April 22, 1924. 1,491,194

J. P. BURGER

ELECTRIC HEATING ELEMENT

Filed March 4 1922

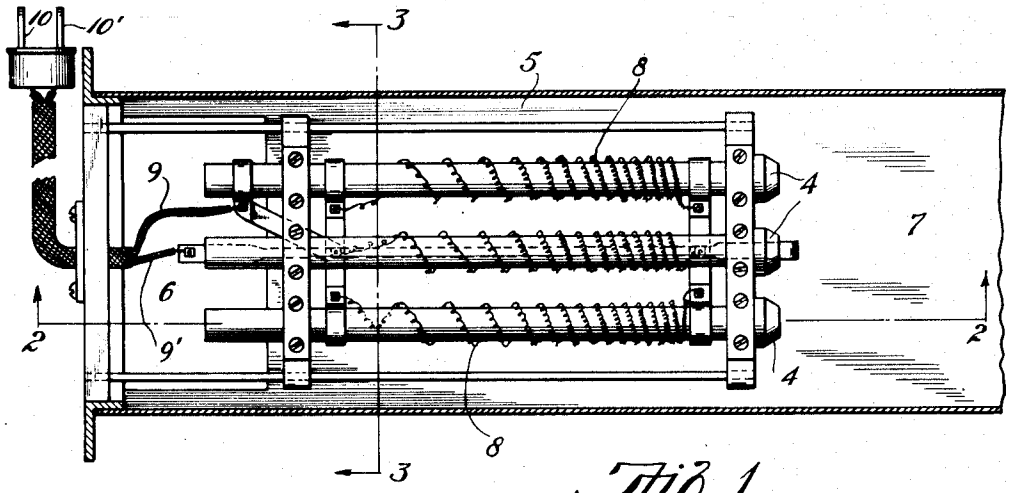



Fig. 1

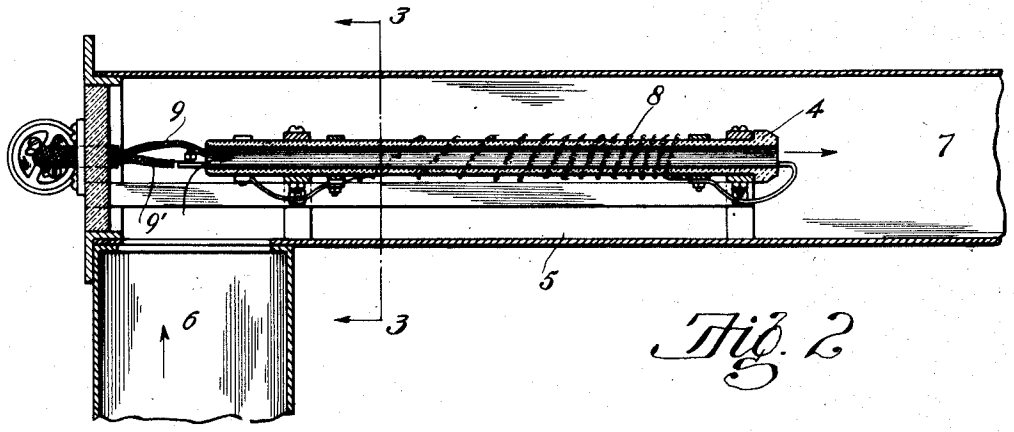



Fig. 2

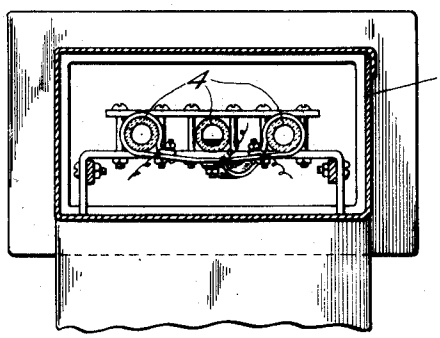



Fig. 3

Inventor

Joseph P. Burger

By Frease and Bond

Attorneys

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# UNITED STATES PATENT OFFICE.

JOSEPH P. BURGER, OF CLEVELAND, OHIO.

## ELECTRIC HEATING ELEMENT.

Application filed March 4, 1922. Serial No. 541,169.

*To all whom it may concern:*

Be it known that I, JOSEPH P. BURGER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Electric Heating Elements, of which the following is a specification.

The invention relates to heating elements for discharging heated air in a horizontal direction, as distinguished from the natural radiation or rising of heated air from the heater; and the object of the improvement is to induce a flow of heated air in any direction from the heater by a stronger current than can be created by the radiation or rising of heated air therefrom.

The present improvement involves the use of one or more tubular cores, preferably made of refractory material, and located in the direction of the axis or plane along which a current of heated air is to be induced or driven; and the use of resistance coils around the tubular cores so arranged and spaced as to heat the rear ends of the tubes to a greater intensity than the forward ends thereof, thereby setting up a strong current of air through the tubes from the cooler forward ends thereof and discharging the same from the hotter rear ends thereof.

A practical embodiment of the invention is illustrated in the accompanying drawings forming a part hereof in which—

Figure 1 is a plan view of a heating element longitudinally located in a case or flue;

Fig. 2, a longitudinal elevation section of the same on line 2—2, Fig. 1; and

Fig. 3, a cross section of the same on line 3—3, Figs. 1 and 2.

Similar numerals refer to similar parts throughout the drawings.

The heating element may include one or more tubular cores 4, preferably made of refractory material, which may be longitudinally located in a flue 5 having an inlet opening 6 at one end, referred to herein as the forward end, and a discharge opening 7 in the other end, referred to herein as the rear end.

Resistance coils 8, preferably arranged in multiple, are wound around the respective tubular cores, beginning at a substantial distance from the forward ends of the tubes, and having the coils and windings closer together at their rear ends than the forward ends thereof, so that the refactory cores will be very much more intensely heated at their forward ends than at their rear ends.

The resistance coils may communicate with an ordinary electric light circuit by means of conductor wires 9 and 9′ having terminal pins 10 and 10′ protruding outside the end of the case or flue, and adapted to be engaged by a suitable terminal socket or other means connected with the electric circuit.

When using resistance coils arranged to consume about one thousand watts per hour, the best results have been secured by the use of tubes about eighteen inches long with openings about five-eighths of an inch in diameter, with the windings as described; but it will be understood that these proportions may be varied to suit different conditions in the current and a different number and arrangement of tubes.

In operation, the resistance coils heat the surrounding air and the adjacent walls of the flue in the usual manner, and also highly heat the tubular cores to a greater intensity at the forward ends than at the rearward ends, thereby including a flow of air through the tubes into the cooler rear ends and discharging the same from the hotter forward ends thereof.

The hot air discharged from the forward ends of the tubes sets up a flow of the air which has been heated around the tubes, and carries it, together with the air discharged from the tubes, forward through the flue, and thereby creates and maintains a constant flow of hot air horizontally from the heater.

It will be understood that when more than one tubular core is used in a heating element, it is not necessary to arrange them parallel with each other, as shown in the drawings; for obviously they can be converged or diverged for concentrating or diffusing the flow of hot air therefrom. It is also obvious that the tubular cores need not be of the same diameter throughout their length, and that the differential heating action can be accomplished by a variation in the coils or by a variation in the winding of the resistance wire.

I claim:

1. An electric heating element including one or more tubular cores open at each end, and a resistance coil wound around each

core to heat one end more intensely than the other end thereof for inducing a flow of heated air through the core.

2. An electric heating element including one or more tubular cores open at each end, and a resistance wire wound around each core with the windings coverged toward one end thereof for inducing a flow of heated air through the core.

3. An electric heating element including one or more tubular cores open at each end and a resistance coil wound around each core with the coils formed closer to each other at one end than at the other end of the winding for inducing a flow of heated air through the core.

JOSEPH P. BURGER.