Nov. 3, 1931. T. A. SPALDING 1,829,765

ELECTRIC HEATING AND VENTILATING FURNACE

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Fig. 1

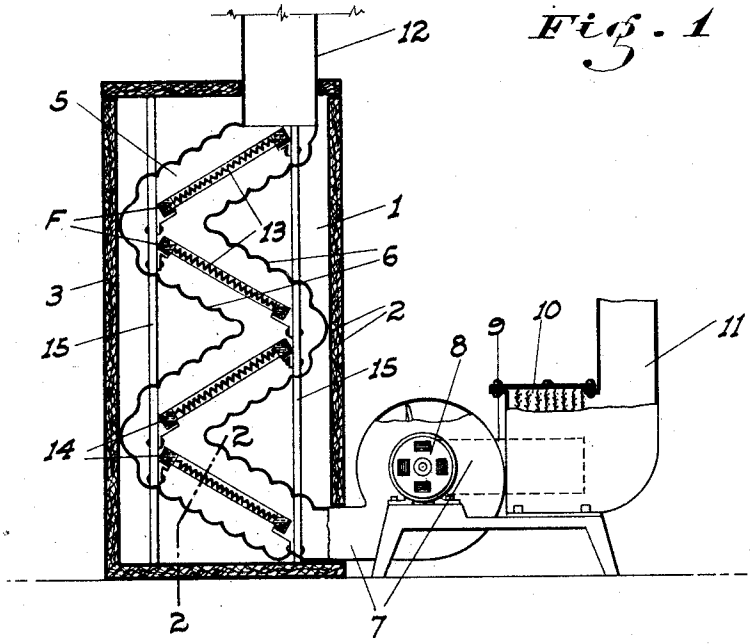
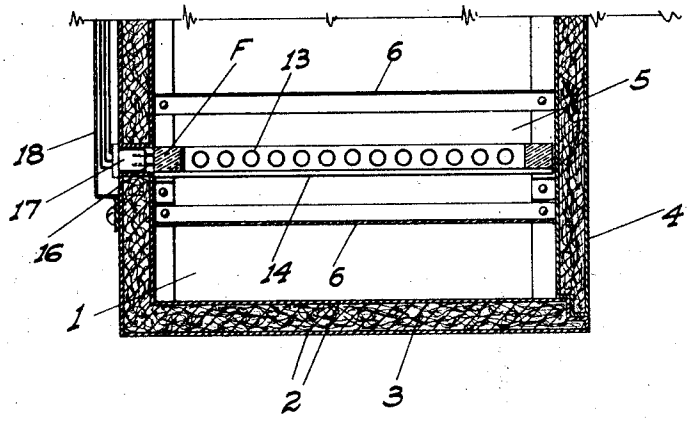


Fig. 2



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Fig. 3

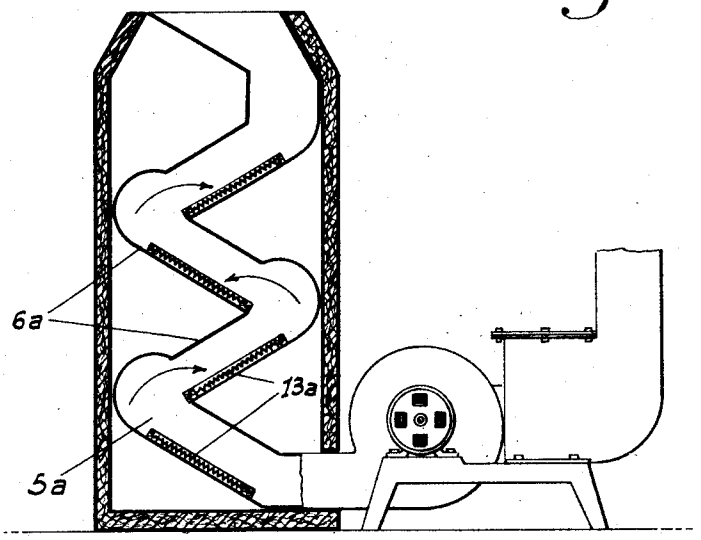
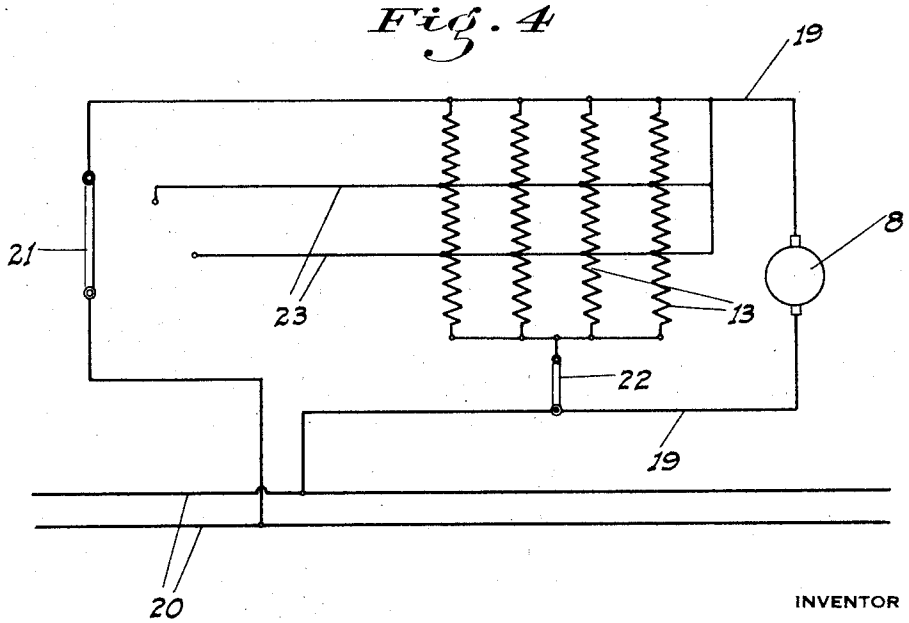


Fig. 4



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1,829,765

UNITED STATES PATENT OFFICE

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ELECTRIC HEATING AND VENTILATING FURNACE

Application filed March 20, 1929. Serial No. 348,457.

This invention relates to heating furnaces for residences and other buildings, and particularly to one in which electricity is used as the source of heat.

The principal object of my invention is to provide a furnace of this general character and for this purpose so constructed as to utilize the heat from the electricity in the most efficient manner, so as to obtain the benefits possible with the use of this clean and easily controlled source of heat, without the excessive cost of current consumption to attain the desired results usually associated with electric air heating devices.

A further object is to construct the furnace as a whole so that it may be used as an air circulating system in warm weather without the heating elements then functioning.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a sectional elevation of the preferred form of my furnace of the type adapted to be mounted in the basement.

Fig. 2 is a fragmentary cross section taken on the line 2—2 of Fig. 1.

Fig. 3 is a sectional elevation of a modified form of the furnace.

Fig. 4 is a diagram of the wiring circuits for either type of furnace.

Referring now more particularly to the characters of reference on the drawings, and particularly at present to Figs. 1 and 2, the furnace comprises a rectangular vertical casing 1 of suitable dimensions, the walls 2 of which are preferably of double character with heat insulating material 3 therebetween. All these walls but one sidewall are permanently connected to form an air-tight unit, the other sidewall however being in the form of a removable panel or door 4, for the purpose which will be evident later, and which when closed also makes air-tight connection with the other walls of the casing.

An air passage 5 preferably rectangular in cross sectional area extends from one end-wall of the casing at the bottom to the top wall of the same, and is arranged in zigzag or spiral form from end to end. The vertical side walls of the passage are formed by the fixed side-wall and the door of the casing, as shown in Fig. 2, while the top and bottom walls 6 of said passage, and which determine its spiral or zigzag form, are preferably arranged as corrugated or concaved reflecting surfaces, extending transversely of the passage, as shown.

At its lower end the passage communicates with the discharge of a blower 7 which is directly driven by an electric motor 8; the intake 9 of the blower receiving its air from an air drier or filter 10 of suitable character. This drier in turn receives its air from an intake passage 11 which projects upwardly to communicate with one or more rooms of the house being heated, and forms the return flue of the air circulating system. At its upper end the passage 5 connects with the upwardly projecting discharge flue 12 which extends to an outlet in one or more rooms of the building, depending on whether the so-called pipeless arrangement, or individual room outlets, are employed.

Disposed in the passage 5 in each zig-zag run thereof in substantially parallel relation to the top and bottom walls of said passage and centrally therebetween are separate electric heating units. Each unit comprises a rectangular frame F of suitable insulation material such as porcelain, with resistance heating elements 13 of suitable character mounted thereon; said frames being arranged so that a circulation of air may be had past the heating elements from the top to the bottom of the units, or vice versa.

The frames extend between the fixed side-wall and the door of the casing, so as to extend the full width of the air passage and are slidably supported on transverse horizontal rails 14 which are mounted on uprights 15 in the casing, so that the heating units may be individually removed from said casing by sliding said units horizontally along the rails when the door is opened.

The elements of each heating unit at the end opposite the door are preferably pro-

vided with terminal blocks 16 adapted to detachably engage a socket member 17 mounted in the corresponding wall of the casing; the wiring from said socket leading to a suitably located control point through a conduit or housing 18 mounted in the outside of the casing.

By means of this arrangement it will be seen that air discharged into the passage 5 from the blower will be reflected and thrown back and forth against the heating elements by the concave reflectors, so that by the time the air reaches the top of said passage and passes into the discharge flue, it is in a thoroughly heated condition. This thorough heating is aided by the retarding effect of the zigzag passage and by the fact that the walls of said air passage are prevented from radiating heat to the exterior by reason of the casing construction, which seals in the heat both by the insulation and the dead air space formed in the casing.

In the type of device shown in Fig. 3 the heating elements 13*a* in the passage 5*a* rest directly on the bottom walls 6*a* of the zigzag turns of the air passage. Said walls at the bends are formed so that the air leaving one element and the corresponding run of the passage is deflected downwardly against the element in the adjacent upper run of the passage. The upper walls of said passage, including the portions at the turns, are of a reflective nature so as to increase the efficiency of the air heating action.

The terminals of the elements in both types of furnace are preferably connected in parallel relation to circuit wires 19 leading from the main line wires 20 and in which the main control switch 21 and the motor 8 are interposed. An auxiliary switch 22 is also provided between one of the wires 19 and the adjacent terminals of the elements to enable the latter to be cut out of the circuit when desired without interfering with the operation of the motor. Also to enable different degrees of heat to be obtained from the elements additional wires 23 are connected to said elements at different points intermediate their ends, said wires at one end being connected to one of the wires 19 and at the other end being adapted for selective engagement by the arm of the switch 21.

The removability and the parallel winding of the heating units enables any unit to be withdrawn from the casing without interfering with the operation of the remainder, in the event that said unit is burnt out or defective.

The closing of the switch 21, if the switch 22 is open, permits the motor to operate without the heating elements being energized, thus enabling the apparatus to function merely as an air circulating system without any heat being imparted to the air.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be restored to as do not form a departure from the spirit of the invention, as defined by the appended claims.

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

1. An electric air heating furnace including an air passage extending upwardly from its lower end in the form of a number of zigzag runs, and electric heating units suspended at intervals between the upper and lower walls of the passage-runs, the said walls of the passage being in the form of concavely corrugated surfaces.

2. An electric air heating furnace including an air heating passage formed as a plurality of zigzag and upwardly sloping runs, electric heating elements in the form of spaced coils extending lengthwise of said runs and disposed parallel to and substantially central between the upper and lower walls of the runs; said elements extending into the passage-area at the junction of the different runs with each other.

3. An electric air heating furnace including an air passage extending upwardly from one end to the other, a removable member forming one side of the passage, and electric heating elements slidably mounted in the passage and accessible for removal with a sliding movement toward said one side when the latter is removed.

In testimony whereof I affix my signature.

THOMAS A. SPALDING.