

D. B. MORISON.
WATER HEATER.
APPLICATION FILED OCT. 6, 1909.

967,142.

Patented Aug. 9, 1910.

2 SHEETS—SHEET 1.

FIG. 1.

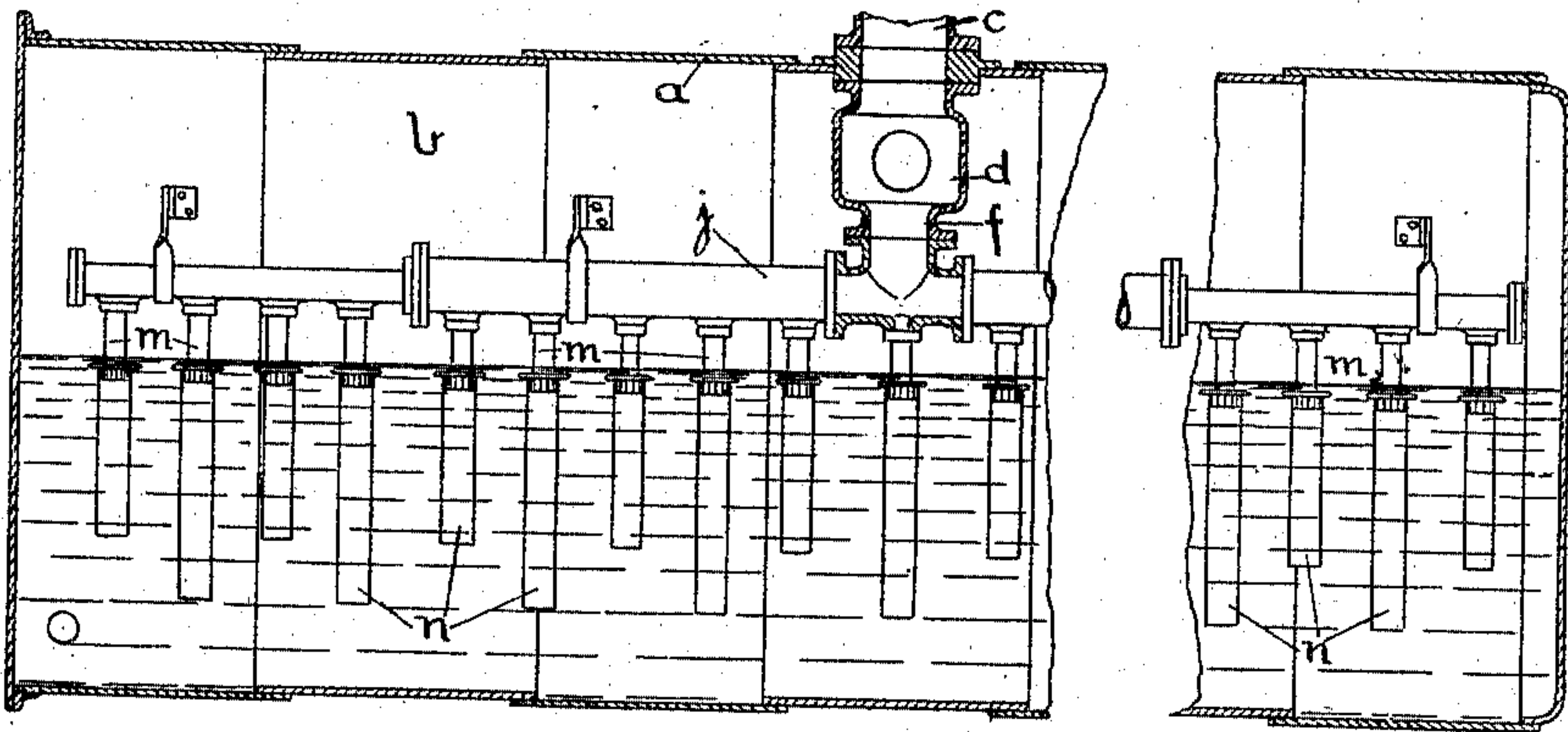
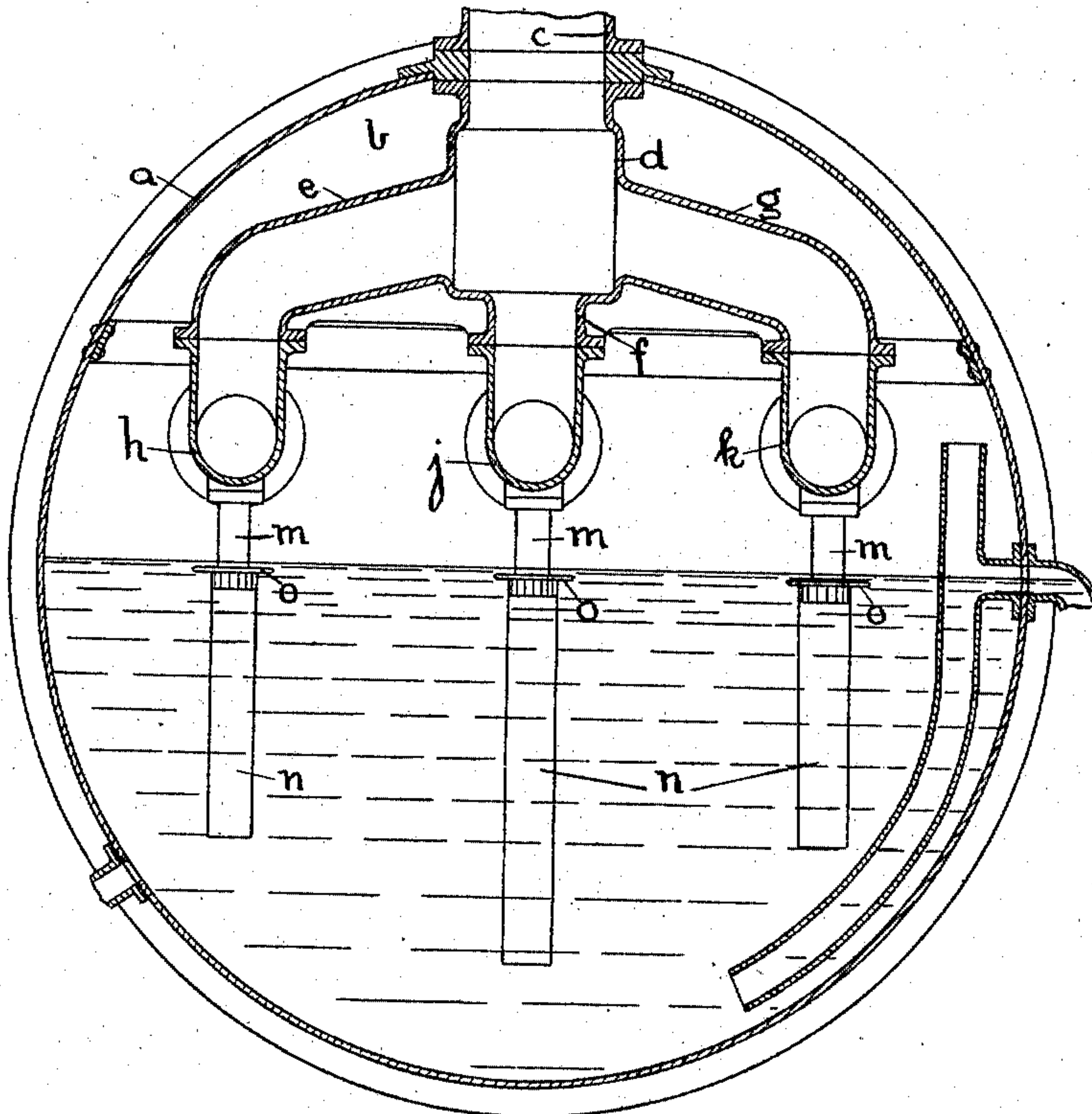


FIG. 2.



Attest.
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2 SHEETS—SHEET 2.

FIG. 3.

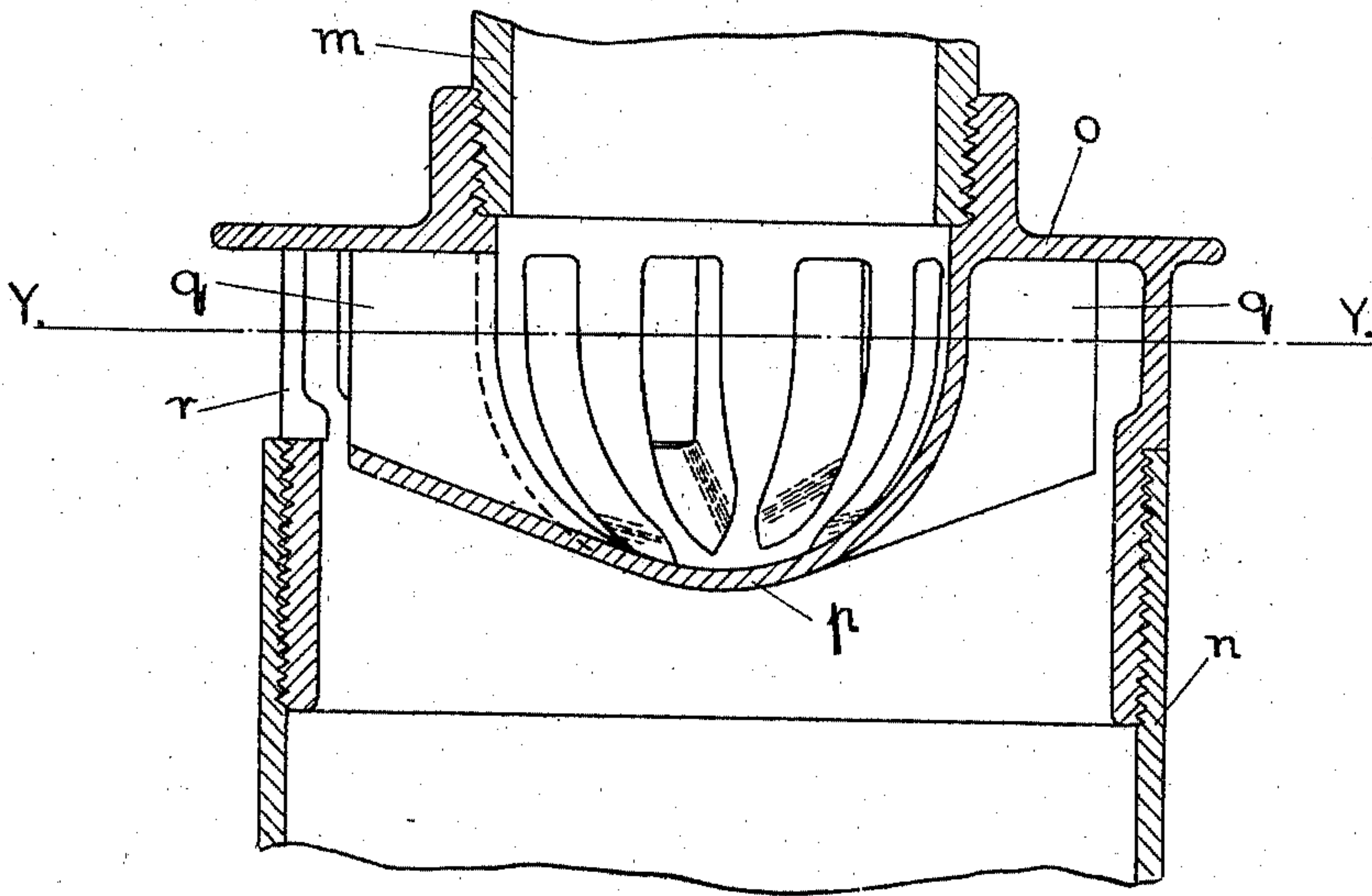
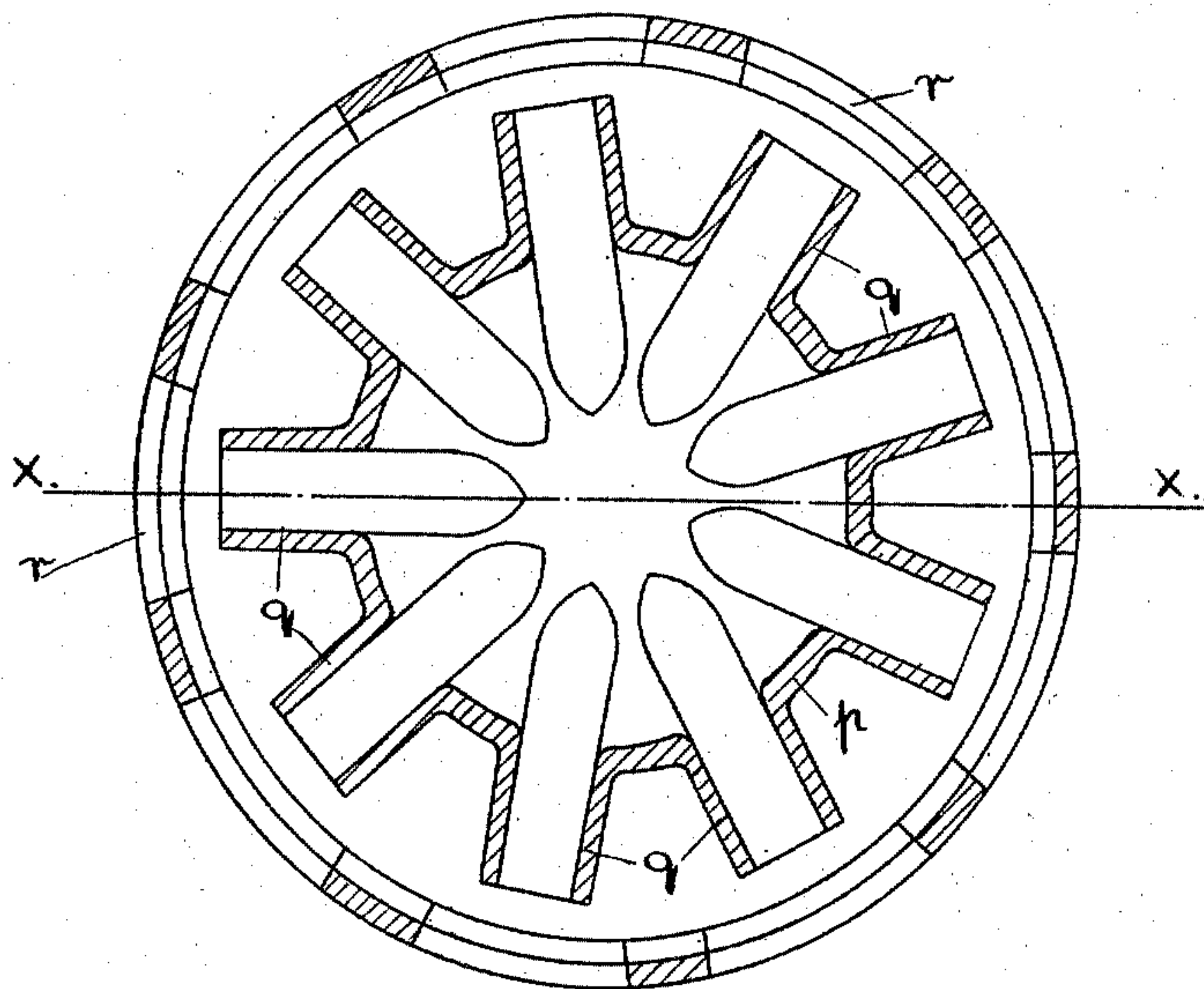


FIG. 4.



Attest,
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UNITED STATES PATENT OFFICE.

DONALD BARNS MORISON, OF HARTLEPOOL, ENGLAND.

WATER-HEATER.

967,142.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Original application filed August 4, 1908, Serial No. 446,957. Divided and this application filed October 6, 1909. Serial No. 521,413.

To all whom it may concern:

Be it known that I, DONALD BARNS MORISON, a subject of the King of Great Britain and Ireland, residing at Hartlepool Engine Works, Hartlepool, in the county of Durham, England, have invented certain new and useful Improvements Relating to Water-Heaters, of which the following is a specification.

This application is a division of that filed by me Aug. 4, 1908, Serial No. 446,957.

This invention relates to a water circulating device for water heating apparatus in which the heating medium is steam which is blown into or through the water. It is often desirable that the pressure in such water heating apparatus should not be much less than the pressure of the heating steam, and that the body of water in the apparatus should be at nearly uniform temperature. It is therefore desirable that an efficient circulation of the water should be obtained without however absorbing much of the steam-head or pressure as would be done, for example, by blowing the steam in at the bottom of the water.

My invention, which has for its object the attaining of this desideratum, consists in a novel arrangement and combination of water circulation pipes and steam discharge nozzles or orifices as will be more particularly set forth in the annexed claims.

In the accompanying drawings, Figures 1 and 2 are respectively vertical longitudinal section and cross section of a water heating apparatus, Fig. 2 being drawn to a larger scale than Fig. 1. Figs. 3 and 4, drawn to a still larger scale than Fig. 2, illustrate more particularly the water circulating device, Fig. 3 being a vertical section on the line X X, of Fig. 4, and Fig. 4 a horizontal section on the line Y Y of Fig. 3.

The water heating apparatus illustrated by way of example in Figs. 1 and 2 consists of a cylindrical receiver *a*, adapted to contain water up to the level shown, which leaves a suitable steam space *b* at the top of the vessel. A pipe *c* serves for the admission of steam to the distribution box *d* from which three branches *e*, *f*, *g* lead respectively to three distribution pipes *h*, *j*, *k*. These distribution pipes extend practically the whole length of the receiver and lead the steam by way of the tubes *m*, *m* to the in-

terior of the pipes *n*, *n*, which are distributed throughout and arranged vertically in the receiver and extend from near the bottom of the latter to near the surface of the water. These pipes *n*, *n* are open at their lower ends and are provided at their upper ends with caps *o*, *o* to which are attached the delivery ends of the tubes *m*, *m*. The caps are provided with downwardly projecting domes *p*, furnished with nozzles *q*, *q* situated opposite holes *r*, *r*, in the caps *o*, *o*, or pipes *n*, *n*. The steam discharged in radial jets through the nozzles *q*, *q*, produces an inducing and propelling action on the water, whereby the latter is projected laterally out of the holes *r*, *r*, and an upward flow of water within the pipes *n*, *n*, is obtained; and, as the steam is discharged at only a small distance below the water level in the receiver and as the nozzles are arranged to offer little resistance to the passage of the steam, the latter, in so far as it is uncondensed by the water, emerges from the latter with very little drop of pressure; and thus a satisfactory and efficient circulation of the water in the receiver is produced in accordance with the object of this invention.

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

1. In water-heating apparatus, in combination, a plurality of water circulation pipes distributed throughout the apparatus, and provided at their upper ends with holes adapted for the outflow of water and steam, a plurality of steam pipes, one led to each of said water pipes, and means for the discharge of steam from the said steam pipes into the water in said water pipes opposite the said holes in the latter, substantially as and for the purpose described.

2. In water-heating apparatus the combination of a plurality of vertical pipes distributed throughout the apparatus and adapted for the upward flow of water through them and provided with water discharge holes at their upper ends with means for discharging steam in jets into the water in the said pipes opposite the said holes, substantially as and for the purpose described.

3. In combination, a receiver which contains water intended to be heated by steam, a plurality of water pipes extending from near the bottom of said receiver to immedi-

ately below the water level in the same and provided at their upper ends with holes adapted for the outflow of water and steam, and means for discharging steam in radial jets directed toward the said outflow holes in the said water pipes, substantially as and for the purpose described.

4. In combination, a receiver which contains water intended to be heated by steam, a plurality of water pipes extending from near the bottom of the said receiver to near the water level in the same and provided at their upper ends with holes adapted for the

outflow of water and steam, and a plurality of steam pipes, one led to each of said water pipes, and provided with nozzles adapted for the discharge of steam and situated respectively opposite the said outflow holes in the said water pipes, substantially as and for the purpose described.

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

DONALD BARNS MORISON.

Witnesses:

HORITZ GUSTAV SCOTCHBURN SWALLOW,
HARRY ALEXANDER EDGER.