

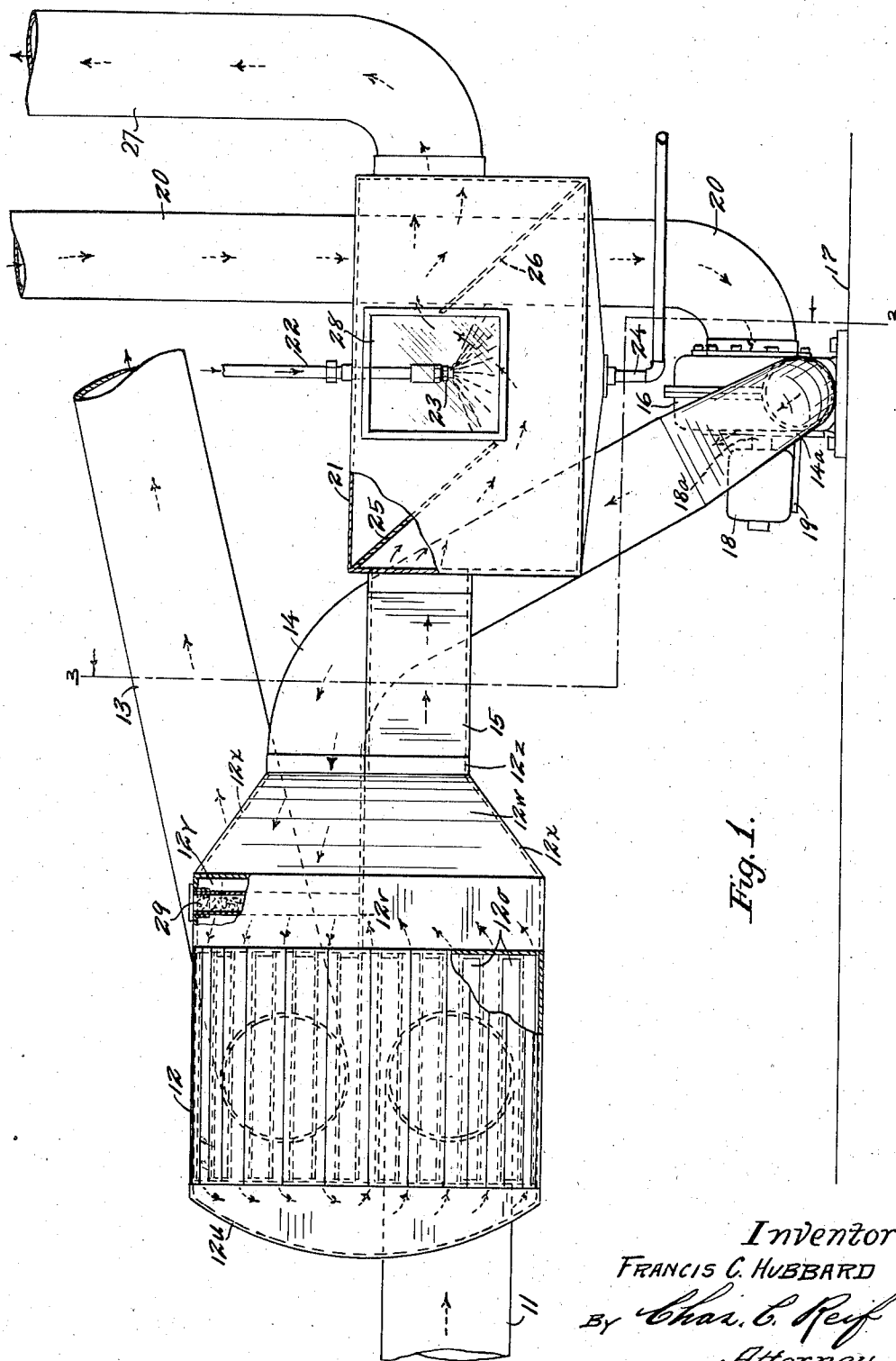
Jan. 10, 1939.

F. C. HUBBARD
HEAT SAVING DEVICE

2,143,269

Filed Jan. 5, 1935

3 Sheets-Sheet 1



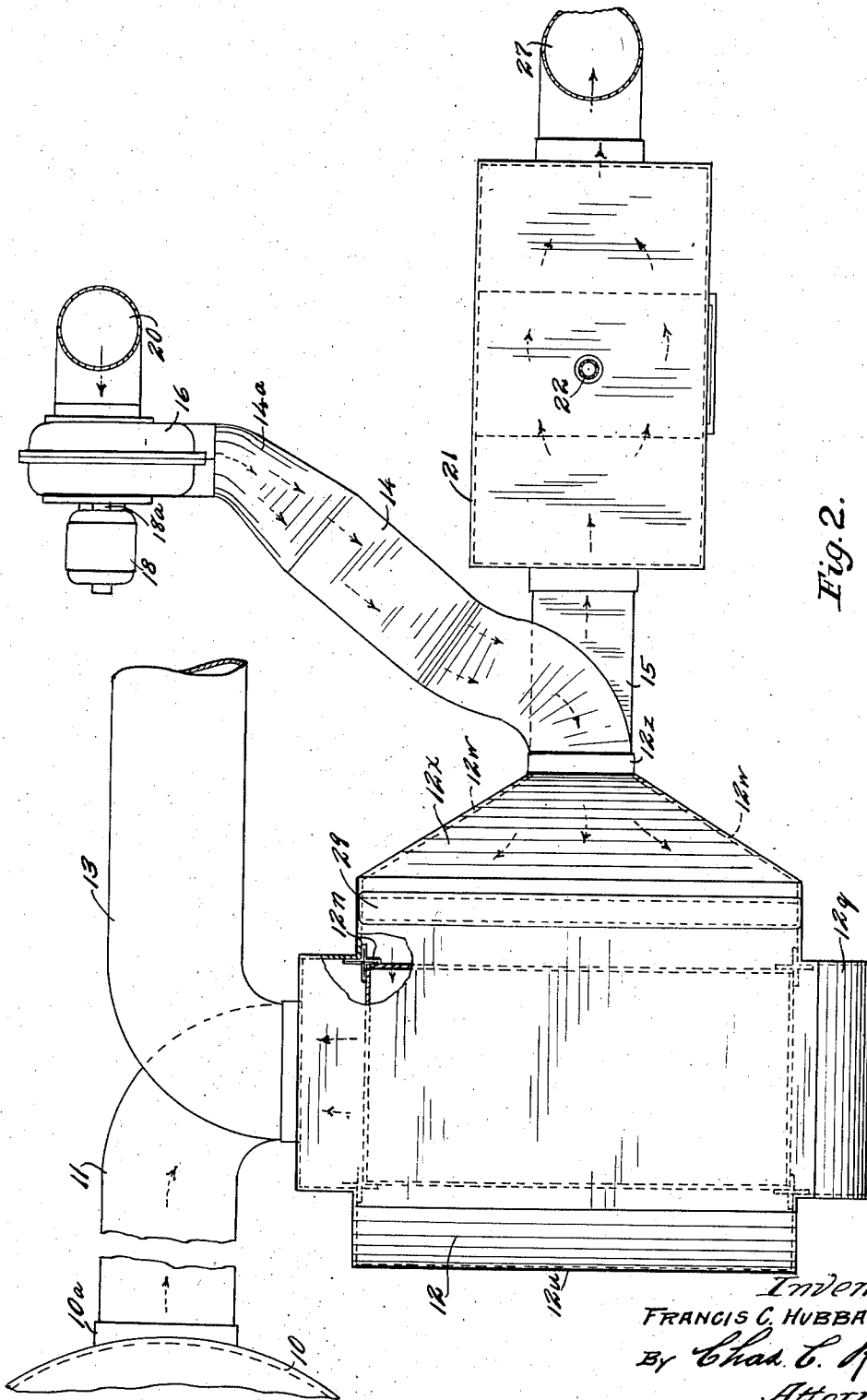
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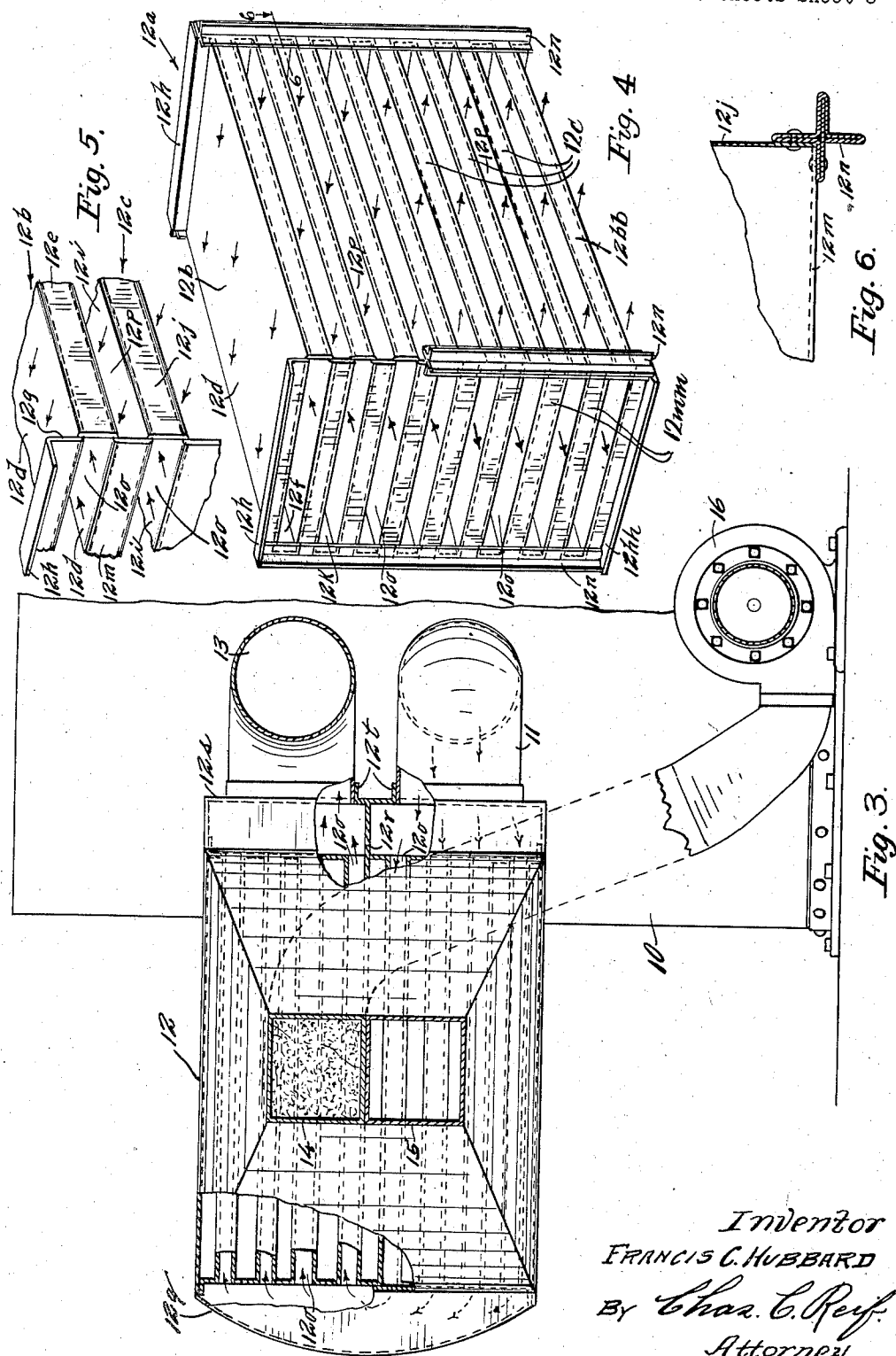
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UNITED STATES PATENT OFFICE

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HEAT SAVING DEVICE

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1 Claim. (Cl. 257—245)

This invention relates to a heat saver and humidifying device adapted to be used with a furnace and while the device has great utility when used with any kind of a furnace, it particularly is adapted for use with a furnace equipped with an oil burner. Many domestic oil burners are now installed in furnaces originally used for coal. In most of these cases, and in fact with most oil burners of all types, the temperature of the gases or products of combustion passing up the stack is unduly high and a great deal of heat is thus lost or wasted.

It is an object of this invention to provide a simple and efficient device which will utilize this wasted heat and which will at the same time function as a humidifier for the rooms to be heated.

It is a further object of the invention to provide a heat saving device comprising a casing having a series of spaced passages extending therethrough, the spaces between which form a second series of passages, the products of combustion from the furnace passing through one of said series of passages and the air to be heated passing through the other of said series of passages.

It is still another object of the invention to provide a heat saver comprising a casing having a series of spaced passages extending therethrough, the spaces between which form another series of spaced passages, a pair of conduits being connected to one side of said casing which communicate respectively with groups of said first series of passages so that the products of combustion from the furnace pass through said casing in one of said groups and return in another of said groups, air conduits being also connected to said casing which communicate respectively with groups of said second series of passages whereby said air passes through one group of said second series of passages and back through the other of said groups.

It is a further object of the invention to provide a heat saver such as set forth in the preceding paragraph in which a counterflow of the products of combustion is effected, the coldest air first engaging the walls of the passages heated by the coolest products of combustion and the hottest products of combustion first passing through the passages, the walls of which are engaged by the most highly heated air.

It is still another object of the invention to provide a heat saver of the type above set forth having a conduit leading to the rooms to be

heated with which cooperates a humidifying device disposed in said conduit.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings, in which like reference characters refer to similar parts throughout the several views and in which:—

Fig. 1 is a view in side elevation of the device, some parts being broken away and others shown in vertical section;

Fig. 2 is a top plan view of the device, certain parts being broken away and others shown in horizontal section;

Fig. 3 is a vertical section taken on line 3—3 of Fig. 1 as indicated by the arrows, certain parts being broken away and others shown in vertical section;

Fig. 4 is a perspective view showing the structure of the heating unit used;

Fig. 5 is a partial view showing the detailed construction, the same being shown on an enlarged scale; and

Fig. 6 is a partial vertical section taken on line 6—6 of Fig. 4 as indicated by the arrow.

Referring to the drawings, a portion 10 of a furnace casing is shown having a smoke connection 10a thereon. A smoke pipe 11 is connected to connection 10a, the products of combustion from the furnace passing therethrough into a casing 12 which is of general rectangular shape in vertical and horizontal cross section. Said casing has therein a unit 12a having a section 12b at its top and a section 12bb at its bottom between which are disposed a series of sections 12c. The section 12b has parallel flat rectangular plates 12d extending substantially the full extent of the casing, said plates being joined at one side by the integral vertical portion 12e extending at right angles thereto. The edge portion of one of the plates 12d opposite the side 12e is turned up at right angles to extend between plates 12d and along the sides thereof as shown at 12f. The ends of the top plate 12d of section 12b are bent upwardly at a right angle as shown at 12g and they have their edge portions 12h again bent at right angles to extend outwardly. The top section 12b has the portions 12g extending upwardly. The bottom section 12bb has the top and bottom plates and side plates extending therebetween similar to section 12b. The bottom plate of section 12bb, however, has its ends bent downwardly substantially at a right angle for a short distance and then bent outwardly for a short distance as shown at 12hh in

Fig. 4. The ends of the top plate of section 12bb are bent upwardly at a right angle to engage the end edges of the adjacent intermediate section now to be described as shown at 12mm. The sections 12c each comprise two flat horizontal portions or plates 12i of large rectangular extent connected at one side by the vertical portion 12j, the side of one of the plates 12i opposite portion 12j being bent at a right angle to lie parallel to plate 12j and extend between and along the side edges of plates 12i as shown at 12k. It will thus be seen that each of the sections 12b, 12bb and 12c form a tube with open ends and with the passage extending longitudinally therethrough. The end portions of the upper plate 12i are bent upwardly as shown at 12m to extend to and along the end edges of the lower plate 12d or the lower plate 12i of the next adjacent section 12c. The sections 12b, 12bb and 12c are arranged in spaced vertical relation and the vertical cross-shaped standards or irons 12n are disposed at the corners thereof, the vertical portions 12e, 12j and 12m being riveted to adjacent arms of standards 12n as shown in Fig. 6. It will be seen that the plates 12d and 12i are of general rectangular form considerably longer than they are wide and that the plates 12g and 12m are at the ends of the unit. With the described construction it will be seen that the unit 12a has series of passages 12o extending longitudinally therethrough and that these passages are vertically spaced. The spaces between the passage sections 12b, 12bb and 12c form another series of passages 12p which extend transversely through the unit 12a. The unit 12a is disposed in casing 12 and one end 12q of the casing is curved as shown in Fig. 3 so that there is a space between the end of the unit and said end of the casing. At the opposite end of the unit a partition 12r extends to the wall 12s of the casing, which wall is spaced some distance from the end of the unit and said wall has connections 12t in the form of cylindrical flanges projecting therefrom at each side of partition 12r. Partition 12r is disposed substantially midway of the top and bottom of casing 12 or so that there are about an equal number of passages 12o above and below the same. The conduit 11 is connected to the lower connection or flange 12t and as seen in Fig. 2 this conduit turns at a right angle adjacent the casing 12, the same extending from the furnace casing 10 to the casing 12. Another conduit 13 is connected to the upper connection or flange 12t and this conduit as seen in Fig. 2 also extends some distance from the casing 12 and then is bent at a right angle and extends in the opposite direction to conduit 11. Conduit 13 will be connected to a chimney (not shown). The casing 12 has one side wall 12u at one side of the unit 12a, curved as shown in Fig. 1 and disposed some distance from the side of said unit. At the opposite side of unit 12a a partition 12v extends to the side of casing 12, which side has a contracted portion formed by the inclined walls 12w and 12x extending from the rectangular portion of the casing. It will be seen that there is a chamber 12y rectangular in horizontal and vertical cross section between the unit 12a and the contracted portion of the casing. Partition 12v is disposed substantially midway vertically of casing 12 or so that there are about an equal number of passages 12p above and below the same.

Said contracted portion of the casing has a flange 12z of rectangular form in cross section extending therefrom and a conduit 14 illustrated

as of rectangular form in cross section is connected to flange 12z above partition 12v. Another conduit 15 also shown as of rectangular form in cross section is connected to flange 12z below partition 12v. Conduit 14 is illustrated as extending downwardly and laterally and has a portion 14a merging into a cylindrical end which is connected with the outlet side of a fan disposed in a fan casing 16 illustrated as mounted on the floor or other supporting surface 17. The fan in casing 16 is driven by a motor 18 illustrated as supported upon a shelf 19 projecting from casing 16, the armature or driving shaft 18a of said motor being connected to the fan in casing 16. Another conduit 20 is connected to the intake side of the fan or casing 16 and this conduit will extend to the register in the floor of the room to be heated.

The conduit 15 extends to and is connected to one side of a casing 21 substantially rectangular in horizontal and vertical cross section. Said casing 21 has extending into the top thereof and substantially centrally of said top a water supply pipe 22, said pipe having connected to its end within casing 21 a spray nozzle 23. Nozzle 23 is constructed and arranged to project a very finely divided spray of water downwardly and outwardly in casing 21. The bottom of casing 21 is shown as slightly inclined and converging toward its center and a drain pipe 24 is connected to said bottom and communicates with the interior thereof, which drain pipe will extend to some suitable point, as to a sink or sewer. Casing 21 has a baffle plate 25 extending from one upper corner at the side to which conduit 15 is connected downwardly and inwardly of said casing or away from conduit 15. Baffle plate 25 thus extends substantially across the end of conduit 15. Casing 21 has another baffle plate 26 extending from a corner diagonally opposite to that from which baffle plate 25 extends, said plate 26 extending upwardly and inwardly to a point some distance above nozzle 23. It will be seen that baffle plate 25 extends some distance below the nozzle 23. A conduit 27 is connected to casing 21 at the end opposite that to which conduit 15 is connected and conduit 27 is substantially aligned horizontally with conduit 15. Conduit 27 will extend to the rooms to be heated and will discharge heated and humidified air into said rooms preferably at a point some distance above the floor thereof. Casing 21 is shown as provided with a transparent section or window 28. Casing 12 has disposed therein in chamber 12y above partition 12v an air filter 29.

In operation, water will be sprayed from nozzle 23 in the casing 21. While this water can be controlled in various ways, it preferably will be controlled by a humidostat disposed in the room to be heated. In practice it has been found feasible to properly regulate the spray and then to have it run continuously. The products of combustion from the furnace which are at high temperature will pass from the furnace through conduit 11 and into casing 10 below partition 12r. These products or hot gases will pass through passages 12o which are below partition 12r, to the opposite end of casing 12 and will be deflected by the curved wall 12q and will return or pass in the opposite direction through the passages 12o above partition 12r. Said gases will then pass into conduit 13 and to the chimney. The walls of passages 12o will be heated by the passage of these hot gases. Motor 18 will be driven, driving the fan in casing 16 so that air will be drawn from

the rooms to be heated through conduit 20. This air will be fairly cold and as stated will preferably be taken from the floor of the said room or rooms. This air is discharged by said fan into conduit 14 and passes from said conduit into the contracted portion of casing 10 and into the chamber 12y. This air then passes through the filter 29 where any dust and dirt is removed therefrom. Said filter can also be constructed and arranged to remove any organic substances or bacteria from the air. After passing through filter 29 the air passes through the passages 12p of unit 12a above partition 12v and is then deflected by the curved wall 12u and returns or passes in the opposite direction through the passages 12p below partition 12v and hence into conduit 15. The air passes from conduit 15 into chamber 21 and is deflected downwardly as indicated by the arrows by a baffle plate 25. The air then passes through the spray from nozzle 23 and must pass upwardly through this spray around baffle plate 26. Said air then passes into conduit 27 and is delivered in heated and humidified condition to the rooms to be heated.

From the above description it is seen that applicant has provided a very simple and yet very efficient apparatus for utilizing the waste heat from the furnace and for using this heat to deliver heated air to the rooms. The air is also properly humidified before being delivered to the rooms. The rooms will thus be heated not only by the radiators or registers connected directly to the furnace, but will have properly heated and treated air delivered thereto. In practice the fan 16 is started some time after the oil burner for the furnace is started. Air is thus circulated through the rooms and the rooms are quickly brought to the desired temperature. As is well known to those skilled in the art, the oil burner

is controlled by a thermostat in the rooms to be heated so that when the temperature reaches the desired point the oil burner is shut off and ceases to operate. The present device as stated brings the temperature of the rooms up quickly and a great saving in fuel is effected. Not only is a great saving in fuel effected and a desirable circulation of air obtained in the rooms, but the air is properly treated and humidified. The device is of simple construction, easily made and installed and requires practically no attention for maintenance. The same has been amply demonstrated in actual practice and found to be very successful and efficient.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which generally stated, consists in a device capable of carrying out the objects above set forth in the parts and combinations of parts disclosed and defined in the appended claim.

What is claimed is:—

A member for a composite unit of a heat saving device having superposed passages extending therethrough in opposite directions comprising a sheet metal plate bent to have parallel horizontal portions rectangular in plan and integrally connected at one side by a narrow portion extending perpendicular thereto, one of said portions having a narrow rectangular part bent downwardly at the opposite side and extending to the other portion thus forming in effect a tube, the upper of said portions having narrow rectangular parts bent upwardly at right angles at the ends thereof whereby a plurality of said members may be superposed to form said unit.

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