July 22, 1941. H. F. EASTWOOD ET AL 2,250,330

HOUSE HEATING SYSTEM

Filed June 6, 1940 2 Sheets-Sheet 1

Fig. 1

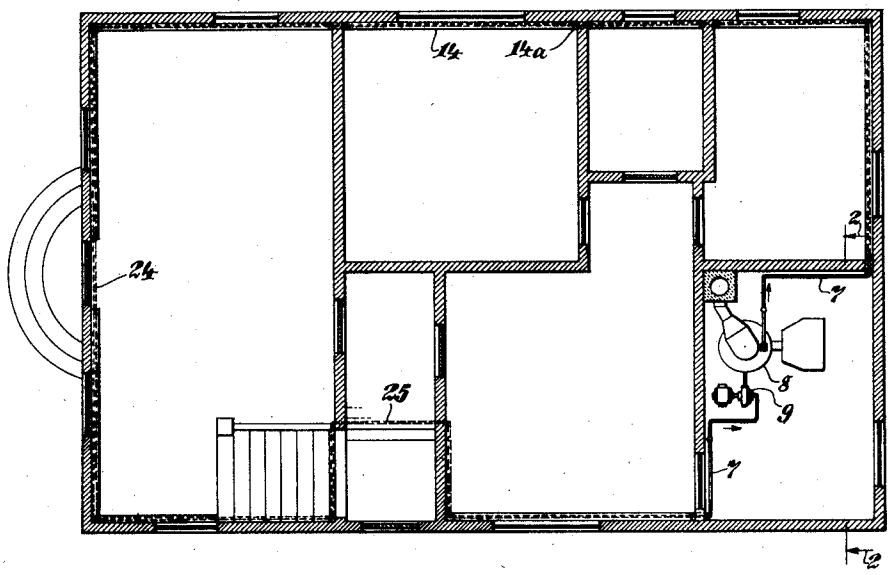

Fig. 2

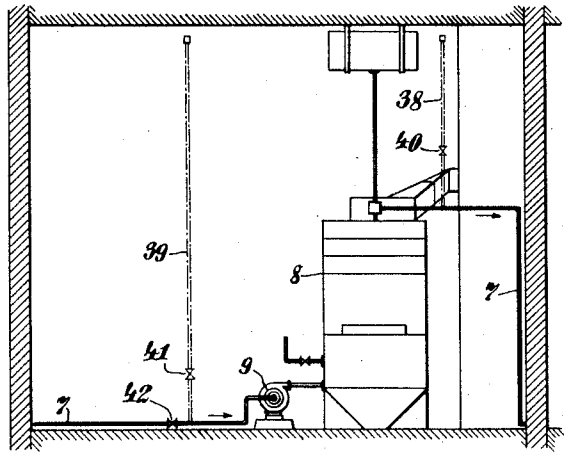

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Fig. 4

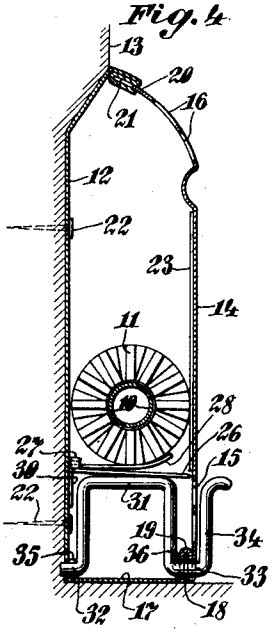


Fig. 3

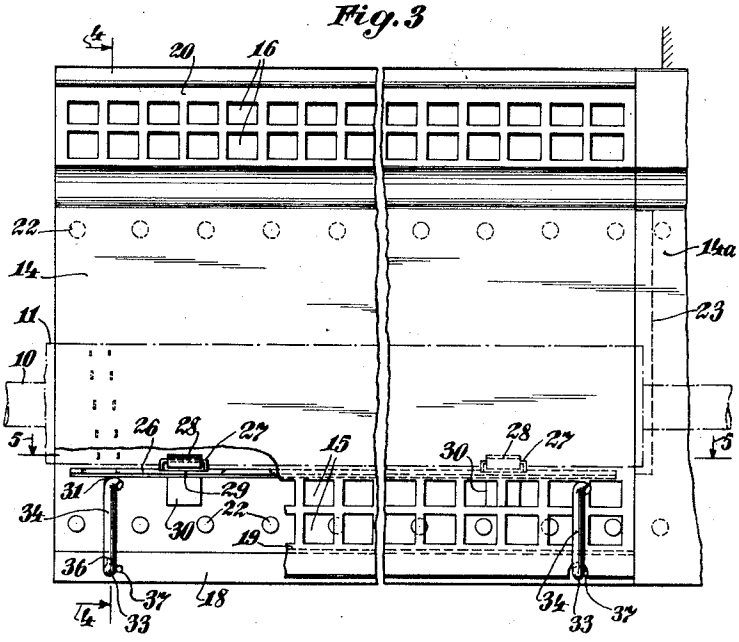


Fig. 6

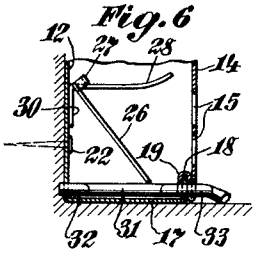
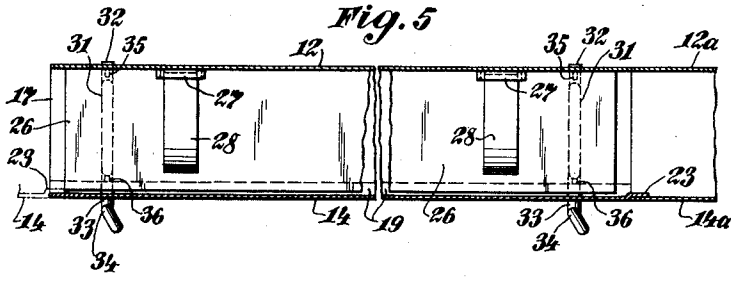


Fig. 5



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UNITED STATES PATENT OFFICE

2,250,330

HOUSE HEATING SYSTEM

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Application June 6, 1940, Serial No. 339,060

2 Claims. (Cl. 237—63)

The invention herein disclosed relates to the heating of houses.

Objects of the invention are to accomplish the heating of houses or the rooms in houses by the simplest possible form of construction, taking up no useful space in the rooms, delivering the heat at the most effective level and operating at maximum economy.

Further objects of the invention are to provide a system of extreme flexibility in the sense of being readily adaptable to the different requirements encountered in heating problems, a system which may be readily installed in old houses as well as in those being built, which will be wholly free of any complications, such as involved in the usual piping, feeders, mains, branches and returns of ordinary systems, which may be further effectively controlled as to total volume or localized delivery of heat units and which will be desirable generally for heat transfer purposes.

Additional objects and the novel features of the invention by which the purposes of the invention are attained are set forth and will appear in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate a present practical embodiment of the invention. Structure and arrangement however may be modified and changed all within the true intent of the invention as will be apparent from the following description and scope of the claims.

Fig. 1 is a so-called plan view of a small house of the bungalow type having the improved heating system incorporated therein, the walls and other parts being shown in section.

Fig. 2 is a broken sectional and elevation view on substantially the plane of line 2—2 of Fig. 1.

Fig. 3 is an enlarged broken detail view of the continuous baseboard form of convector heater.

Fig. 4 is a broken vertical sectional view of the same as on line 4—4 of Fig. 3.

Fig. 5 is a broken horizontal sectional view as on line 5—5 of Fig. 3.

Fig. 6 is a broken sectional detail illustrating features of the swinging damper control.

As indicated in the general views, Figs. 1 and 2, the system consists of a continuous line of piping extending in a single circuit 7, from a boiler 8, or other form of heater, in series from one room to another back to the boiler with an interposed pump 9, or the like, for maintaining the desired rate of circulation and with such piping developed into a convector form of heater located in the baseboard portions of the walls in the rooms to be heated.

The convector type heater as shown in Figs. 3 to 6, consists of lengths of pipe 10, equipped with heat radiating fins 11, preferably of the type covered in the Tilley Patent 1,932,610 of October 31, 1933, and mounted within a baseboard casing composed of a heat reflective backing 12, set into the wall 13, and a baseboard front or facing 14, having air inlet openings 15, providing a grille at the bottom and heated air outlet openings providing a grille 16, at the top.

The structure of the baseboard casing may vary quite widely, but it is shown as made up with an angularly projecting bottom wall 17, integral with the back wall 12, said bottom wall having an angularly upturned front flange 18, over which the reversely U-bent lower edge portion 19, of the front plate 14, is dropped, after the upper, inwardly curved edge 20 of said plate has first been introduced into the reversely U-bent flange 21, which projects forwardly from the upper edge of the back plate.

This baseboard casing can be made up in convenient lengths and then assembled by simply securing the backing in place against the foot of the wall as by nails, screws or other fastenings indicated at 22, and then entering the upper edge of the face plate within the groove 21, at the top of the back plate sufficiently to enable the grooved portion 19, at the lower edge of the face plate to ride over and drop down over the upstanding flange 18 of the bottom. This bottom flange is indicated as of less extent than the sliding connection 20, 21, at the top, so that the latter will not become disengaged when the parts 18, 19, become fully engaged, Fig. 4.

Where the convector piping is to be carried through a wall, a short length of blank casing, that is, without any grille portions may be inserted in the wall, in position to connect sections of the casing in the rooms at the opposite sides of the wall. Such a blank section of wall-passing casing is indicated in Figs. 3 and 5, where the backing is denoted 12*a* and the facing as 14*a*. Inwardly offset tongues 23 on the intermediate portion at one end of each front plate provide simple means for effecting joints between adjoining sections of the casing.

Where heating is to be effected at opposite sides of a wall and in rooms normally to be kept at the same temperature, the radiating finned tubing may be carried continuously through the wall and on into one room from the other. In some cases however, the finned tubing may be

discontinued at one or both sides of the wall and unfinned connecting tubing be run through the wall. In some cases also, the convector casing may be simply run up to the wall at one or both sides and the heating piping, finned or unfinned be extended through just a pipe size opening in the wall.

The piping may be all alike, that is of the same material or the heat radiating sections within the baseboard channel may be of higher or more effective heat radiating material than other portions of the system. Also portions of the circuit, if desired, may be suitably insulated.

The single continuous length of piping, at the baseboard level, enables doorways, stairwells and other customary interruptions to be readily avoided, as by simply dropping a connecting length of the piping beneath the floor at a doorway as indicated at **24**, Fig. 1, and by carrying a connecting length of the piping around a stairwell as shown at **25**, in the same figure.

While illustrated as a hot water heating system, it should be understood that the invention may be incorporated in systems employing other forms of heat transmitting fluid.

A system employing a hot water boiler such as illustrated has certain advantages, among which may be mentioned that only a relatively small amount of water is required to fill it and only a small pump needed to completely replace the water several times a minute without enough drop in temperature to have appreciable effect on the heating characteristics of any part of the circuit. By controlling the pump operation as to speed of circulation, the heat transfer can be readily controlled. By starting and stopping the pump or by providing a by-pass about the pump further or additional control effects may be obtained.

The convectors or radiation portions of the circuit may be run about all or any number of the walls of the rooms, depending on heating requirements and one or a number of finned pipes may be used in any one or more baseboard casings. In the case of multiple rows of finned piping, these can be connected in loop or in parallel relation forming part of the series connection of the complete circuit.

To enable localized control of heating effects, dampers may be provided substantially as indicated at **26**, in Figs. 3 to 6, these each being in the form of a plate or sheet of material hingedly supported below the finned piping and adapted to be swung from a downwardly inclined position, Fig. 6, directing air entering through the floor level grille upwardly about the finned tube, to an upper position, Figs. 3, 4 and 5, extending across from the back to the front wall and substantially closing off flow of air to the tubing.

A simple method of hinging the dampers is illustrated involving providing upwardly struck integral loops **27**, in the rearward edge of each damper plate engaged over forwardly projecting bracket arms **28**, welded or otherwise secured to the back wall of the casing. One of these damper plates may be provided in each or in any selected number of the convector units and the ready removability of the front wall **14**, enables such dampers to be inserted and removed at will as conditions may make desirable.

The striking of the hinge loops **27**, out of the rear edges of the damper plates **26**, leaves the notches **29**, in the rearward edges of the plates to afford clearance for the lower mounting portions **30**, of the brackets, so that these dampers may make close fitting engagement with the back wall of the casing.

For raising and lowering the dampers, cranks **31** of bent wire are shown having shaft end portions **32**, **33**, journalled in bearing openings in the back and front walls of the casing sections and with the front bearing portions having hand lever extensions **34**, accessible at the front. The rearward bearing portions of these hand cranks are shown as having key lugs **35**, engaging the rearward wall to keep the cranked portions clear of the casing fastenings **22**, and the lower portions **30**, of the supporting brackets and the forward bearing portions **33**, are indicated as having upstruck lugs **36**, engageable inside the front flange **18**. The latter as indicated in Fig. 3, may have keyhole bearing openings **37**, to admit or permit withdrawal of crank portions of such operating handles.

The hinge brackets **28** for the damper plates may also be utilized as supports for the finned tubing, substantially as indicated in Fig. **4**, where it will be seen that such brackets have upwardly turned forward ends to retain the finned tubing in position thereon and that the latter then will obstruct and prevent removal of the hinge loops of the dampers from such brackets.

The various elements of the system cooperate to provide a most effective heating system. The radiation tubing finned according to the Tilley Patent 1,932,610 with a narrow strip wound helically and having integral fins radiating in generally parallel relation affords a most effective heat transfer for convector air currents entering at the bottom and passing upwardly and forwardly out at the top. The intake of air substantially at the floor level and the delivery of heated air out into the room, substantially at the baseboard level in conjunction with such finned tubing, provides extremely effective heating results with the greatest economy of fuel and power for forced circulation. The local damper controls enable output of heat to be governed according to individual desire in different rooms or in different portions of the same rooms. While shown as a single floor heating system, it will be apparent that the system can be extended to an upper floor or floors as by means of risers indicated at **38**, **39**, in Fig. 2, which can be extended to the opposite ends of an upper floor circuit and which may be equipped with valves **40**, **41**, to govern and control an upper floor circuit and which in conjunction with one or more valves **42**, in the first floor circuit may be utilized to proportion and assure an equal or otherwise desired flow of circulating medium through different floor circuits. The radiating tubing, casing sections and the like, can be made up in suitable size units, readily adapted to and interchangeable in different size and shape rooms and to suit other various building requirements, so that manufacturing and installation costs are reasonable. Changes and repairs can be readily made because of the easily removable character of the baseboard casing fronts, the removable and replaceable dampers and operating handles, etc. The baseboard casings and the inlet and outlet grilles can be made up in various shapes and styles to suit architectural requirements.

The special combination and relation of units affords both maximum flow of heating fluid and change of air and hence accomplishes the most effective distribution of heat with substantially

equal efficiency about the entire circuit. The absence of mains, branch lines and the like, is particularly important, keeping the installation costs low and avoiding any exposed piping or need for concealing piping.

The invention is of particular importance as providing a low cost hot water heating system, which may be easily installed, which will not take up useful space in a room or rooms and which by providing continuous circulation in a single loop of low resistance and with a maximum of air flow, provides an especially efficient heating installation.

What is claimed is:

1. In a house heating system of the character disclosed, the combination of flat shallow casings located substantially at the baseboard level, above the floor and extending along the outer walls of the rooms to be heated, said casings being open at the bottom along the floor to freely admit air above the floor level and open at the top along the walls for free discharge of air along the walls into the rooms to be heated, a single length of finned tubing located in said flat shallow wall casings between the open bottom and top portions of the same and extending in a single continuous loop through said outer wall casings substantially about the outer walls of the house, a heater, the ends of said single continuous loop of finned tubing having connections with the output and return sides of said heater and a pump in said connections controlled to force rapid circulation of heating fluid through said loop of finned tubing extending continuously in the single loop through the open casings along the walls of the several rooms to be heated.

2. In a house heating system of the character disclosed, the combination of flat shallow casings located substantially at the baseboard level, above the floor and extending along the outer walls of the rooms to be heated, said casings being open at the bottom along the floor to freely admit air above the floor level and open at the top along the walls for free discharge of air along the walls into the rooms to be heated, a single length of finned tubing located in said flat shallow wall casings between the open bottom and top portions of the same and extending in a single continuous loop through said outer wall casings substantially about the outer walls of the house, a heater, the ends of said single continuous loop of finned tubing having connections with the output and return sides of said heater and a pump in said connections controlled to force rapid circulation of heating fluid through said loop of finned tubing extending continuously in the single loop through the open casings along the walls of the several rooms to be heated, said wall casings having readily removable front sections and dampers removably engageable in said wall casings upon removal of said front sections, whereby dampers may be located at will in different selected portions along the outer walls of the heated rooms, and means within the casings for movably supporting the inserted dampers in position between the open bottom and top portions of said casings.

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