

G. L. FOGLER.

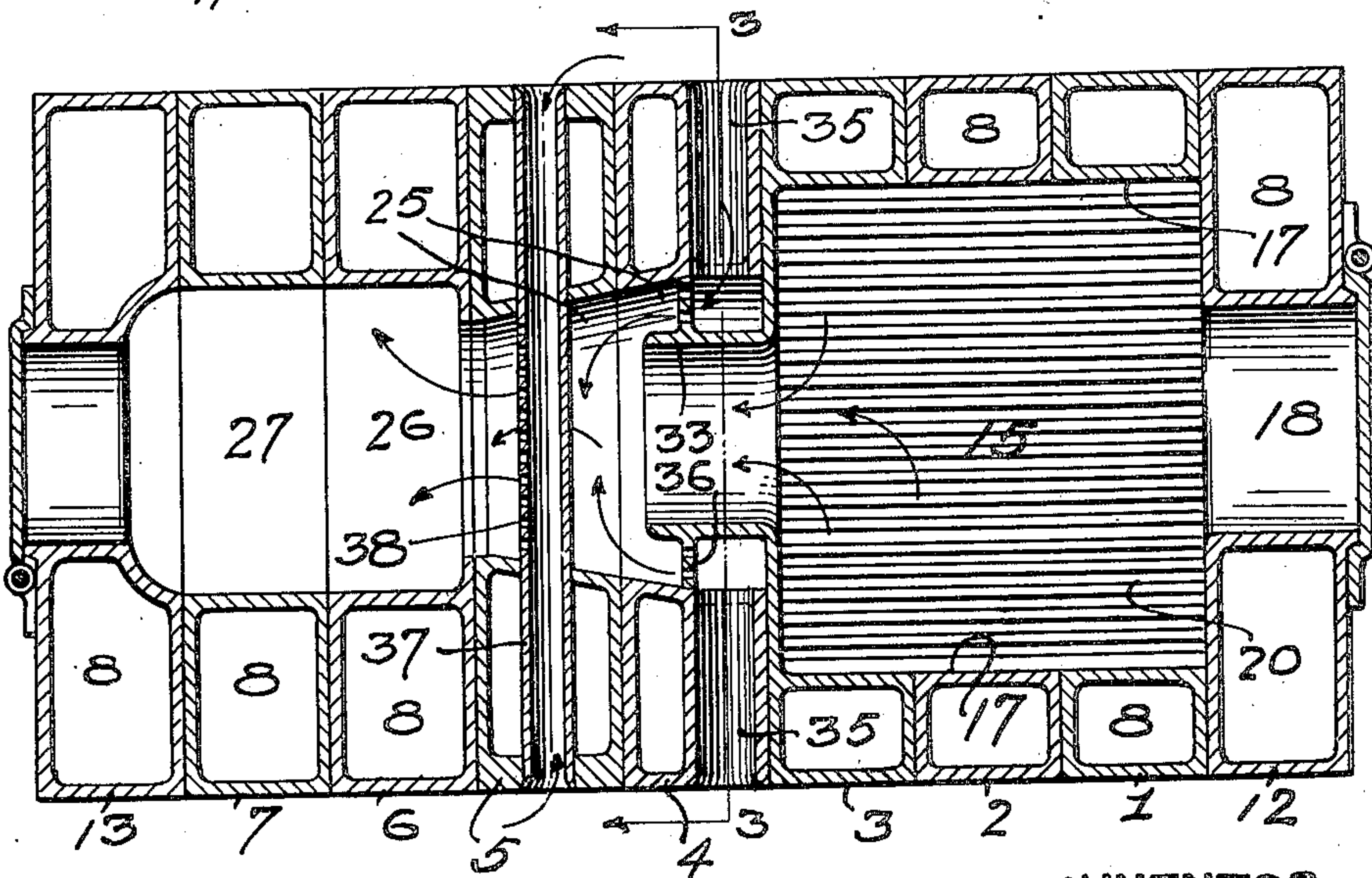
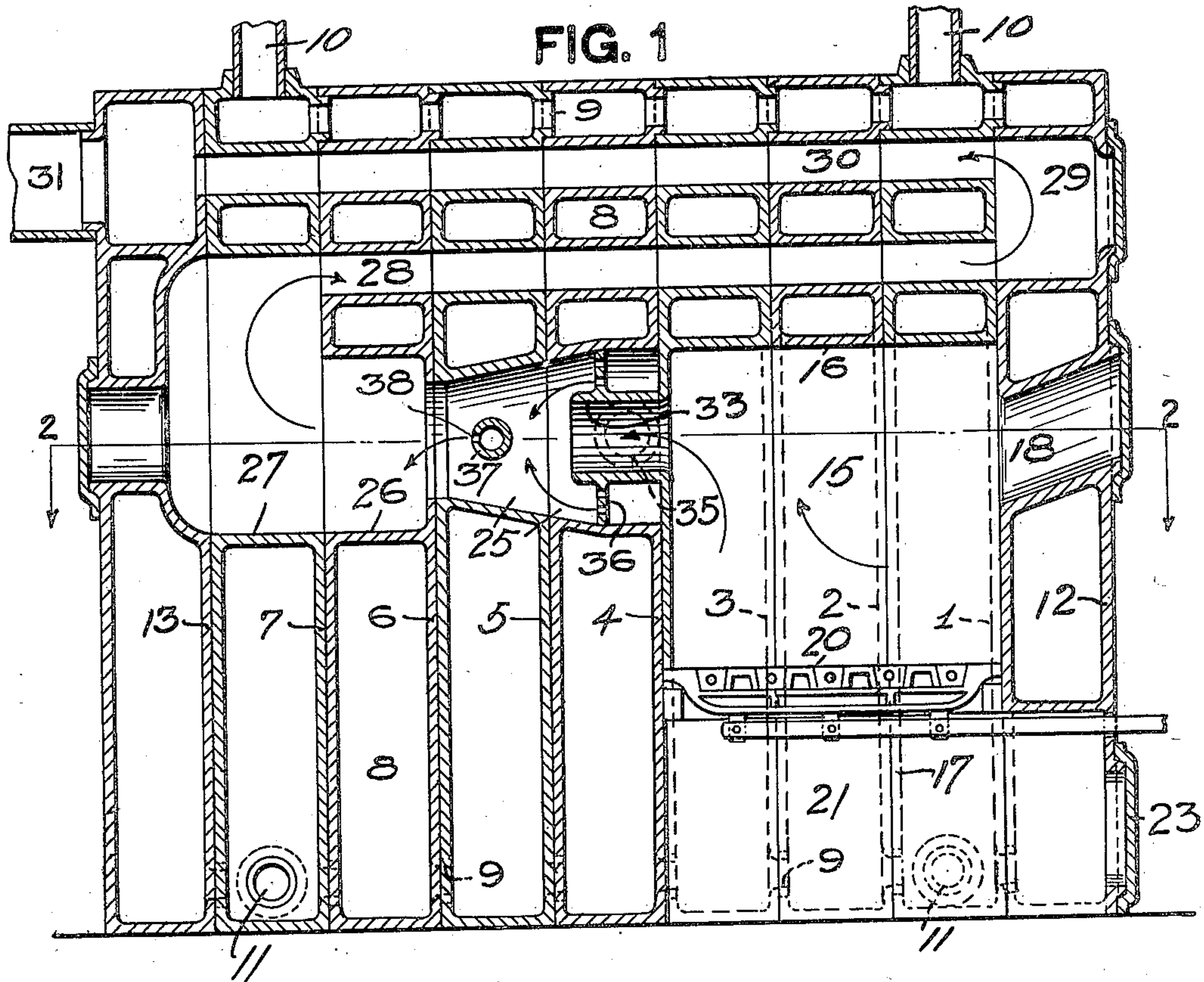
HEATER.

APPLICATION FILED APR. 8, 1908.

Patented Mar. 9, 1909.

2 SHEETS—SHEET 1.

914,402.



WITNESSES.

J. B. Keller
Robert C. Fottner

FIG. 2

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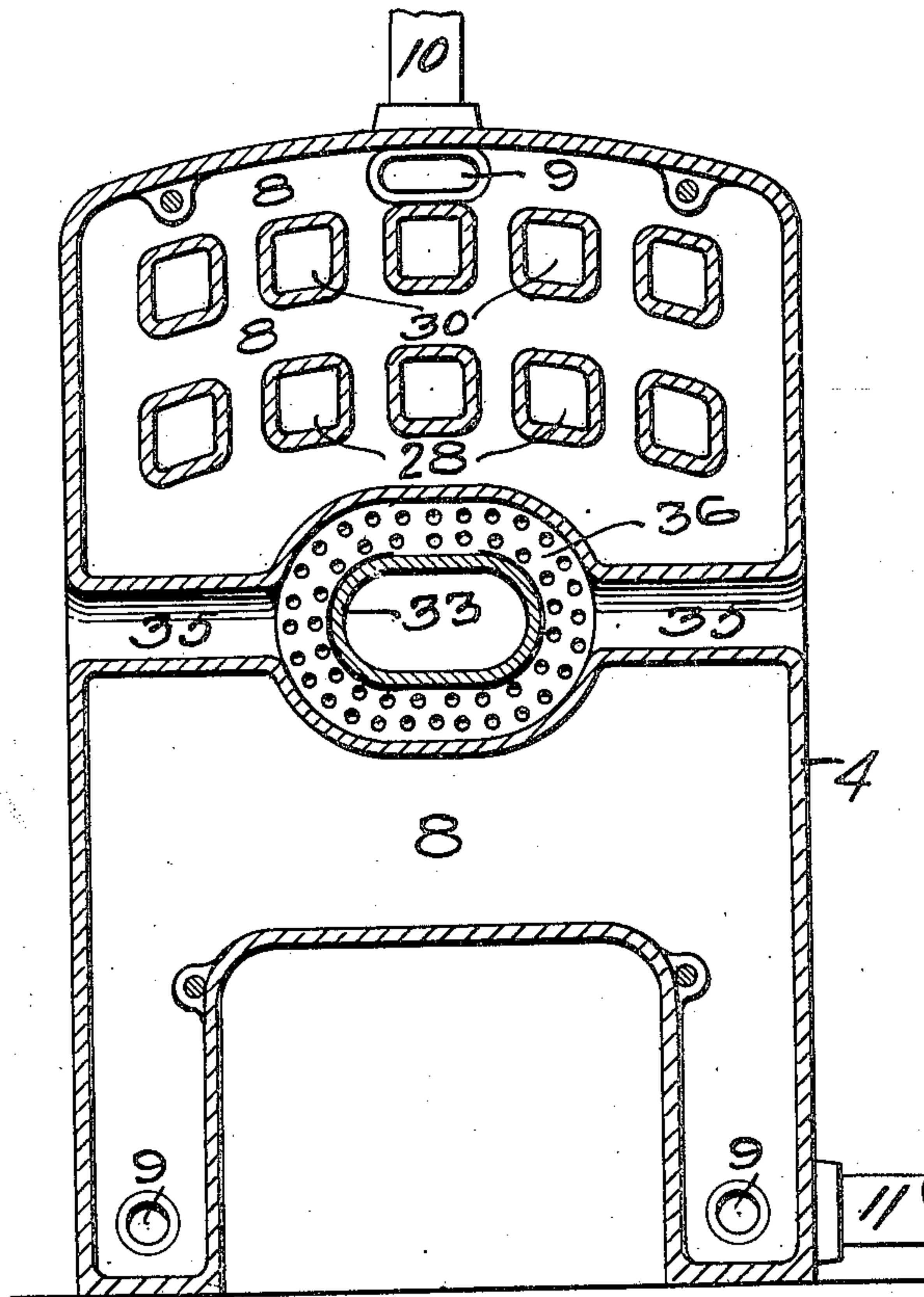


FIG. 3

WITNESSES.

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UNITED STATES PATENT OFFICE.

GEORGE L. FOGLER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO FOGLER FURNACE COMPANY, OF TACOMA, WASHINGTON, A CORPORATION OF WASHINGTON.

HEATER.

No. 914,402.

Specification of Letters Patent.

Patented March 9, 1909.

Application filed April 8, 1908. Serial No. 425,848.

To all whom it may concern:

Be it known that I, GEORGE L. FOGLER, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Heaters for Hot-Water and Steam-Heating Systems; and I do hereby declare the following to a full, clear, and exact description thereof.

This invention relates to water heaters and more especially to sectional heaters or boilers, such as used in connection with hot water or steam heating systems for dwellings and the like, in which the water is either heated for circulation through the system, or converted into steam of low pressure for circulation through the system.

The object of the invention is to provide a heater for the purpose specified having a greater efficiency for the quantity of fuel consumed than prior heaters of a similar character.

The invention comprises the construction and arrangement of parts hereinafter described and claimed.

In the accompanying drawing Figure 1 is a vertical section through a heater embodying my invention; Fig. 2 is a horizontal section on the line 2—2, Fig. 1; and Fig. 3 is a vertical transverse section taken on the line 3—3, Fig. 2.

The heater shown is of the sectional boiler type, being composed of a series of vertical sections 1, 2, 3, 4, 5, 6 and 7. These sections are preferably castings according to the usual way of constructing these heaters, being provided with the water circulating spaces 8 and having the several sections connected to provide for the circulation of water therethrough either by sleeves or nipples 9, or by manifolds on the outside. The supply opening or openings are provided at 10 in the top of the sections and the return openings at 11 near the bottoms of the sections. The manner of connecting these parts and their manner of operation is well understood by those skilled in the art. The front of the heater is a water wall 12 and the rear is a similar water wall 13, the spaces of these walls communicating with the circulation spaces of the sections 1, 2, 3, 4, 5, 6 and 7. Heretofore in heaters of this kind the fire box or chamber has extended through all of the sections of the heater, but with my im-

proved heater only a portion of the sections are formed to provide the fire box. As shown, the front three sections 1, 2 and 3 are so formed as to provide therein the fire box 15, said sections being the crown portions 16 and legs 17 forming the tops and sides of the fire box, the front of said box being formed by the water wall 12 through which is the feed door 18, and the rear being formed by the section 4. The bottom of the fire box is provided with the grate 20 beneath which is the ash pit 21 formed by the legs of the sections. The ash pit is provided with an ash removing door 23 which is arranged to be sealed tightly.

The sections to the rear of the fire box, namely, 4 and 5, are provided with openings 25 which communicate with the upper portion of the fire box and which are preferably tapered rearwardly, as shown, while the next section, 6, (or series of sections, if a greater number are used) is provided with an opening 26 of greater area than the openings 25, so as to provide an expansion or combustion chamber. The section 7, or the one which is next to the rear water wall 13, is provided with a chamber 27 which, at its lower end, communicates with the openings 26 and at its upper end communicates with one or more openings 28, formed in the several sections in alinement and forming flues extending through to the front of the heater where they communicate with a vertical space 29 which in turn communicates with one or more openings 30 formed in the sections and being in alinement to form return flues which at their rear ends are shown communicating with the outlet 31 for the smoke pipe. As many openings forming flues 28 and 30 as are desired may be provided and they may be made to pass back and forth as many times as necessary to cause the complete absorption of the heat from the gases.

A nozzle 33 is connected to the rear wall of the fire box section 3, preferably by casting integral with said section, and projects into the openings 25. This nozzle, as well as the openings 25 may be of any desired shape in cross section, preferably oblong with the long axis horizontal, as shown. The section 4 is provided with the horizontal openings 35 leading from the outside where they communicate with the atmosphere to the opening

25 at or near the base of the nozzle 33. A perforated plate 36 surrounds the nozzle, preferably being integral therewith, and fills the space between the nozzle and the opening 25. Extending through the section 5, by being cast therein, is a horizontally arranged pipe 37 which at its ends is open to the atmosphere outside the heater and inside of the opening 25 is provided with perforations 38.

The nozzle 33, together with the funnel formed by the tapering opening 25, which communicates through passages 35 to the atmosphere, form an injector burner. The products of combustion from the fire box pass through the nozzle 33 and act on the principle of an injector to draw air in through the opening 35 and through the perforated plate 36 and also acting to draw in air through the perforated pipe 37. The fire box has a materially smaller grate area than fire boxes heretofore used in such heaters and is also of relatively greater depth. The fuel is preferably bituminous, or other volatile coal, and is maintained in the fire box in a comparatively deep body and is only slowly burned therein, due to the fact that the draft opening can be practically sealed. In this fire box the fuel is merely volatilized, or converted into a gas, that is, the products of combustion from the glowing layer over the grate pass up through the deep body of fuel and enrich themselves in the usual way of gas producers. The gaseous products formed in this chamber, while still at the high heat of their production, pass through the nozzle 33 and by their injector action draw in air through the openings 35, which air mingles partly with the gas and also forms an envelop around the same, and also draw in further air through the perforated pipe 37, which latter air is introduced directly into the stream of gas, breaking the same up. The mixture is burned at the end of the openings 25, that is, in the enlarged combustion chamber 26. The hot gases pass up through the vertical chamber 37 and back and forth through the flues 28 and 30. The quantity of air drawn in is automatically regulated and is in proportion to the quantity of gas produced in the fire box. Obviously, if a large quantity of gas is produced, it passes through the nozzle 33 at a high velocity, drawing in a comparatively large amount of air; while with a lesser production of gas its velocity through the nozzle is decreased, drawing in a lesser quantity of air. In this way the amount of air is exactly proportioned automatically to the amount of gas produced. The air comes in practically cold so that as soon as it is struck by the hot gases, it expands many times in volume, opening up the stream of gas and causing complete combustion of such gases. The consequence is

that the device is very efficient, giving a large quantity of heat units for the amount of fuel consumed.

The combined cross sectional areas of the flues 28 is less than the cross sectional area of the small end of the sleeve 37. This provides at the end of the combustion chamber a point at which the flue area is somewhat restricted, so that it serves to choke back the gases and prevents the draft of the chimney or stack from extending back to the nozzle or burner. The consequence is that the gas coming through the nozzle 33 is not affected by the suction of the stack and therefore acts under its normal pressure of production on the principle of an injector to draw in just the right quantity of air. The consequence is that the quantity of air entering and the pressure and velocity thereof is automatically regulated by the gas so that at all times, no matter what the quantity of gas being produced may be, practically perfect combustion is insured. This could not be the case if the suction from the stack extended back to the nozzle to its full force, since under those conditions the stack suction would have the effect of drawing in a greater quantity of air when a small quantity of gas was being produced than when a larger quantity of gas is produced.

The heater described being of the sectional type can be enlarged in size as desired. If desired, the fire box can be enlarged by adding one or more sections similar to those marked 1 and 2, while for increasing the generating capacity of the heater, sections similar to 6 are added. Also, if desired, the openings 25 may be made to extend through three or more of the sections, but usually two sections for this purpose are sufficient.

What I claim is:

1. A heater for water and steam heating systems comprising a plurality of hollow sections providing water circulating spaces, some of said sections having alining openings therethrough from front to rear, the forward one of said last named sections having an opening connecting its opening with the atmosphere, and a nozzle communicating with the fire box and projecting into said alining openings.

2. A heater for water and steam heating systems comprising a plurality of hollow sections providing water circulating spaces, some of said sections having alining openings therethrough from the front to the rear, the forward one of said last named sections having an opening connecting its opening with the atmosphere, a nozzle communicating with the fire box and projecting into said alining openings, and a perforated pipe in the next adjacent section in front of said nozzle and having its end extending through the section and open to the atmosphere.

3. A heater for water and steam heating

systems comprising a plurality of hollow sections providing water circulating spaces, some of said sections having alining openings therethrough from front to rear, the forward
 5 one of the last named sections having an opening connecting its opening with the atmosphere, a nozzle communicating with the fire box and projecting into said alining openings, and return flues formed in the upper
 10 part of said sections by alining sleeved openings therethrough.

4. A heater for water and steam heating systems comprising a plurality of hollow sections providing water circulating spaces, cer-
 15 tain of said sections being provided with openings to provide a fire box, the sections to the rear of the fire box sections being provided with alining openings therethrough from their front to their rear faces and one of
 20 them having an opening extending from its opening to the exterior, and a nozzle on the rearmost fire box section and projecting into said alining opening beyond the air inlet.

5. A heater for water and steam heating
 25 systems comprising a plurality of hollow sections providing water circulating spaces, some of said sections being provided with openings to form a fire box, the sections immediately adjacent to the fire box sections
 30 being provided with alining openings therethrough from their front to their rear faces, and one of said sections having an opening leading from its opening to the exterior, the sections to the rear of said last named sec-
 35 tions being provided with enlarged openings to form a combustion chamber, and a nozzle on the rearmost fire box section and project-

ing into the adjacent opening beyond the air inlet.

6. A heater for water and steam heating 40
 systems comprising a plurality of hollow sections providing water circulating spaces, some of said sections having alined openings therethrough from front to rear, the forward
 45 one of said last named sections having an opening connecting its opening with the atmosphere, a nozzle communicating with the fire box and projecting into said alining openings, and other openings through said
 50 sections forming flues of lesser cross sectional area than the openings into which the nozzle projects.

7. A heater for water and steam heating
 systems comprising a plurality of hollow sections providing water circulating spaces, 55
 some of said sections having alined openings therethrough from front to rear, the forward
 one of said last named sections having an opening connecting its opening with the at-
 60 mosphere, a nozzle communicating with the fire box and projecting into said alining openings, the sections to the rear of said last named sections being provided with en-
 65 larged openings to form a combustion chamber, and other openings through said sections forming flues of lesser cross sectional area than the openings into which the nozzle projects.

In testimony whereof, I the said GEORGE L. FOGLER have hereunto set my hand.

GEORGE L. FOGLER.

Witnesses:

F. W. WINTER,

WM. A. STEINMEYER.