(No Model.) 3 Sheets—Sheet 1.

J. E. DAME.

COMBINED STEAM AND HOT WATER STOVE.

No. 560,693. Patented May 26, 1896.

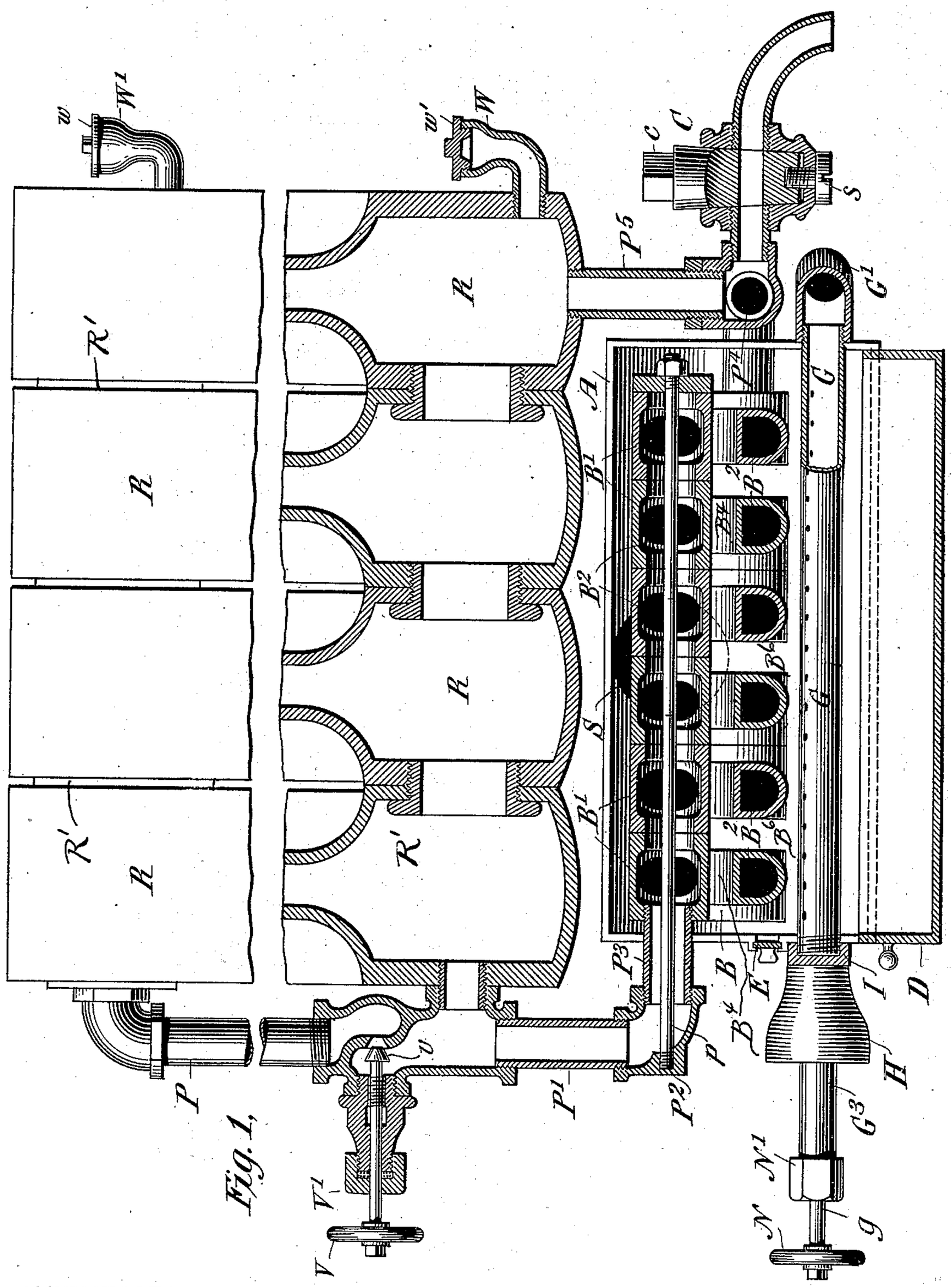

Fig. 1.

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D. R. Cahill.

INVENTOR:
John E. Dame
By his Attorney
Charles J. Kintner

(No Model.) 3 Sheets—Sheet 2.

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COMBINED STEAM AND HOT WATER STOVE.

No. 560,693. Patented May 26, 1896.

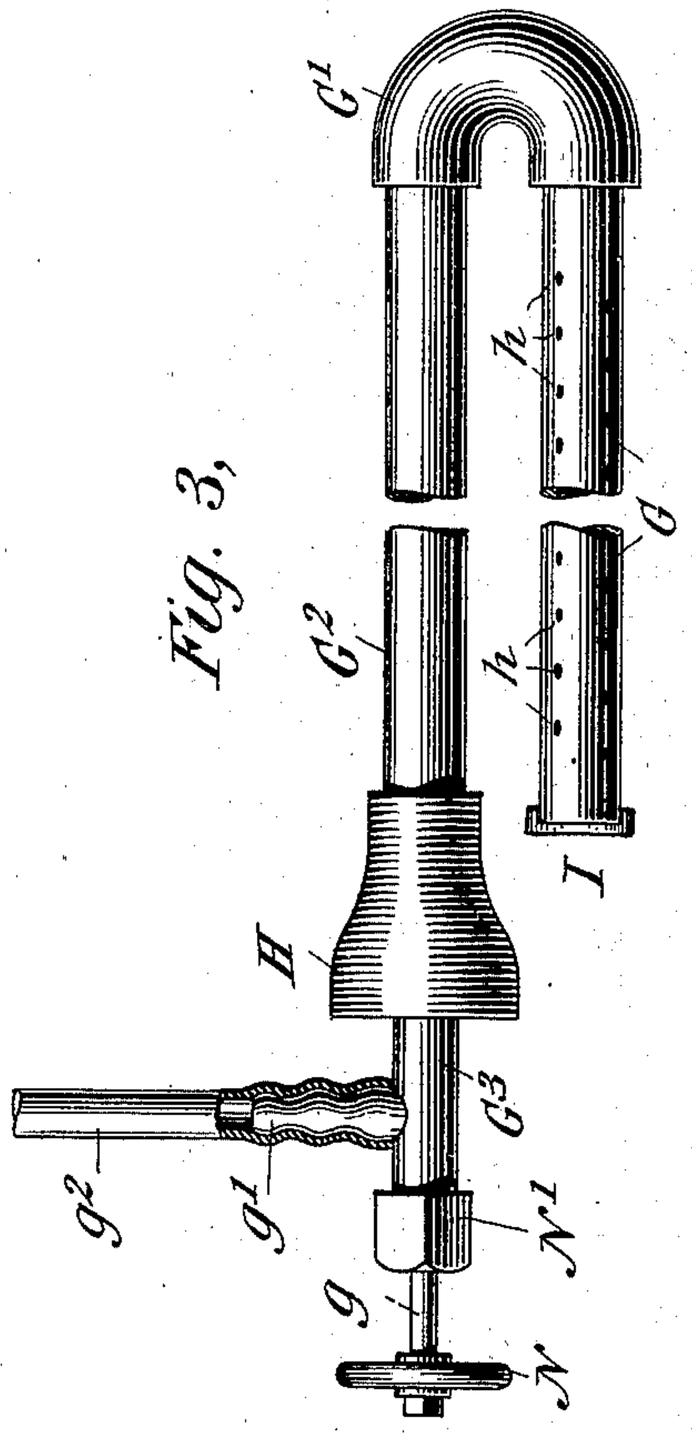

Fig. 3,

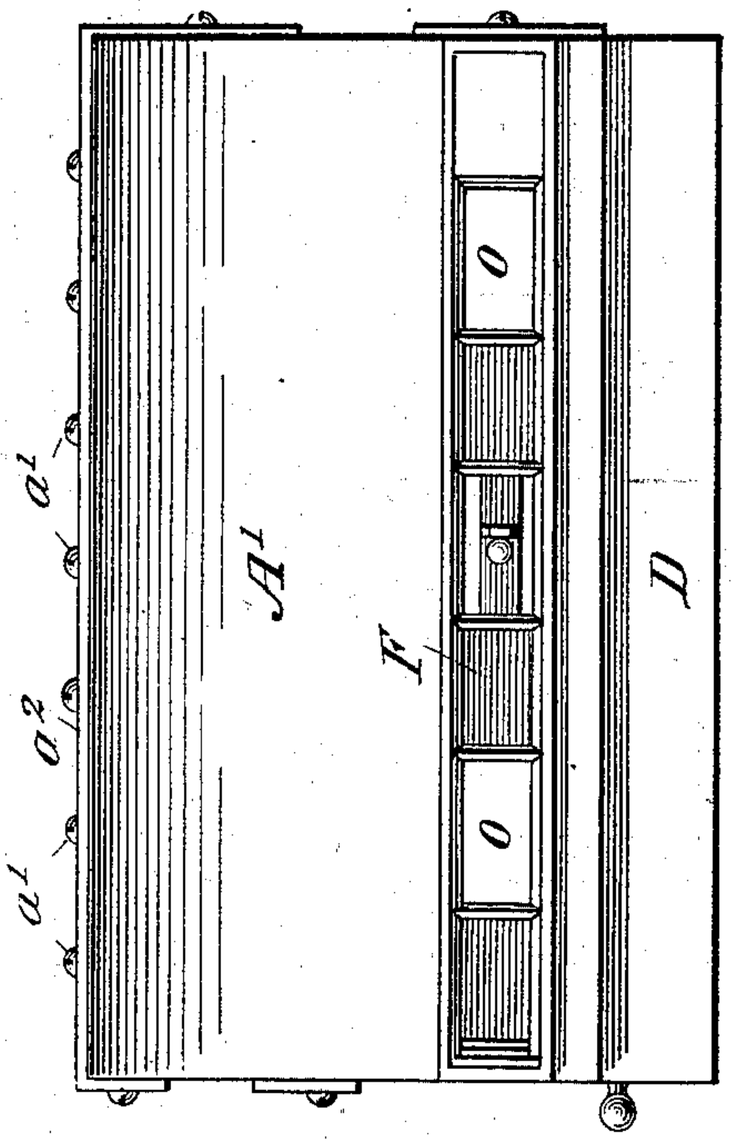

Fig. 4,

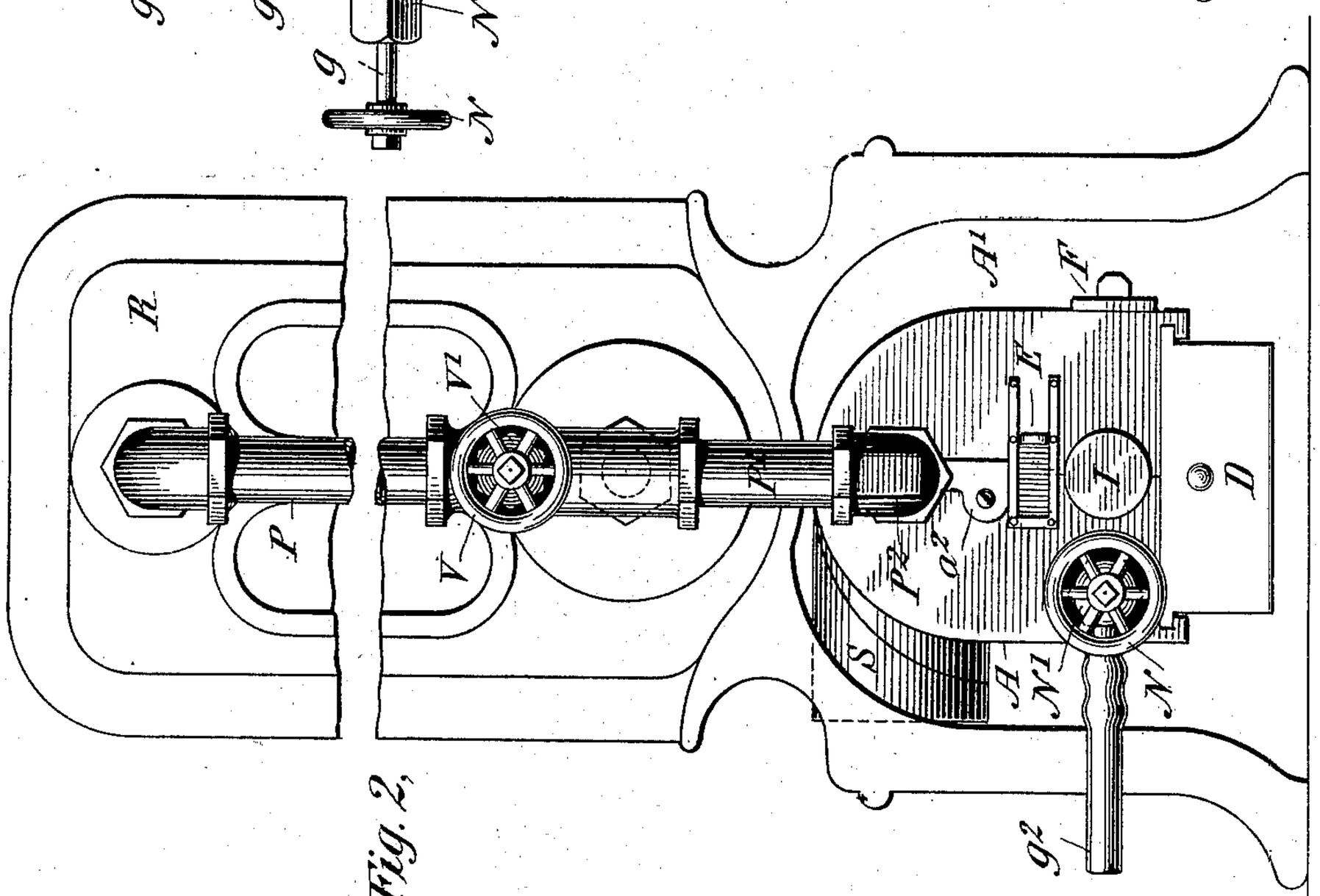

Fig. 2,

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(No Model.) 3 Sheets—Sheet 3.

J. E. DAME.

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Fig. 5.

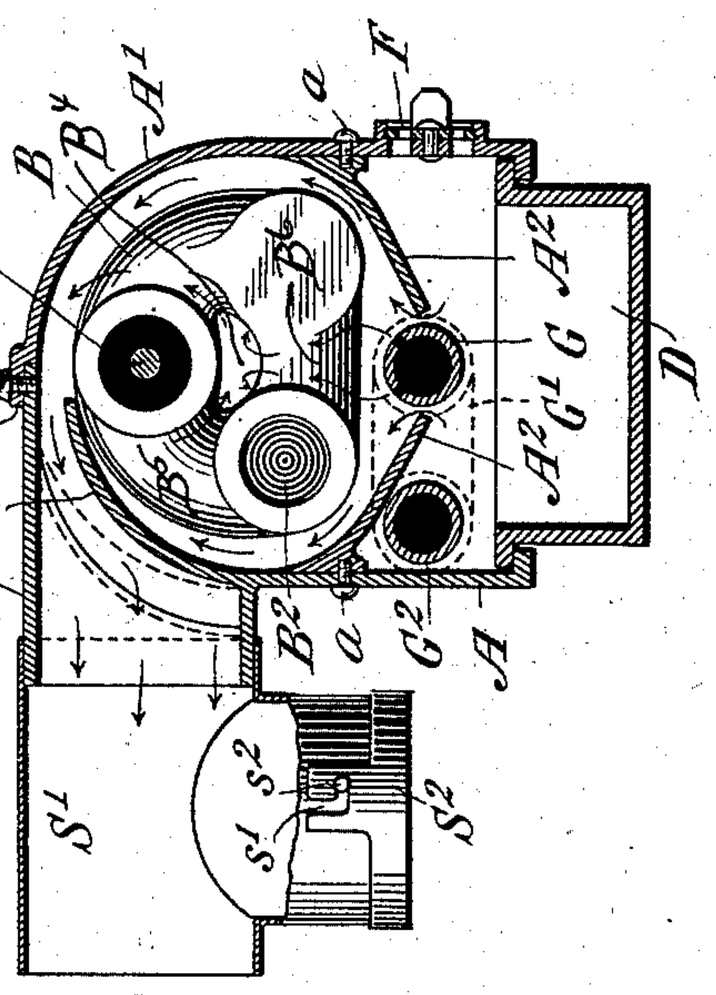


Fig. 8.

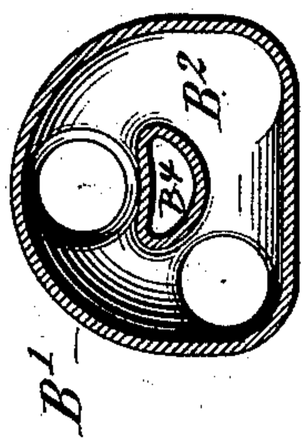


Fig. 6,

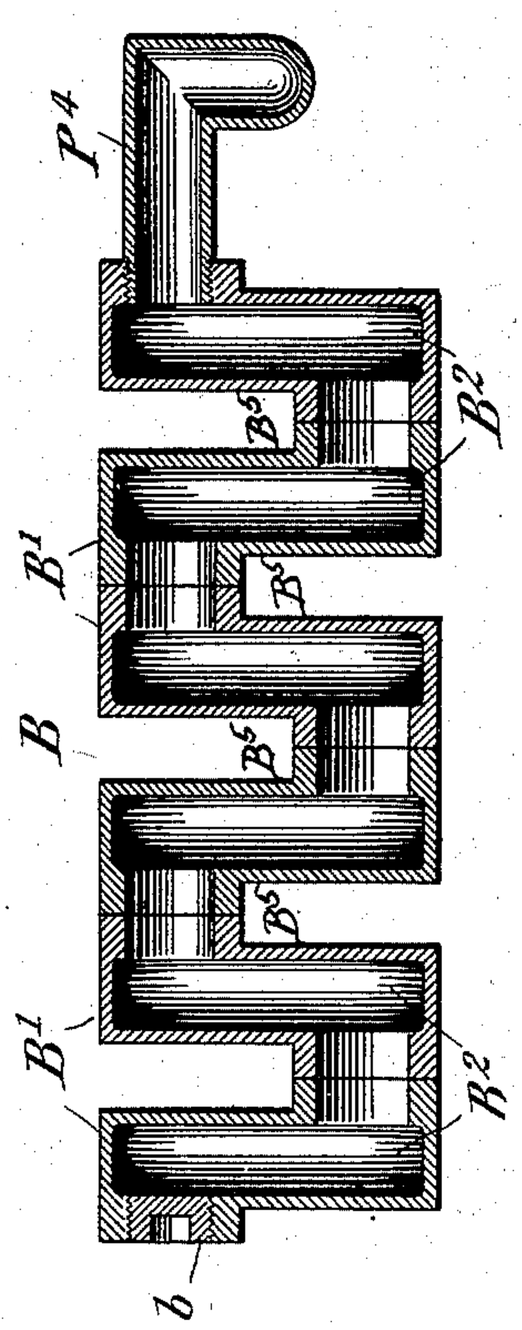
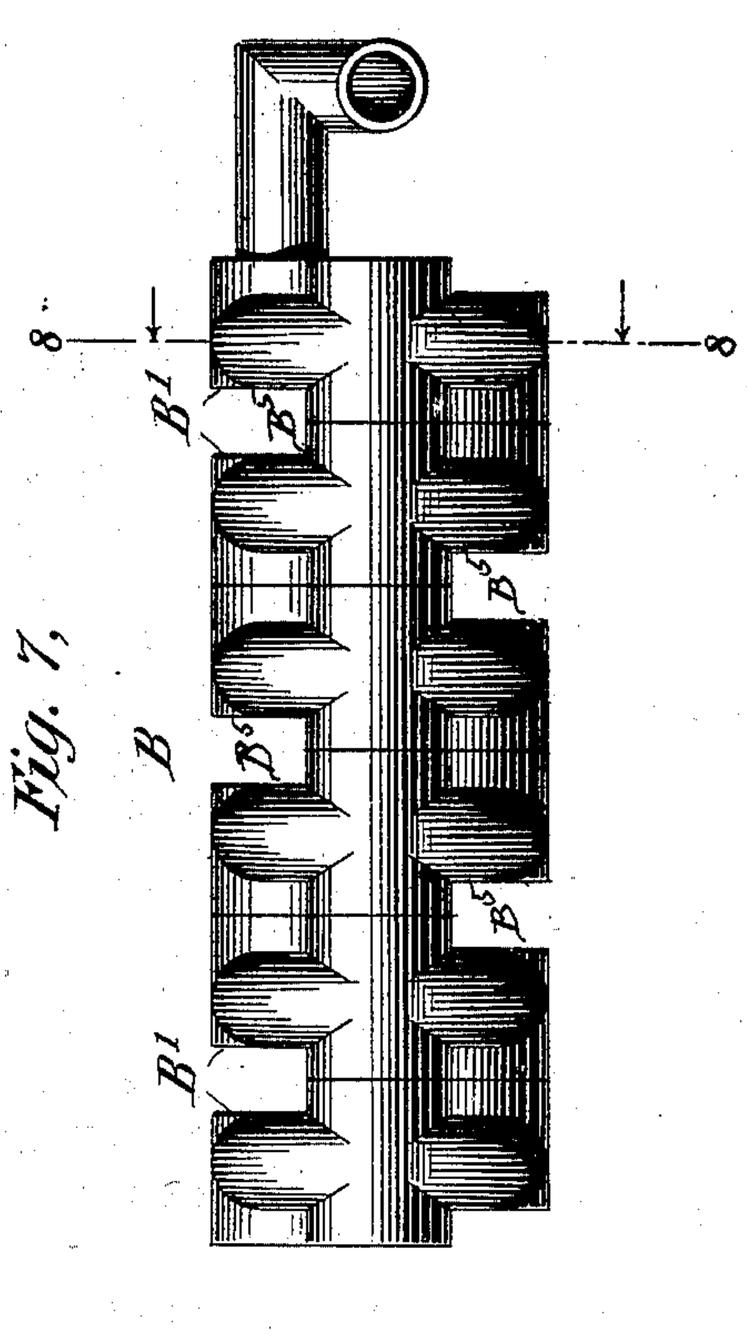


Fig. 7,



WITNESSES:

C. E. Ashley

D. R. Cahill.

INVENTOR:

John E. Dame

By his Attorney

Charles J. Kintner

UNITED STATES PATENT OFFICE.

JOHN E. DAME, OF BROOKLYN, NEW YORK.

COMBINED STEAM AND HOT-WATER STOVE.

SPECIFICATION forming part of Letters Patent No. 560,693, dated May 26, 1896.

Application filed April 12, 1895. Serial No. 545,429. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. DAME, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have made a new and useful Improvement in Combined Steam and Hot-Water Stoves, of which the following is a specification.

My invention is directed particularly to improvements in heating apparatus of the type indicated, which derives its primary heat from gas-jets, and although I design to use the same with this type of primary heating apparatus it will be readily understood by those skilled in the art that many of the details of my invention may be used in connection with steam and hot-water apparatus generally.

The object of the invention is to increase the economy, efficiency, and capacity of such heating apparatus; and it consists in the construction hereinafter described and particularly pointed out.

Referring now to the drawings which constitute a part of this specification, Figure 1 is a vertical longitudinal broken sectional view illustrating my invention in its entirety. Fig. 2 is an end elevation of the same as seen looking at Fig. 1 from the left toward the right, a sustaining-frame being added. Fig. 3 is a detail plan view, partly in section, illustrating my improved form of gas-burner, which is adapted for use with heaters generally. Fig. 4 is a side elevational view of the inclosing box or chamber, illustrating also the air-regulating dampers for the burner and a detachable pan secured to the bottom of said chamber. Fig. 5 is a sectional view taken through the body of the heat-generating portion of the apparatus and illustrating also the attachments for conveying the products of combustion to some distant point and additional attachments for collecting the condensed vapors and weighty products of combustion. Fig. 6 is a horizontal sectional view of the boiler or hot-water or steam-generating portion of the apparatus, and Fig 7 is a plan view of the same. Fig. 8 is a vertical section of the same, taken on line 8 8, Fig. 7, and as seen looking at that figure from right to left in the direction of the arrows.

Referring now to the drawings in detail, in all of which like letters of reference represent like parts wherever used, A and A′ represent the lateral or side faces of the inclosing box or chamber of the heat-generating apparatus, made, preferably, of cast or sheet iron or equivalent material, secured together at the top by screws or rivets a' a^2 and being adapted, together with a detachable pan D, to entirely inclose the heat-generating burner and boiler, all of the parts being sustained by a framework, as clearly shown in Fig. 2.

G G′ G² G³ (see Fig. 3) represent my improved form of burner, which is secured at its opposite ends to the ends of the inclosing box or chamber and is provided with the usual form of gas-jet holes h h, adapted to be located directly under the boiler or hot-water-generating chamber B B′ B², &c. This burner is provided with a well-known form of needle-valve g, having an operating-handle N and extends through a screw-threaded nut N′ into a valve-seat. (Not shown, but located in a tube G³ at a point substantially below the inlet-nipple g'.)

H is a funnel-shaped air-cap secured by screw-threads to the tube G², the usual form of openings between the air-cap and the tube G³ being provided so as to admit air in the well-known manner and thus allow it to intermingle with the gas as it enters the tube G² from the tube G³. The outer end of the burner G is screw-threaded and provided with a removable screw-threaded cap I. (See Figs. 1 and 2.) I make that part of the tube G² of sufficient length to allow the air and gas to thoroughly intermingle before it reaches the jet-holes h h, and I unite the part G to the part G² by a curved neck G′. I find that with a burner as thus disposed increased heating effects are attained, and I regard this form of burner as one of the essential features of my invention.

Referring now to Figs. 1, 6, 7, and 8, I will describe my improved form of steam-generator or water-heating device, which consists of a series of sections of tubular form, (clearly illustrated in the drawings,) the arrangement being such that when the separate sections are joined together end to end and firmly secured in position through the agency of a bolt p and nut and screw-threads at the opposite ends, as at P² and P³, Fig. 1, the several sections constitute a continuous zigzag tubular channel, the lower outlet P⁴ being connected

to a water-cock C, having an operating-handle *c* and the usual form of adjusting-screw *s*, said cock being also connected at its inner end to a water-supply and condensing or return pipe P^5, which corresponds to a second tubular upright or direct pipe P′ at the other end of the heater, which in turn is secured to the tubular part P^3. These tubular uprights or direct and return pipes P′ and P^5 are screw-threaded, the one to a hollow or tubular casting, which constitutes a seat for a valve V′, having a valve-operating handle V and a valve *v*, and the other to the lower side of one of a series of hollow radiator-sections R R R, secured together by hollow screw-threaded tubes, as shown, and secured in turn in similar manner to the hollow upright or pipe P′. It will be observed that the upper end of the inlet-pipe P^5 is attached directly to the bottom of the right-hand radiator-chamber R, while the upper end of the pipe P′ is connected to the lateral face of the radiator next to it at a point of higher level than the upper end of the pipe P^5. This difference of level of the upper ends of said pipes is for the purpose of affording free circulation of the heated water. P is a circulatory pipe connecting the pipe P′ and valve V′ *v* with the tops of the radiators R R, said radiators being connected together at their upper ends in the same manner as indicated in sectional view at their lower ends. R′ denotes thimbles having screw-threaded connection with two adjacent sections and coupling them together. The radiator-sections thus coupled communicate freely both at their lower and upper parts. W′ is a cone-shaped inlet-pipe at the upper end of the right-hand radiator R, and *w* is a screw-cap for closing the free end thereof. W is a second cone-shaped inlet-pipe at the base of the right-hand radiator R, adapted to receive water, and *w′* is a screw-threaded cap similar in all respects to *w*. For obvious and well-known reasons it is desirable to introduce steam into steam-radiators at or near their bottom level, while hot-water radiators should be supplied with the heated water at or near their top. These two operations are provided for in the described combination by the use of the valve *v*. The two inlets W and W′ coöperate with the other parts described to provide for the use of either steam or hot water in the radiators, one of the advantages of the inlets W and W′ being that they enable the operator to see when the boiler is suitably filled for the particular method of using which he has in view. D represents a removable pan for collecting heavy products of combustion and is located directly below the burner and has laterally-extending edges adapting it to be drawn outward from beneath the burner, as clearly shown in Figs. 1, 2, 4, and 5. E, Figs. 1 and 2, represents an igniting-orifice and closing-door therefor located in the end of the surrounding chamber A A′, and F *o o* represent sliding regulating-dampers in the side of said chamber directly opposite the jet-holes *h h* of the burner G.

Referring now to Fig. 5, which illustrates in detail the interior structure of the heating-chamber and the direction of the air-currents from the burner G, A^2 A^2 represent internally-projecting flanges, which are secured by screws *a a* to the interior walls A A′ of the surrounding chamber, their inner edges being located sufficiently close to the sides of the burner G to admit the necessary supply of air thereto. The rear wall A of the surrounding chamber extends upward so that its upper edge is located above the boiler or hot-water-generating chamber B B′ B^2, and constitutes at its upper surface an outlet for the products of combustion into an outlet-pipe S, to which is secured an elbow or sleeve S′, having a detachable cup S^2 at its lower end provided with bayonet-slots and pins *s′* s^2 at its opposite sides, the sleeve S′ being adapted to be secured to a rubber or other equivalent heat-conveying tube adapted to carry the products of combustion to some point exterior to the room. The upper flange A^2 partially surrounds the boiler on its rear side, and at its upper edge is contiguous thereto and prevents the immediate ascent of the hot products on that side and deflects them downwardly through the fire-spaces B^5. Preferably the flanges A^2 are situated as represented in Fig. 5, so as to leave a wider exit for products on one side than on the other to prevent the short-circuiting of the gases and to direct a suitable part thereof through the longer or more roundabout course.

The operation of my invention is as follows: If it is desired to heat by steam, I remove the screw-cap *w′* from the mouth of the inlet-pipe W and pour sufficient water into the radiator-chambers R R and boiler or hot-water-generating chamber B B′ B^2 to fill the same to about the lower level of the joining screw-collars which unite the sections of the radiators R R. The screw-cap *w′* is then secured in place and the valve *v* turned into closed position. The supply of gas is then regulated by the needle-valve *g*, and it is lighted at the igniting-orifice E. The draft is of course regulated by the dampers F *o o*, as required. Steam is very quickly generated, and the hot water is caused to circulate through the zigzag or angular passage-ways of the boiler B B′, and steam ultimately passes upward through the direct pipe P to the radiators R R. The boiler is adapted by its peculiar form to generate steam rapidly by thoroughly exposing the circulating water to the influence of its highly-heated walls. Its form is such that the water-currents are divided and distributed so that different sides or parts of the several currents or parts of currents come in contact with the heated metal in quick succession, insuring rapid conduction and convection of heat. Thus water entering the boiler by the return-pipe first

passes forward through such pipe and then rises to the level of the upper continuous horizontal conduit by a transverse ascending movement. Upon reaching said upper conduit it, or a considerable part of it, will descend by reason of its superior gravity, being comparatively cool, in the first transversely-descending passage immediately opposite that in which it entered the main upper conduit. A part, however, will move through said main upper conduit without descending at this point. The descending current just named will pass forward from the first section of the boiler into the adjacent one through the short lower horizontal passage and, being heated, will ascend transversely to the main conduit and mingle with its contents. Water therefore moves, first, forward on a low level, then transversely upward, and then by a divided current in part forward and in part downward, the upper forward current giving origin to several transverse descending currents, each of which is laterally diverted at its lower part into a short lower forwardly-extending conduit communicating directly with another transversely-ascending conduit or passage through the whole series. These several conduits, having the relation and operation indicated, are formed by connecting several sections, each of which has an upper horizontal passage open at both ends and two oppositely-placed vertical or transverse passages, each having at its foot a short horizontal passage open in a direction opposite to that of the other, the construction being such as shown, whereby a main upper continuous lengthwise conduit is provided with alternately-placed descending and ascending branch conduits communicating by short passages at their lower ends, said short passages being situated on each side of a fire-space B^5 at the side of and beneath the main conduits. A continuous lengthwise fire-space flue or fire-tube B^4 is also formed below said main conduit and contiguous or adjacent to all the water-passages. The vertical fire-spaces B^5 communicate with the fire-flue B^4, as indicated in Figs. 1 and 5. Said flue also communicates freely with fire-spaces B^6, immediately under it and over the burner, as shown in Fig. 5. The products of combustion ascend around the boiler in the manner indicated by the arrows in Fig. 5 and ultimately pass out through the outlet S and elbow or sleeve S′ and conveying-tube (not shown) to some distant point. Many of said products being heavier than air are of course deposited or retained by the pan D at the bottom of the heater and the detachable cup S^2, secured to the elbow or sleeve S′, as illustrated in Fig. 5.

Although my invention is designed particularly for use as a radiator for heating purposes, it is obvious that it may be used for the purpose of heating water, generating steam, or, in fact, in any or all places where apparatus of this general nature is utilized.

If desired to heat by water alone, I remove the screw-cap *w* from the pipe W′, turn the valve *v* to the position shown in Fig. 1, and then fill not only the parts already indicated, but all of the chambers of the radiators R R, when the heating process proceeds as before. Hot water may then be drawn off as desired by the cock C. By turning the valve V′ *v* into the position shown in Fig. 1 when water is to be heated the natural tendency of the heated water from the boiler or generating-chamber B B′ B^2 will be from pipe P^3 through upright circulating-pipe P′, through the valve *v*, pipe P to the upper ends of the radiators R R, descending again to the bottom of the right-hand radiator R, and by the return-pipe P^5 returning to the boiler or heating-chamber. By such an arrangement I obtain an excellent circulation and cause the water to be quickly heated.

It is obvious that my form of heater being made entirely in sections may be readily taken apart and cleansed or repaired, and this I consider an essential feature of my invention. It is also obvious that the draft regulation of the entire heater may be such as to give the most desirable sanitary effects, and this also constitutes one of the important features of novelty in my invention.

I do not broadly claim a sectional boiler inclosed in a chamber or casing, my improvement in this respect being characterized by the particular construction above described and hereinafter pointed out, whereby the hot gaseous products of combustion are divided into three currents which are in contact with the upper part of the boiler, every part of all the sectional conduits being thoroughly exposed to the same.

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

1. For use in heating by radiation from either steam or water, the boiler composed of sections, each having an upper horizontal conduit portion communicating with transverse vertically-situated conduits each of which has at its foot an oppositely-situated horizontal passage adapted when the sections are suitably secured together to register with a like passage of an adjacent section, the said first-named horizontal sectional conduits registering with each other and forming a continuous conduit, substantially as set forth.

2. For use in heating by radiation from either steam or water, the boiler composed of sections, each having an upper horizontal conduit portion communicating with transverse vertically-situated conduits each of which has at its foot an oppositely-situated horizontal passage adapted when the sections are suitably secured together to register with a like passage of an adjacent section, the said first-named horizontal sectional conduits registering with each other and forming a continuous conduit, the said sectional boiler having the fire-spaces B^4, B^5 and B^6, whereby the sev-

eral partial or sectional conduits are heated, substantially as set forth.

3. For use in heating by radiation from either steam or water, the boiler composed of sections, each having an upper horizontal conduit portion communicating with transverse vertically-situated conduits each of which has at its foot an oppositely-situated horizontal passage adapted when the sections are suitably secured together to register with a like passage of an adjacent section, the said first-named horizontal sectional conduits registering with each other and forming a continuous conduit, the said sectional boiler having the fire-spaces B^4, B^5 and B^6, whereby the several partial or sectional conduits are heated, and the flanges A^2, all as set forth whereby products of combustion are divided into three vertical currents and then united below the top of the main water-conduit and passed around the same, substantially as set forth.

4. In combination a boiler, a radiator, and direct and return communicating pipes, said radiator having upper and lower water-supply inlets and having also a pipe with connections whereby the boiler may communicate with the upper and lower parts of the radiator, and a valve in said pipe to close communication with the upper connection, substantially as set forth.

In testimony whereof I have hereunto subscribed my name this 11th day of April, 1895.

JOHN E. DAME.

Witnesses:
C. J. KINTNER,
M. M. ROBINSON.