No. 720,497. PATENTED FEB. 10, 1903.

D. E. SMOAK.

WATER HEATER.

APPLICATION FILED AUG. 13, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

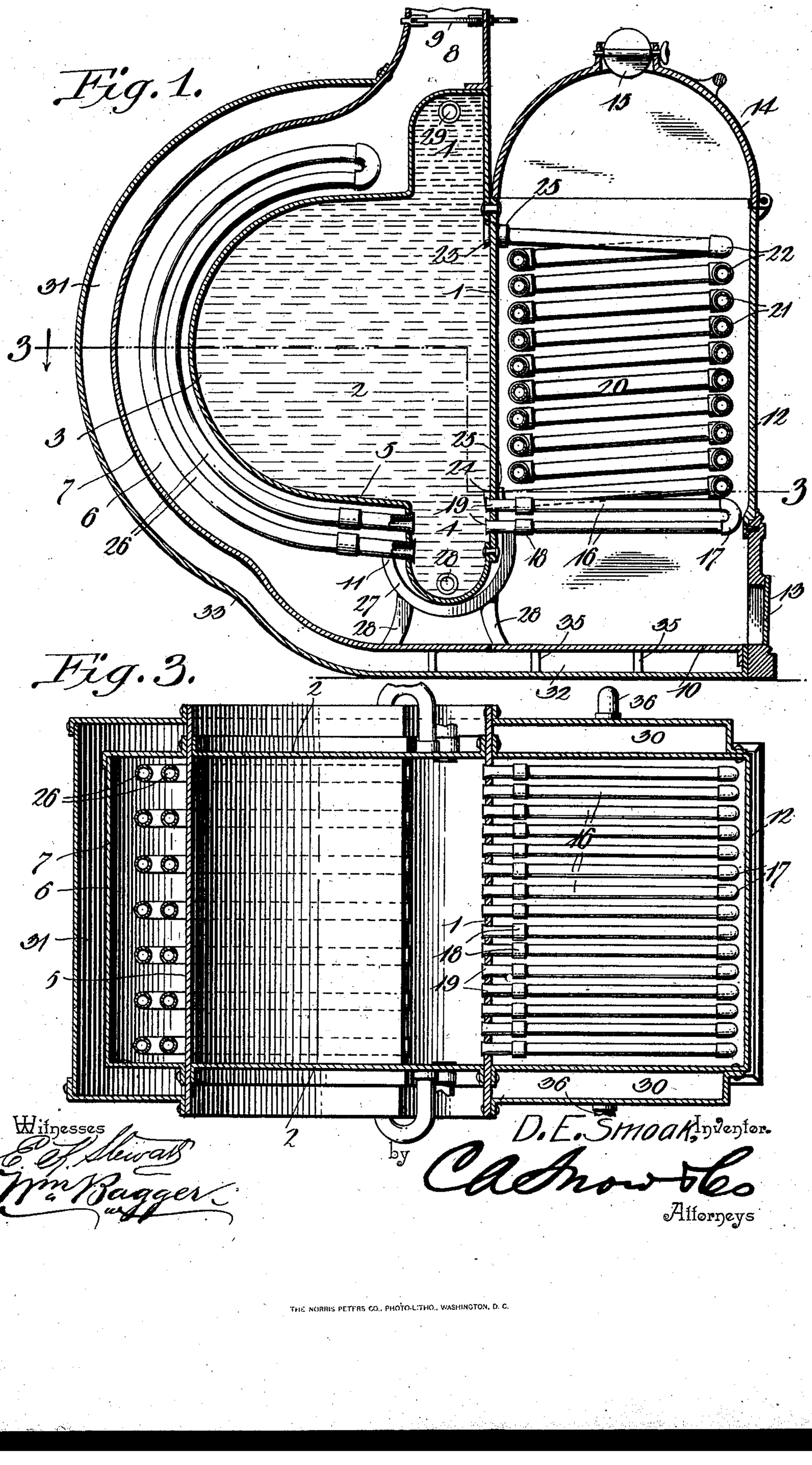

Fig. 3.

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NO MODEL. 2 SHEETS—SHEET 2.

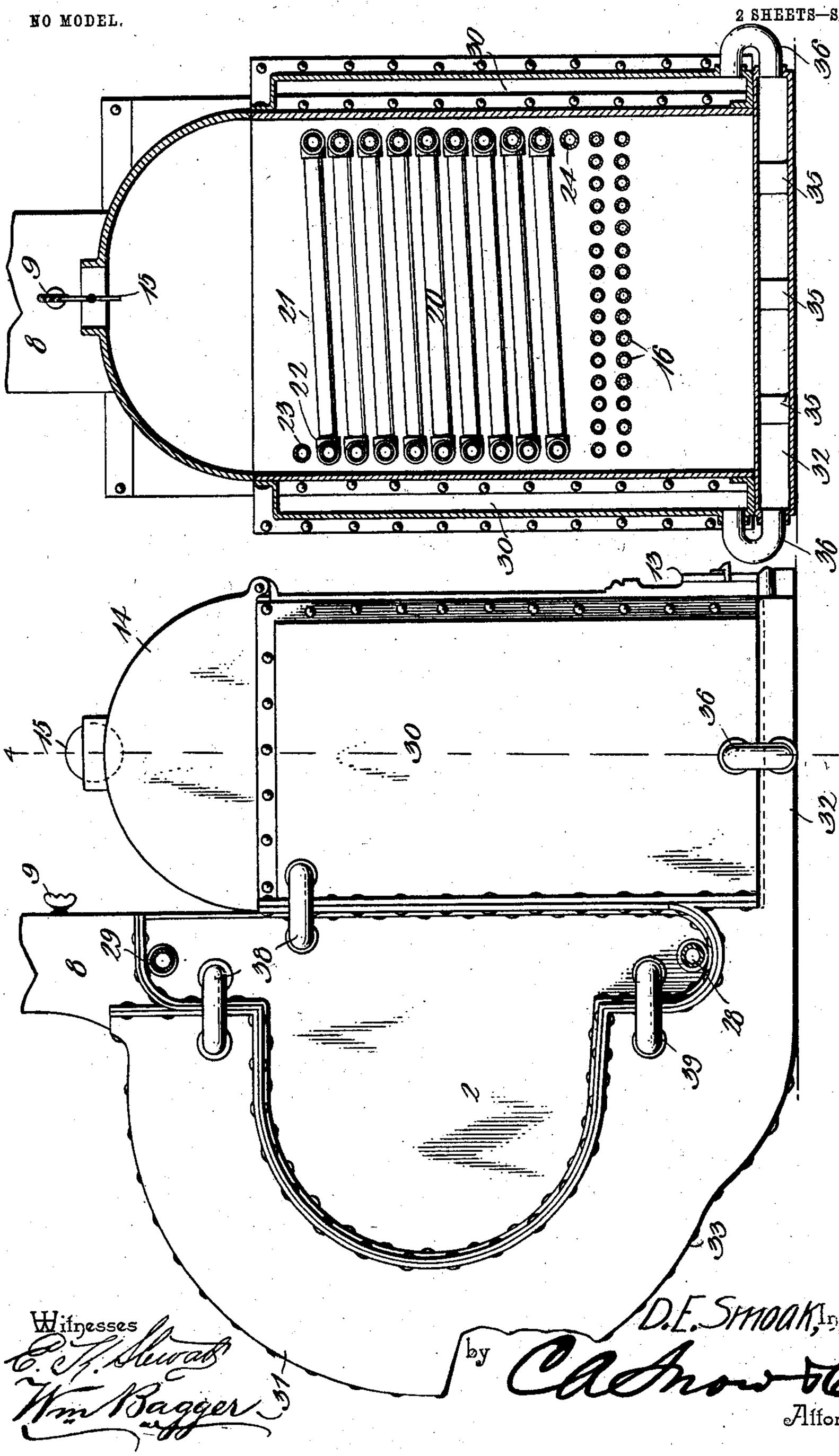

Fig. 2.

Fig. 4.

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UNITED STATES PATENT OFFICE.

DANIEL E. SMOAK, OF WILKESBORO, NORTH CAROLINA.

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 720,497, dated February 10, 1903.

Application filed August 13, 1902. Serial No. 119,573. (No model.)

To all whom it may concern:

Be it known that I, DANIEL E. SMOAK, a citizen of the United States, residing at Wilkesboro, in the county of Wilkes and State of North Carolina, have invented a new and useful Stove and Water-Heater, of which the following is a specification.

This invention relates to that class of stoves which are used also as water-heaters in order that the greatest possible amount of heat may be extracted from the fuel consumed; and it has for its object to provide a stove of this class which shall possess superior advantages in point of simplicity, durability, and general efficiency.

Another object of the invention is to so construct a stove or heating apparatus of this class that it shall be practically surrounded by a water casing or jacket, so that practically no portion of the heat shall be permitted to go to waste.

With these and other ends in view the invention consists in the improved construction, arrangement, and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional view showing one of my improved stoves or heating devices complete. Fig. 2 is a side view of the same. Fig. 3 is a horizontal sectional view taken on the plane indicated by the line 3 3 in Fig. 1. Fig. 4 is a transverse sectional view taken on the line 4 4 in Fig. 3.

Corresponding parts in the several figures are indicated by like characters of reference.

In carrying out my invention I construct a water casing or drum, which is preferably composed of a front plate 1, (which forms the back of the heater,) side plates 2 2, the rear ends of which are curved, as shown at 3, and the upper and lower front ends of which are extended upwardly and downwardly, forming lips 4 4. These side plates, which form the heads or ends of the water-casing, are preferably flanged along their edges, so as to be capable of being connected by bolts, rivets, or other suitable fastening means with the plate 1, which, as stated, forms the front of the water-casing, and with the back plate 5, which is curved to correspond with the outlines of the end plates of the casing.

The back plate 5 of the water-casing forms the front of the flue 6, the rear plate of which, 7, is curved, so as to be for the greater part of its extent parallel to the plate 5, the upper end of said flue-plate being connected with or extended upwardly to form a part of the upwardly-extending flue 8, in which a damper 9 is located and which leads to the chimney or smoke-stack. The lower end of the back flue-plate 7 is riveted to or otherwise connected with the bottom plate 10 of the heater, upon which is placed a suitably-constructed support 11 for the water-heater and its related parts. The heater-casing 12 is suitably mounted upon and connected with the bottom plate, and it has a door at its lower front end to admit of the removal of ashes, said door being designated 13. The top of the casing has a hinged, preferably arched, cover 14, provided with a valve or damper 15 to regulate the downdraft through said heater-casing.

The grate of the heater is formed by a plurality of bent or U-shaped pipes, which, as shown in the drawings, are preferably constructed of single lengths of pipe 16, connected at their outer ends by U-couplings 17, their inner ends being connected by ordinary right and left hand threaded unions or sleeves 18, with short pipe-sections 19 engaging the front wall of the water-casing. These grate-pipes may be spaced any desired distance apart, but should preferably be placed sufficiently close together to enable coal or any other kind of fuel to be used in the heater.

Above the grate formed by the return-pipes herein described and within the heater-casing is disposed a coil 20, which may consist of a single length of pipe suitably coiled, or it may, as shown in the drawings, be composed of a plurality of straight pipe-sections 21, connected at their ends by means of ordinary L-couplings 22. This coil or "basket," as it may be termed, is connected at its upper and lower ends with the front plate of the water-casing, as indicated at 23 and 24, ordinary coupling-sleeves, as 25, being employed to form the connections. It is obvious that throughout this device wherever piping is used the couplings are effected in any suitable manner well known to plumbers or mechanics skilled in the art to which the in-

vention appertains and that I do not by any means limit myself to the particular forms of connections shown in the drawings. It will further be understood that wherever it is possible to dispense with couplings by simply bending the pipes I reserve the privilege of doing so.

In the flue 6, back of the water-casing, is disposed a plurality of curved return-pipes 26, which are curved to the conformation of the said flue and which are connected at their lower ends with the back plate of the water-casing below the rearwardly-extending portions of the end plates 2 2. These return-pipes being thus connected with the water-casing extend through the back flue 6 to the upper end of the water-casing, with which, however, they have obviously no connection. The lower ends of these return-pipes are partially supported by the device 11, which, as will be seen by reference to the drawings, comprises simply a curved frame 27, provided with legs 28, the central portion of said curved framing supporting the water-casing proper, while its front and rear ends are sufficiently extended to form supports for the return-pipes constituting the grate, which said return-pipes as a whole are designated 16, and for the return-pipes 26, which have just been described.

One of the heads of the water-casing is provided at its lower end with an inlet 28 and at its upper end with an outlet 29 for the water, which may be supplied to and discharged from the casing in any suitable manner, the supply being drawn from any suitable source and the discharge being connected with means whereby the heat of the water may be utilized.

By the means just described a very great proportion of the heat derived from the consumption of fuel in the heater-casing will be utilized, said heat being not only radiated from the heater-casing and the back plate of the flue, as well as by the heads of the water-casing, but a large quantity of water will be at the same time heated during its passage through the water-casing and during its circulation in the various return-pipes and the coil connected therewith, the water thus heated being utilized in any suitable and convenient manner. In order, however, to extract and utilize as nearly as possible all of the heat derived from the fuel consumed, I prefer to use the auxiliary water-casings shown in the accompanying drawings and which comprise side casings 30, forming the sides of the heater-casing, a back casing 31, forming the back of the flue 6, (the front of said back casing being constituted by the back plate 7 of said flue,) and a bottom casing 32, comprised by the bottom plate 33 of said casing and the bottom plate 10 of the heater-casing. The bottom plate 33 is preferably extended upwardly and curved parallel to the back plate 7 of the flue, so as to form at the same time the back plate of the back casing 31; but any other suitable construction may be employed. Between the plates 33 and 10, which constitute the bottom and the top of the bottom casing, I interpose a plurality of braces 35, which may be integral with either of said plates, although any other suitable construction may be employed when desired. These braces perform an important function in spacing the plates 33 and 10, so as to enable the weight of the entire device to be safely supported upon the latter. The casings 30, 31, and 32 are to be mutually connected, such connection being preferably effected, as shown in the drawings, by making the back and bottom casings practically one and connecting the said bottom casing with the side casings by means of U-shaped pipes, as 36. The several casings being thus connected to form a single water-jacket, the latter is then suitably connected with the water-casing proper, preferably by pipes effecting such connection near the upper and lower ends, as shown, respectively, at 38 and 39.

The operation and advantages of this device will be readily understood from the drawings hereto annexed, taken in connection with the foregoing description.

The draft through the fuel placed in the fire-box, which is composed by the pipe-coil within the heater-casing and by the return-pipes forming the grate, being in a downward direction, the said coil and return-pipes, as well as the sides of the heater-casing, are entirely exposed to the direct action of the flames and heat. The draft continuing downwardly strikes the bottom casing, the contents of which are thus heated to a considerable extent. The draft continuing upward through the flue 6, the remainder of the heat is practically entirely absorbed by the water circulating through the pipes 26 and through the back casing, so that when the products of combustion escape into the chimney the heat units will practically have been altogether utilized.

While I have herein described the preferred or the complete construction of my improved stove and water-heater, I desire it to be understood that I do not in any degree limit myself as regards the construction and arrangement of the detailed parts of the device. I would, moreover, have it understood that it may at times, in order to lessen the cost of construction, be found profitable to dispense with what may be termed the "exterior" casings or the "water-jacket" formed by the casings herein designated 30, 31, and 32, or either of said casings. I do not, accordingly, limit myself to the precise construction and arrangement of parts herein set forth, but reserve to myself the right to any changes, alterations, and modifications which may be resorted to without detracting from the utility of my invention or departing from the spirit and scope of the same.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. A device of the class described comprising a water-casing and a heater-casing the partition between the two being formed by a plate which constitutes the front wall of the water-casing and the rear wall of the heater-casing, said plate supporting a plurality of return-pipes which extend into the heater-casing and constitute the grate of the latter.

2. A device of the class described comprising a water-casing and a heater-casing, a partition between the two constituting the front wall of the water-casing and the rear wall of the heater-casing, a plurality of return-pipes extending from the lower part of said partition-plate into the heater-casing and forming the grate, and a return-coil disposed within said heater-casing forming a fuel-basket and connected at its upper and lower ends with the water-casing.

3. In a device of the class described, a water-casing disposed between a heater-casing and a flue, the front and rear walls of said water-casing constituting respectively the rear and front walls of said heater-casing and flue, a plurality of return-pipes extending from the lower end of the front wall of the water-casing into the heater-casing, a return-coil disposed within the latter and having its upper and lower ends connected with the front wall of the water-casing, and a plurality of return-pipes extending through the flue and having their lower ends connected with the lower part of the water-casing.

4. A device of the class described comprising a water-casing disposed between a heater-casing and a flue, the latter being curved to correspond with the curved outline of the back part of the water-casing, and curved return-pipes disposed within said curved flue and having their ends attached to and supported by the lower part of the water-casing.

5. In a device of the class described, a water-casing disposed between a heater-casing and a flue, the front and rear walls of said water-casing forming respectively the rear and front walls of said heater-casing and flue, return-pipes extending from the lower part of the front wall of the water-casing into the heater-casing and forming the grate, curved return-pipes extending through the flue and having their lower ends attached to and connected with the lower part of the water-casing, and a curved supporting device, supporting the lower end of the water-casing and having its front and rear ends extended to support respectively the return-pipes forming the grate and the return-pipes extending through the flue.

6. In a device of the class described, a water-casing disposed between a heater-casing and a flue, the front and rear walls of said water-casing forming respectively the rear and front walls of said heater-casing and flue, a bottom water-casing the top plate of which constitutes the bottom plate of the heater-casing, braces interposed between the top and bottom walls of said bottom casing and curved supporting means disposed upon the top plate of the latter and supporting the main water-casing and its related parts.

7. A device of the class described comprising a main water-casing disposed between a heater-casing and a flue, the front and rear walls of said water-casing forming respectively the rear and front walls of said heater-casing and flue, return-pipes disposed within the heater-casing, having connection with the water-casing and constituting the grate, a return-coil disposed within the heater-casing and having its upper and lower ends connected with the water-casing, a plurality of return-pipes disposed within the flue and connected at their lower ends with the water-casing, water-casings forming the sides of the heater-casing, the back of the flue and the bottom of the heater and flue casings, means connecting said auxiliary casings or jackets with each other and with the main water-casing, and inlet and discharge means for the latter.

8. In a device of the class described, the bottom casing or jacket, the top plate of which forms the bottom plate of the heater-casing, braces interposed between the bottom and top plates of said bottom jacket, a curved supporting device mounted upon the top plate of said bottom jacket, a water-casing supported thereon, return-pipes extending from said water-casing into the heater-casing, forming the grate of the latter and supported by the front arms of the curved supporting device, and return-pipes connected with the lower rear part of said water-casing and supported by the rear arms of said curved supporting device.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

DANIEL E. SMOAK.

Witnesses:
W. E. PHARR,
E. M. BLACKBURN.