No. 771,431. PATENTED OCT. 4, 1904.

J. E. MANNEN & W. M. ESTERLY.

HEATING APPARATUS.

APPLICATION FILED APR. 2, 1904.

NO MODEL.

FIG. 1.

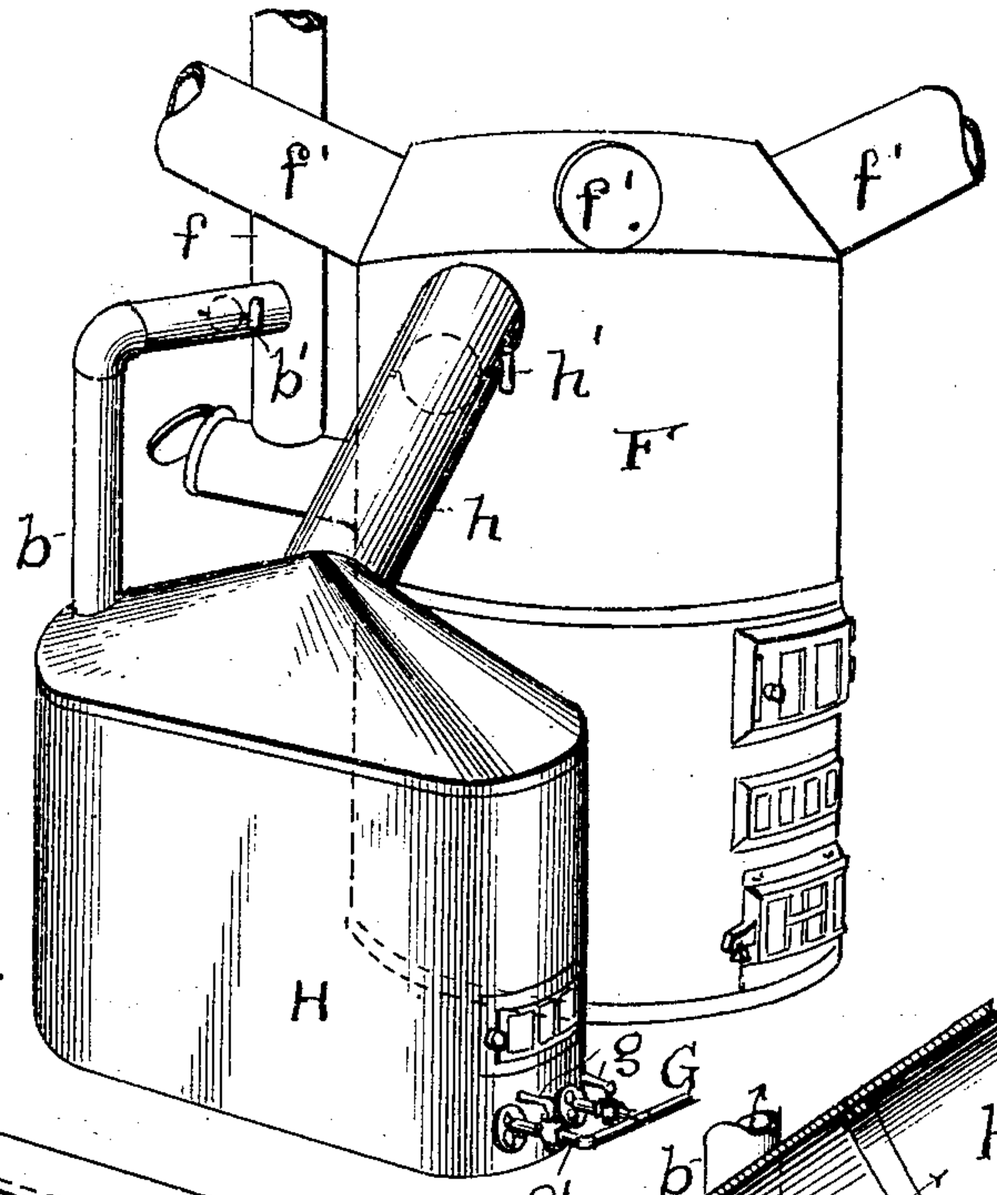


FIG. 2.

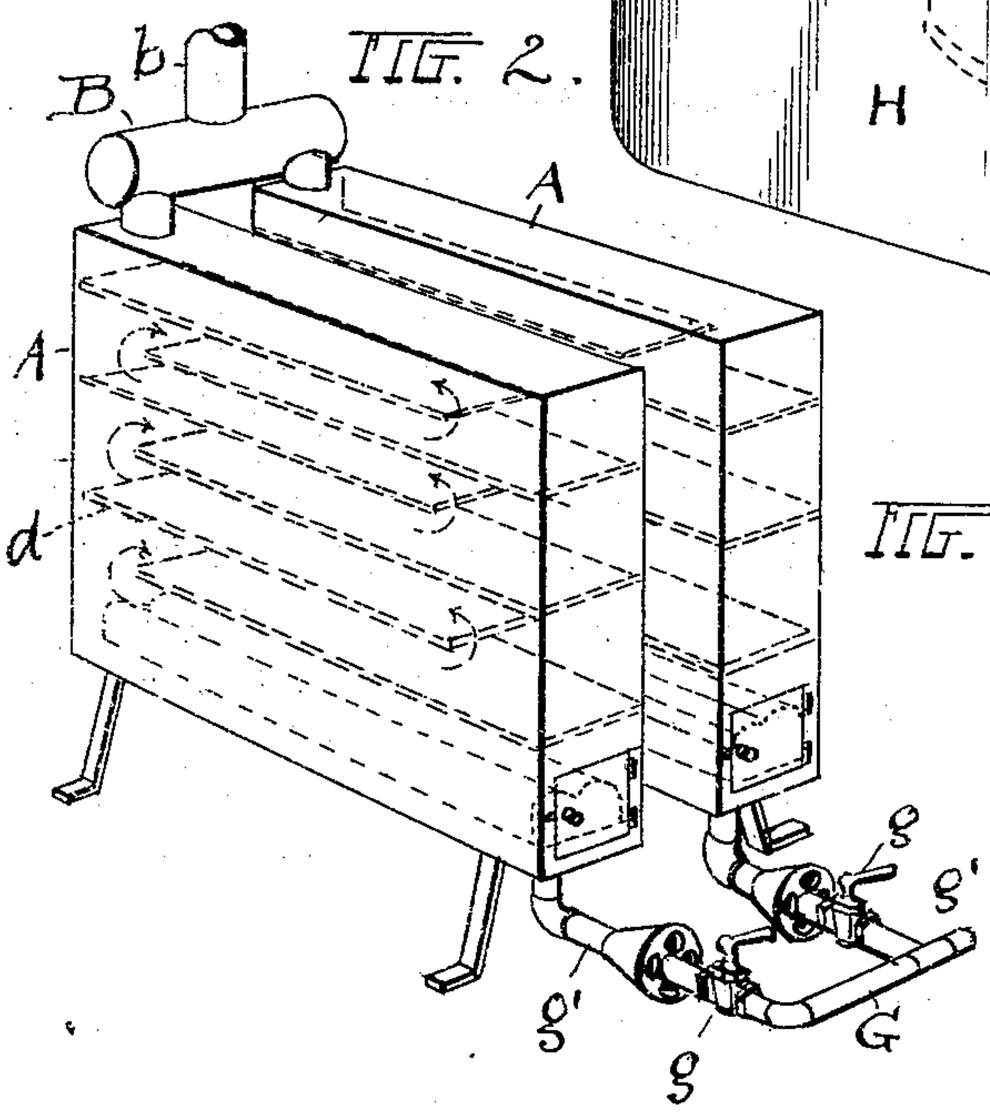
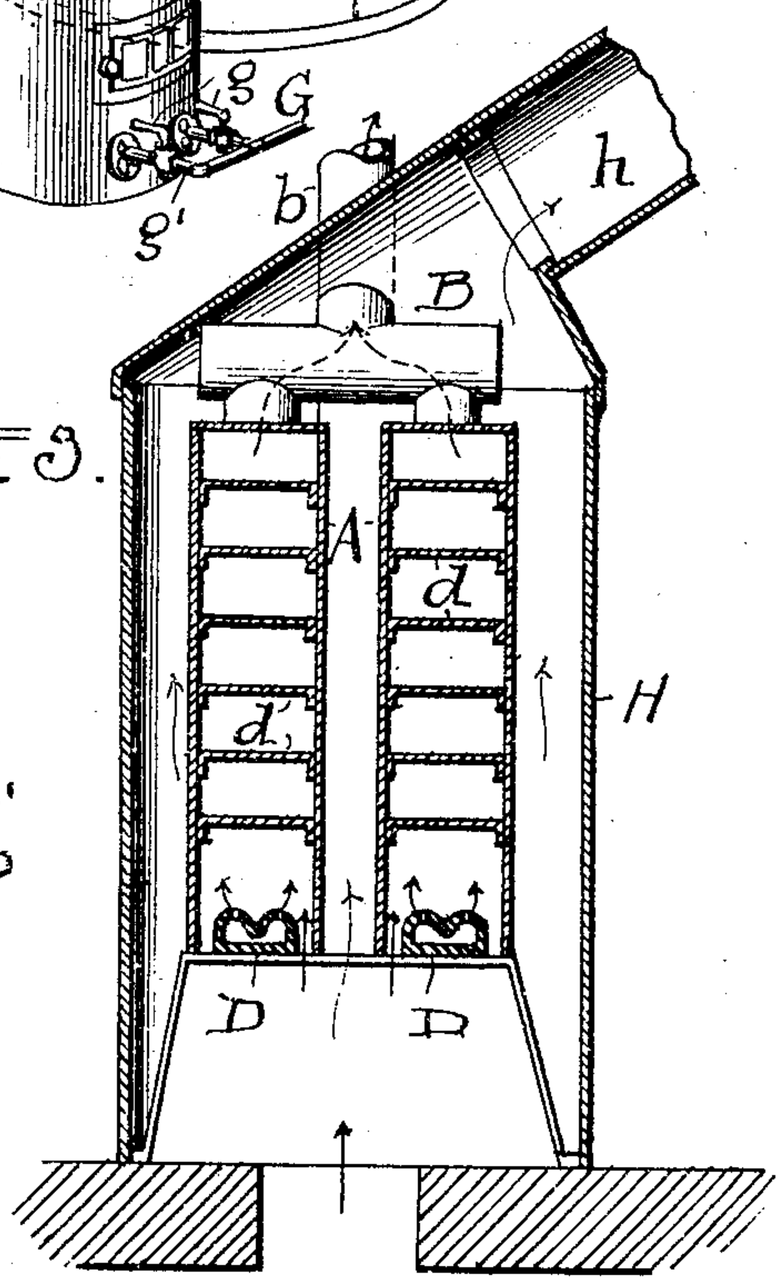


FIG. 3.



WITNESSES:

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No. 771,431. Patented October 4, 1904.

UNITED STATES PATENT OFFICE.

JOHN E. MANNEN AND WILLIS M. ESTERLY, OF CLEVELAND, OHIO.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 771,431, dated October 4, 1904.

Application filed April 2, 1904. Serial No. 201,249. (No model.)

To all whom it may concern:

Be it known that we, JOHN E. MANNEN and WILLIS M. ESTERLY, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Heating Apparatus; and we declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has reference to heating apparatus for dwellings, store-rooms, factories, and other places; and the invention consists, first, in a gas-heater of novel and original construction, and, secondly, of a combination of said heater with a hot-air furnace or the flues leading therefrom and adapted to be used independently of the furnace or as an adjunct thereto to further increase the volume of heat for excessively cold weather or the like, all substantially as shown and described, and particularly pointed out in the claim.

In the accompanying drawings, Figure 1 is a perspective view of a combined gas-heater and furnace, and Fig. 2 is a perspective view of the gas-heater alone. Fig. 3 is a cross-section of the said heater and the inclosing casing therefor.

In this heater we utilize either natural or artificial gas or hydrocarbon vapors from suitable gasolene or kerosene burners.

The reference character A represents one or two or more similar gas-heaters arranged side by side and suitably spaced apart, and the two are joined at their rear by a cross-flue B, from which proceeds a single flue or pipe *b* to carry away the products of combustion. Said flue *b* is shown as discharging into corresponding flue *f* from coal-furnace F; but it may go directly to the chimney or other place of escape, and said flue *b* has a damper *b'* of usual pattern and purpose.

The gas-heater itself is shown here as of rectangular or box shape, narrow between its flat sides and provided with division-plates *d*, arranged in series one above the other with a draft-space for the products of combustion intervening and having open passages at the ends of the plates alternately from one draft to the other from bottom to top. The said end passages are first at one end and then at the other, so that the products of combustion have to traverse the full length of a given space from end to end of the heater before they can pass into the next space above, and the aggregate effect or value of that long travel is to give off practically all the heat from the products of combustion through the walls of the heater before they escape to the outer air. To this end also I construct the heater of thin sheet-steel or similar thin metal, by which the heat will be readily absorbed and radiated, care being taken in the selection of the metal that it will not be of a kind to readily burn out or become warped in use, as the sides of the heater nearest the burners are liable to become red-hot if a full volume of gas be turned on. This may be measurably overcome by keeping the walls farther from the burners or by building the lower portion of the heater of cast metal; but either expediency is at the expense of maximum radiation at this low point, which is desirable.

The burners D are of any suitable pattern or style according to the fuel used, but in this instance are supposed to be of a style to burn natural gas. The supply-pipe G therefore has controlling valves or cocks *g*, and connections *g'* deliver the gas to the burners.

One or more of the heaters A may be used in an equipment or installation of this system, and the gas is of course under control, as usual, so as to burn more or less, as may be wanted, and in one or both heaters at a time. The drum or casing H for said heaters is preferably elliptical in cross-section and provided with a heat-conveying flue *h* at its top, which discharges into the side and upper portion of the furnace-drum F, as here shown, whereby the said heater is placed in open communication with the building through the flues *f'*, radiating from drum F and which are already in position. A damper *h'* in hot-air flue *h* serves the usual purpose and cuts out the heater when not used.

The term "gas-heater" as employed herein is to be understood as including hydrocarbon vapor or gas and whether the gas or vapor be first carried through a mixer or be con-

sumed without previous mixing, as occurs generally in gasolene-burners.

What we claim is—

In gas-heaters for hot-air uses, the combination comprising a plurality of flat-sided narrow heaters arranged side by side with a space between and having each a series of plates running lengthwise thereof from bottom to top and provided with passages at their ends alternately from one space to another between said plates, thereby carrying the products of combustion back and forth through the heater, a separate burner at the bottom of each heater, a cross-flue uniting the heaters and a single draft-pipe therefrom for the products of combustion, and a drum inclosing said heaters having a single discharge at its top for the heated air, substantially as described.

In testimony whereof we sign this specification in the presence of two witnesses.

JOHN E. MANNEN.
WILLIS M. ESTERLY.

Witnesses:
R. B. MOSER,
C. A. SELL.