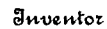


G. D. COOPER.
WATER HEATER.
APPLICATION FILED MAR. 6, 1908.

4 SHEETS—SHEET 1.

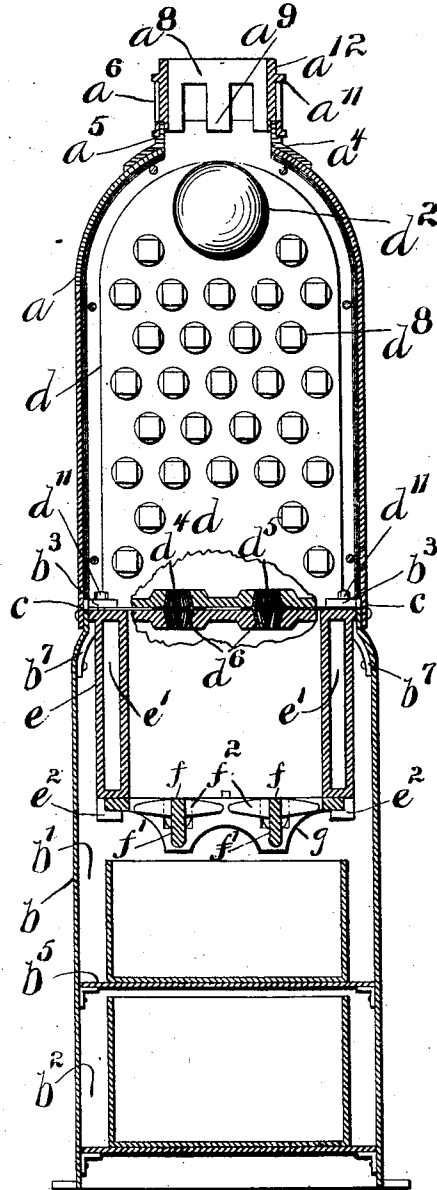


Attorneys

ਭੈਰਵ

968,129.

Fig. 2



Witnesses
S. A. Endtner
Bliss & Welch

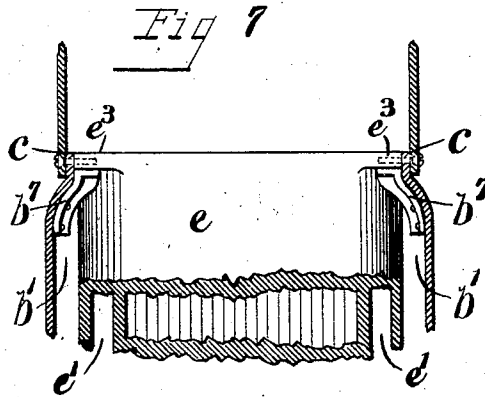
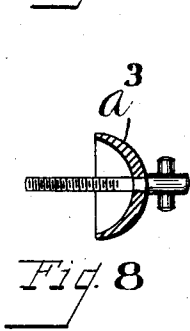
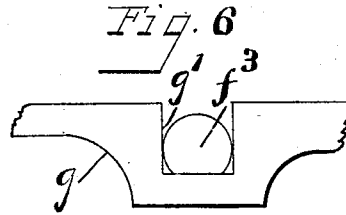
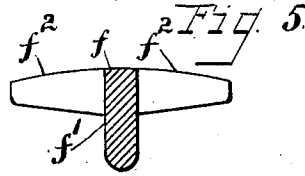
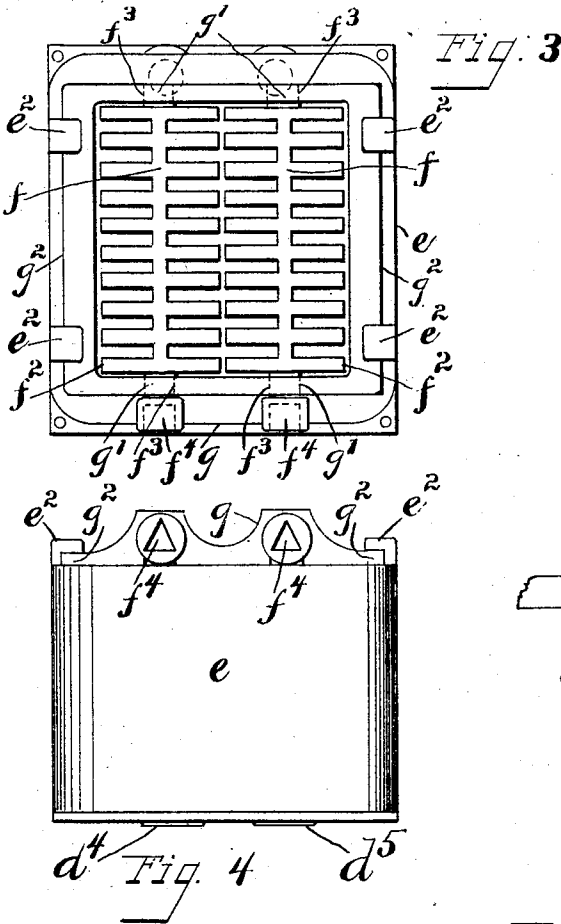
By

Inventor
George D. Cooper
Stacy & Bowman
Attorneys

Patented Aug. 23, 1910.

4 SHEETS—SHEET 3.

968,129.



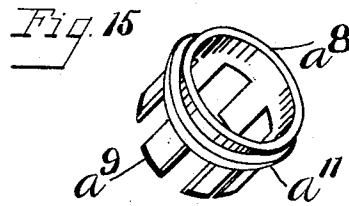
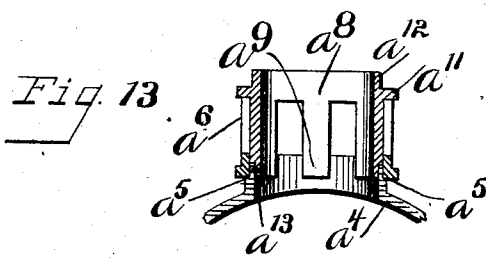
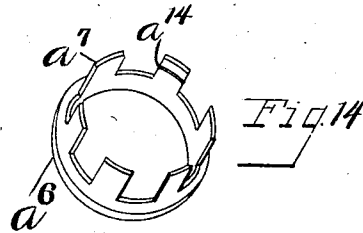
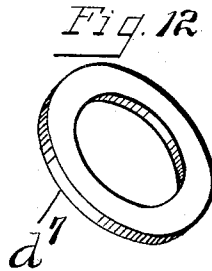
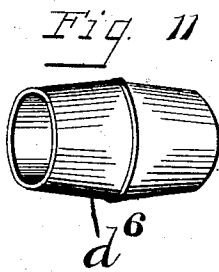
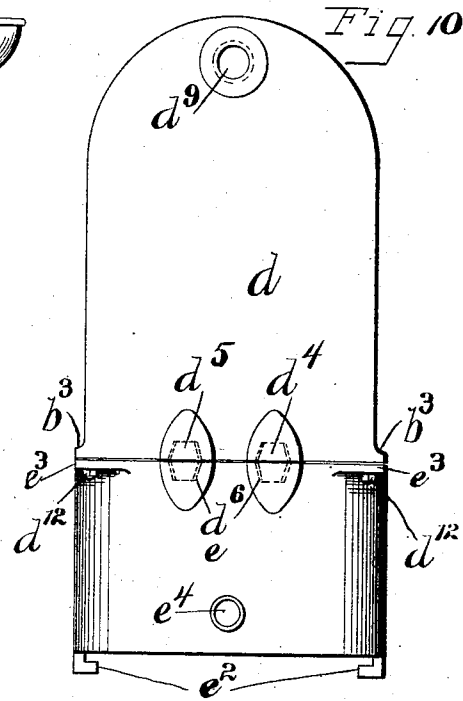
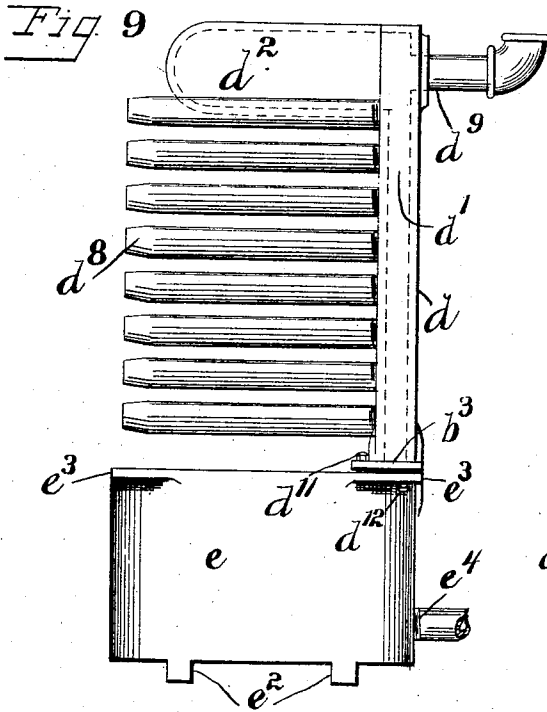
Witnesses
G. A. Endter.
Chas. J. Welch

Inventor
George D. Cooper
By *Stacy & Bowman*
Attorneys

968,129.

Patented Aug. 23, 1910.

4 SHEETS—SHEET 4.



Witnesses
S. A. Endter.
Chas. I. Welch

Inventor
George D. Cooper
Atty. *John H. Brown*
Attorneys

UNITED STATES PATENT OFFICE.

GEORGE D. COOPER, OF DAYTON, OHIO, ASSIGNOR TO HARRY F. SCHAEFFER, OF DAYTON, OHIO.

WATER-HEATER.

968,129.

Specification of Letters Patent.

Patented Aug. 23, 1910.

Application filed March 6, 1908. Serial No. 419,533.

To all whom it may concern:

Be it known that I, GEORGE D. COOPER, a citizen 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 invention relates to new and useful improvements in water heaters and particularly to heaters which are adapted to be used for heating cars where a large amount of heating surface within a small compass is desired.

The invention consists in the constructions hereinafter described and pointed out in the claims.

In the accompanying drawings Figure 1 is a front elevation of a device embodying my invention. Fig. 2 is a sectional elevation of the same. Fig. 3 is a bottom plan of the fire-pot showing the means for attaching the grates. Fig. 4 is a front elevation of the fire-pot and grate connections. Fig. 5 is a detail sectional view of one of the grate-bars. Fig. 6 is a detail of the support for the grate-bar. Fig. 7 is a section of part of the outer casing and fire-pot showing the manner of joining and supporting the casing. Fig. 8 is a detail view of the damper. Fig. 9 is a side elevation with the outer casing removed. Fig. 10 is a rear view of the same. Figs. 11 and 12 are detail views of the slip connection between the fire-pot and water wall. Fig. 13 is a detail view in section and Figs. 14 and 15 details of the damper.

Like parts are represented by similar characters of reference in the several views.

The heater proper is inclosed within an outer casing which is preferably constructed of thin metal which may be either cast in the nature of stove plates or may be formed from sheet steel or similar material cast or stamped to the desired form to suitably inclose the heater proper to secure the strength and lightness desired. The outer casing is made in two principal parts, *a* and *b*, which are adapted to be secured together at *c* in the manner hereinafter described. The lower part *b* is divided into compartments *b*¹ *b*², which compartments are provided with suitable doors *b*³ *b*⁴. The lower compartment *b*² is to be used as a coal bunker, and the upper compartment *b*¹ is adapted to contain the fire-pot to be hereinafter de-

scribed, which with the partition wall *b*⁵ between the upper and lower compartments, forms the ash-box through which the ashes are to be removed.

The upper portion *a* of the casing is provided with a large door *a*¹ which gives access to the entire upper portion of the heater for cleaning purposes. This door is hinged as shown to the main casing *a*, and has near its bottom a smaller door *a*² which is hinged onto the main door *a*¹ to give access to the fire-pot for inserting fuel. The door *a*² is provided with an opening which is adapted to be closed by an adjustable cap *a*³ which is adapted to be used in the nature of a damper as hereinafter described. The door *b*³ into the ash-box is provided with the usual draft openings adapted to be opened or closed by means of a slide in a well known manner.

The heater proper consists of two principal parts, *d* and *e*. The lower part *e* forms the fire-pot. This fire-pot is preferably cast integral with an annular water-space or jacket *e*¹ surrounding the same. It is open at the top and bottom, but the bottom is adapted to be partly closed by the grates *f*. These grates, of which there are preferably two, are mounted in a frame *g*, preferably rectangular in shape; each of the grates being journaled at each end in bearings *g*¹ in this rectangular frame. For the purpose of economy in construction and also to permit the grates to be readily removed or replaced, I form on the bottom of the fire-pot hook-shaped projections *e*² into which the rectangular frame *g* is adapted to be inserted by being slipped in longitudinally; the side bars *g*² of the frame *g* being adapted to be engaged by these hook-shaped projections *e*² and hold them firmly in place. The grates *f* are formed as shown in detail in Fig. 5, having a central bar *f*¹ and projecting lugs or fingers *f*² extending in each direction from this central bar; these lugs or fingers being preferably slightly curved on their upper surface. The bar *f*¹ is extended at each end in the form of trunnions *f*³, which rest in the bearings *g*¹ of the frame *g*. These bearings are flat at the bottom and the trunnions are correspondingly flattened so that when in the normal horizontal position the grate-bars rest upon the flat surfaces and are thus retained in this position, but capable of being moved for the purpose of shaking. The trunnions *f*³ at the front end are formed

with sockets f^4 into which a suitable wrench can be inserted to shake the bars; an opening being provided in the outer casing and preferably closed by a door b^6 for this purpose. The fire-pot e is preferably formed rectangular in shape except that the corners are rounded slightly. The walls of the fire-pot are practically straight and at the top run up to a rectangular form so that there is at each corner a slight projection e^3 extending outwardly beyond the rounded corners of the fire-pot wall.

The other principal part of the heater proper, that is, the part d , consists of a water-wall d^1 extending vertically from and supported upon the rear wall of the fire-pot e . This water-wall is preferably flat, preferably rounded at the top, and provided at the top with a laterally extending cylindrical portion or drum d^2 preferably formed integral with the water-wall d . The water-wall may be formed of slightly less width than the width of the fire-pot from outside to outside, and it is preferably provided with projecting feet b^3 which rest on the top of the fire-pot and through which fastening devices may be inserted to secure the parts together. There are in the lower or bottom portion of the water-wall two openings d^4 and d^5 , and these openings are adapted to register with similar openings in the top of the rear portion of the fire-pot; the respective openings being adapted to establish a communication from the annular space surrounding the fire-pot and a water space in the water-wall. In order to secure the proper joint between these parts and prevent leakage, I preferably form the joint with a tapered slip-nipple, d^6 , preferably tapered in both directions and adapted to be inserted into the respective openings of the fire-pot and water-wall so that when the water-wall is clamped onto the fire-pot, these tapered nipples d^6 fit firmly in the respective openings and secure a tight joint. In some cases it may be desirable also to place around the nipple and between the parts a washer d^7 of asbestos or similar material to prevent the nipple from being affected by the heat and also doubly secure the joint against leakage. The water-wall d is formed at one side or at the front with a series of openings which are preferably staggered in the usual way, and these openings are adapted to receive the ends of projecting tubes d^8 . These tubes are preferably formed from ordinary black pipe cut to the proper length and screw-threaded at one end to fit into the openings in the water-wall, which are correspondingly threaded, and at the other end the tubes are closed by inserting therein suitable plugs and welding them fast, the ends of the tubes thus closed being during the process of welding formed rectangular or with flattened sides to which a wrench can be applied for

inserting them into position or readily removing them from the water-wall.

The fire-pot is provided near the bottom and at the back with a single opening e^4 extending through the outer portion of the wall thereof and into the annular chamber e^1 . Into this opening is secured in a proper manner a pipe which constitutes an inlet pipe for the water to be heated. At the top of the water-wall and in the back thereof there is provided a similar opening d^9 into which is to be attached a similar pipe which forms the outlet pipe, and this opening d^9 is placed immediately opposite and preferably in longitudinal alinement with the cylindrical portion or drum d^2 . It will be understood that the inlet and outlet pipes will extend through the outer casing, which is provided with suitable openings for this purpose.

The principal parts d and e of the heater being properly constructed, are placed together with the slip-nipples between the said parts and located in the respective openings. They are then clamped securely together preferably by means of screw-threaded studs or bolts, d^{11} and d^{12} , the bolts d^{11} extending downwardly through the feet b^3 and into the top of the fire-pot, and the bolts d^{12} extending upwardly through the projecting corners e^3 of the fire-pot and into the bottom of the water-wall, there being one of these bolts d^{11} and d^{12} at each side which constitute the sole connecting means between the upper and lower principal parts of the heater.

The lower part b of the casing is provided near its top or slightly below the top with inwardly extending projections b^7 , the tops of which are below the top of the casing a distance about equal to the thickness of the corner projection e^3 , so that when the fire pot is slipped into this casing from the top these corner projections will rest upon the extensions b^7 and thus form a support for the fire-pot within the lower portion of the casing. The upper portion a of the casing is then slipped over the upper portion of the heater and incloses the same; the bottom part of this casing being adapted preferably to telescope over the top of the lower casing, the parts being secured together by screws, those at the corners being preferably extended through the respective casing parts and screwed into the sides of the corner projections e^3 of the fire-pot, thus securing and uniting all of the parts together.

The upper casing a is provided with an up-take or smoke outlet a^4 , and this I form in a novel manner as follows: The upper end of this up-take or flue is shouldered down as shown at a^5 and adapted to receive a ring a^6 having outwardly projecting lugs or fingers a^7 . A similar ring a^8 is adapted to slip into the ring a^6 , the projecting fingers

a^9 of this inner ring being shouldered to fit within the flue a^4 , the ring having at its upper end a flange a^{11} which contacts with the ends of the fingers a^7 of the outer ring a^6 . This inner ring a^6 is also preferably provided with an extension a^{12} to which an ordinary stove pipe may be applied for the further extension of the up-take. The inner ring a^8 is prevented from turning by means of a projection a^{13} which fits into a notch in the top of the flue a^4 . A similar projection a^{14} in this ring is adapted to contact with one of the fingers a^7 , which is preferably notched out for this purpose, to limit the movement of the ring a^6 around the inner ring so that the fingers a^7 may be made to register with the fingers a^9 or the spaces between these fingers may be made to register so as to form a check damper in the smoke pipe or up-take.

All the doors are provided with a suitable fastening and locking device which will prevent them from being displaced by the jolting of the car, and the bottom of the casing is provided with a suitable flange by means of which it may be bolted fast and held firmly in place.

It will be seen that I construct a heater which, while having a very large amount of heating surface, is extremely simple in its construction, and composed of but very few parts which can be readily assembled or taken apart in the original manufacture or for repairs. The principal parts of the heater being formed with but few joints, the possibility of leakage is reduced to the minimum. By having the inlet opening at or near the bottom of the fire-pot and leading into the annular space around the fire-pot, and having the connections between the water-wall and annular space above the same, rapid circulation is secured which is enhanced by the closed-ended tubes communicating with the water-wall. The drum or cylindrical portion above the tubes being located immediately under the up-take, receives the products of combustion and also forms a reservoir immediately opposite

the outlet pipe from which the water is drawn.

Having thus described my invention, I claim:—

1. In a heater, such as described, the combination of a two part outer casing and a two part inner heating device, the outer casing comprising an upper and lower part and the inner heating device comprising a water jacketed pot and a water wall and a series of water tubes connected at one end to said wall and closed at their outer ends and extending over the fire pot, means for securing the two outer casings together, and means for securing the two part heating device, and supporting means projecting from one of the outer casings for supporting the inner heating device, tapered passageways extending through the bottom of the water wall and the top of the fire pot and registering one with the other, substantially as specified.

2. In a heater, such as described, the combination of a two part outer casing and a two part inner heating device, the outer casing comprising an upper and lower part and the inner heating device comprising a water jacketed pot and a water wall and a series of water tubes connected at one end to said wall and closed at their outer ends and extending over the fire pot, means for securing the two outer casings together, and means for securing the two part heating device at a point substantially co-incident with the fastening part of the outer casing, and supporting means projecting from one of the outer casings for supporting the inner heating device, tapered passageways extending through the bottom of the water wall and the top of the fire pot and registering one with the other, substantially as specified.

In testimony whereof, I have hereunto set my hand this 22nd day of February, 1908.

GEORGE D. COOPER.

Witnesses:

CHAS. I. WELCH,
 G. A. ENDER.