

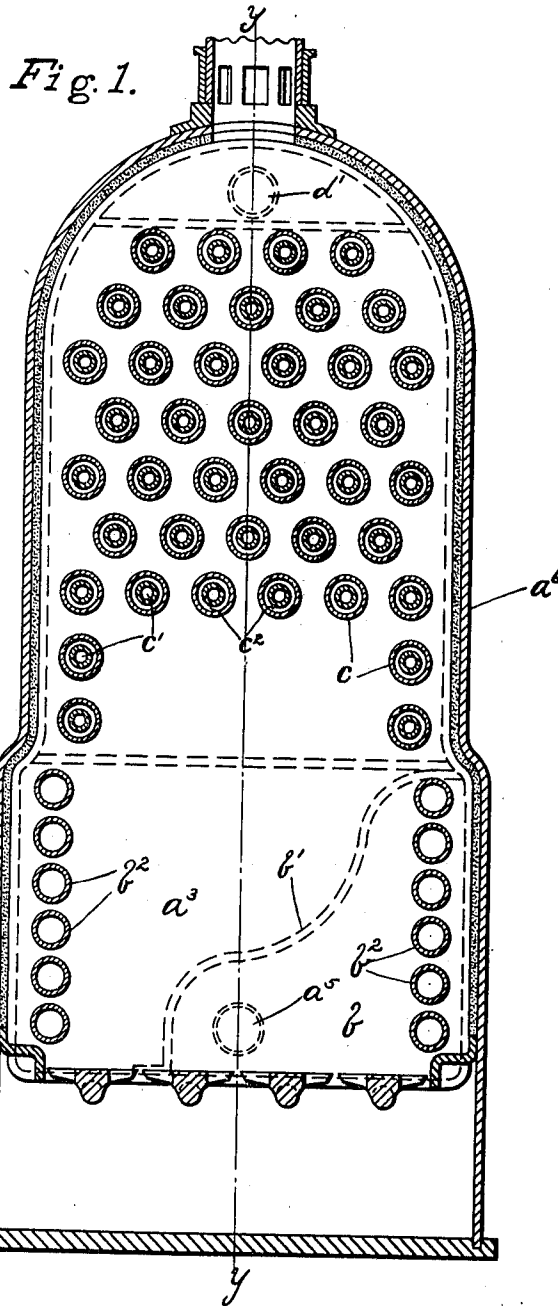
W. L. BLACKWELL & E. J. DE VILLE.
WATER HEATER.

1,035,679.

APPLICATION FILED APR. 13, 1910.

Patented Aug. 13, 1912.

3 SHEETS—SHEET 1.



Witnesses
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Geo. J. Welch

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Edward J. de Ville
By *Staley Borman* Attorneys

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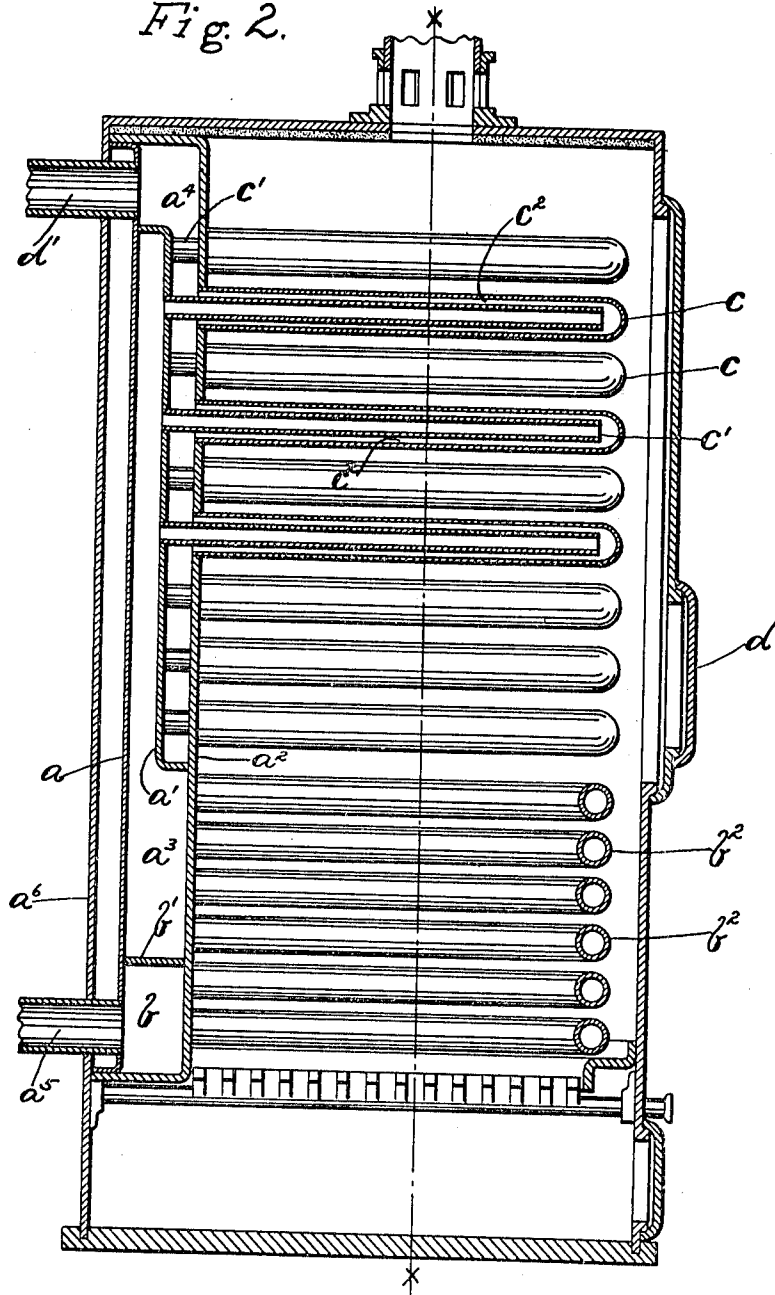
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3 SHEETS-SHEET 2.

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Fig. 2.



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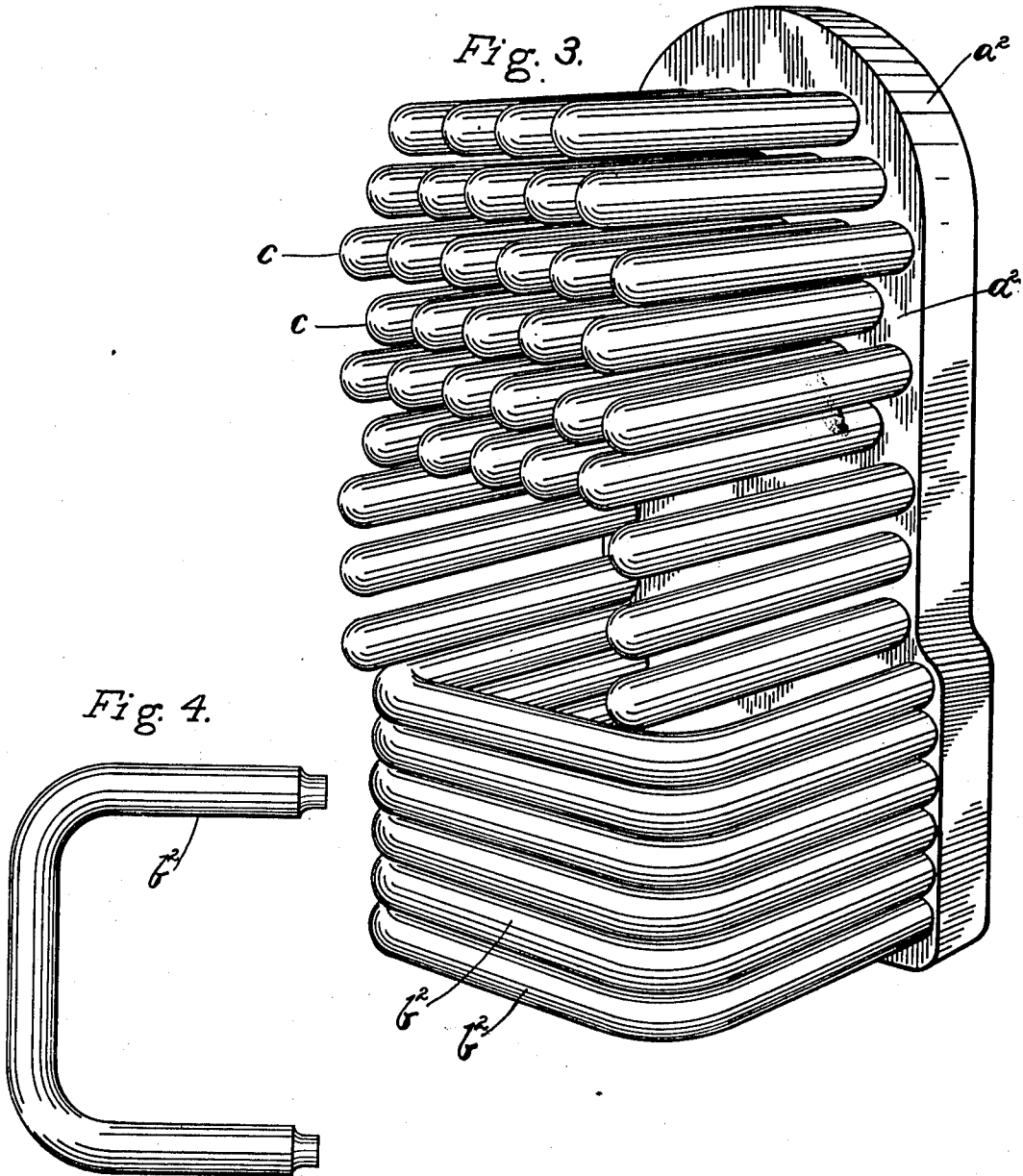
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3 SHEETS-SHEET 3.

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UNITED STATES PATENT OFFICE.

WILLIAM L. BLACKWELL AND EDWARD J. DE VILLE, OF DAYTON, OHIO, ASSIGNORS
TO THE COOPER HEATER COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

WATER-HEATER.

1,035,679.

Specification of Letters Patent.

Patented Aug. 13, 1912.

Application filed April 13, 1910. Serial No. 555,235.

To all whom it may concern:

Be it known that we, WILLIAM L. BLACKWELL and EDWARD J. DE VILLE, citizens of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Water-Heaters, of which the following is a specification.

This improvement relates to a water heater and more particularly a water heater for places requiring a compact device such as in street cars and analogous uses and the general object in the arrangement of parts is to make the heater such that the parts can be stamped or pressed out of some desirable material such as steel thereby avoiding as much possible cast metal and at the same time simplifying and strengthening the construction in an improved manner.

Referring to the drawings: Figure 1 is a front sectional view on the line $x-x$ of Fig. 2. Fig. 2 is a transverse sectional view on the line $y-y$ of Fig. 1. Fig. 3 is a perspective view of the water back and outer circulating tubes. Fig. 4 is a detail view of one of the circulating pipes.

Like letters of reference indicate similar parts throughout the different views.

In a general way the circulation of water is similar to that shown and described in the Letters-Patent 945,214, issued January 4th, 1910, to W. L. Blackwell, there being a series of outer circulating tubes and inner telescoping tubes that are so arranged as to cause the water to circulate from the outer vertical water leg; thence into the inner series of tubes and from thence to the outer series of tubes; thence to the inner water leg and thence to the outlet, but in the construction shown and described herein the parts are so formed that they may be pressed or stamped out of suitable material thereby dispensing with cast material, and the arrangement is such as to simplify the construction.

Referring to Fig. 1, we preferably employ an outer wall or casing, marked a , forming with the inner and outer tube sheets a^1 and a^2 , an outer water leg a^3 and an inner water leg a^4 , the inlet a^5 from the source of supply comprising a passage passing through the outside casing a^6 of the heater and also through the outer wall a , discharging into the chamber b . This chamber has a curved partition b^1 which

extends from the base of the fire box to the top thereof and the lower series of circulating pipes b^2 (see Fig. 2) extend from said chamber b around the circumference of the fire box and discharge into the chamber a^3 (see Fig. 1). The object of this partition b^1 being to force the water entering through the inlet a^5 to circulate through chamber b , thence through said lower series of circulating pipes b^2 to said chamber a^3 being the lower part of said outer water leg. The construction preferably shown and described of the series of upper tubes is one where the outer circulating tubes c are closed at their front or free ends, projecting from the inner tube sheet a^2 which is of pressed material, being preferably one continuous inclosing wall extending from the ash pit to the top of the heater. The inner circulating tubes c^1 project from the outer tube sheet a^1 having their outer or free ends open and telescoping within the outer circulating tubes c and this outer tube sheet is pressed out with flanges forming walls for water legs. It is apparent that the outer wall, a , may be welded to the inner tube sheet a^2 and in Fig. 1 this inner tube sheet is shown extending downwardly and supported by the base of the heater. There is preferably shown an outside casing for the stove comprising the rear outside casing a^6 and the corresponding front casing having a fire door therein and it is apparent that the fire grate may be supported in any usual way at the base of the stove as indicated in Fig. 1 and the fuel may be supplied through said door, d , (Fig. 2).

Following, now, the circulation of water, the common inlet a^5 supplies water to the chamber b , and same circulates, as heretofore explained, through the curved lower series of circulating pipes b^2 to the outer water leg a^3 and the water rises in said outer water leg, it being apparent that the arrangement of the circulating pipes and the partition or guiding wall b^1 will improve the circulation of the water by reason of increasing the amount of heat to which the water will be subjected while passing around the fire box and as a result the water entering the water leg a^3 will be expanded so that when it fills said outer water leg a^3 the top wall will coöperate therewith to force the water through the pipes c^1 . To this end the pipes b^2 are tapered at their ends and

wedged into the outer tube sheets a^2 so that the circulating pipes b^2 are nested together very closely, insuring a number of circulating pipes within a limited space. The
 5 water passes into the inner circulating pipes c^1 , thence through the closed outer circulating pipes c , by reason of the space c^2 , (Fig. 2) formed between the inner and outer circulating pipes to the inner water leg a^4 ,
 10 thence upwardly until water is discharged out of the outlet d^1 . The circulation in this arrangement is substantially as shown and disclosed in the above mentioned Patent
 15 945,214, in that the water passes from the outer water leg through a series of inner circulating pipes open at their front end and thereby discharge into the outer circulating pipes closed at their front ends and
 20 thence to the inner water leg and from thence through the discharge.

Having thus described our invention, we claim:

1. In a heater of the character described, the combination of a fire box, two vertically-
 25 arranged water legs, a partition in the lower end of one of said legs to form a chamber on one side of the lower end of said leg, an inlet communicating with said chamber, circulating pipes in said fire box communicating
 30 with said chamber and also with one of said water legs, circulating pipes above said fire box communicating with both of said water legs, and an outlet leading from one of said legs located at the upper end of
 35 said heater.

2. In a heater of the character described, a fire box, two vertically-arranged water legs, a diagonally-arranged partition located in the lower end of one of said legs to form a chamber on one side thereof, a
 40 series of circulating pipes located in said fire box communicating with said chamber and with one of said water legs, a series of circulating pipes located above said fire box having a communication with both of said
 45 water legs, and an outlet from one of said water legs.

3. In a heater of the character described, the combination of a fire box, a casing having a vertically-arranged partition to form
 50 outer and inner water legs, a partition in the lower part of said casing to form a lower chamber, an inlet communicating with said chamber, circulating pipes in said fire box forming a communication between said
 55 chamber and said outer water leg, a set of circulating pipes around the upper part of said heater communicating with said inner water leg, a series of pipes forming communications between said outer water leg
 60 and said upper set of water pipes, and an outlet connected with said inner water leg.

In testimony whereof, we have hereunto set our hands this 30th day of March 1910.

WILLIAM L. BLACKWELL.
 EDWARD J. DE VILLE.

Witnesses:

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