

(No Model.)

G. H. WARD.
FILTER.

No. 592,675.

Patented Oct. 26, 1897.

Fig. 1.

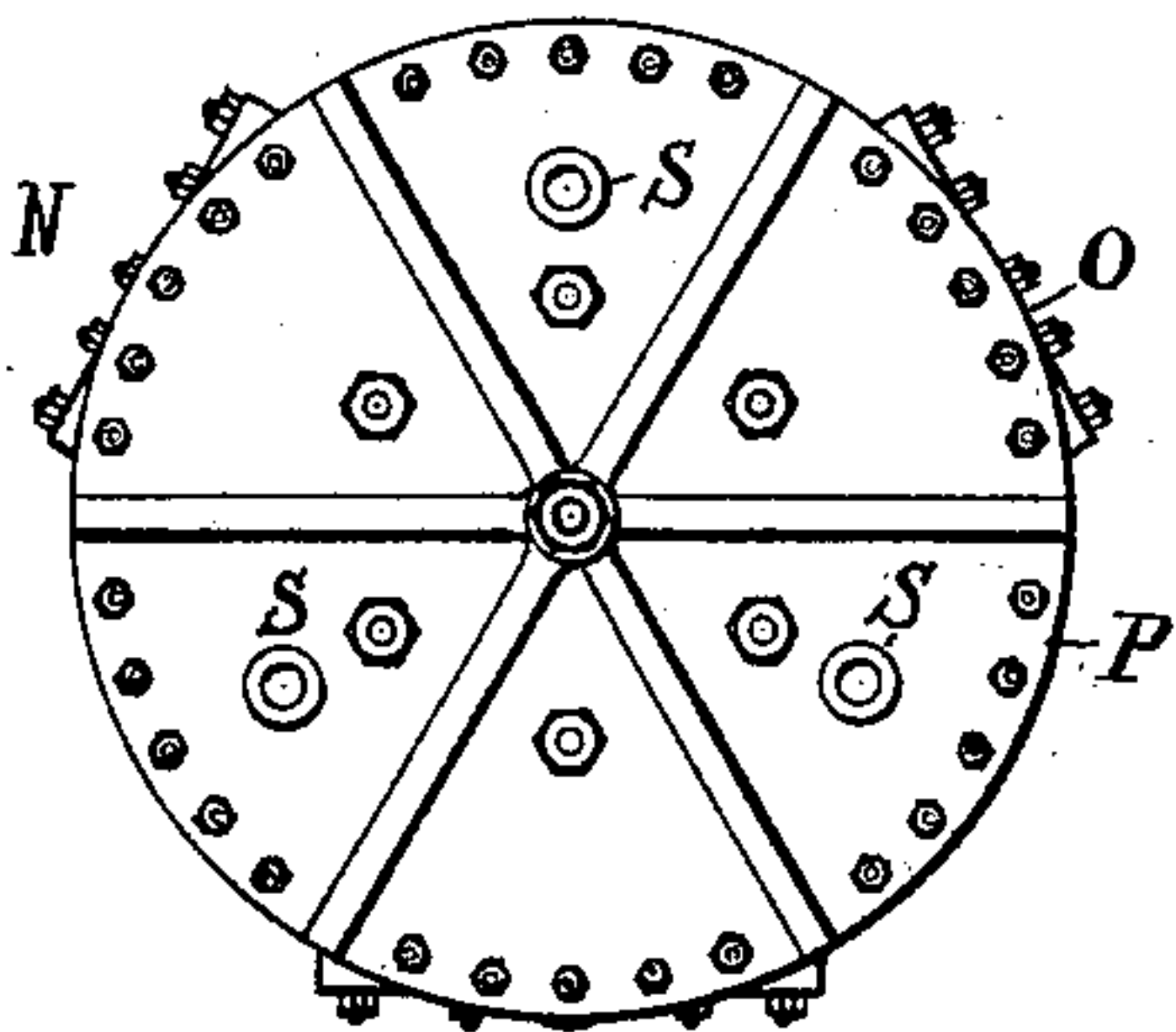


Fig. 3.

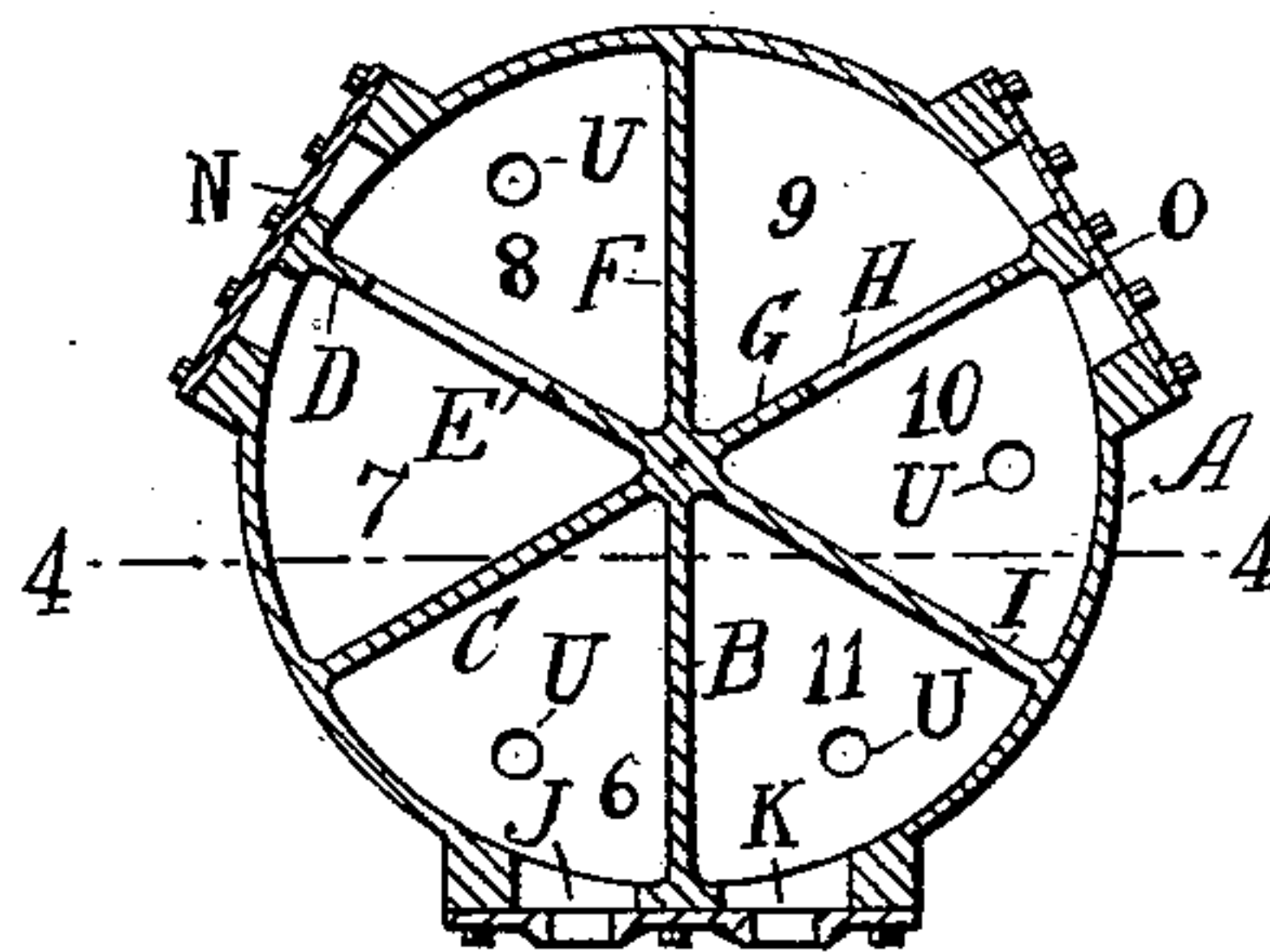


Fig. 2.

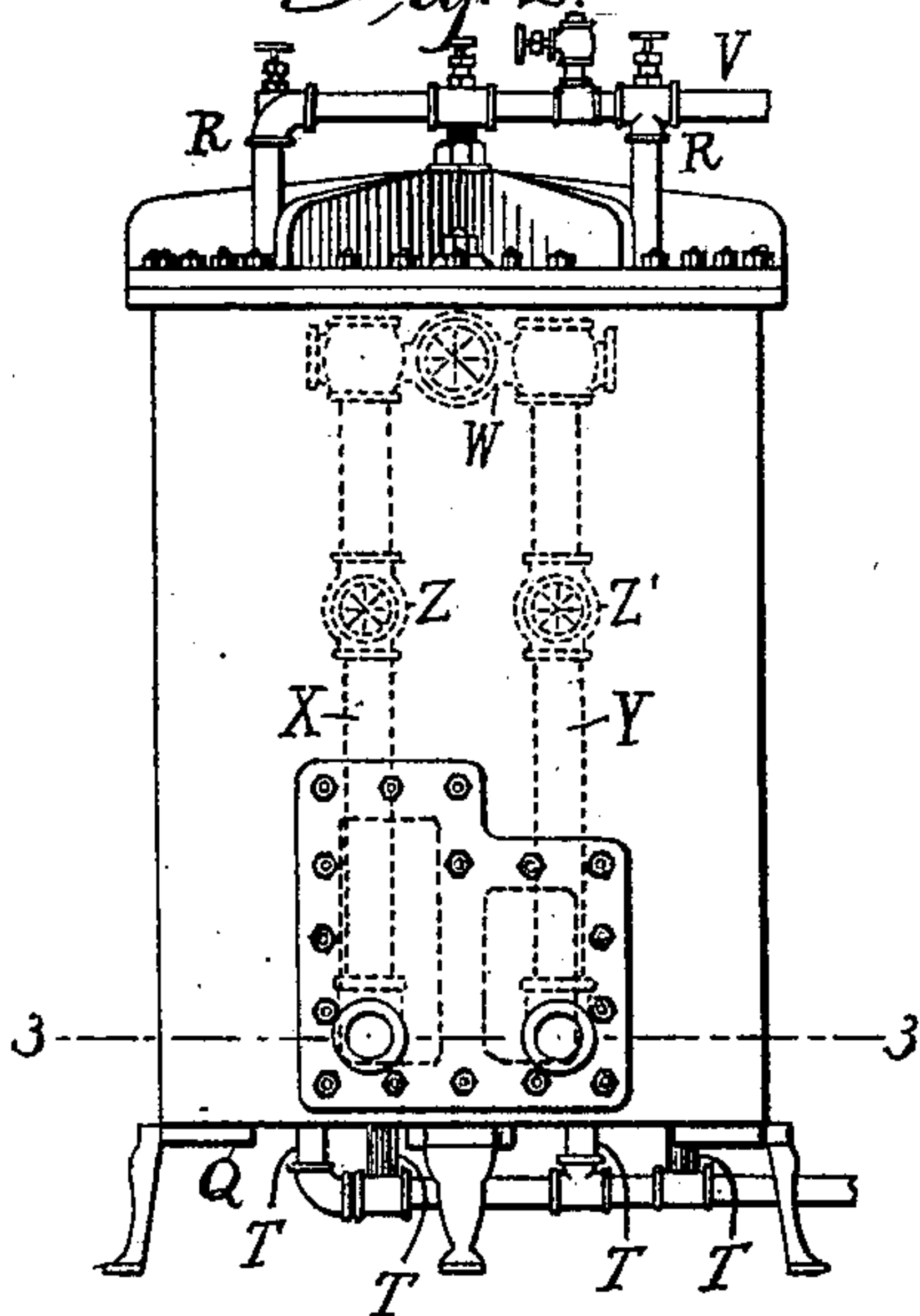
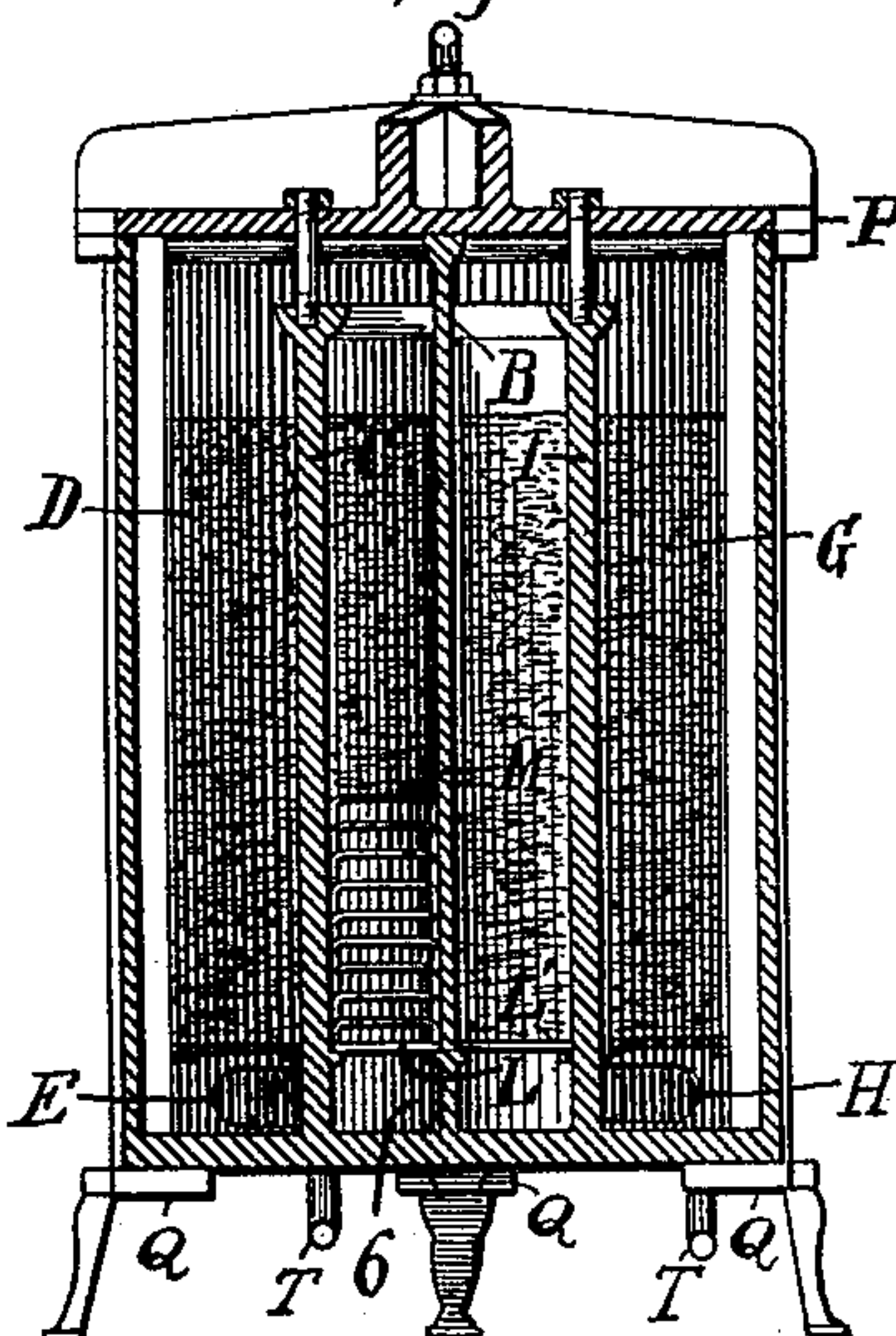
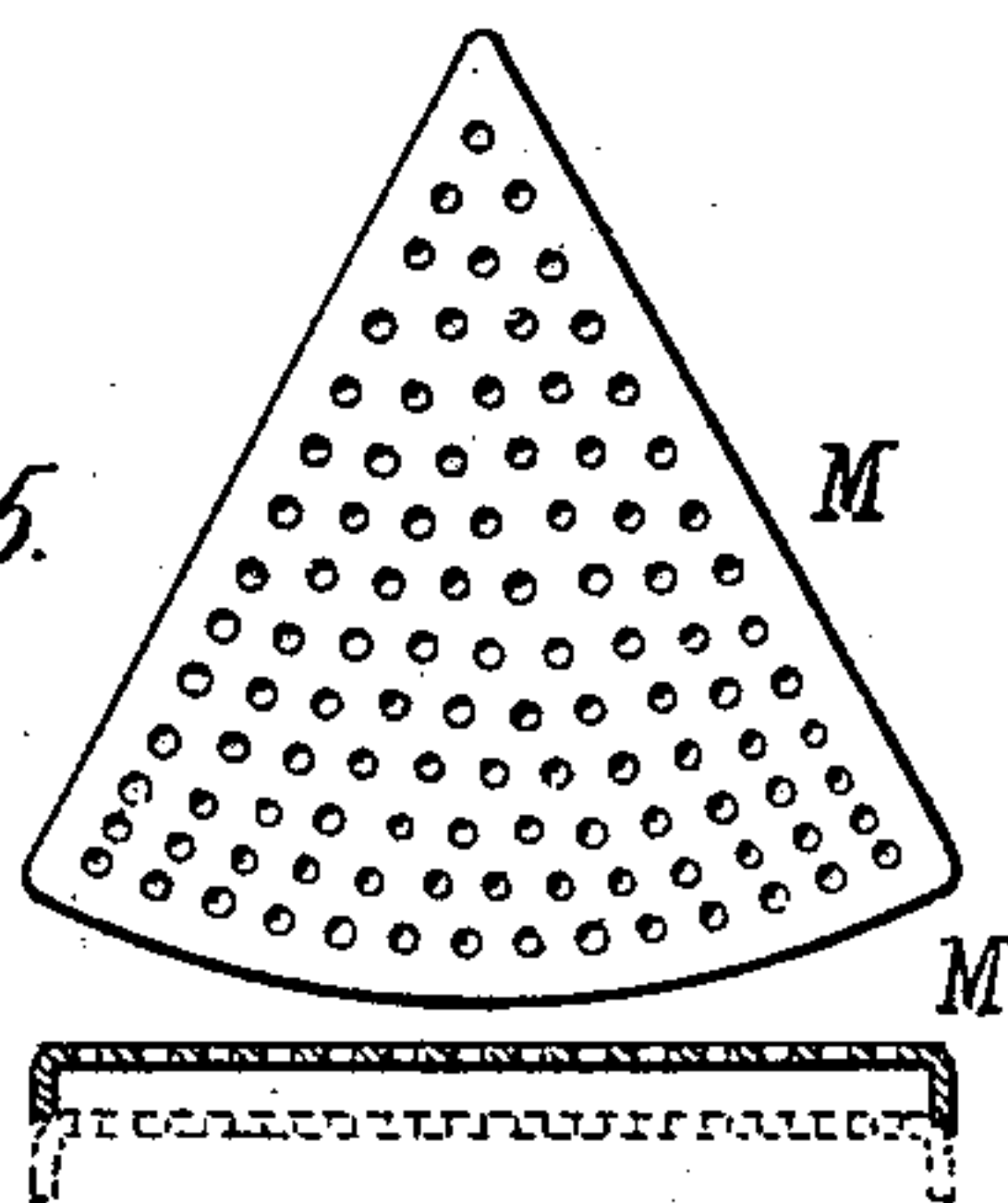


Fig. 4.



Witnesses:
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Fig. 5.



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UNITED STATES PATENT OFFICE.

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FILTER.

SPECIFICATION forming part of Letters Patent No. 592,675, dated October 26, 1897.

Application filed May 4, 1897. Serial No. 635,074. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. WARD, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Filters; 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.

My invention relates to feed-water filters, and particularly to that class designed to remove from the water of condensation the oil with which it has become impregnated. Filters heretofore constructed for this purpose have mainly depended upon the use of a filtering substance for taking the oil from the water, but that plan is not satisfactory.

The object of the present invention is to provide an apparatus in which in addition to cleansing the water by passing it through a suitable filtering substance the oil and water are allowed to separate and the water to pass on and leave the oil behind.

A further object of the invention is to remove the nascent oxygen, which is always to be found to a greater or less extent in all water of condensation, and by removing this oxygen from the water before the water enters the boiler corrosion and pitting of the boiler is prevented.

With these objects in view my invention consists in the construction, combination, and arrangement of parts hereinafter described and claimed.

In the accompanying drawings, which form a part of this specification, Figure 1 represents a plan of the filter. Fig. 2 represents a side elevation thereof. Fig. 3 is a horizontal section taken in the plane represented by line 3 3, Fig. 2. Fig. 4 is a vertical section taken in the plane represented by line 4 4, Fig. 3. Fig. 5 represents, on an enlarged scale, a plan and transverse section of one of the zinc plates, a second one being indicated in dotted lines in the section.

As indicated above, the intention in operating this filter is to pass the water of condensation and the oil with which it is impregnated through a chamber in which sufficient space is allowed for the oil to rise on

the water, from which chamber the water is allowed to pass from under the oil into another chamber, where such oil as may remain in the water is allowed to rise on the surface thereof, and so on through a succession of such chambers until not a trace of the oil is left in the water. The apparatus providing for this operation may be variously constructed, but the form preferred is that illustrated, wherein the body of the filter A is cylindrical and provided with a number of radial partitions, of which the partition B extends from top to bottom of the cylinder. The partition C to the left of partition B does not extend to the top of the cylinder, while the partition D extends from top to bottom of the cylinder, but is provided at its lower end with an aperture E. The next partition F is of the same height as partition C, while the partition G is the same as partition D, it being provided with a port H, while the partition I is the same as partitions C and F. In this manner six prismatic chambers 6, 7, 8, 9, 10, and 11 are formed, into the first of which is an inlet-opening J and from the last of which is the outlet-opening K. Near the bottom of chambers 6 and 11 are perforated trays L L', located in a horizontal position in any suitable manner, as by resting upon ledges, as indicated in Fig. 4, and upon the tray L in the inlet-chamber rests a series of perforated zinc plates M. These zinc plates are supported at a slight distance from one another in any suitable manner, as by means of projections or flanges, as indicated.

The compartment in which the zinc plates are located is made accessible through a suitable opening in the side of the cylinder A, as indicated in Fig. 2, which opening may be covered by the same bonnet as the cleaning-opening in chamber 11. The remaining chambers are provided also with suitable cleaning-openings, as indicated, the openings for chambers 7 and 8 being covered by the same bonnet N, as likewise are the openings from chambers 9 and 10 covered by the bonnet O.

The body A may be formed of any suitable material and in any suitable way, as by casting, as indicated in the drawings, or of sheet metal. The cover P may also be con-

structed in any suitable manner, here shown as consisting of a ribbed casting secured to the flange of the body and by stay-bolts to the partitions.

5 The filter has been shown also as provided with lugs Q for the attachment thereto of suitable lugs or supports.

It is intended that the chambers of the filter shall be filled or partially filled with a
10 suitable filtering substance or medium—preferably animal charcoal—which in chamber 6 will rest upon the uppermost zinc plate or upon a suitable tray, similar to tray L, placed above the zinc plates, if desired, while in
15 chamber 11 such filtering medium will rest upon the tray L'. In the remaining chambers the filtering medium may be supported above the ports E and H or not, as preferred, the principal reason for supporting such me-
20 dium above the bottom of chambers 6 and 11 being that thereby it is kept from clogging the inlet and outlet ports.

The course of the water through the filter is then as follows: Being entered at port J,
25 it ascends through the zinc compartment, where the nascent oxygen is eliminated from the water by exercising its affinity for combination upon the zinc plates. Thence the oily water rises to the top of chamber 6, from
30 which the water flows over partition C into chamber 7 and down through port E into chamber 8, where it rises and flows from under the oil which floats thereon into chamber 9 down through the charcoal of that cham-
35 ber and through port H into chamber 10, in the top of which the small amount of oil that may remain rises to the top, leaving the water to flow over partition I into chamber 11, through which it descends and passes out
40 through port K.

To remove the oil accumulating in the various chambers, suitable waste-pipes or blow-off-pipes R are connected to said chambers, as indicated in Fig. 2, the ports to which said
45 pipes are connected being shown at S in Fig. 1.

For the purpose of cleaning the filtering medium or charcoal suitable blow-offs or waste-pipes T may be provided at the bottom of the filter, as represented in Fig. 2, the
50 location of the ports for which is indicated at U in Fig. 3. This cleansing is best effected by the admission of live steam to the top of the filter through the oil blow-offs, as by means of the pipe V.

55 While cleaning the filtering medium, as just described, it is best to cut the filter out of the line. It is also advantageous to have the filter provided with such cut-out means in order that it may be emptied of filtering medium or
60 the zinc compartment refilled without having to shut down the boiler plant. For this purpose the inlet and outlet pipes (indicated in dotted lines at X Y, Fig. 2) are each provided with a suitable valve, as Z Z', and connected
65 together by the valve-controlled by-pass W. Obviously the by-pass will be closed while the filter is in operation, and by opening it and

closing the valves Z Z' the filter may be cut out of line.

This filter is preferably located in the feed-
70 water line next to the boiler in order that it may thoroughly counteract the effect of the feed-water heater, as well as that of the condenser, by removing the free oxygen. Not only is the water freed from oil and oxygen
75 as it passes through the filter, but the oil also is cleansed, and after being blown off it may be recovered and used again.

Many changes in the form and construction of the various parts of the filter aside from
80 those above described may be made without departing from the spirit of this invention.

What I claim as my invention is—

1. A feed-water filter consisting of a cylindrical body divided vertically by radial par-
85 titions one of which is complete and extends from top to bottom of the body, while the others form a series of chambers communicating with one another in succession alternately at top and bottom, an inlet and an outlet at op-
90 posite sides of said complete partition, a tray in each the inlet and the outlet chambers located above the inlet and outlet openings, and a filtering medium sustained by said trays.

2. A feed-water filter having a body portion
95 divided into a series of chambers, substantially as described, a filtering medium in said chambers above which are left spaces for the separation of oil from the water, and a series of blow-offs leading from said spaces to a com-
100 mon waste-pipe for the purpose set forth.

3. In a feed-water filter, a series of successively-communicating chambers containing a filtering medium, and a series of zinc plates
105 placed at the entrance of the first of said series of chambers, for the purpose set forth.

4. In a feed-water filter placed in the feed-water line next to the boiler, a compartment at the inlet to said filter, and zinc placed in
110 said compartment for the purpose set forth.

5. The feed-water filter substantially as described, consisting of the body portion divided into the series of communicating cham-
115 bers for the reception of a filtering medium, suitable cleaning-ports opening into said chambers, the blow-off pipes for oil collected in said chambers, a live-steam pipe connected to the blow-off pipes, waste-pipes at the bot-
120 tom of the chambers, and means for cutting the filter out of the feed-water line while being cleaned.

6. In a feed-water filter, a series of chambers arranged in a group so that the first and last chambers of the series are side by side,
125 valved inlet and outlet pipes placed side by side and communicating with said chambers, and a valved by-pass connecting said pipes, as and for the purpose set forth.

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

GEORGE H. WARD.

Witnesses:

WM. H. CAPEL,

H. C. TOWNSEND.