Feb. 20, 1940. C. LENGYEL 2,191,349

HOT AIR FURNACE ATTACHMENT

Filed Sept. 7, 1938

Fig. 1.

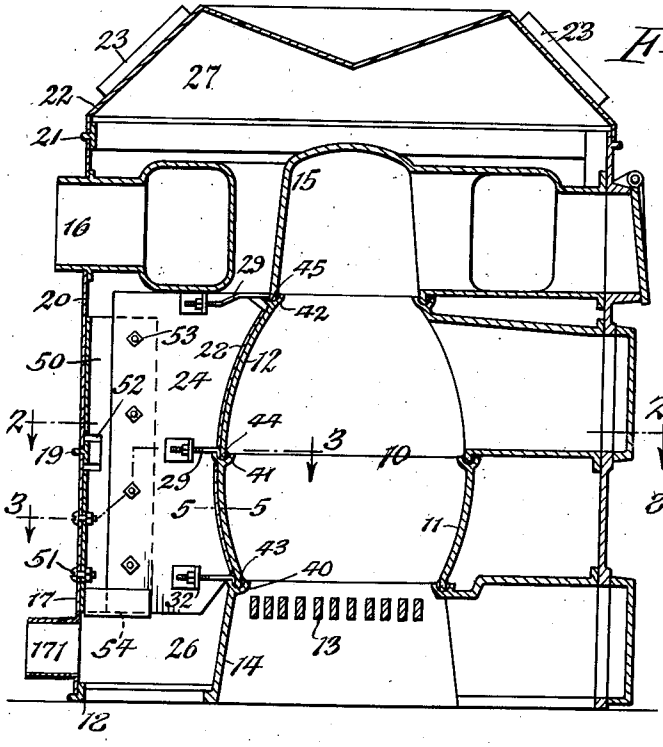


Fig. 2.

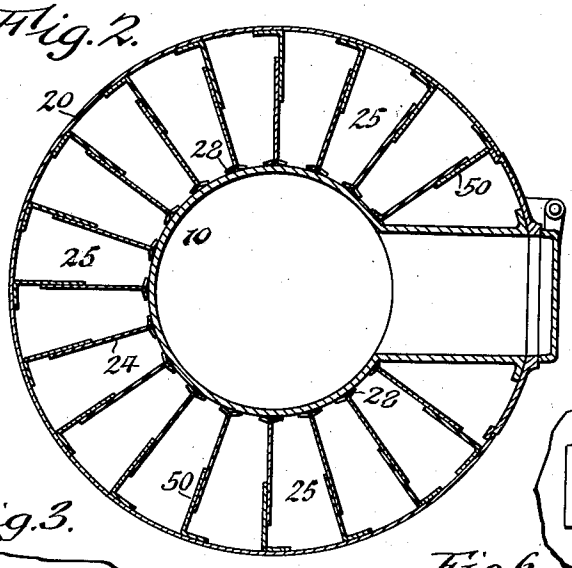


Fig. 3.

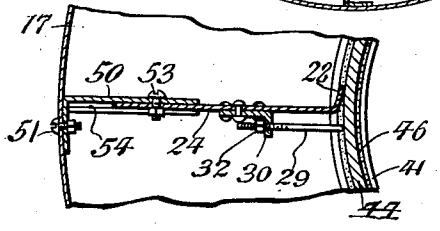


Fig. 9.

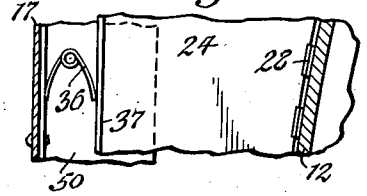


Fig. 7.

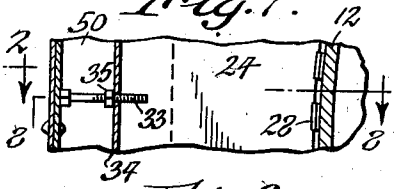


Fig. 8.

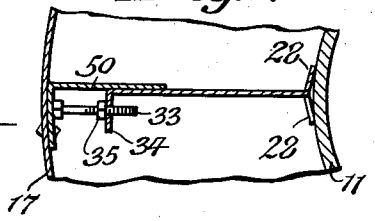


Fig. 5.

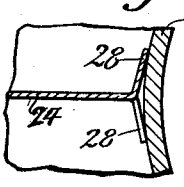


Fig. 4.

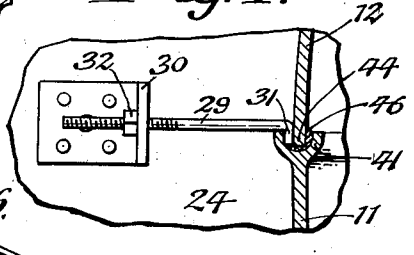
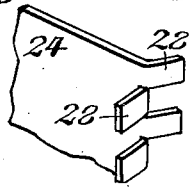


Fig. 6.



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HOT AIR FURNACE ATTACHMENT

Carl Lengyel, Buffalo, N. Y.

Application September 7, 1938, Serial No. 228,810

6 Claims. (Cl. 126—118)

This invention relates to a hot air furnace and more particularly to means whereby a greater amount of the heat produced by the burning of fuel in the heating chamber is transferred to the air which is conducted to the building to be heated.

The principal object of this invention is to provide an attachment for hot air furnaces whereby a greater amount of heat is transferred from the burning fuel in the heating chamber to the air which passes from the air chamber to the rooms to be heated and which is so organized that the same can be conveniently applied to furnaces already installed and in use although the same can also be embodied advantageously in new furnaces.

Another object of this invention is to provide heat radiating means of this character which can be readily applied to furnaces having air spaces of different widths and thus avoid the expense of making radiating means to fit furnaces which vary in size.

A further object of this invention is to provide a heat radiating or transferring attachment for furnaces which is of simple construction and capable of being easily installed by unskilled workmen and which transfers a greater amount of heat from the burning fuel to the air, thus effecting a corresponding saving in the cost for heating rooms.

In the accompanying drawing:

Fig. 1 is a vertical section of a hot air furnace equipped with these improvements.

Fig. 2 is a horizontal section taken on line 2—2, Fig. 1.

Fig. 3 is a fragmentary horizontal section, on an enlarged scale, taken on line 3—3, Fig. 1.

Fig. 4 is a fragmentary vertical section, on an enlarged scale, showing one form of means for drawing a radiating fin against the exterior of the heating chamber.

Fig. 5 is a fragmentary horizontal section, on an enlarged scale, taken on line 5—5, Fig. 1.

Fig. 6 is a fragmentary perspective view of one of the radiating fins.

Fig. 7 is a fragmentary vertical section showing a modified form of means for moving a radiating fin toward the wall of the heating chamber by means of a pushing action.

Fig. 8 is a horizontal section taken on line 8—8, Fig. 7.

Fig. 9 is a fragmentary vertical section showing spring means for pushing a radiating fin against the heating chamber of the furnace.

In the following description like reference characters denote corresponding parts in the several figures of the drawing.

Although this invention is applicable to hot air furnaces of various forms, that shown in the drawing as a satisfactory example for utilizing this invention is constructed as follows:

The numeral 10 represents the tubular heating chamber of the furnace in which the fuel is burned and which in this case comprises a lower section or fire pot 11 and a combustion space or upper section 12 mounted on the lower section. Any suitable fuel may be burned in the heating chamber such as coal, wood, gas or oil, but the drawing shows the furnace organized for burning coal and the like which is supported on a grate 13 which is arranged adjacent to the lower end of the heating chamber and mounted on an ash pit 14 which supports the lower section of the heating chamber. From the upper end of the heating chamber the hot gases and products of combustion resulting from the burning fuel pass into a radiator 15 mounted on the upper section of the heating chamber and thence through the outlet 16 thereof to the chimney of the building to the atmosphere.

Although a gas tight connection may be obtained between the several opposing surfaces of the ash pit, heating chamber sections and the radiator, it is preferable to employ the means for this purpose which are now in common use and which consist of annular upwardly opening grooves or furrows 40, 41, 42 formed respectively in upper edges of the ash pit and the heating chamber sections, providing the lower edges of the lower and upper heating chamber sections and the radiator with downwardly projecting tongues 43, 44, 45 which engage respectively with the grooves 40, 41, 42 and sealing the joints between these grooves and tenons by means of cement 46, as shown in Figs. 1 and 4.

Surrounding the ash pit, heating chamber and radiator is an enclosing casing preferably constructed of sheet metal which forms between this casing and the ash pit, heating chamber and radiator, a hot air chamber through which air passes from its lower end to the top thereof and then is discharged to the desired place. This casing may be of any suitable construction but that shown in the drawing is of the usual form and comprises a lower section 17 resting on the base retaining ring 18 of the furnace and having an air inlet 171, an intermediate retaining ring 19 resting on the lower casing sections, an upper casing section 20 resting on the intermediate retaining ring 19, an upper retaining ring 21 rest-

ing on the upper edge of the upper casing section 20, and a top 22 arranged above the radiator 15 and resting at its lower edge on the upper retaining ring 21 and provided with hot air delivery pipes 23 leading to the rooms to be heated.

The means embodying this invention for increasing the heat transference from the heating chamber to the air in the air chamber are constructed as follows:

The numeral 24 represents a plurality of upright radiating fins, preferably made of sheet metal, arranged in an annular row around the heating chamber 10 so that each fin is arranged radially or substantially radially relative to the vertical axis of the furnace. These fins are preferably of such height that they extend from a position adjacent to the top of the ash pit to a position adjacent to the underside of the radiator and the same are of such width that the same extend from the heating chamber close to the outer casing, thereby forming a plurality of upright flues 25 through which the air to be heated flows upwardly and is divided into a plurality of streams, a lower annular channel 26 which receives the air below the fins and distributes the same among the several flues 25 and an upper dome 27 which receives the air from the upper ends of the several flues and conducts the same to the delivery pipes 23.

The several radiating fins engage their inner ends with the exterior of the walls of the lower and upper sections of the heating chamber so that the same become heated by fire inside of the heating chamber and as the air passes upwardly through the flues 25 in contact with the fins this heat is transferred from the latter to the air preparatory to delivering the same to the rooms to be heated.

For the purpose of obtaining an intimate contact between the radiating fins and the exterior of the wall of the heating chamber and thus secure the maximum transference of heat, the inner edge of each fin is provided with a plurality of contact wings 28 which are preferably arranged in two rows projecting laterally in opposite directions from the inner edge of the respective fin and engaging with the adjacent part of the external surface of the heating chamber. The wings are preferably formed by providing the inner edge of the sheet metal fin with a plurality of horizontal slits and bending the metal between successive pairs of slits alternately in opposite directions, as shown in Fig. 6. Due to the resilience of the sheet metal fins the wings thereof when moved inwardly into engagement with the heating chamber wall, as shown in Fig. 5, will bear yieldingly against the latter and adapt the wings thereto so as to produce a firm metallic contact with the heating chamber wall and the wings and thus insure a maximum heat transference to the air passing through the air flues.

Various means may be employed for moving each of the fins toward the heating chamber those shown in Figs. 1, 3 and 4 consisting of a plurality of hook bolts each of which has a radial body 29 passing through a bracket 30 on the inner part of the respective fin, a hook 31 at its inner end engaging with the adjacent part of one of the joint sealing grooves 40, 41 or 42, and a screw nut 32 working on the threaded outer part of the bolt body 29 and engaging with the outer side of the bracket 30. Upon tightening the units 32 of the several hook bolts the fins will be moved inwardly and their contact wings firmly engaged with the heating chamber wall and thereby cause the heat to be effectively transferred from this wall to the fins which latter in turn transmit the heat to the air moving upwardly in contact therewith.

The means just described for moving the fins inwardly toward the heating chamber operate by a drawing action and are well suited for use in furnaces having comparatively wide air chambers which permit of an installation of this character. When however the air chamber is comparatively narrow and only a limited amount of space is available for installing narrower fins it is preferable to employ fin moving means which operate by a pushing action.

In Figs. 7 and 8 a fin moving device of the last mentioned character is shown and consists of a bush bolt 33 passing with its threaded inner end through a bracket 34 on the fin and bearing with the head at its outer end against the inner side of an abutment forming part of the casing, and a thrust screw nut 35 working on the thread of the bolt 33 and engaging the outer side of the bracket 34. Upon unscrewing the nut 35 from the bolt 33, the fin will be pushed inwardly and its contact wings engaged with the exterior of the heating chamber wall.

Instead of using means for moving the fins positively toward the heating chamber wall such as those shown in Figs. 1, 3, 4, 6 and 7, means may be employed which exert a yielding pressure against the fins for producing contact between the same and the heating chamber wall, such for example, as the wishbone spring 36 which has its arms engaging respectively with a shoulder or flange 37 on the outer edge of the respective fin 24 and an abutment formed by a part of the enclosing casing, as shown in Fig. 9. In this organization the spring exerts a constant inward pressure on the fin for maintaining contact between the same and the heating chamber wall. The use of a spring for this purpose permits of some variation of the width of the fins, the same can be installed quickly and conveniently and the same automatically takes up any slack or expansion which might occur during the installation or operation of the furnace.

In order to avoid the necessity of making the fins of an exact width to fit the width of the air space between the heating chamber and the enclosing casing and separate the air flues effectively from one another and also supporting the fins at their outer edges, the following means are provided.

The numeral 50 represents a plurality of upright supporting bars which are of L-shaped form in cross section and each mounted on the inner side of the enclosing casing and overlapping the adjacent outer part of one of the fins so as to practically form a continuous web from the heating chamber to the enclosing casing. Each of these supporting bars is secured at its lower end to the inner side of the lower casing section 17 by bolts 51 or otherwise but not connected with the upper section 20 of the case and its central part is provided with a notch 52 which receives the adjacent part of the intermediate retaining ring 19, as shown in Fig. 1. By means of this construction it is possible to install the several parts of this heat transferring means on a furnace already in use by merely removing the upper casing section 20 in order to gain access to the interior of the air chamber 25 and then restoring this enclosing casing section after the work is completed without disturbing any other parts of the furnace.

Each of the supporting bars is preferably con-

nected with the companion fin by one or more bolts 53, as shown in Figs. 1 and 3.

For this purpose of enabling the fin and its supporting bar to slide on each other in a direction radially of the axis of the furnace preparatory to holding these members tightly together, the lower end of each supporting bar 50 has its lower edge portion folded upwardly to form a guide groove 54 which is slidably engaged by the lower edge of the respective fin, as shown in Figs. 1 and 3. The bolts 53 are applied to the members 24 and 50 by piercing openings in corresponding parts thereof and inserting these bolts in said openings, such piercing being readily effected by a pointed tool inasmuch as the members 24 and 50 are made of sheet metal.

It will be noted that in this invention each fin comprises an inner section which is attached to the heating chamber of the furnace and an outer section which is attached to the enclosing casing, which sections overlap each other and therefore permit of adjusting the width of each fin to suit the varying widths of the air chambers of different furnaces without requiring any change in construction.

Moreover this improvement can be readily applied to hot air furnaces which are already installed and in use without requiring dismantling of any of the hot air conduits or other main members of the furnace, the addition of this invention to furnaces already installed being, conveniently effected by attaching one pair at a time of the sections constituting a fin.

As a whole these heat transfer means are comparatively simple in construction, the same can be easily and conveniently installed and the same permit of recovering a substantial amount of the heat which otherwise would be lost and enables fuel to be used more advantageously and economically.

I claim as my invention:

1. A hot air furnace comprising a heating chamber, a casing enclosing said heating chamber and forming an air chamber therebetween, a plurality of upright radiating fins arranged in said air chamber and engaging their inner edges with the exterior of said heating chamber, a plurality of upright supporting bars secured to the inner side of said casing and each bar overlapping one of said fins, and means for guiding each radiating fin on the respective supporting bar preparatory to connecting each fin with its bar.

2. A hot air furnace comprising a heating chamber, a casing enclosing said heating chamber and forming an air chamber therebetween, a plurality of upright radiating fins arranged in said air chamber and engaging their inner edges with the exterior of said heating chamber, a plurality of upright supporting bars secured to the inner side of said casing and each bar overlapping one of said fins, and means interposed between each radiating fin and the respective supporting bar for pushing the fin against said heating chamber.

3. A hot air furnace comprising a heating chamber, a casing enclosing said heating chamber and forming an air chamber therebetween, a plurality of upright radiating fins arranged in said air chamber and engaging their inner edges with the exterior of said heating chamber, a plurality of upright supporting bars secured to the inner side of said casing and each bar overlapping one of said fins, and means interposed between each radiating fin and the respective supporting bar for pushing the fin against said heating chamber including a bolt bearing against said bar and a nut on said bolt bearing against said fin.

4. A hot air furnace comprising a heating chamber, a casing enclosing said heating chamber and forming an air chamber therebetween, a plurality of upright radiating fins arranged in said air chamber and engaging their inner edges with the exterior of said heating chamber, a plurality of upright supporting bars secured to the inner side of said casing and each bar overlapping one of said fins, and spring means interposed between each fin and the casing and operating to constantly press the respective fin against said heating chamber.

5. A hot air furnace comprising a heating chamber, a casing enclosing said heating chamber and forming an air chamber therebetween and including upper and lower sections and a retaining ring between the opposing edges of said sections, a plurality of radiating fins arranged in said air chamber and engaging said heating chamber, and a plurality of supporting bars overlapping said fins and each bar having only its lower part connected with the inner side of said lower casing section while its upper part is disconnected from said upper casing section and the central part of said bar being provided with a notch which receives said retaining ring.

6. A hot air furnace comprising a heating chamber, a casing enclosing the heating chamber and forming an air chamber therebetween, and means for radiating heat from the heating chamber to the air in said air chamber including a plurality of radiating fins each of which has an inner section secured to the outer side of the heating chamber and an outer section secured to the inner side of the enclosing casing and said fin sections having opposing edges which overlap and are adapted to be adjusted radially one relative to the other and subsequently connected with each other.

CARL LENGYEL.