

May 13, 1941.

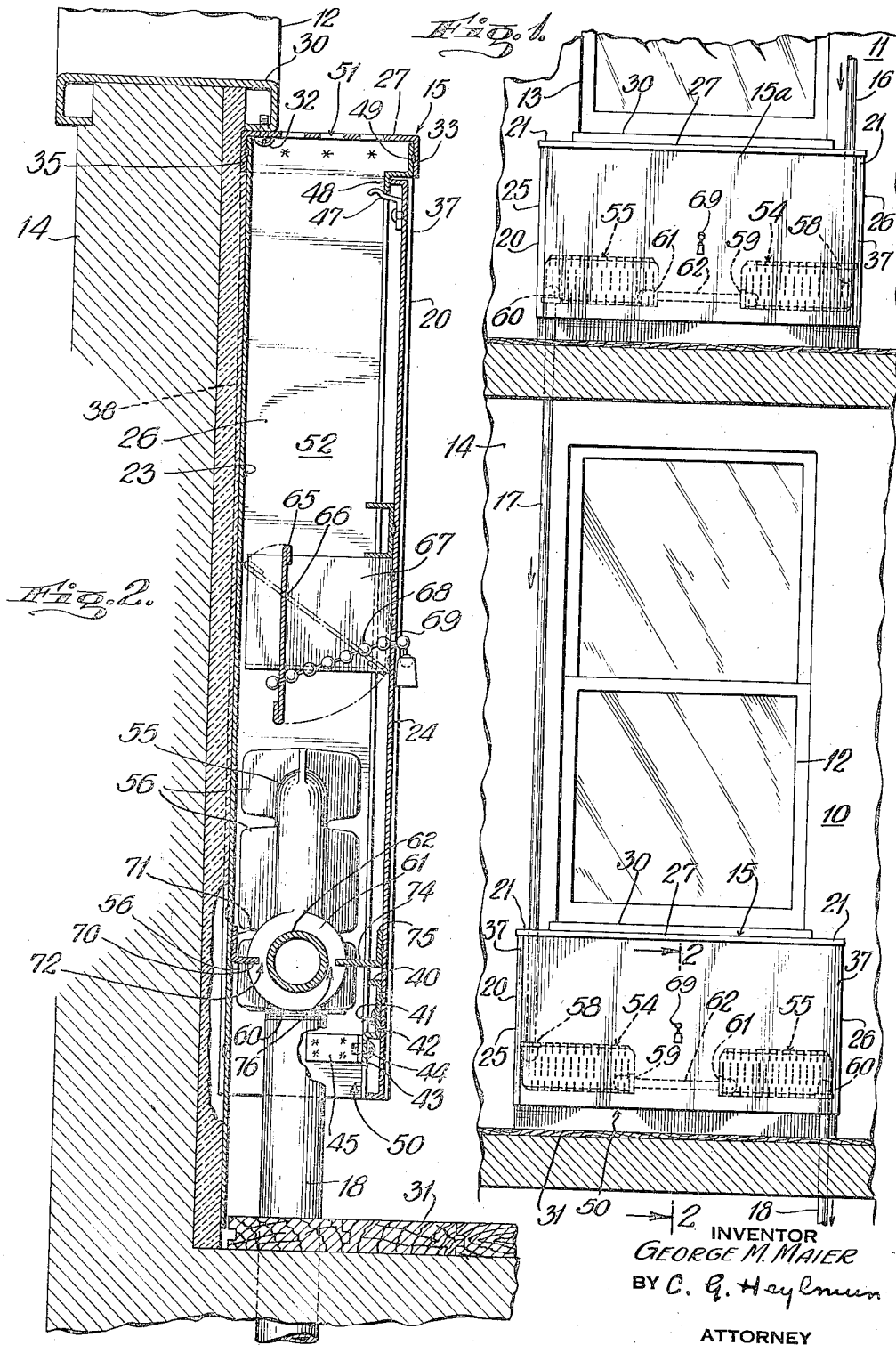
G. M. MAIER

2,241,864

HEATING APPARATUS

Filed Feb. 28, 1940

3 Sheets-Sheet 1



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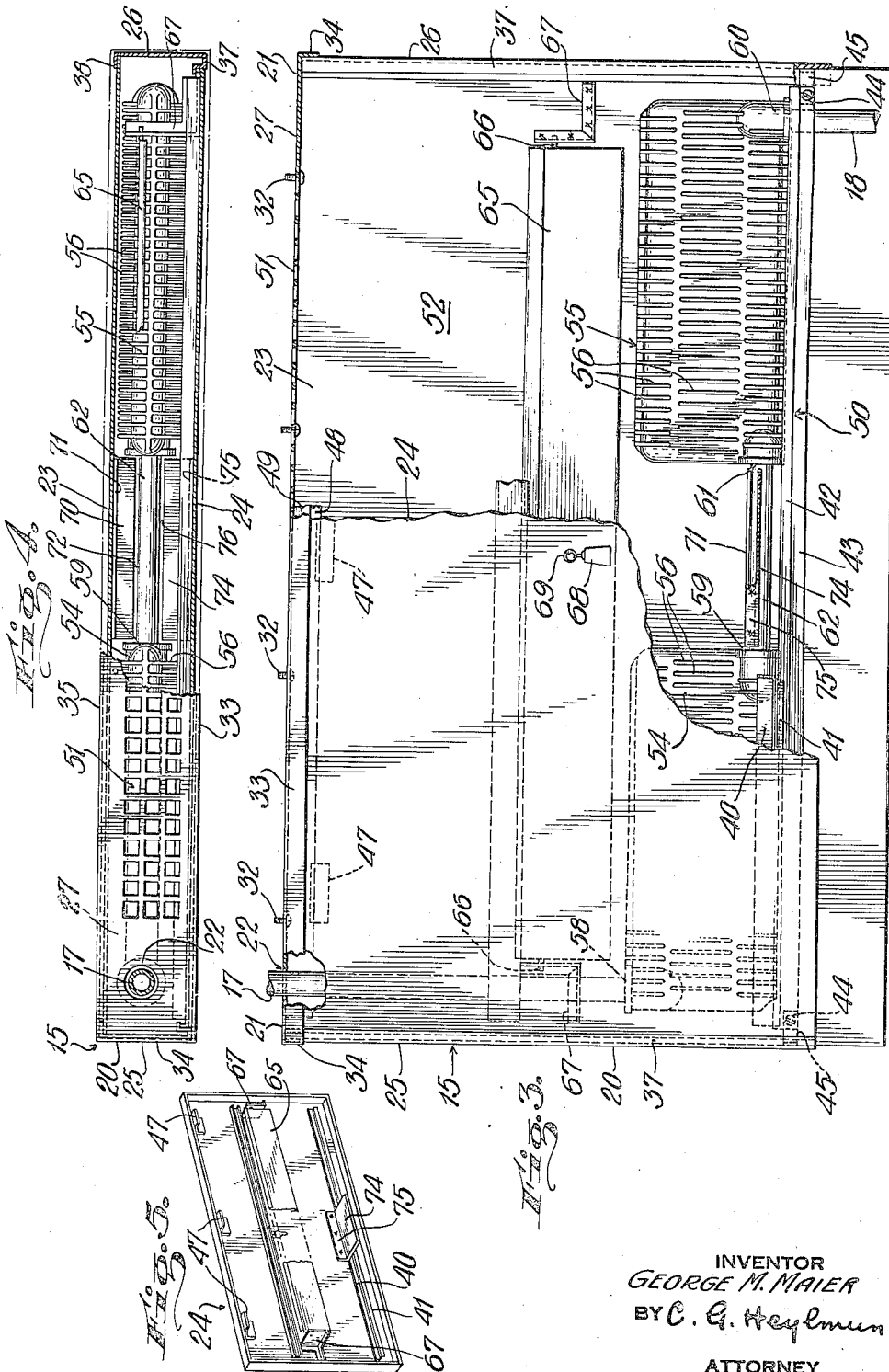
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2,241,864

HEATING APPARATUS

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8 Claims. (Cl. 257—136)

This invention relates to heating apparatus and more particularly to unitary heating devices adapted to be arranged within the room spaces of a building and operable to transmit the heat to the air of the room spaces by convection.

This invention has for an object to provide heating apparatus of the above type which is simple and inexpensive in its construction and which is dependable and efficient in operation.

The invention consists in the novel construction and combination of parts, to be more fully described hereinafter, and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawings, to be taken as a part of this specification, I have fully and clearly illustrated a preferred embodiment of my invention, in which drawings—

Fig. 1 is a fragmentary vertical sectional view illustrating my invention as installed within a multiple story building, the heating apparatus being shown in front elevation;

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1 and showing on an enlarged scale one of the unitary heating devices which is constructed in accordance with the present invention;

Fig. 3 is a front elevation of the unit shown in Fig. 2 with certain portions thereof being broken away and shown in section so as to illustrate more clearly the interior structure of the unit;

Fig. 4 is a plan view of the unit shown in Figs. 2 and 3 with certain of the parts being broken away and shown in section;

Fig. 5 is a perspective view showing the inside of the removable casing front;

Fig. 6 is a vertical sectional view similar to Fig. 2 and showing a modified form of my invention, the view being taken on the line 6—6 of Fig. 8;

Fig. 7 is a fragmentary plan view of the modified form of unitary heating device shown in Fig. 6, a portion of the device being shown in horizontal section to disclose the interior structure thereof;

Fig. 8 is a fragmentary front elevation of the device shown in Figs. 6 and 7, with certain of the parts being broken away and others shown in section to disclose the interior structure;

Fig. 9 is an exploded view showing in perspective the details of the back portion and removable cover portion of the modified form of my invention; and

Fig. 10 is a perspective view illustrating a modified form of baffle construction.

Referring now in detail to the construction illustrated and first to the modification shown in Figs. 1 to 5 incl., it will be observed that I have shown in Fig. 1, my improved heating apparatus as installed within a conventional building having a plurality of floors 10 and 11. The floors 10 and 11 are provided, respectively, with the usual window openings 12 and 13 through an outside wall 14 thereof. As is common in buildings, the window openings of the several floors are arranged, respectively, one above the other and in vertical alignment.

The heating apparatus comprises improved unitary heating devices 15 and 15a which are shown as being located, respectively, in the floors 10 and 11 and alongside the outside wall 14 and beneath the windows 12 and 13. A suitable heating fluid, such as steam, may be supplied to the uppermost device 15a by a vertically-arranged flow pipe 16, which may be connected at its other or upper end to another device, like the devices 15 and 15a located in an upper floor (not shown); or, the upper end of the pipe 16 may be connected directly to a source of steam supply such, for example, as a steam boiler (not shown). The device 15a may be also connected to a vertically-arranged steam flow pipe 17 extending between the lower discharge end of the device 15a and the upper supply end of the device 15. Likewise, the lower discharge end of the device 15 may be connected to the upper end of a vertically-arranged flow pipe 18, and the latter may be connected at its lower end to either a device similar to the devices 15 and 15a or to the return side of the heating system.

From the above, it will be apparent that I have elected to show my improvements as incorporated in a heating system of the type wherein the heating fluid such as steam flows in series through the several unitary heating devices located, respectively, one above the other in the several floors of the building, and that the steam flow pipes are of sufficient size to supply the steam to all of the unitary heating devices and to conduct away the condensate from such devices. The building may comprise any number of floors, and the unitary devices 15 and 15a may form a part of a vertical bank or row of such devices in a larger building. Also, there may be a larger number of vertical banks or rows arranged in parallel and with the unitary devices of each bank connected in series, as shown. It will be appreciated however that my

invention is not to be considered as being limited in all of its aspects to its incorporation in a heating system of this type; for, in so far as certain of its broader aspects are concerned, my improvements may form a part of other forms of steam heating systems and also hot water heating systems.

Each of the improved form of unitary heating devices 15 and 15a comprises an enclosure or casing 20 which is of sufficient length to provide two end portions 21 which are shown as extending, respectively, beyond the two vertical sides of the window in front of which the device is located. In each device, one of its end portions 21 is adapted to receive through a pipe opening 22 formed in the top thereof, the lower end of a steam flow pipe, and is adapted to receive through the bottom of its other end portion 21, the upper end of a steam flow pipe.

From an examination of Figs. 2, 3, and 4, it will be noted that each of the casings 20 of the unitary heating devices comprises a rear wall 23, a front wall 24, end walls 25 and 26 and a top wall 27. The rear wall 23 is arranged adjacent the room wall 14 and between the window sill 30 and the floor 31 of the room in which the casing is located. The top wall is secured by suitable screws 32 to the lower part of the sill 30, and is formed along its four edges with front, end and rear depending flanges 33, 34, and 35, respectively. The rear depending flange 35 is suitably secured to the upper edge of the rear wall 23 by spotwelding. The vertical end walls 25 and 26 of the casing are suitably secured to the top wall 27 by spotwelding to the depending end flanges 34. Each of the end walls 25 and 26 is also provided with inwardly-extending flanges 37 and 38 at the front and rear thereof, respectively. The end walls 25 and 26 are suitably secured to the rear wall 23 by spotwelding each of the flanges 38 to the two outer vertical edge portions of the rear wall 23.

The front wall 24 of each casing extends between the flanges 37 and is so constructed that it may be readily removed and replaced in position on the casing. To this end, an angle member 40 is suitably spotwelded to the inside surface of the front wall and at the lower part of the latter, and the angle member is provided at its lower edge with a downwardly and inwardly extending lip 41 which is spaced from the inside surface of the front wall and receives therebetween an upwardly extending flange 42 of a Z bar 43. The Z bar 43 is fixed by screws 44 at its ends to brackets 45 spotwelded to the casing end walls 25 and 26. Thus, the front wall is supported by the Z bar 43 and is secured thereby at its lower edge to the remaining portions of the casing. The upper edge of the removable front wall 24 is detachably secured to the casing by a plurality of spring clips 47 fixed to the front wall 24 and engaging beneath a depending vertical flange 48 of a Z bar 49. The bar 49 is suitably spotwelded to the flange 33 depending from the forward edge of the top wall 27. The spring clips 47 may be readily detached by pulling the upper part of the front wall forwardly to disengage the clips 47, and the front wall may then be easily disengaged from the flange 42 by lifting the wall 24. To replace the front wall 24 the lower end is first engaged with the flange 42 of Z bar 43 and the upper end then swung inwardly toward the casing and until the clips 47 engage beneath the flange 48.

Each casing 20 is open at its lower end to pro-

vide an air inlet opening 50 communicating with the room in which it is located and is provided in the top wall 27 with an air outlet grille or opening 51, which also communicates with the room. The openings 50 and 51 are connected by a vertical flue space 52 which is defined by the inside surfaces of the rear wall 23, end walls 25 and 26, and front wall 24.

Each of the unitary heating devices is provided with convector heat-emitting elements which are arranged in spaced relation across the flue space 52. In the drawings, I have shown these heat-emitting elements as convector radiators 54 and 55 formed of cast iron and having vertical heat dissipating fins 56 formed thereon. While in so far as the broader aspects of this invention are concerned, any number of radiators may be installed within a casing or enclosure, I have elected to show in each casing the two radiators 54 and 55 arranged at substantially the same level across the flue space 52 and adjacent the end walls 25 and 26, respectively, of the casing.

Each radiator 54 is provided in its top and adjacent one end thereof with a threaded pipe connection 58 and is provided in the lower part of the other end with a threaded pipe connection 59. The other radiator 55 is provided in its bottom and adjacent one end with a threaded pipe connection 60 and in the lower part of its other end with a pipe connection 61. Each radiator 54 may be termed the inlet radiator as it first receives the steam, and each radiator 55 may be termed the outlet radiator. The radiators 54 and 55 are connected by a connecting flow pipe 62 threadedly engaging at its opposite ends with the pipe connections 59 and 61, respectively.

As stated, the unitary heating devices 15 and 15a are adapted to be connected for series flow therethrough of a heating fluid, such as steam. In order to accomplish this, the flow pipe 16, which is the steam supply pipe, is shown in Fig. 1 as being located alongside one of the vertical sides of the window 13; the flow pipe 17 connecting the devices 15 and 15a is shown as being located along the vertical side of the window 12 which is opposite to the pipe 16, and the flow pipe 18 is located directly beneath the pipe 16. On account of this the position of the radiators 54 and 55 in the device 15a is shown as being reversed or opposite to the position of the radiators 54 and 55 in the device 15. The inlet radiator 54 of the device 15a is shown in Fig. 1 as being adjacent the end wall 26 with its connection 58 in vertical alignment and receiving the threaded lower end of the pipe 16, and the outlet radiator 55 of the device 15a is located adjacent the end wall 25 and in vertical alignment and receiving the threaded upper end of the flow pipe 17. In the device 15 the inlet radiator 54 is adjacent the end wall 25 and receives the lower end of the pipe 17, and the outlet radiator 55 is adjacent the end wall 26 and receives the upper end of pipe 18.

As stated, the improved heating devices 15 and 15a are shown as being incorporated in a system wherein the steam flows through such devices in series. The reason for such an arrangement is to reduce the cost of piping. As the devices 15 and 15a are connected in series, the flow of steam to any particular device cannot be regulated with respect to the flow of steam to the other devices. Therefore, in order to control the heat output of the unitary heating devices in

such a system, I provide a pivoted damper 65 in each of the casings 20 which extends across the flue space 52 and may be adjusted to regulate the gravity flow of air upward over the radiators and into the room through the grille 51. Advantageously, the damper 65 is provided with a pivot 66 journaled in spaced brackets 67 carried by the removable front wall 24. The pivot 66 of the damper 65 is so located that the damper tends at all times to remain fully open by its own weight and thereby permits the free flow of air through the flue space. In order to regulate the position of the damper, a bead chain 68 is connected at one end to the damper and extends outwardly of the casing through the key hole slot 69 in the front wall 24. By means of the bead chain 68 and slot 69, the damper may be closed entirely or may be adjusted to any desired mid-position, in a manner well understood by those skilled in the art. When the damper 65 is closed, air circulation through the flue space 52 is stopped. As the room is heated primarily by the transmission of heat by convection to the air flowing upwardly over the external surfaces of the radiators 54 and 55, the supply of heat to each unitary device and its room is effectively controlled by the damper.

The unitary devices 15 and 15a are preferably of such a length that the flow pipes 16, 17, and 18 can be arranged at the sides of the windows and be directly connected at their ends to the radiators 54 and 55 without requiring the usual pipe fittings, such as T's, elbows and the like, and the resulting increased labor cost in installing such a system. In order to make this possible, the radiators 54 and 55 have to be arranged adjacent the end walls of their respective casings or enclosures 20, which results in the adjacent ends of the radiators being spaced apart a substantial distance and being connected by the connecting flow pipes 62.

In accordance with the present invention, I also provide a baffling means for each of the unitary heating devices which cooperates with each connecting flow pipe 62 to restrict the upward flow of air through the regions of the flue space between radiators, so as to prevent the main body of air from by-passing the heat-emitting surfaces of the radiators 54 and 55 and at the same time to provide for the flow of a small body of air over the outer surfaces of the connecting flow pipe 62 and thereby make use of the pipe as a heat-emitting surface. To this end, a baffle 70 extends along the rear wall 23 of the casing opposite the connecting flow pipe 62 and between the radiators 54 and 55 and is provided with a flange 71 suitably spotwelded to the rear wall 23. The baffle 70 extends inwardly from the rear wall 23 toward the flow pipe 62 and terminates a slight distance from the flow pipe to provide a small opening 72, through which a small amount of air will flow over the pipe. Also, I provide a baffle 74 which is carried by the lower inside of the front wall 24 and extends between the radiators 54 and 55 opposite the connecting flow pipe 62. The baffle 74 is formed with a flange 75 which is suitably spotwelded to the front wall 24 and the baffle 74 extends inwardly from the front wall toward the connecting flow pipe 62 and terminates a short distance therefrom to provide a relatively small opening 76, through which air may flow over the flow pipe. These baffles 70 and 74 prevent the upwardly flowing air from by-passing in any objectionable amounts the heating surfaces of the

radiators 54 and 55, and at the same time provide the small openings 72 and 76 which permit a small flow over the connecting flow pipe 62 which, as stated above, results in the utilization of the flow pipe as a heat-emitting surface.

In Figs. 6, 7, 8, 9, and 10, I have illustrated a modified form of unitary heating device which is indicated, in general, by the reference numeral 115 and comprises a metal radiator enclosure or casing 120; a pair of radiators 154 and 155, arranged across the interior of the casing and connected by a flow pipe 162; and a baffling means which cooperates with the connecting flow pipe 162 to restrict the upward flow of air through the interior regions of the casing 120 which lie between the radiators 154 and 155. As in the previously described modification, the purpose of such a baffling means is to prevent the main body of upwardly flowing air from by-passing the heat-emitting surfaces of the radiators; and, at the same time, to provide for the flow of a small body of air over the connecting flow pipe 162 and thereby make use of the latter as a heat-emitting surface.

The casing 120 is composed of two unitary, fabricated metal parts, one part 80 forming the back wall 123 and being supported in fixed relation to the room wall 114 by brackets 81, and the other part 82 being removably attached to the part 80 by screws 83 and including the front wall 124, end walls 125 and 126, and a top wall 127. The casing 120 is open at its bottom to provide the air inlet opening 150 and is provided in its top wall 127 with an air outlet opening or grille 151. The hollow interior of the casing provides the vertical flue space 152, across which the radiators 154 and 155 and connecting flow pipe 162 are arranged. A bracket 84 is fixed to a lower corner of the fixed part 80 and serves to support the outlet radiator 155. In installing my improvements, the room wall 114 is first plastered, the part 80 permanently attached to the wall 114 by the bracket 81, the radiators 154 and 155 and connecting flow pipes 117, 118 and 162 connected and installed, and then the removable part 82 of the casing is secured in place by the screws 83.

As in the previously described modification, the casing 120 is made extra long to provide the extensions 121 at each end thereof, and one of the latter is provided with an opening 122 for receiving the vertical flow pipe 117. In order to provide for attaching and removing the part 82 after the installation of the radiators and flow pipes, the opening 122 is provided by forming, in the top wall 127, an open ended slot 85 having its closed or inner end curved, as indicated at 86, to provide one half of the opening, and by providing a plate 87 removably attached by a screw 88 within the outer end of the slot 85 and having a curved inner end 89 forming the other half of the opening.

A damper 165 is arranged across the flue space 152 and may be adjusted between full open and full closed positions to regulate the quantity of heated air flowing out through the grille 151. The damper is provided in its opposite ends with pivot pins 166 and the latter are journaled within brackets 167 suitably spotwelded to the top wall 127. A shaft 87 is formed as an extension of one of the pivot pins 166 and extends outwardly through the end wall 126. A knob 88 is fixed to the outer end of the shaft 87 and serves as a means of manually regulating the position of the damper 165.

In the modified form of unitary heating device 115, the baffling means which restricts the upward flow of air in the regions adjacent the pipe 162, is advantageously formed as a one piece removable baffle device 90 (see Fig. 10). The device 90 is in the form of a saddle-like element, comprising end members 91 and 92 formed, respectively, with arcuate cut-away portions 93 and 94, spaced from one another and connected by baffle plates 95 and 96. As can be seen from an examination of Figs. 6, 7, and 8, when the device 90 is placed in position on the pipe 162, the cut-away portions 93 and 94 receive the upper surfaces of the pipe, and the plates 95 and 96 extend lengthwise of the pipe 162 and at each side thereof. The device 90 is so formed that the outer edges of the plates 95 and 96 engage or lie directly adjacent the walls 123 and 124, respectively, and the inner edges of the plates 95 and 96 are spaced, respectively, from the opposite sides of the pipe 162 to form the small opening 172 and 176 through which a restricted upward flow of air about the pipe 162 is had.

From the above, it will be apparent that I have provided a heating apparatus which is unusually simple in construction and which is well adapted to be installed in a system with a minimum requirement of labor and materials. This is an important feature, for in large buildings, such as the present low-cost housing projects, the number of steam flow pipes, elbows, and T connections for the heating systems and the labor cost of connecting the elements of the system, are most important items. From the above, it will be apparent that by reason of the arrangement of the enclosure and the radiators in my improved unitary heating devices so as to permit their connection with steam flow pipes without the use of fittings, and by reason of the fact that I provide baffles to restrict the flow of air through the portion of the flue spaces not occupied by the radiators, I am able to reduce materially the cost of the heating system without sacrificing its efficiency of operation. Furthermore, as the transmission of heat from each unitary device to the room is effected almost entirely by convection air currents, the simple damper regulating the flow of air through the flue space controls the heat output of the heating device without requiring the usual control valves for the radiators. The cross-sectional areas of the radiators and of the steam flow pipes are such that the several heating units of any one vertical bank in a building may be connected in series without danger of condensate interfering with the required flow of steam to any particular unit.

It is to be noted that in so far as certain of the broader aspects of my invention are concerned, certain of the walls of the casings 20 or 120, or their equivalent, may be formed by portions of the room wall 14. For example, the rear walls 23 or 123 may be omitted and the remaining walls so arranged with respect to the room wall that the face of the latter will function as the rear wall of the casing and define in part the flue passages 52 or 152. As a further example, the room wall may be provided with a recess of sufficient depth to function as both the rear wall and as the two end walls of the casing. In the latter instance the rear walls 23, 123 and end walls 25, 125 and 26, 126 could be omitted entirely and the front and top walls of the casing so installed with respect to the recess as to define the flue passages 52 or 152. Various other modifications of the structure disclosed may be

devised without departing from the invention, as defined in the appended claims.

What I claim and desire to secure by Letters Patent of the United States is:

1. Heating apparatus comprising casing means providing a radiator enclosure adapted to be arranged alongside a room wall and having spaced air inlet and air outlet openings therein and including walls defining a flue space within the interior thereof connecting said inlet and outlet openings; a convector heat-emitting device occupying a portion of said flue space; a flow pipe for heating fluid connected to said device and extending laterally across said flue space from said device and within the portion of the latter not occupied by said device; and baffle means cooperating with said flow pipe to restrict air flow through the portion of the flue space not occupied by said device so as to prevent the main body of air from by-passing the heating surfaces of said device and, at the same time, to provide a restricted flow of air over said pipe for utilizing the heating surfaces of said pipe.

2. Heating apparatus comprising casing means providing a radiator enclosure adapted to be arranged alongside a room wall and having spaced air inlet and air outlet openings therein and including walls defining a flue space within the interior thereof connecting said inlet and outlet openings; a pair of convector radiators arranged across said flue space and occupying, respectively, laterally-spaced portions of said flue space; a flow pipe for heating fluid connecting said radiators and extending across said flue space and within the portion of the latter not occupied by said radiators; and baffle means cooperating with said connecting flow pipe to restrict air flow through the portion of the flue space not occupied by said radiators so as to prevent the main body of air from by-passing the heating surfaces of said radiators and, at the same time, to provide a restricted flow of air over said pipe for utilizing the heating surfaces of said pipe.

3. Heating apparatus comprising casing means providing a radiator enclosure adapted to be arranged alongside a room wall and having spaced air inlet and air outlet openings therein and a flue space connecting said inlet and outlet openings; said casing means including a pair of upright end walls defining in part said flue space; a pair of convector radiators arranged respectively at approximately the same level within the flue space and adjacent said end walls, and said radiators being spaced a substantial distance from each other across the flue space; a flow pipe for heating fluid extending across the flue space between radiators and connecting the adjacent ends of said radiators; and baffle means cooperating with said connecting flow pipe to restrict air flow through the portions of the flue space between said radiators so as to prevent the main body of air from by-passing the heating surfaces of said radiators and, at the same time, to provide a restricted flow of air over said connecting pipe for utilizing the heating surfaces of said pipe.

4. Heating apparatus comprising casing means providing a radiator enclosure adapted to be arranged alongside a room wall and having spaced air inlet and air outlet openings therein and including walls defining a flue space within the interior thereof connecting said inlet and outlet openings; a convector heat-emitting device occupying a portion of said flue space; a flow pipe for heating fluid connected to said device

and extending laterally across said flue space from said device and within the portion of the latter not occupied by said device; and baffle means extending inwardly from the defining walls of said casing means and toward the pipe connection to provide restricted flow of air through the laterally-spaced portions of the flue space not occupied by said device.

5. Heating apparatus comprising casing means providing a radiator enclosure adapted to be arranged alongside a room wall and having spaced air inlet and air outlet openings therein and including walls defining a flue space within the interior thereof and connecting said inlet and outlet openings; a convector heat-emitting device occupying a portion of said flue space; a flow pipe for heating fluid connected to said device and extending laterally across said flue space and within the portion of the latter not occupied by said device; and baffle means extending inwardly from the defining walls of said casing means toward said flow pipe and terminating a slight distance from said flow pipe to provide for a restricted flow of air about said pipe and to prevent the by-passing of the main body of air past the heating surfaces of said device.

6. Heating apparatus comprising casing means providing a radiator enclosure adapted to be arranged alongside a room wall and having spaced air inlet and air outlet openings therein and including walls defining a flue space within the interior thereof connecting said inlet and outlet openings; two of said walls constituting up-right end walls for the casing means; a pair of convector radiators arranged at approximately the same level within the flue space and adjacent the two end walls, respectively, and being spaced a substantial distance from each other laterally across the flue space; a flow pipe for heating fluid

connecting the adjacent ends of the radiators and extending across the portion of the flue space not occupied by the radiators; and baffle means extending inwardly from the casing walls toward the connecting flow pipe to provide restricted flow of air through the portion of the flue space not occupied by the radiators.

7. Heating apparatus comprising casing means providing a radiator enclosure adapted to be arranged alongside a room wall and having spaced air inlet and air outlet openings therein and including walls defining a flue space within the interior thereof connecting said inlet and outlet openings; a convector heat-emitting device occupying a portion of said flue space; a flow pipe for heating fluid connected to said device and extending laterally across said flue space from said device and within the portion of the latter not occupied by said device; and baffle means for restricting the flow of air through the laterally-spaced portions of the flue space not occupied by said device, and said baffle means comprising a saddle-like element including end members engaging the upper surfaces of the pipe and a pair of baffle plates connecting the end elements and arranged, respectively, lengthwise of the pipe and between the opposite sides thereof and the adjacent defining walls of said casing means.

8. A saddle-like baffle element for use with laterally extending flow pipes for convector radiators, comprising a pair of spaced end members having arcuate cut-away portions in their under sides, respectively, adapted to receive the upper surfaces of a flow pipe, and a pair of baffle plates connecting, respectively, the outer ends of said end members and adapted to be arranged lengthwise of and at opposite sides of a flow pipe.

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