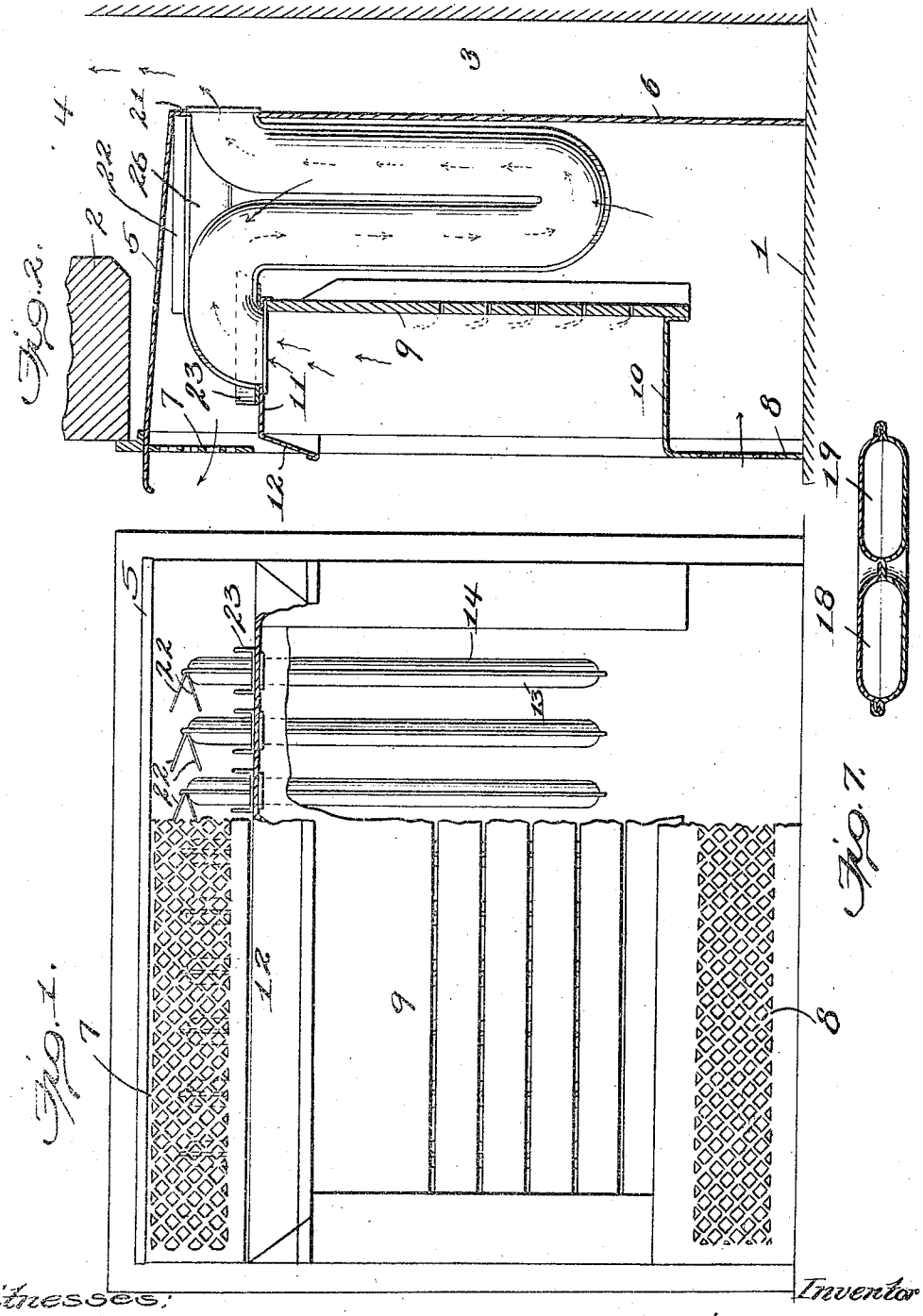
L. T. HAGAN.

GAS HEATER.

APPLICATION FILED DEC. 12, 1914.

1,245,904. Patented Nov. 6, 1917.

2 SHEETS—SHEET 1.



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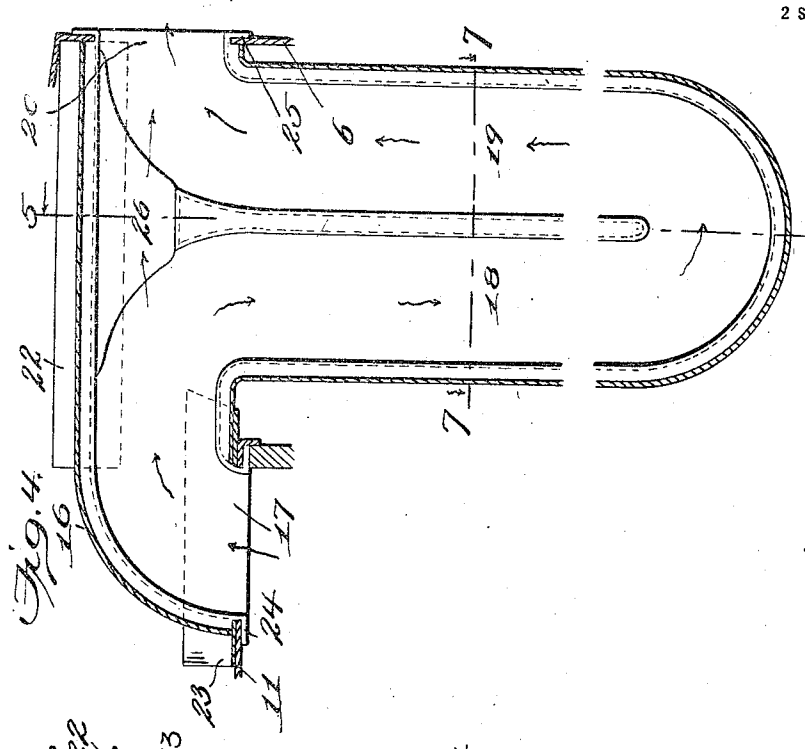

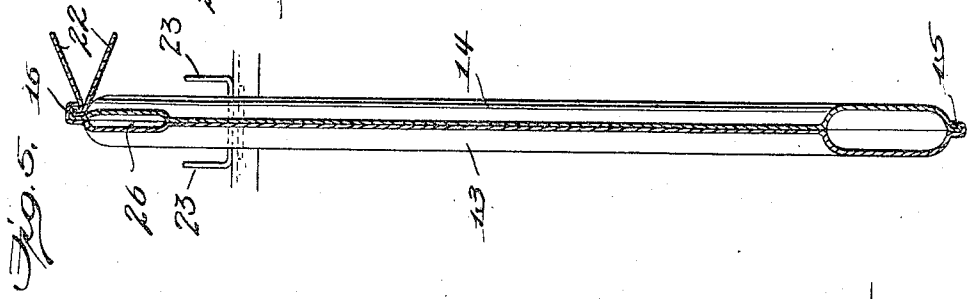

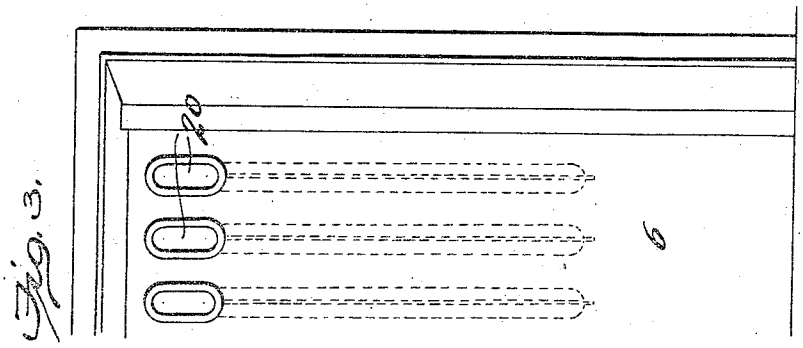

Witnesses

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UNITED STATES PATENT OFFICE.

LOUIS T. HAGAN, OF WINCHESTER, KENTUCKY.

GAS-HEATER.

1,245,904. Specification of Letters Patent. Patented Nov. 6, 1917.

Application filed December 12, 1914. Serial No. 876,954.

To all whom it may concern:

Be it known that I, LOUIS T. HAGAN, a citizen of the United States, residing at Winchester, in the county of Clark and State of Kentucky, have invented new and useful Improvements in Gas-Heaters, of which the following is a specification.

My present invention relates to improvements in gas heaters, and the primary objects are to provide an improved heater of this character which is capable of operating with relatively high efficiency to transmit heat therefrom to the air of a room or other chamber to be heated, the heater being provided with means for insuring an efficient draft therefor when first started and when the heater is operated with a relatively low flame.

To these and other ends, the invention consists in certain improvements, and combinations and arrangements of parts, all as will be hereinafter more fully described, the novel features being pointed out particularly in the claims at the end of the specification.

In the accompanying drawing:—

Figure 1 is a front elevation, partly in section, of a gas heater constructed in accordance with the present invention;

Fig. 2 represents a vertical section through the heater, as shown in Fig. 1, and looking toward the left;

Fig. 3 shows one end of the heater as viewed from the rear;

Fig. 4 is a detail view showing one of the return flues in vertical section;

Fig. 5 represents, on an enlarged scale, a section on the line 5—5 of Fig. 4;

Fig. 6 is a top plan view of one of the flues;

Fig. 7 represents a cross-section through one of the flues on the line 7—7 of Fig. 4.

Similar parts are designated by the same reference characters in the several views.

The preferred construction is illustrated in the accompanying drawing and will be hereinafter described in detail. It is to be understood, however, that the invention is not restricted to the precise construction shown, as equivalent constructions within the scope of the annexed claims may be used and will be covered thereby.

In the construction shown, the heater is of a type adapted to use natural or other gas and is set into an ordinary open fire-place, 1 designating the hearth, 2 the front wall of the chimney, 3 the rear wall of the chimney or fire-place, and 4 the flue of the chimney. The heater comprises an exterior casing embodying a top wall 5, a rear wall 6, which latter is preferably spaced a suitable distance in front of the wall 3, and ventilating or perforated plates 7 and 8. A burner or fire-back 9 is suitably fixed within the casing, preferably at a point in rear of the perforated ventilating plates 7 and 8, and this burner or fire-back can be of any suitable construction and appropriately connected to a source of gas supply. In the present instance, the burner or fire-back 9 is supported at its rear end by a ledge 10 which extends rearwardly from the top of the lower perforated plate 8 and its upper end is supported by a rearward extension 11 of a cowl 12, the latter overhanging the combustion chamber which is formed in front of the burner or fire-back 9.

According to the present invention, heat is radiated not only directly from the flame produced in front of the burner or fire-back 9, but is also radiated from a suitable number of flues through which the products of combustion from the burner pass on their way to the chimney, the heat being absorbed from the flues by air which circulates past them, such air entering the casing through the lower perforated plate 8 and flowing into the room through the upper perforated plate 7. In the construction shown, a number of flues having return bends are arranged within the casing of the heater and they serve as conduits through which the products of combustion from the burner pass to the chimney. Preferably, each flue is composed of a pair of concaved sheet metal sections 13 and 14 which may be stamped into shape and united at their marginal edges by seams 15 and 16. Each flue is formed with an inlet 17, a down bend 18, an up bend 19, and an exit 20, the exit of each flue extending through an opening 21 formed in the upper portion of the rear wall 6 of the heater, and the inlet end 17 of each flue is secured or attached to the member 11. Each of these return flues offers a considerable surface to the air circulating through the casing of the heater. In order to increase this radiating surface, a pair of fins 22 is preferably secured to the upper seam 16, and also a channeled plate 23, the flanges

of which extend upwardly, is secured in position at the point where the inlet 17 of the flue is connected to the member 11. In the present instance, the channel-shaped member 23 is formed with an opening through which the inlet end of the flue passes, and after the flue is passed through the member 11, it may be flanged, as at 24. The outlet or exit end 20 of each flue may be similarly flanged, as at 25, to secure it to the rear wall 6 of the casing.

The present invention provides simple and efficient means for insuring the necessary draft for the burner when the same is first started and also when the heater is operated with a relatively low flame. It consists in providing a direct passage having a less capacity than that of the return bend flues for the flow of some of the products of combustion to the chimney without requiring such products of combustion to flow through the return bends 18 and 19. This direct or by-passage 26 is always open and it is preferably formed in each flue by concaving the flue sections 13 and 14 at the point between the inlet 17 and exit 20. In consequence, when the burner is first lighted, some of the heated gases or products of combustion will enter the inlet 17 of each flue and will then flow directly through the by-pass 26 and to the chimney, thereby heating the air or gases in the chimney to a degree sufficient to induce a draft which will draw the major portion of the products of combustion through the return bends 18 and 19 of the flues. The same action occurs when the burner is operated with a relatively low flame, with the result that a positive circulation of the heated gases or products of combustion through the return bends 18 and 19 of the flues is insured and the relatively large heating surfaces thus provided afford ample opportunity for the absorption of heat by the air which enters the lower perforated plate 8 and which discharges from the casing through the upper perforated plate 7. It is to be understood that, in operating the heater at its normal capacity, only a portion of the heated gases or products of combustion flow through the by-passage 26, the major portion of the gases or products of combustion flowing through the return bends of the flues.

I claim as my invention:—

1. In a heater of the class described, the combination with a casing having a combustion chamber and an air inlet at the bottom and an air outlet at the top thereof, of a row of flues arranged in spaced relation within the casing and forming between them vertical air passages connecting the air inlet and outlet of the casing, each flue having return bends leading from the combustion chamber to the chimney exit and each flue also having a by-passage of a capacity less than that of the return bends of the flue and leading directly from the combustion chamber to the chimney exit, said return bends and the by-passages of the flues forming communication at all times between the combustion chamber and the chimney exit.

2. In a heater of the character described, a flue comprising a pair of complemental sheet metal sections stamped into shape to form an inlet, an exit, and return bends connecting them, and complemental ribs forming a dividing partition between said return bends, said ribs being shallower toward their upper ends to form a by-passage directly connecting said inlet and exit.

3. In a heater of the class described, the combination with a casing containing a combustion chamber and having an air inlet at the bottom and an air outlet at the top, of a row of upright laterally spaced flues arranged within the casing and spaced laterally to provide upright air passages connecting the air inlet and the air outlet of the casing, the passages of the flues being connected to receive the products of combustion from the combustion chamber, and heat radiating fins projecting laterally from the tops of the flues across the air passages between the flues.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LOUIS T. HAGAN.

Witnesses:
R. H. BROOKSHIER,
L. D. BRANDENBERG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."