March 25, 1958 H. C. SNODGRASS 2,828,078

HEARTH HEATER

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Fig. 1

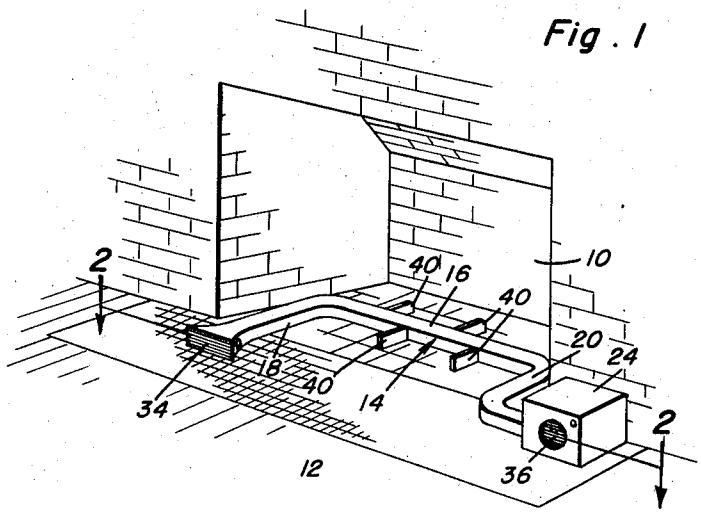


Fig. 2

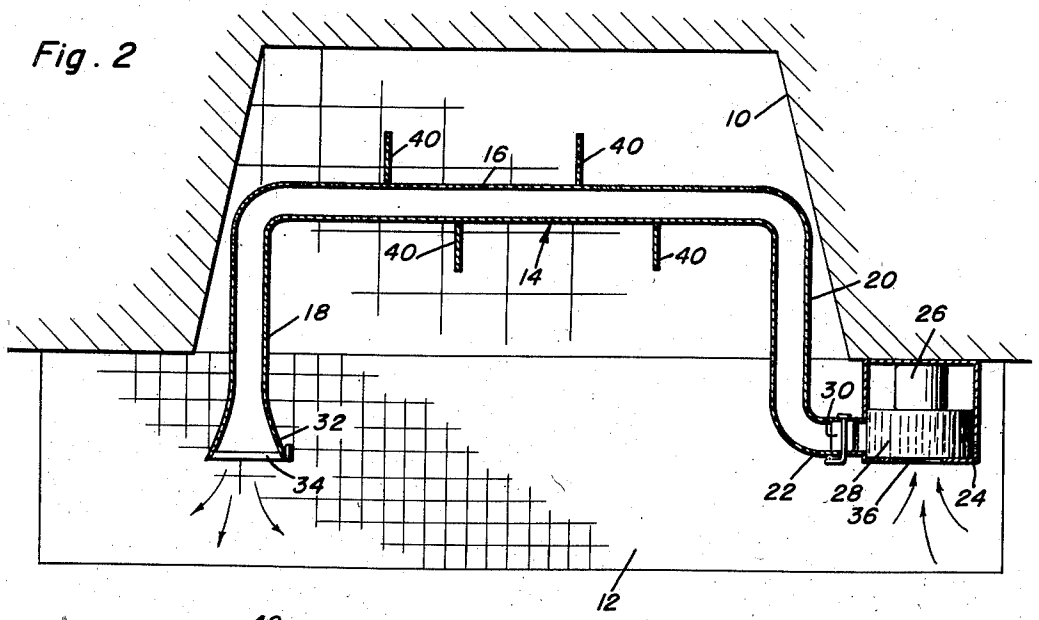
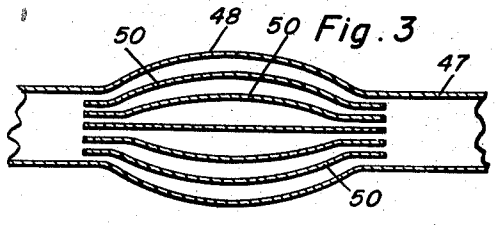


Fig. 3



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Fig 4

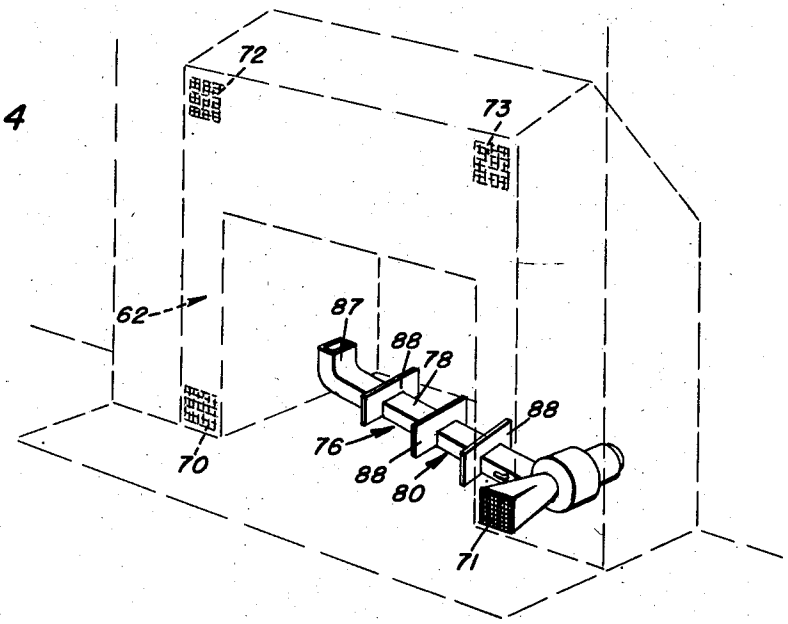


Fig. 5

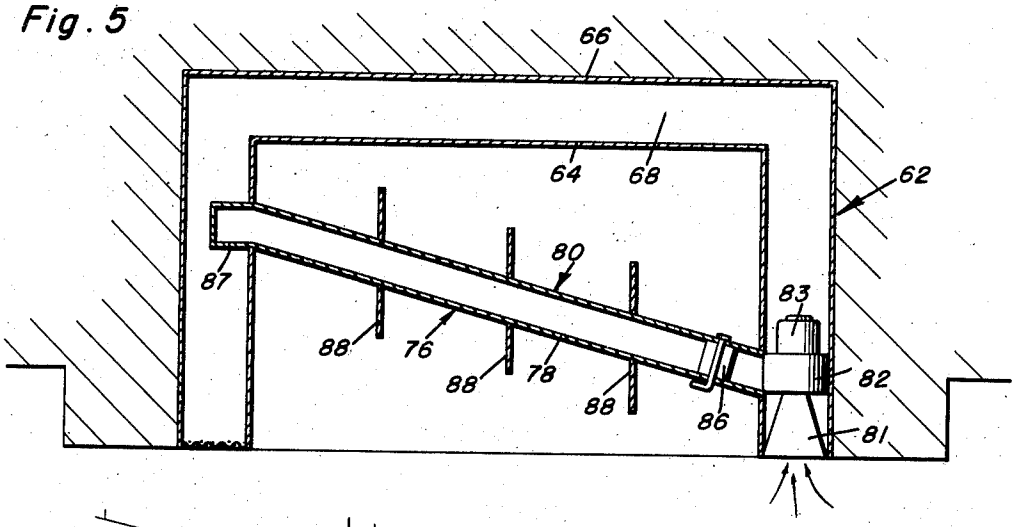
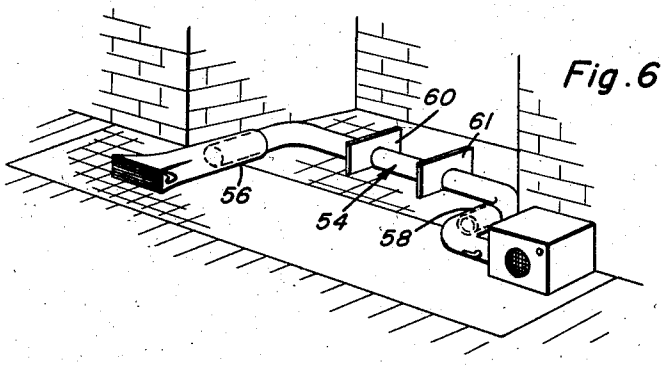


Fig. 6



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Fig. 7

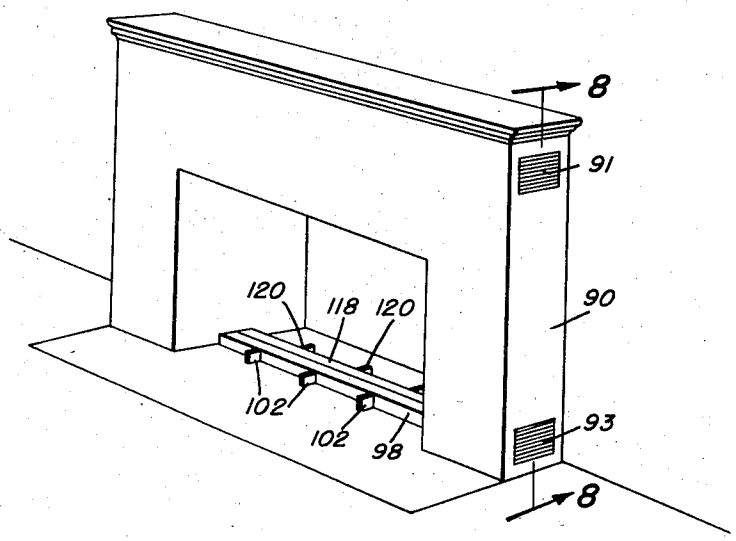


Fig. 8

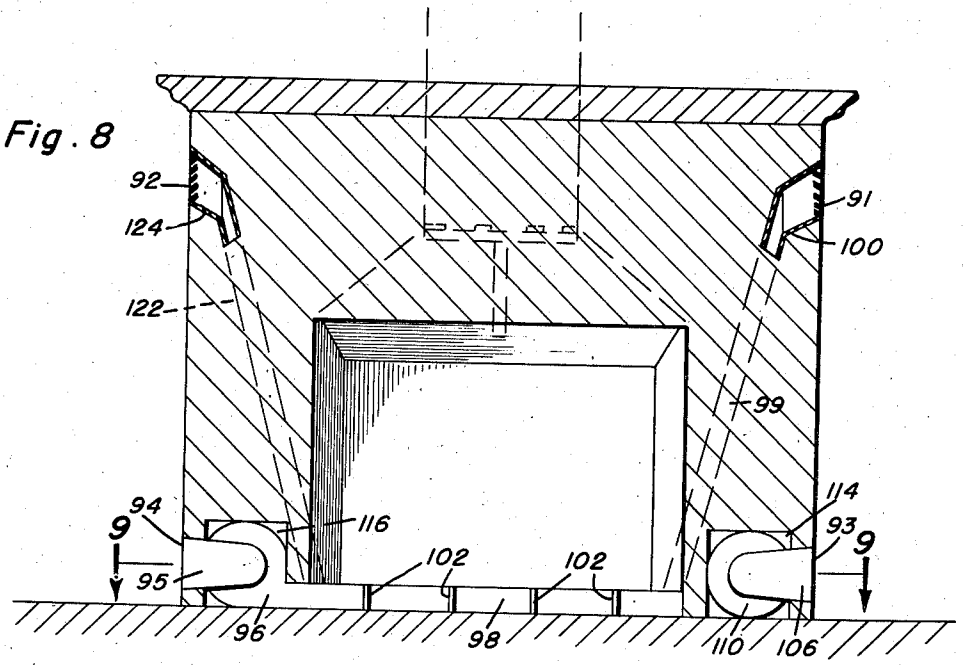
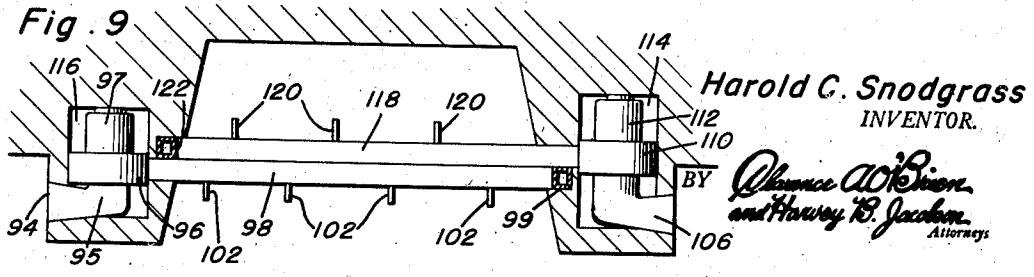


Fig. 9



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United States Patent Office 2,828,078 Patented Mar. 25, 1958

2,828,078

HEARTH HEATER

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Application July 17, 1956, Serial No. 598,430

7 Claims. (Cl. 237—51)

This invention relates to hearth heaters and particularly to a heater which is adapted to extract waste heat from the products of combustion in open fireplaces as the products, for example, smoke, hot gases, etc. pass from the fire and into the flue of the fireplace.

An object of the present invention is to provide an efficient device for extracting heat which would ordinarily be wasted up the flue of an open fireplace in order to distribute this heat in the room or the enclosure wherein the fireplace is located.

A more specific object of the invention is to provide a hearth heater of the type which utilizes waste heat, the heater being of extremely simple construction involving a duct which is adapted to fit on the firebrick bottom or in an analogous position in the fireplace and which has means to withdraw or force the air through the duct and distribute it to the room.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a perspective view of a fireplace having one form of the invention applied thereto;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary sectional view showing a modification of the duct which constitutes a part of the invention;

Figure 4 is a perspective view of another form of the invention;

Figure 5 is a horizontal sectional view of the heater of Figure 4;

Figure 6 is a fragmentary perspective view showing a modification of the invention;

Figure 7 is a further modification;

Figure 8 is a sectional view taken on the line 8—8 of Figure 7; and,

Figure 9 is a sectional view taken approximately on the line 9—9 of Figure 8.

The fact that a considerable quantity of heat passes through the flue of an open fireplace, particularly a fireplace normally found in the home today, is not disputed. However, it is not appreciated in general, how much heat is actually lost in this way. For example, a stainless steel system as shown in Figure 4 in fourteen minutes after the fire was lit, had an inlet temperature of 64° F. while the outlet temperature registered in the order of 120° F. After one hour the inlet temperature registered 68° F. while the outlet temperature registered in the order of 212° F. This represents a British thermal unit output of between 21,000 and 22,000.

The only fuel cost is approximately three cents for electricity in order to actuate for a twelve hour period the 1/15 horsepower motor for the small blower. If it generates about 216,000 British thermal units in a twelve hour period, then the cost is approximately three cents.

In the absence of the invention, all of this heat would ordinarily be dissipated up the chimney.

In practicing the invention, various materials of construction may be used. For example, the ducts may be made of stainless steel, sheet metal, brass or others, and the performance of the hearth heater will vary slightly in accordance with the selection of material and in accordance with its thickness.

In Figure 1 a typical installation is illustrated. Here there is a fireplace 10 of standard form having a hearth 12. Other appurtenances contiguous to fireplaces may be used in accordance with the desires of the home owner. The invention comprises a duct 14 having an intermediate portion 16 together with end parts 18 and 20, respectively. The end parts 18 and 20 are approximately right angularly related to the intermediate portion 16. Duct 14 is rectangular in cross-section and has an elbow 22 at the extremity of part 20. This elbow joins to a casing 24 wherein there is an electric motor 26 that is drivingly connected to a small blower 28. Controls, for example, a switch for the motor 26 and a light which is on while the motor is in operation, are applied in accordance with the desires of the manufacturer. Valve 30 in elbow 22 is adapted to be closed when the motor is not in operation so as to protect the blower from the heat of the fire.

The outer extremity of part 18 of the duct 14 is flared outwardly as at 32 and has a controllable lever 34 or grill thereon. This is the heater outlet, while the louvered opening 36 in casing 24 is to cool their inlet, being in registry with the inlet of the blower 28.

In order to more effectively extract heat from the fire, heat baffles 40 are attached to the side walls of the duct 14 and like the duct 14, are adapted to rest on the bottom of the fireplace.

Figure 3 has a slight modification of the invention which is capable of being used in addition to the heat baffles 40 or in lieu of the heat baffles 40. Duct 47 has an enlargement 48 intermediate its ends, duct 47 schematically representing a duct similar to duct 14 or any of the succeeding ducts to be described herein. The baffles 50 in the duct 47 are arranged in general alignment with the longitudinal axis of the duct and are smoothly curved in longitudinal section in order to form a heat exchanger within the duct.

Attention is now invited to Figure 6 which differs from Figure 1 in the specific details of construction. Here, duct 54 is of the same configuration as duct 14, but it is of circular cross-section rather than rectangular cross-section. In addition, the sides 56 and 58 are telescopingly extensible so as to be able to more effectively position the parts of the hearth heater in the fireplace. Heat exchange baffles 60 and 61 instead of being flush with the top of the duct, extend around the majority of the periphery of the duct.

Figures 4 and 5 show a further form of the invention wherein it is applied to one of the commercially available double walled fireboxes 62. In order to avoid the possibility of faulty fireplace design and to take some advantage of the heat in the fireplace which would ordinarily be lost up the chimney, some fireplaces have in place of an ordinary masonry firebox, an inner and outer casing 64 and 66, respectively, between which there is an air jacket 68. Blower, air inlet grills 70 and 71 are arranged over air inlets, while grills 72 and 73 are ordinarily arranged over heated air outlets. However, this is only a partial solution to the problem and yields only a very small percentage of the heat available in the firebox. Accordingly, the hearth heater 76 in Figures 4 and 5 illustrates a combination of such a heater with one of these commercially available double walled fireboxes or one similar thereto. The heater 76 includes an inter-

mediate portion 78 of duct 80. A flared inlet scoop 81 is arranged in registry with the air inlet of the blower 82, the latter being located in the jacket 68 and being driven by motor 83 that is operatively connected therewith. The discharge of the blower is in registry with the duct 80, and there is a valve 86 in the duct in order to protect the blower against fireplace heat when the blower is not in use. The opposite end of duct 80 has an elbow 87 located in the jacket 68 and adapted to propel air thereinto. Heat baffles 88 are on the duct 80 and are adapted to rest in the firebox in order to more effectively extract heat from the fire in the fireplace for propulsion through the jacket 68.

Figures 7–9 deal with the finally illustrated form of the invention. Here, the fireplace 90 has on each side louvered outlets 91 and 92 near the top parts of the fireplace, and louvered air inlets 93 and 94 near the bottom parts of the fireplace. The air inlet 94 has an air inlet scoop 95 which registers with the air inlet of the blower 96, the latter being actuated by electric motor 97. Duct 98 extends from the outlet of the blower, across the fireplace on the bottom thereof and has an upwardly extending part 99 which flares outwardly as at 100 in order to form outlet 91. A number of heat baffles 102 are attached to the duct 98 and are adapted to rest on the bottom of the fireplace for the same purpose as the previously described heat ducts. The cool air inlet 93 has a flared cool air inlet 106 in registry with the inlet of the blower 110, the latter being actuated by an electric motor 112. Opening 114 accommodates the motor, blower and inlet, while opening 116 accommodates the corresponding parts on the other side of the fireplace. Duct 118 extends from the outlet of the blower 110 across the bottom of the fireplace and has a number of baffles 120 thereon. The outer part of the duct 118 proceeds upwardly as at 122 until it flares outwardly as at 124 in order to accommodate the louver or grill unit at the heated air outlet.

In use of the hearth heater disclosed in any of the figures of the drawings or in any other embodiment of the invention, a considerable amount of heat is extracted which would ordinarily be lost. This heat will make it possible to more effectively heat a room or any other enclosure by the open fireplace method.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In an open fireplace that has sides and a bottom, the improvement comprising: a hearth heater that has a duct which extends across the bottom of the fireplace, said sides of the fireplace having cavities, a blower in one of said cavities, an air inlet scoop operatively connected with said blower and opening through one of said sides whereby cool air is drawn by said blower through said scoop, said duct being in registry with said blower so that the cool air is propelled through said duct in order to extract heat from the fire in the fireplace, said duct having an upwardly extending part in the other of said sides of the fireplace, an air outlet grill in other of said sides of said fireplace through which the heated air from said part of the duct is adapted to be propelled, and baffles on the part of said duct which is on the bottom of the fireplace in order to provide additional heat exchange means and to protect the duct.

2. The hearth heater of claim 1 wherein there is a second blower in the other of said cavities, an air inlet opening through said other side of the fireplace and in registry with the air inlet of said blower, a second duct operatively connected to said blower and located alongside of the first mentioned duct on the bottom of the fireplace, said second duct having an upwardly extending part, an air discharge grill at the end of said last mentioned part of the duct and opening through the last mentioned side of the fireplace.

3. The hearth heater of claim 2 wherein there are additional baffles offset with respect to the first mentioned baffles secured to the part of the second duct which is on the bottom of the fireplace.

4. In an open fireplace that has sides and a bottom, a hearth heater comprising a duct having a flat top wall and a flat bottom wall which is adapted to rest directly on the bottom of the fireplace, said duct extending from side to side of the fireplace and having an air inlet and an air outlet, a blower arranged to propel air through the inlet and outlet of said duct, and laterally extending baffles on the exterior of said duct, said baffles having lower edges coplanar with the flat bottom wall of said duct to stabilize the duct on the bottom of the fireplace.

5. The hearth heater of claim 4 wherein there are a number of internal heat conducting baffles in said duct.

6. In an open fireplace that has sides, a flat bottom and an open front, a hearth heater comprising a duct having a flat bottom wall which is adapted to rest directly on the flat bottom of the fireplace, said duct extending transversely across the fireplace from approximately one side thereof to approximately the other side thereof, a blower arranged in communication with said duct to propel air through said duct, a plurality of laterally extending baffles on the exterior of said duct and at approximately right angles thereto, said baffles having flat lower edges which are substantially coplanar with the flat bottom of said duct to stabilize the duct on the flat bottom of the fireplace, and said baffles being laterally spaced from each other and arranged approximately parallel to the sides of the fireplace in order to lend access to the space within said baffles from the front of the fireplace.

7. In an open fireplace that has sides, a flat bottom and an open front, a hearth heater comprising a duct having a bottom wall which is adapted to rest directly on the flat bottom of the fireplace, said duct extending transversely across the fireplace from approximately one side thereof to approximately the other side thereof, a blower arranged in communication with said duct to propel air through said duct, a plurality of laterally extending baffles on the exterior of said duct and at approximately right angles thereto, said baffles having lower edges which are substantially coplanar with the bottom of said duct to stabilize the duct on the flat bottom of the fireplace, and said baffles being laterally spaced from each other and arranged approximately parallel to the sides of the fireplace in order to lend access to the space within said baffles from the front of the fireplace.

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