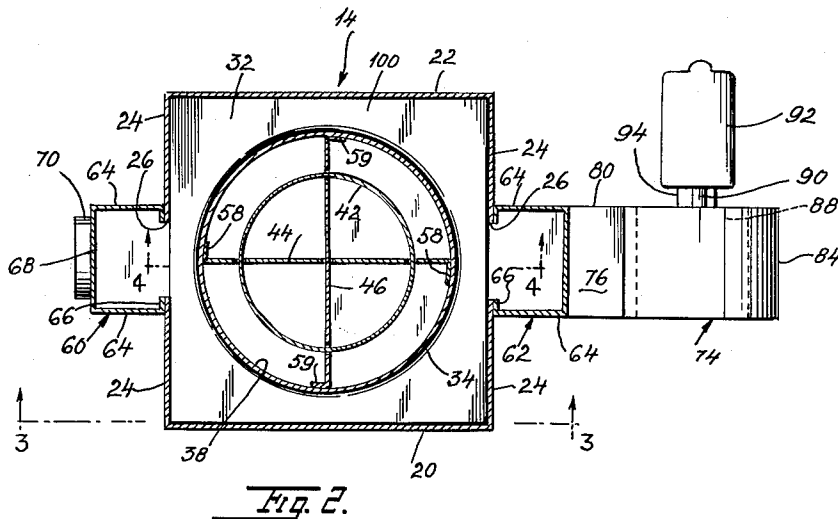
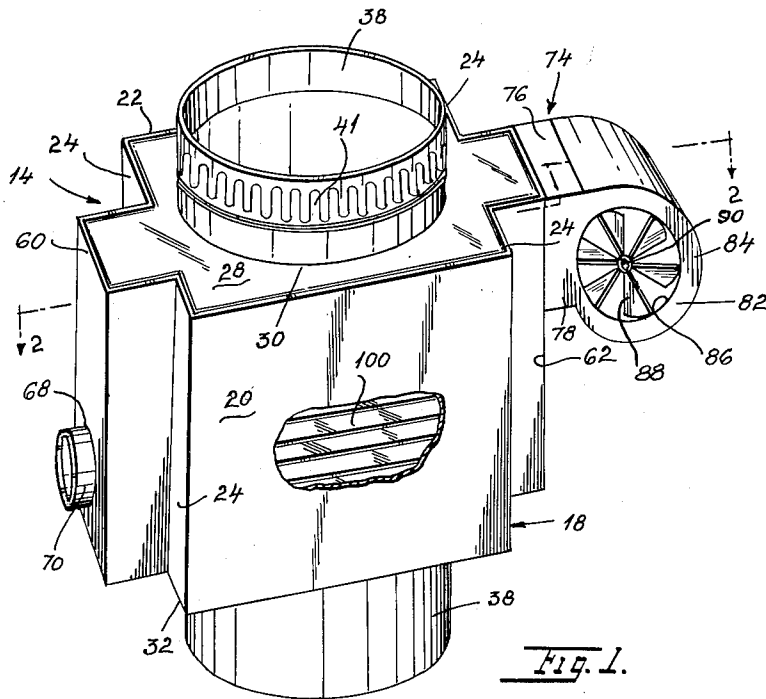


R. S. FUNK
 DEVICE TO UTILIZE HEAT FROM BOILER FLUE
 TO HEAT ADDITIONAL SPACES IN HOME

4 Sheets-Sheet 1



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TO HEAT ADDITIONAL SPACES IN HOME

3,124,197

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4 Sheets-Sheet 3

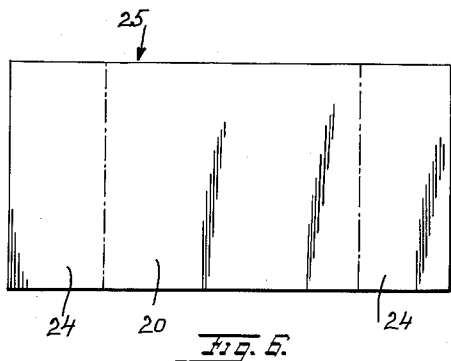


Fig. 6.

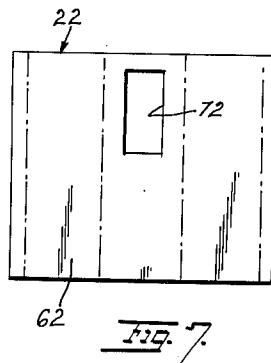


Fig. 7.

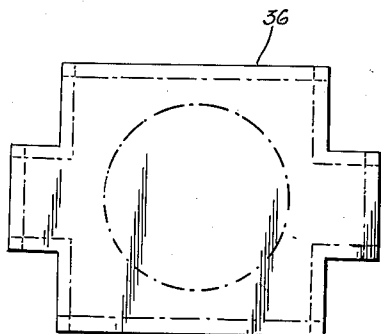


Fig. 8.

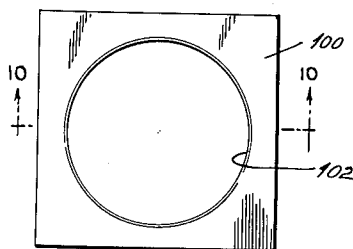


Fig. 9.

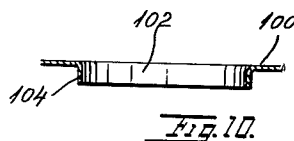


Fig. 10.

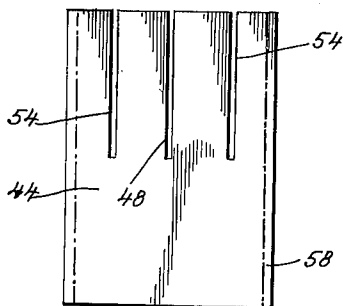


Fig. 11.

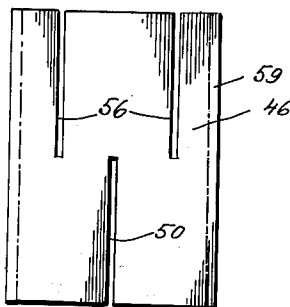


Fig. 12.

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4 Sheets-Sheet 4

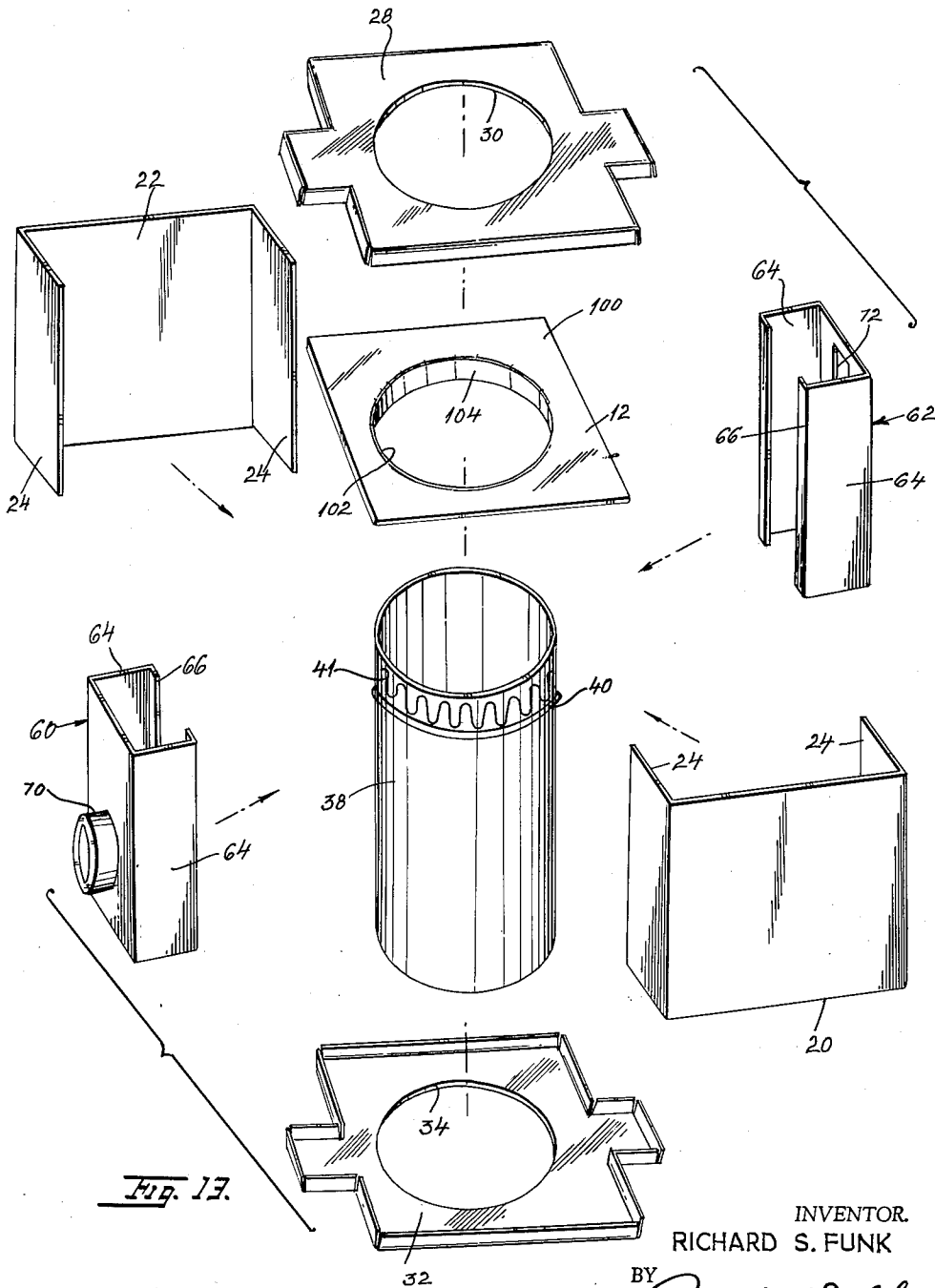


Fig. 13.

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DEVICE TO UTILIZE HEAT FROM BOILER FLUE TO HEAT ADDITIONAL SPACES IN HOME

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2 Claims. (Cl. 165—122)

This invention relates generally to a heat-saving device, and more particularly to auxiliary heat economizers and the like.

A primary object of the present invention is to provide a novel and improved device which may be attached to or used in connection with a furnace or the like for extracting heat from the hot gases on the way to the chimney for use as desired.

Another object of the invention is to provide a novel and improved device which may be installed in the smoke stack of a heating system, so as to allow the hot chimney gases from a furnace to flow through the main casing of the device, while clean fresh air to be warmed is piped through the interior of the main casing by means of interior ducts, thus extracting heat from the hot gases to warm the clean air, the heated air being moved through its own ducts by means of an inducer fan or blower.

Still another object of the invention is to provide a novel and improved furnace accessory, which employs waste heat extracted from the flue gases, to heat a separate stream of clean air, which is piped either into the basement, or to one or more rooms or parts of a building, or a garage or the like enclosure, to heat the same, supplementing the usual heat from radiators supplied by the regular heating system of the building, while not adding to the heating burden normally loading the furnace.

Further objects of the invention are to provide a novel and improved heat economizer of the character described which is simple in design, inexpensive to manufacture, is readily installed on most smoke pipes for its intended use, and which is efficient and economical in reclamation of waste heat.

For a better understanding of the invention and of the objects and advantages thereof, reference will be had to the following description taken with the accompanying drawings and to the appended claims, in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a perspective view of an auxiliary heater device or heat economizer embodying my invention.

FIG. 2 is a transverse cross-sectional view of the heater device taken on the line 2—2 of FIG. 1.

FIG. 3 is a vertical sectional view of the device taken on the line 3—3 of FIG. 2.

FIG. 4 is a fragmentary or vertical sectional view taken generally on the line 4—4 of FIG. 2.

FIG. 5 is a spread perspective view of the inner sleeve and associated radial baffles.

FIG. 6 is a plan view of the blank from which the vertical wall sections of the casing are formed.

FIG. 7 is a plan view of the blank from which the air ducts are formed, the slot already being made therein.

FIG. 8 is a top plan view of the blank from which the upper and lower end walls of the casing are formed.

FIG. 9 is a plan view of a baffle plate.

FIG. 10 is a cross-sectional view of the baffle plate taken on the line 10—10 of FIG. 9.

FIG. 11 is a plan view of a blank of one of the radial baffle plates.

FIG. 12 is a plan view of the blank of the other radial baffle plate.

FIG. 13 is a spread or explosive perspective view of the flue, outer casing and associated parts.

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Referring in detail to the drawings and particularly to FIG. 1, herein there is shown a smoke pipe 10 extending from the furnace or boiler and heading toward the chimney (not shown) in an ordinary installation. As the hot gases are flowing from the furnace to the chimney at a temperature in the vicinity of about 750° Fahrenheit, or thereabouts, the present device indicated generally at 14 is interposed as at a break 16, FIG. 3, in the smoke pipe or flue, for abstracting a large part of this waste heat from the gases.

In order to accomplish this, the device 14 is provided with a hollow sheet metal casing or housing 18 formed, as viewed in FIG. 1, with a front wall 20, a rear wall 22, and spaced side wall sections 24, 24, forming a slot 26 between the inner ends of the side wall sections. Each of the walls and side sections 24 are formed from a blank 25 shown in FIG. 6. The top of the casing or housing 18 is closed by a flanged closure plate 28 having a central opening 30 and the bottom is similarly closed by a flanged closure plate 32 formed with a central opening 34 in axial alignment with opening 30 in the top plate. Each of the closure plates 28 and 30 is formed from a blank 36 shown in FIG. 8. The flanges of the closure plates are welded to the edges of the associated walls and side wall sections.

A central pipe section 38 is inserted through the aligned openings in the top and bottom closure plates and extends above and below said plates, respectively, for attachment to the ends of the break 16 in the smoke pipe 10. One end of the pipe, the top end as viewed in FIG. 1, is formed with an annular bead 40 and the surface outwardly of this bead is corrugated as indicated at 41, as common in stove pipes.

Another pipe or sleeve 42 of smaller diameter is positioned inside of pipe 38 and concentrically therewith and spaced therefrom. A pair of elongated rectangular-shaped baffle plates 44 and 46 is mounted inside the sleeve 42 in interlocking relation with each other and with the sleeve 42. This interlock includes a central narrow slot 48 in plate 44 in the upper half of the plate at its center, intersecting the top edge of the plate, and a similar central narrow slot 50 in plate 46 in the bottom half thereof, the edge walls of the slots interlocking with the solid portions of the plates as seen in FIG. 5. Elongated narrow slots 52 are formed in the bottom half of the sleeve 42 in spaced relation and intersecting the bottom edge of the sleeve 42, the edge walls of which slots interlock with the edge walls of slots 54 formed in the upper half of plate 44 and intersecting the top edge thereof and with the edge walls of slots 56 in the upper half of plate 46 and intersecting the top edge thereof. This interlock is best seen in FIG. 4. The long edges of the baffle plates 44 and 46 are bent forming flanges 58 and 59 respectively, which flanges are welded or the like to the inner surface of pipe 38, as best seen in FIG. 2. The interspacing of the inner sleeve and the baffle plates are so chosen as to provide minimal air stream interference in regard to the moving hot gases of the furnace output, yet permitting optimum abstraction of heat from the hot gases by means of the sleeve, pipe and baffle plates.

Channel-shaped air ducts or headers 60 and 62 close the spaces or slots 26 between the adjacent inner end edges of the side wall sections 24. A blank 27 from which duct 62 is formed is shown in FIG. 7. The upper ends of the ducts are closed by the top wall 28, and their bottom ends by the bottom wall 32. Leg portions 64 of the ducts are formed with intumed flanges 66, FIGS. 2 and 13, which are welded to the outer surface of the side wall sections 24. A circular opening 68 is formed in the bight portion of the air duct 60 around which the opening is formed with an exterior collar 70 for attachment to an air distributing conduit or the like, whereby the opening 68 functions as an outlet.

A rectangular-shaped opening 72 is formed in the other air duct 62 adjacent the top thereof and functions as an inlet. The opening 72 is closed by a hollow fan housing 74 which is substantially rectangular in configuration having top and bottom walls 76 and 78, respectively, side walls 80 and 82. One end wall 84 is rounded or curved and the other end is open and communicating with the opening 72, the end edges of the top, bottom and side walls being welded to the bight portion of the air duct 62 around the slot 72. A circular opening 86 is formed in side walls 82 for ingress of air. An impeller fan 88 is suitably mounted in the housing 74 and is operated by the drive shaft 90 of a motor mounted on a bracket 94 fixed to the side of the housing 74.

In order to aid in extracting hot temperatures from the flue gases, I mount a number of fins or vanes 100 on the outside surface of the pipe 38 inside the casing 20. Each fin 100, as seen in FIGS. 9 and 10, has a square-shaped thin body of metal with a central opening 102 and with a downwardly-extending annular flange 104 around the opening. The flanges are preferably welded to the pipe 38 and extend to the inner surfaces of the walls and wall sections.

In practical use of the device, as the smoke passes through the smoke pipe 10, it is required to pass through the inner sleeve 42 and baffle plates 44 and 46 before it can reach the chimney. In doing this, the smoke and other products of combustion that pass through the smoke pipe are decelerated, causing a turbulence and requiring the smoke and other hot products of combustion to surrender some of their heat to the inner sleeve 42 and the baffle plates 44 and 46 and also to the pipe 38. The inner sleeve 42 and the baffle plates are responsible for this turbulent condition of the gases. The heat from the baffle plates is also carried by conduction to the pipe 38. As a result, the air in the casing or housing 18 around the fins 100 become heated up a considerable degree and this heat is absorbed by the fins 100.

During this operation, when the blower fan 88 is operated by the motor 92, the ambient air is drawn into the air inlet 86 shown in FIG. 1 and is then blown through the fan housing 74, through the slot 72 in air duct or header 62, through and over and around the top heat absorbing fins 100 and then for the next indefinite number of fins the air is required to assume a tortuous path in the direction of the arrows in FIG. 3 around the housing and fins. The air in the casing or housing 18 is thus superheated and this superheated air is discharged through the outlet opening 68 in duct 60 and carried by any suitable conduit attached to collar 70 to a space desired to be heated.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and that various changes and modifications may

be made within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:

1. A heat saver comprising a pipe, a hollow casing enveloping said pipe, the ends of the pipe extending outwardly of the casing for connection to the ends of a break in a smoke pipe to receive hot flue gases therefrom to flow through said pipe, said casing having an air inlet at one side at the top thereof, said casing having an air outlet at the other side at the bottom thereof, a sleeve concentrically positioned in spaced relation inside the pipe, said sleeve having spaced elongated slots intersecting one end edge thereof, elongated baffle plates inside said sleeve, said baffle plates having spaced elongated slots intersecting one end edge thereof, the slots in the sleeve interlocked with solid portions of the baffle plates, the slots in the baffle plates interlocked with solid portions of the sleeve, the outer ends of the baffle plates being fastened to the pipe, and a blower operative to propel ambient air through said inlet, casing and outlet.

2. A heat saver comprising a pipe, a hollow casing enveloping said pipe, the ends of the pipe extending outwardly of the casing for connection to the ends of a break in a smoke pipe to receive hot flue gases therefrom to flow through said pipe, said casing having an air inlet at one side at the top thereof, said casing having an air outlet at the other side at the bottom thereof, a sleeve concentrically positioned in spaced relation inside the pipe, said sleeve having spaced elongated slots intersecting one end edge thereof, elongated baffle plates inside said sleeve, said baffle plates having spaced elongated slots intersecting one end edge thereof, the slots in the sleeve interlocked with solid portions of the baffle plates, the slots in the baffle plates interlocked with solid portions of the sleeve, the ends of the baffle plates being fastened to the pipe, a series of plates constituting heat abstracting fins disposed in spaced relation around the pipe, and a blower operative to propel ambient air through said inlet, fins and outlet.

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