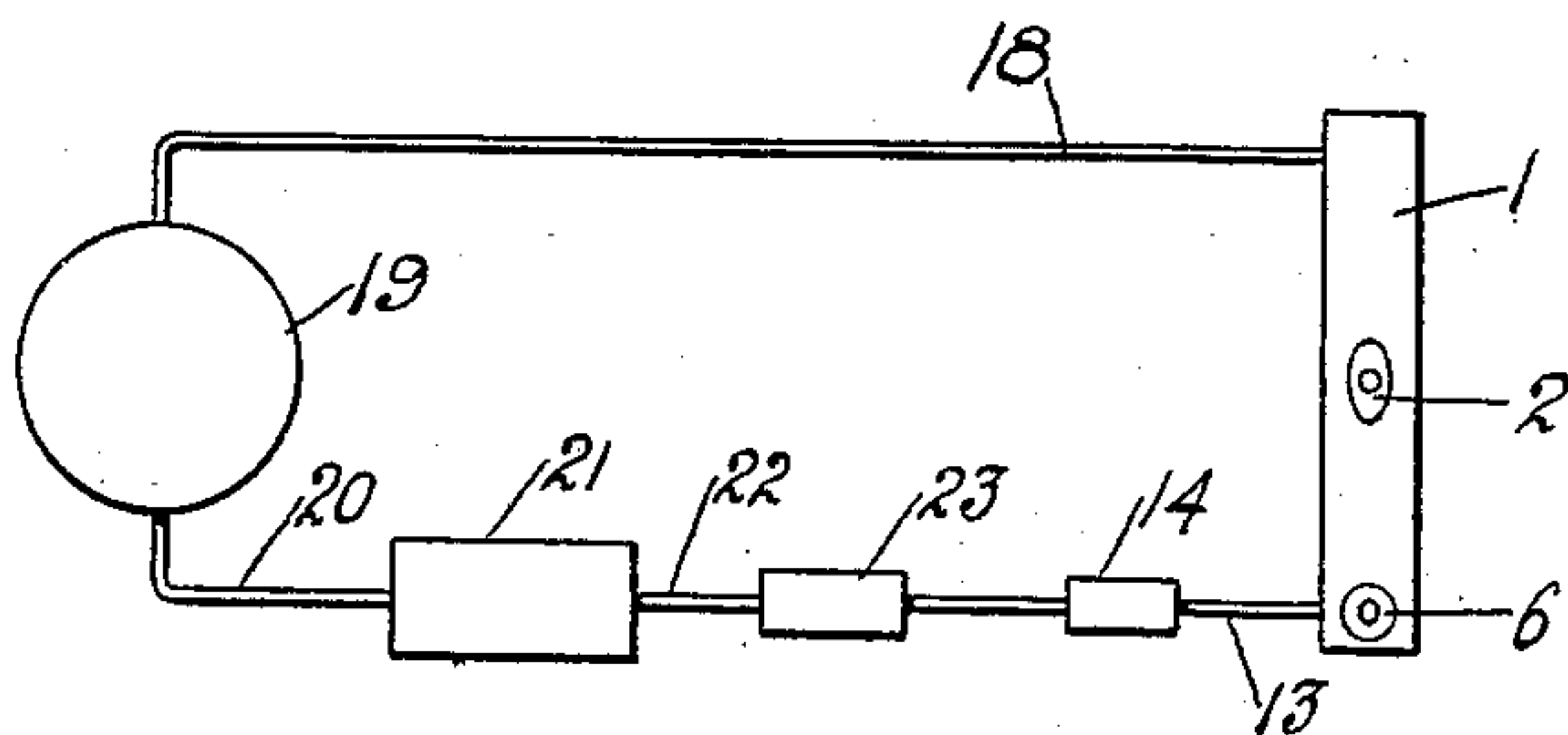


FIG. 1.

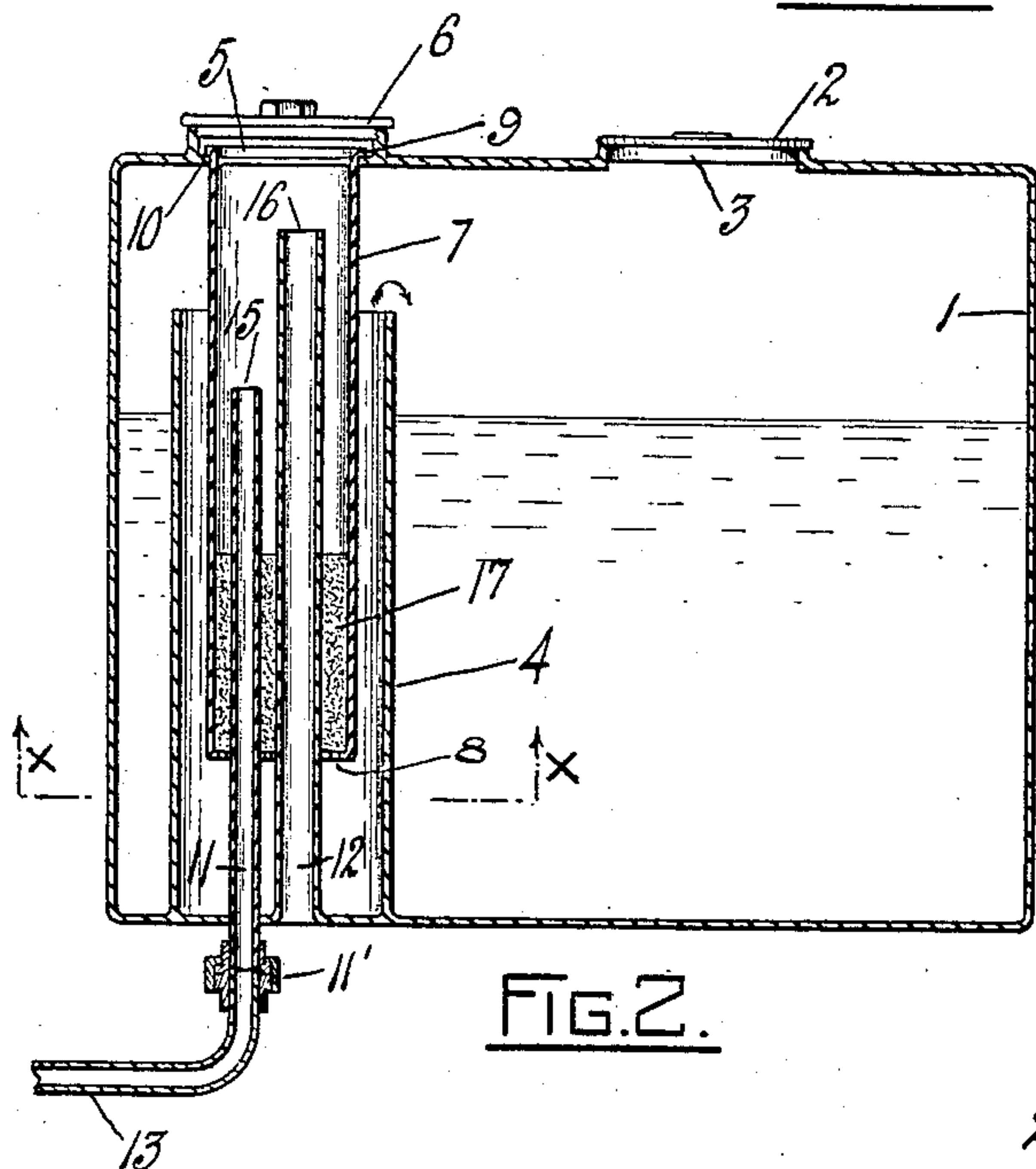


FIG. 2.

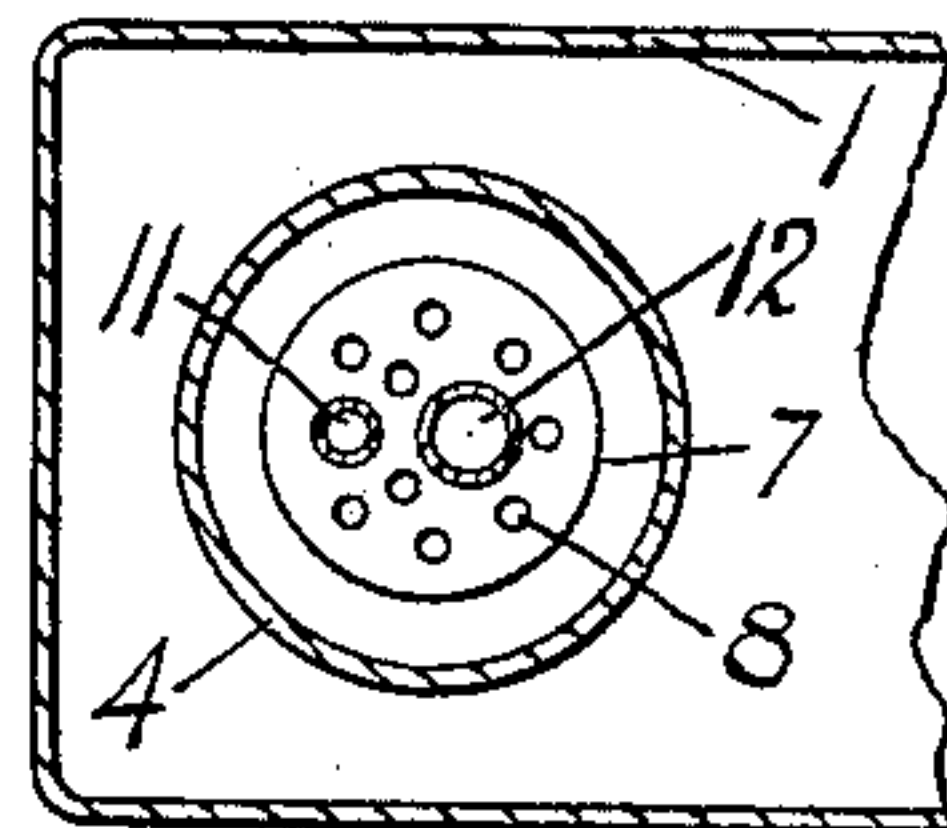


FIG. 3.

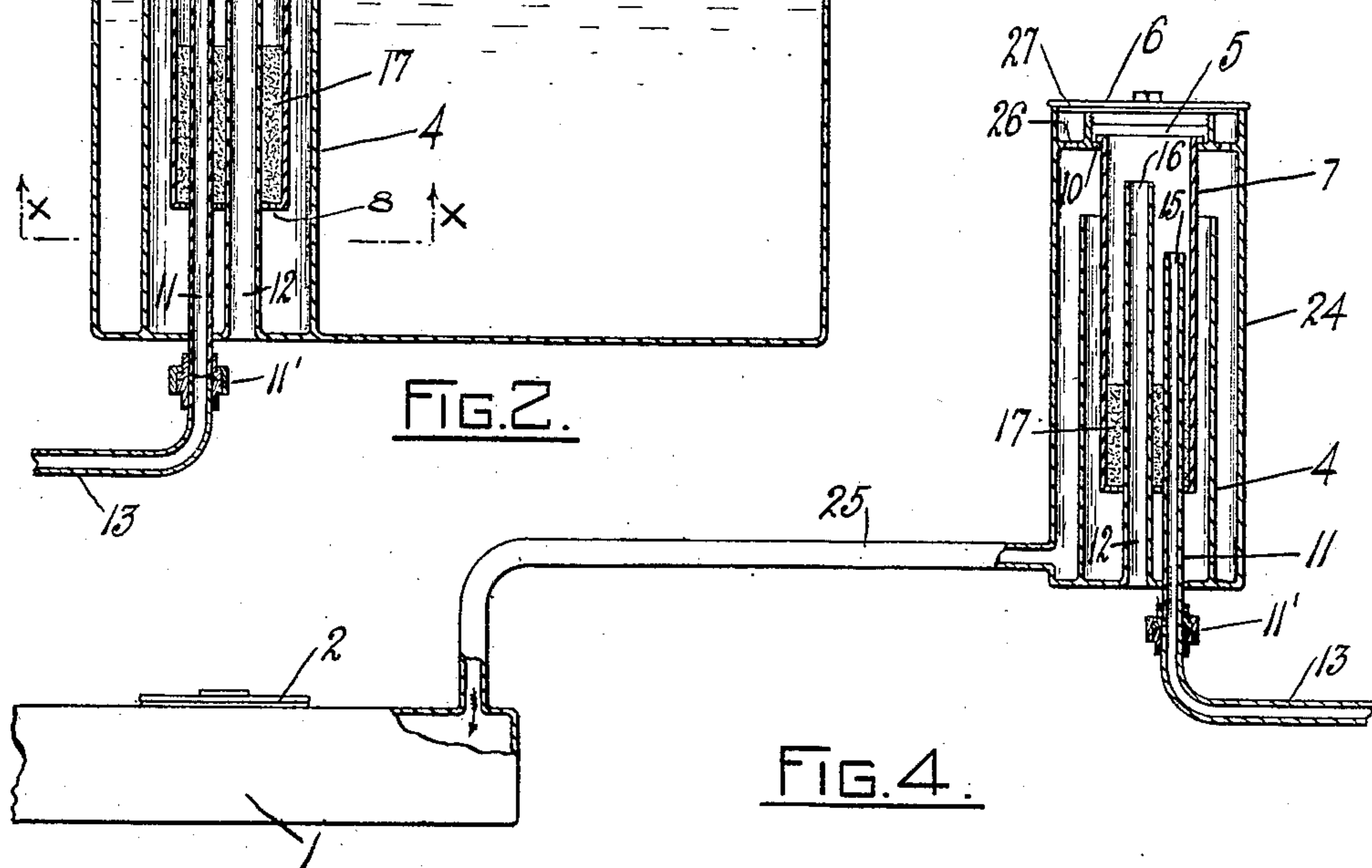


FIG. 4.

WITNESSES.

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# UNITED STATES PATENT OFFICE.

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## SEPARATOR.

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*To all whom it may concern:*

Be it known that we, WARREN R. FALES, of East Providence, county of Providence, and State of Rhode Island, and LEON F. N. BALDWIN, of Providence, county of Providence, and State of Rhode Island, have invented certain new and useful Improvements in Separators; and we do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

The invention relates to a device for separating foreign substances from liquids and is particularly designed for use in connection with a steam-generator, and more particularly the generator of a steam-automobile, when a condenser is employed.

Where a condenser is employed in connection with a steam generator, the water of condensation is returned to the water-tank with more or less oil mixed with it, which oil from its continual subjection to very high temperatures is more or less baked and clotted and liable to clog the valves and piping of the generator and the entire system.

It is the object of the present invention to produce an apparatus which will separate the oil, or other foreign substance, thus mixed with the water of condensation, before said water returns from the condenser into the water-tank, thereby preventing said oil, after it has been subjected to a high temperature, from again passing through the system.

To this end the invention consists of the novel apparatus hereinafter described and claimed, reference being had to the accompanying drawings.

Referring to the drawings, Figure 1 is a diagrammatic view of a steam-generator installation showing our improved separating apparatus included in said system. Fig. 2 is a central vertical section of our improved separating apparatus located within the water-tank. Fig. 3 is a horizontal sectional view on the line  $x-x$ , Fig. 2. Fig. 4 is a modification showing our improved separating apparatus located outside of and at a distance from the water-tank.

In the drawings, 1 represents a water-tank such as is commonly used for supplying water to a steam-boiler or generator, and 2 is a removable cap for closing the opening 3,

which opening is made use of in filling or emptying said water-tank. Arranged within the water-tank 1 is a receptacle 4, in the form of a vertical cylinder closed at the bottom and open at the top. The open end of the receptacle 4 is located a short distance below the top of the water-tank as shown, for a purpose to be hereinafter described.

The water-tank 1 is provided with a second opening 5 in the top thereof directly opposite the open end of the receptacle 4 and a removable cap 6 for closing said opening. Arranged in the opening 5 is a second receptacle 7 which extends into the receptacle 4 and is provided at its bottom with a series of perforations 8. The second receptacle 7 is held in position in the opening 5 by means of an outwardly extending flange 9 formed upon said receptacle which is adapted to rest upon an inwardly extending flange 10 in the opening 5.

Extending upwardly through the bottom of the water-tank 1 and through the closed end of the receptacle 4 and the open or perforated end of the second receptacle 7 are two pipes 11 and 12. The pipe 11 is connected at one end by a union 11' to the pipe 13 leading from the condenser-pump 14, shown in Fig. 1, and the other end of said pipe 11 is open and located about three inches below the top or open end of the receptacle 4. The pipe 12 is open at both ends, and the upper end 16 thereof is located a short distance below the top of the receptacle 7, said pipe serving as an overflow pipe, as hereinafter described. A suitable filtering material 17, such as waste, oakum, or the like, is preferably placed in the lower end of the receptacle 7.

With the above construction the operation is as follows: The water from the tank 1 passes through the pipe 18 to the boiler 19, shown in Fig. 1, where it is made into steam. The steam passes from the boiler 19 through the pipe 20 to engine 21, where it performs its work and then through the pipes 22 to the condenser 23, where it is condensed into water. The water of condensation is then pumped by the pump 14 from the condenser 23 through the pipe 13 into the pipe 11 and out through the open end 15 of said pipe, thence downward through the receptacle 7 and through the filtering material 17 and the perforations 8 into the receptacle 4,



as indicated by the arrows in the drawings. When sufficient water has passed into the receptacle 4 to fill the same, the surplus will of course run over the open top of said receptacle and back into the water-tank 1 to be used over again.

As will be seen, the water of condensation, in flowing through the receptacle 7, and the filtering material 17, as above described, will have the oil and foreign substances separated therefrom, so that the water which flows through the perforations 8 will be substantially free from any foreign substance. The oil thus separated from the water will rise to the surface of the water in the receptacle 7, wherever the surface of the water therein may be.

If the water level in the tank 1 is below the top of the receptacle 4, the water level in the receptacle 7 will be at the top of the said receptacle 4 and will remain at this level as long as the water level in the tank 1 is below the top of the receptacle 4. When, however, the water-tank 1 is filled and the water level therein is raised above the top of the receptacle 4, the water will flow down through said receptacle 4 and thence up through the perforations 8 and filtering material 17 and cause the water level in the receptacle 7 to rise to the top of the overflow pipe 12, so that the oil which is on the surface of the water in said receptacle 7 will flow into the upper open end 16 of said pipe 12, and be discharged out through the lower open end. It will thus be seen that the filling of the water-tank 1 not only serves to discharge the oil which has accumulated upon the surface of the water in the receptacle 7, but also serves to reverse the flow of the water through the filtering material 17, thereby cleansing said filtering material to a greater or less extent. It will also be seen that the receptacle 7 can be readily removed at any time and the interior cleaned or the filtering material changed, as desired.

In Fig. 4 the separator is located outside of the main water-tank 1 and when thus used an auxiliary water-chamber 24 is provided which is connected with the main water-tank 1 by means of the pipe 25. The auxiliary chamber 24 surrounds the outer receptacle 4 and extends above the upper end of the overflow pipe 12, being provided at the top with an opening 26 which surrounds the opening 5 and is closed by an enlarged flange 27 on the cap 6. In this modified construction the tank is filled through the opening 26 and the oil is separated from the water and dispelled through the overflow pipe 12 in the same manner as in the form of device shown in Fig. 2.

Various other changes may be made in the details of construction without departing from the spirit and scope of our inven-

tion, and it will be understood that we do not wish to limit ourselves to the precise construction shown and described.

What we claim as our invention and desire to secure by Letters Patent is:

1. A separator comprising an outer receptacle open at one end, a second receptacle having one end open and located within said outer receptacle, and the other end closed and located outside of said outer receptacle, and two pipes opening into said second receptacle.

2. A separator comprising an outer receptacle open at one end, a second receptacle having one end provided with a series of perforations and located within said outer receptacle, and the other end closed and located outside of said outer receptacle, and two pipes opening into said second receptacle.

3. A separator comprising an outer receptacle open at one end, a second receptacle extending into said outer receptacle and having its outer end closed and its inner end perforated, a filtering material in said second receptacle, and two pipes extending and opening into said second receptacle.

4. The combination, with a water-tank, of a vertically arranged receptacle secured therein and having the top open and the bottom closed, a second receptacle extending into said first receptacle and having the top closed and the bottom open, and two pipes extending from the exterior of said water-tank into said second receptacle, one of said pipes having its inner end open and located adjacent the top of said first receptacle and the other of said pipes having its inner end open and located adjacent the top of said second receptacle.

5. The combination, with a water-tank, of a vertically arranged receptacle secured therein and having the top open and the bottom closed, a second receptacle extending into said first receptacle and having the top closed and the bottom provided with a series of perforations, and two pipes extending from the exterior of said water-tank into said second receptacle, one of said pipes having its inner end open and located adjacent the top of the first receptacle, and the other of said pipes having its inner end open and located adjacent the top of the second receptacle.

6. The combination, with a water-tank, of a vertically arranged receptacle secured therein and having the top open and the bottom closed, a second receptacle extending into said first receptacle and having the top closed and the bottom perforated, a filtering material in the second receptacle, and two pipes extending from the exterior of said second receptacle, one of said pipes having its inner end open and located adjacent the top of the first receptacle and the other of said pipes having its inner end open and lo-



cated adjacent the top of said second receptacle.

7. The combination, with a water-tank provided with an opening in the top thereof and a removable cap for closing said opening, of a receptacle secured within said water-tank opposite said opening, said receptacle having the top open and the bottom closed, a second receptacle supported in the afore-  
10 said opening in the water-tank and having its bottom open and its top closed by means of the aforesaid cap, and two pipes extending from the exterior of said water-tank into said second receptacle, each of said pipes having  
15 its inner end open.

8. The combination, with a water-tank having an opening provided with an inwardly extending flange, and means for closing said opening, of a receptacle secured within said  
20 water-tank opposite said opening and having the top open and the bottom closed, a removable receptacle provided at its top with an outwardly extending flange adapted to engage the flange in the opening in said  
25 water-tank, said removable receptacle hav-

ing its top open and its bottom located within the first receptacle and provided with a series of perforations, and two pipes extending from the exterior of the water-tank into the removable receptacle, and having their  
30 inner ends open.

9. The combination, with a water-tank, of a receptacle arranged therein and having one end open, a second receptacle extending within said outer receptacle and having its  
35 inner end open and its outer end closed, and two pipes opening into said second receptacle.

10. The combination, with a water-tank, of a receptacle arranged therein and having  
40 one end open, a second receptacle extending within said outer receptacle and having its outer end closed and its inner end provided with a series of perforations and two pipes opening into said second receptacle.

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