

No. 735,693.

PATENTED AUG. 11, 1903.

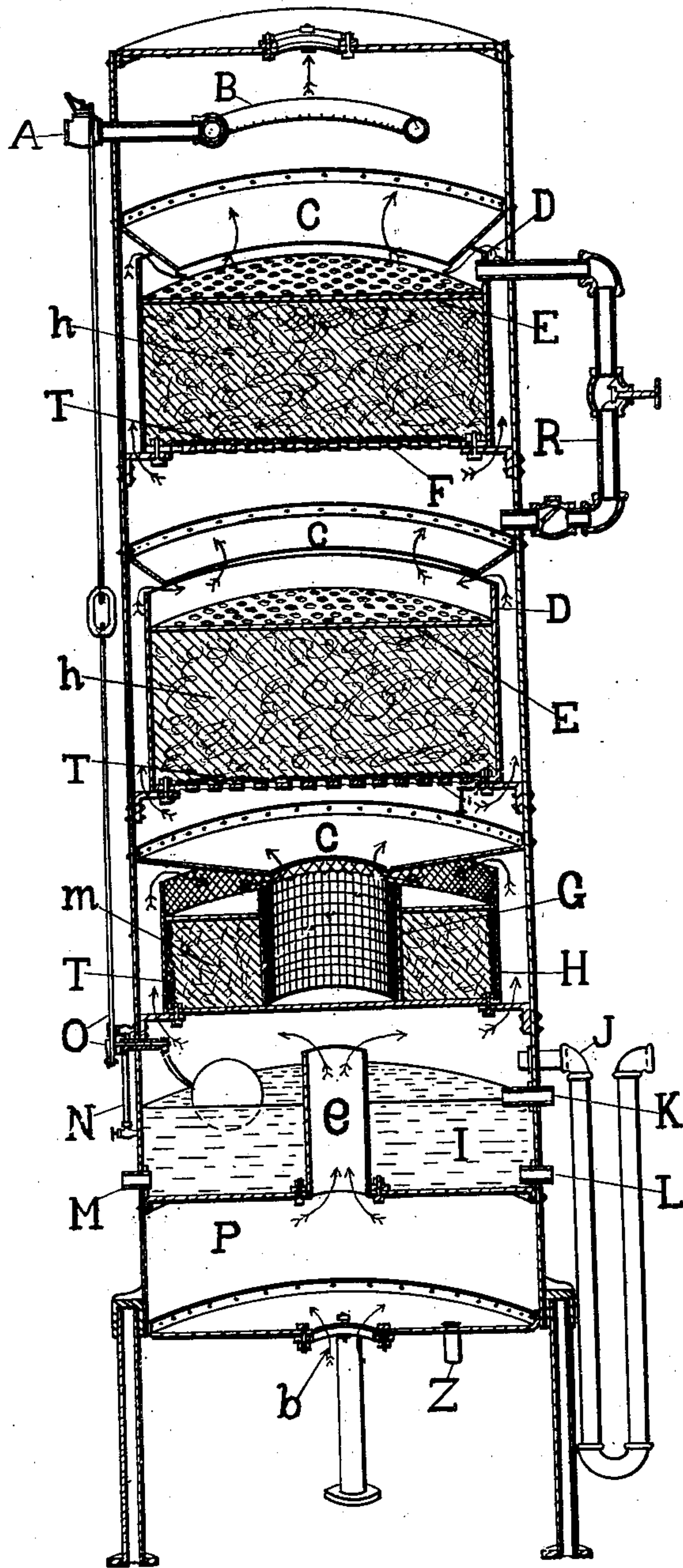
R. D. H. ANDERSON.
FEED WATER HEATER AND PURIFIER.

APPLICATION FILED DEC. 13, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

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R. H. Hanford

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2 SHEETS—SHEET 2.

FIG. 2.

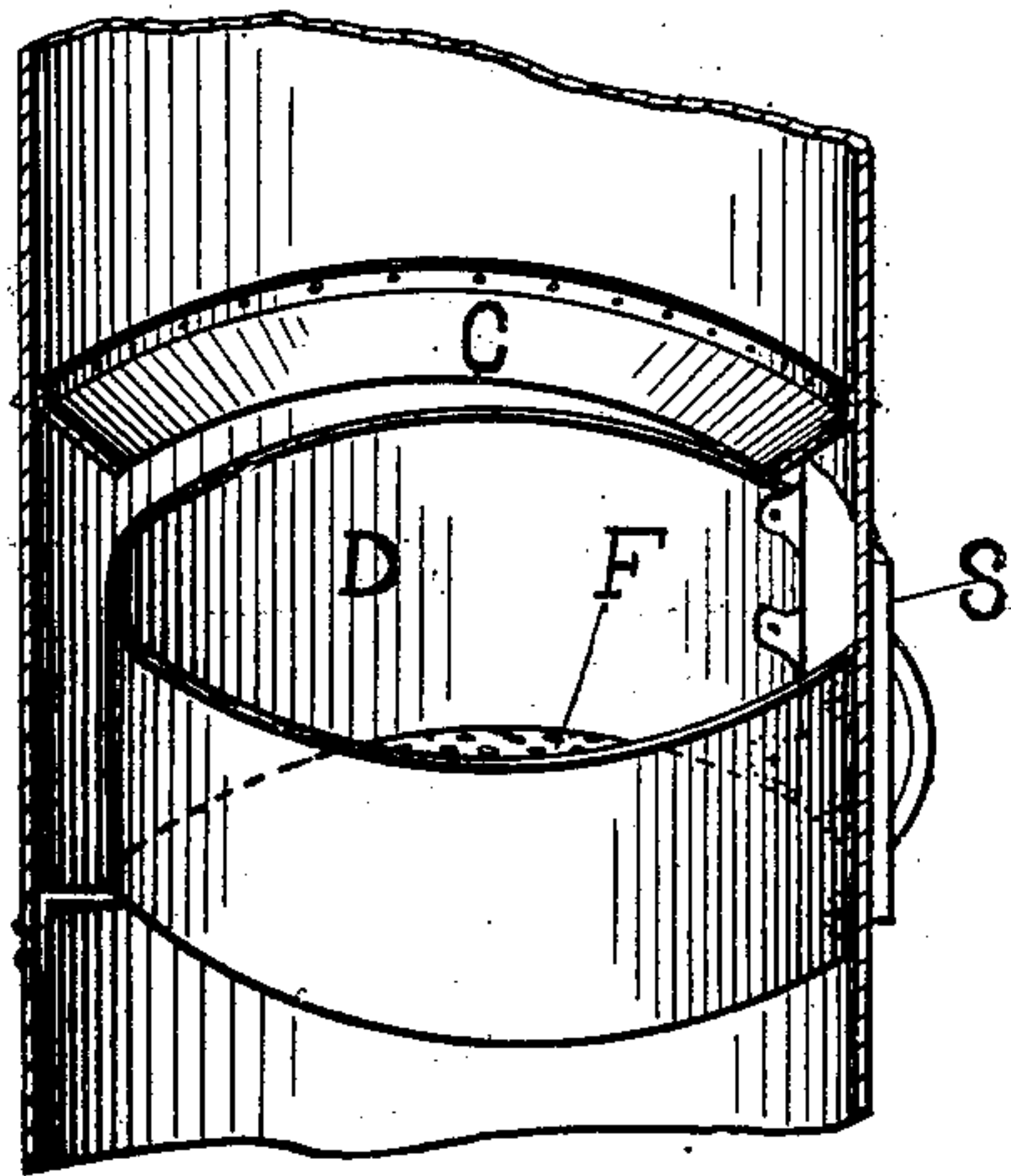
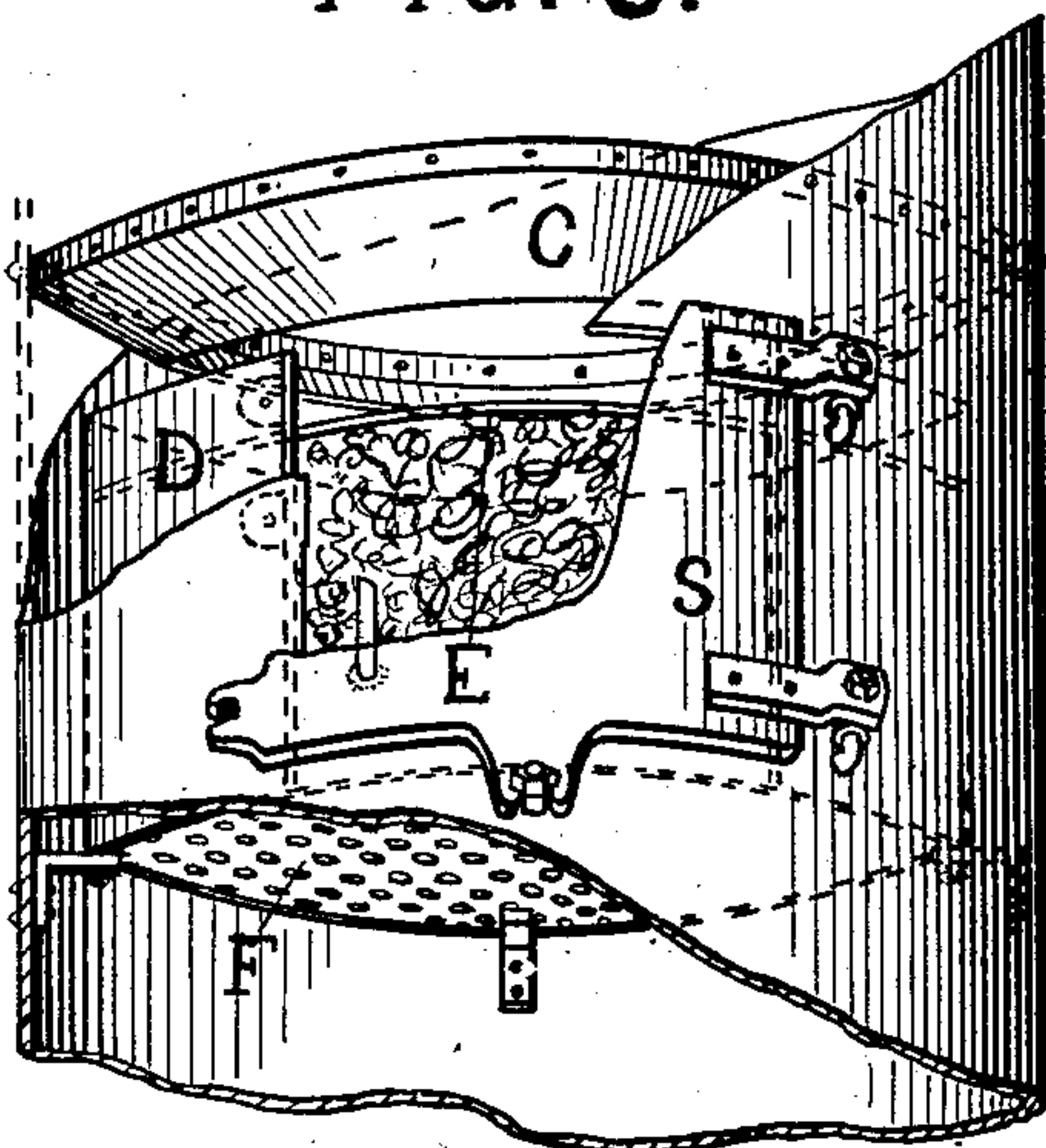


FIG. 3.



WITNESSES:
Dr. W. M. Clawson.
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Robert D. H. Anderson.

UNITED STATES PATENT OFFICE.

ROBERT D. H. ANDERSON, OF CINCINNATI, OHIO.

FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 735,693, dated August 11, 1903.

Application filed December 13, 1902. Serial No. 135,166. (No model.)

To all whom it may concern:

Be it known that I, ROBERT D. H. ANDERSON, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Feed-Water Heating and Purifying Apparatus, of which the following is a specification.

My invention relates to feed-water heating and purifying devices using exhaust-steam as a heating medium and being of the class known as the "open" type.

The object of my improvement is to produce a device that will furnish pure boiling-hot water for use in steam-generators.

I attain the object desired by the device illustrated in the accompanying several drawings, in which—

Figure 1 is a vertical section showing the entire mechanism of the device. Fig. 2 is a sectional view, showing the manner of connecting the filter-walls to the sides of the doorways. Fig. 3 is section showing the style of the doors and their relative position to the filter-beds.

The separate parts are all indicated by letters on the several drawings.

Similar letters refer to similar parts throughout the several views.

The device generally is to be constructed of boiler-plate the thickness of which will vary with the size of the device.

The different parts and their uses can be best understood by describing the course of the water and then the course of the steam through the device. The water enters through the balance-valve A at the top of the heater, and the supply is regulated by means of the float in the hot-water well I and the connections C to the balance-valve A. After passing through the balance-valve A the water is broken up into a fine spray by the circular spray-pipe B and thence rains down onto the top water-shed C and the perforated plate E. The water that falls on the water-shed C is conveyed over the steam-passage and also falls onto the perforated plate E. The perforated plate E is for the purpose of distributing the water evenly over the surface of the filter-bed on its entrance into same. It also holds the filter mass compactly in place. The entire filter-bed is contained within the wall

D and the perforated bottom F, the whole of which is held in position in the center of the heater by being bolted to a series of brackets (which are riveted to the shell of the heater) and to lugs at the sides of the doorway. After the water passes through the perforated plate E it percolates through the filter mass, which may be of excelsior or any good filtering material, at the bottom of which is spread several thicknesses of burlaps cloth. After the water strains through this burlaps cloth it is precipitated to the second down filter-bed, which is identically the same in construction and principle as the top filter-bed, and the same course is therefore pursued for the second time, as described above, after which the water is precipitated onto the lower water-shed C, which conveys it to the center, where it falls into the space encircled by the screen G, which screen is in the form of a headless drum and is made of coarse wire and serves to hold the coke or filter mass in this lower cross filter-bed away from the center, forming a receptacle for the water prior to its entrance to the filter, causing it to enter laterally and work its way laterally from this point out to the outer wall H, which is also composed of wire-net in the same form as the screen G, but is much larger in diameter. This wire-netting H is lined with burlaps cloth T, through which the water passes and from thence falls into the hot-water well I, from whence it is taken through the suction-pipe by the feed-pump and is conveyed into the boilers.

The wire-netting H is fastened to the sides of the doorways in the same manner as the walls D in the two upper filter-beds and is best shown in Figs. 2 and 3. This manner of attaching the filter-walls to the sides of the doorways gives direct access to the filter-beds, and therefore makes it an easy matter to clean out and remove the filter mass when it becomes necessary. The entire filter is held in position in the same manner as the two upper filters—viz., by being bolted to a series of brackets (which are riveted to the shell of the heater) and the lugs at the sides of the doorway.

Each of the three filter-beds are contained within the walls D and D and H, which walls are enough smaller in circumference than the

casing or shell of the heater to allow a free passage for the steam around them within the shell.

The course of the steam is accurately indicated by the arrows on Fig. 1. It enters at the bottom through the opening *b* and passes into the expansion-chamber *P*, from whence it is conveyed up through the pipe *e* and then strikes the bottom of the cross filter-bed *m*, thence passing to the sides of this filter-bed, when it comes in direct contact with the water dripping from the cross filter-bed, and thence it passes up and around the cross filter-bed to the lower water-shed *C*, under which it passes to the center, where it again comes in direct contact with the water, which above this point and from the bottom of the middle filter-bed *h* is falling through the steam almost in the form of a mist. The steam again passes to the sides of the heater and up through the passage around the middle filter-bed *h* to the middle water-shed *C*, around which it passes again, coming in contact with a fine shower of water which is falling from the top filter-bed *h*. It again passes to the sides of the heater and up through the passage around the top filter-bed *h* to the top water-shed *C*, under and around which it passes, and then it comes in contact with a shower of water which is just entering the heater through the spray-pipe *B*. It passes entirely through this shower and out through the outlet in the top of the heater, (indicated by the arrow at that point.)

The top water-shed has an extra feature—viz., it is made longer than the middle one and projects down below and inside of the top edge of the wall *D* of the top filter-bed *h*, the object being that in case the top filter-bed should become clogged with mineral matter the water rising on top of the filter-bed would come in contact with the steam at the lower edge of the water-shed *C*, whereupon the steam in forcing a passage through the body of water would “pound” and make a loud noise, thereby warning the engineer in charge of the fact that the top filter-bed was clogged, and he can then open the valve in the by-pass *R*, which will then convey the water to the middle filter *h* until such time as he may set to clean the heater.

Another feature of the water-sheds *C C C* is the fact that they keep the water from clinging to the shell of the heater and running down same in a solid sheet, which circumstance would be a detriment to its purification and heating.

The trap or “gooseneck” overflow will carry off any surplus water should the regulating mechanism get out of order. Should the regulating mechanism and the overflow

both get out of order at the same time, the water would rise in the hot-well *I* to the top of pipe *e*, through which it would fall into the expansion-chamber *P*, from whence it would be carried out through the drain-pipe *Z* at the bottom of the heater, thereby avoiding any possibility of its being carried over to the engine through the exhaust-pipe.

Every part of the three filtering-beds may be removed from the heater with little difficulty, the perforated plate *E* and the bottom *F*, the side walls *D*, and the wire-net *H* being put in in sections and bolted together for this purpose.

K is a skum-pipe.

L is a blow-off pipe.

N is a gage-glass for determining the stage of the water.

The drain *Z* at the bottom of the heater has to be provided with a gooseneck similar to the overflow *J*.

The style of the door is well illustrated in Fig. 3, showing the eyebolt-hinges which make it possible to bolt the door tight to the gasket when closing and on opening it allows the door to be swung open without entirely removing it. There are three of these doors to the heater, and they are located in front of the device, and their relative position to the doors is shown in Figs. 2 and 3.

I am aware that prior to my invention feed-water heaters have been made with suspended filter-beds, and therefore do not claim the invention in its broadest sense; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. In a feed-water heater and purifier, the combination with the casing of the two upper filter-beds, *h, h*, the brackets that hold same in position, the passage around said filter-beds for the steam, the upper water-shed, *C*, the middle water-shed, *C*, and the by-pass pipe, *R*, substantially as described and shown.

2. In a feed-water heater and purifier, the combination with the casing, the two upper filter-beds, *h, h*, the brackets that hold same in position, the passages around said filter-beds for the steam, the upper water-shed, *C*, the middle water-shed, *C*, and the by-pass pipe, *R*, of the lower water-shed, *C*, the cross filter-bed, *m*, the brackets for holding same in position and the passage around said cross filter-bed for the steam, substantially as described and shown.

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

ROBERT D. H. ANDERSON.

Witnesses:

WARREN M. CLAWSON,
ROBERT H. HANFORD.