Nov. 17, 1925. 1,561,814

L. E. ASKE

ELECTRIC HEATER AND VAPORIZER

Filed June 19, 1923

Fig. 1.

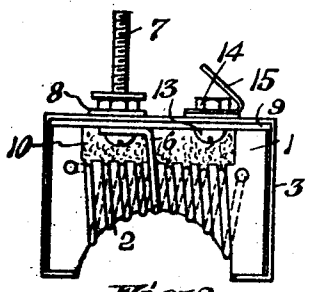


Fig. 2.

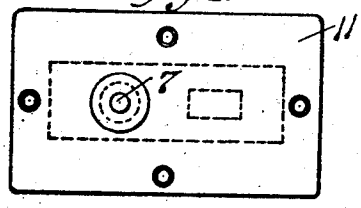


Fig. 3.
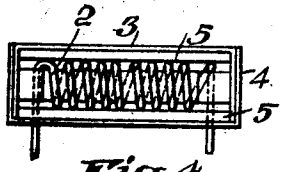
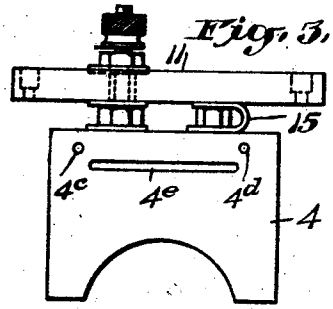




Fig. 4.

Fig. 6.

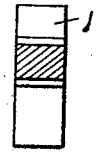


Fig. 7.

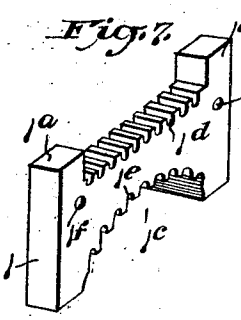


Fig. 11.

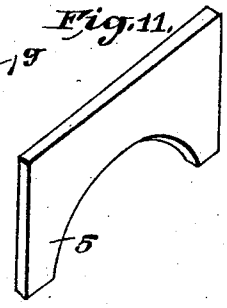


Fig. 8.

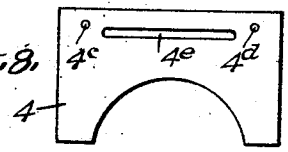


Fig. 12.

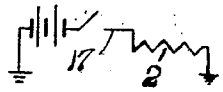


Fig. 9.

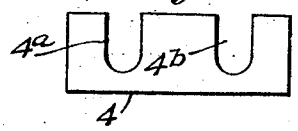


Fig. 13.

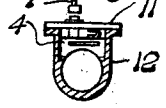
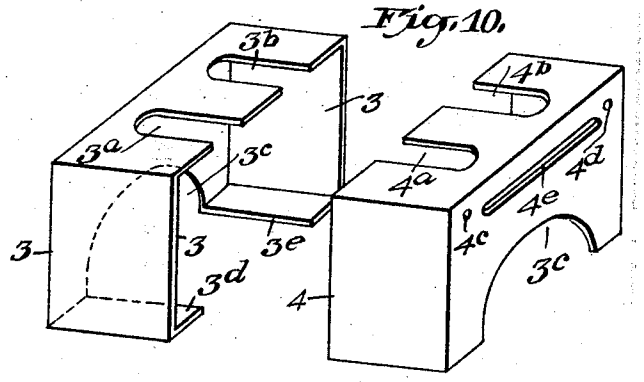


Fig. 10.



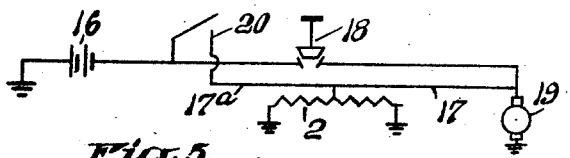


Fig. 5.

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attorney

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UNITED STATES PATENT OFFICE.

LEONARD E. ASKE, OF DULUTH, MINNESOTA.

ELECTRIC HEATER AND VAPORIZER.

Application filed June 19, 1923. Serial No. 646,336.

To all whom it may concern:

Be it known that I, LEONARD E. ASKE, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Electric Heaters and Vaporizers, of which I do hereby declare the following to be a specification.

My invention relates to electric liquid and gas heaters, or vaporizers and has for its object an improved heater or vaporizer which will absorb a quantity of moisture when cold and vaporize the absorbed quantity promptly when the electric current is turned on. It has for a further object the provision of an electric heater which will not materially reduce the transverse area of the liquid or gas conduit, and which will contact with the stream flowing there through and which will continuously receive liquid or wet vapor from said stream and heat and vaporize the quantity thus received and feed it back into said stream in a vaporized and highly heated condition, thereby avoiding recondensation of the vapor by the chilling of the same on the walls of the heater chamber or other comparatively cool surfaces.

With these and other objects in view, it consists of the structures, combinations and arrangements of parts hereinafter described and claimed.

In the drawings, Fig. 1 is an elevation of a portion of a heater case or housing, showing in side elevation a heating element positioned therein. Fig. 2 is a top plan of a cover for a vaporizer chamber, said cover being adapted to form a ground of a hereinafter described electric circuit. Fig. 3 is a side elevation showing said case and cover. Fig. 4 is a bottom plan view of said case, showing said element. Fig. 5 is a wiring diagram of an electric circuit, including said heater, a battery, circuit closers, and a starting motor. Fig. 6 is a central vertical transverse section through a coil frame. Fig. 7 is a perspective view of said frame. Fig. 8, is side elevation of one half of said heater case or housing. Fig. 9 is a top plan view of said half case or housing. Fig. 10 is a perspective view of said case or housing, showing the same in two sections drawn apart from each other. Fig. 11 is a perspective view of an absorbtive pad. Fig. 12 is a wiring diagram of a modified form of said heating element. Fig. 13 is a transverse section of a portion of a fuel conduit, as a carburetor throat, or manifold, showing my invention positioned therein.

In the drawings, 1 is a frame of any suitable insulating material, as porcelain, preferably provided at each end with upwardly extending shoulders, 1^a, 1^b, and having a concave or arched lower surface as at 1^c whereby said lower surface is adapted to conform approximately to a portion of the periphery of a liquid or vapor fuel passage, as in a carburetor throat, or manifold. The upper and lower faces of said frame are preferably transversely grooved intermediate of the ends, as at 1^d, 1^e, to facilitate winding and to retain the turns of the hereinafter described coil in proper position. Near each end of said frame is a transversely directed aperture 1^f and 1^g, respectively, for the passage of the opposite ends of a wire 2, which is coiled upon said frame intermediate of its ends. A case, or housing is provided for said frame and coil, which case preferably consists of two sections, 3 and 4, one of which, as 4, is adapted to telescope into the other, as 3. In the upper faces of each of the said sections, are formed transversely directed slots, 3^a 3^b and 4^a 4^b, respectively, open at the opposing edges of said sections, said slots in one section being adapted to register with said slots in the opposite section, so as to cooperate to form passages for the hereinafter described screws or posts. In one side of either of said sections, as 4, are preferably formed apertures 4^c 4^d for the passage of the opposite ends of said coil wire. In one side of each of said sections is preferably formed an elongated slot as 4^e for the intake of exhaust of liquid or vapor. The lower edges of the sides of both of said sections are arched, as at 3^c. The bottom of one of said sections preferably has inwardly directed end flanges or shelves formed thereon as at 3^d 3^e, upon which to rest the frame 1; but otherwise each of said sections is open at the bottom to expose the bottom of said coil. The sides of said sections are lined with absorbing pads, as 5, of any suitable material, preferably asbestos, adapted to absorb liquid or wet vapor to be heated and volatized, which pads preferably cover the slots 4^e and receive moisture there through.

In accordance with the wiring plan shown in Fig. 5, the coil being wound upon said frame, the ends of the coil wire are grounded

on one of said sections, as by being led through said apertures 4^c, 4^d, and soldered to the outer face of said section 4. A wire 6 is electrically connected to said coil intermediate of its ends and is secured to a binding post, 7, which extends through an insulating thimble, 8, (directed through said slots 3^a 4^a), and through an insulating plate or member 9 which is positioned within said housing and above said frame. Asbestos wool, or other suitable absorptive insulating material is preferably packed lightly into the space 10 between said plate 9 and said frame, intermediate of said shoulders 1^a and 1^b. Spaced above said housing is a cover 11 adapted to cover a chamber 12, formed in a fluid conduit as in a carburetor throat or a manifold. Secured to said housing in any suitable manner as by a screw 13 directed through said slots 4^a, 4^b, and a nut 14, is a spring contact 15, adapted to contact with said cover and thus indirectly ground the terminals of said coil wire.

In Fig. 5, 16 is a source of electricity, as a battery; 2 is said wire coil connected intermediate of its ends with one side of said battery by a wire 17 in which is interposed a circuit closer, 18, said coil being grounded at its opposite ends to form parallel circuits. A translation device, 19, as a starting motor for an automobile, is connected with said battery in parallel with said coil, as by said wire, 17 and circuit closer 18. If desired said coil (Fig. 5) may also be connected with one side of said battery independently of said motor by means of a wire 17^a and a circuit closer 20, thus permitting the operation of the heating element without the necessity of continuing the operation of the motor.

If desired, all of the turns of said coil may be in series as in the modified form shown in Fig. 12, in which the wire 17 is shown connected to one end of the coil 2 instead of to an intermediate turn thereof, and only one end of the coil is grounded.

In operation, the heating element is positioned in said case or housing and the terminal connections made with the binding post 7 and with the side of the housing as hereinbefore indicated. The housing is then inserted in said chamber of the fluid conductor, and said cover is secured thereto in any suitable manner as by screws, not shown, well known to the art. It will be observed that the lower bends of said coil are exposed to the main stream of fluid flowing through said conduit, but do not materially obstruct the fluid passage through said conduit. It will also be particularly observed that the approximately radial direction of the turns of the coil with respect to the axis of said conduit operates to form paths between the coils along which heated vapor tends to flow back to the main stream without obstruction and subject to volatizing heat along the whole course until it is mixed with said main stream. This is an important feature, since it has been found that unless the vapor is provided with a free and direct return path subject to a high degree of heat all the way until it rejoins the main stream, it tends to boil and condense and eddy and boil and recondense or to rejoin the main stream in a wet and inefficient condition. In operation, wet or cold liquid or fluid is absorbed by said pads through said slots, and is vaporized and highly heated and conducted downwardly by said paths between said coils to the main fluid stream with which it mixes and materially heats the same. When the current is turned off, a quantity of cold fluid is absorbed and held by said pads and absorptive packing, which are preferably in contact with said coil; thus when the current is again turned on and the coil heated there is present in the heater pads a quantity of fluid which is almost instantly vaporized and delivered at high temperature and in sufficient quantity to supply as many and as large cylinders as it is common to use for driving automobiles, thus avoiding the objection to certain types of vaporizers that the hot vapor is not furnished rapidly enough or in sufficient quantities to supply all of the driving cylinders of any well known automobile.

It is obvious that said construction may be modified in various particulars within the spirit and scope of certain of my claims.

What I claim is:

1. In an electric fluid heater or vaporizer, the combination of a frame or plate, of insulating material, having an arched lower edge, a resistance coil wound transversely upon said frame or plate, a housing for said coil open at the bottom and having arched lower edges conforming substantially to the arched lower edge of said frame, said coil being grounded at one end on said housing, a binding post insulated from said housing, said coil being electrically connected with the binding post.

2. The combination of a plate or frame of insulating material, said plate having an arched lower edge, of an electric resistance coil wound upon said coil, a housing for said frame and coil, said housing being open at the bottom and having arched lower edges conforming approximately to the arch of said plate, said housing having an aperture formed in one of its sides for the passage of fluid, said coil being electrically grounded at one end on said housing, a binding post insulated from said housing, said coil being electrically connected to said binding post.

3. The combination of a plate or frame of insulating material having an arched lower edge, an electrical resistance coil wound upon said frame from top to bottom,

a housing for said frame and coil, said housing being open at the bottom to expose the lower bends of said coil, said housing having arched lower edges adapted to conform approximately to the arch in said plate, said housing being lined in part with fluid absorbing pads, said coil being grounded at one end, a binding post insulated from said housing, said coil being electrically connected to said post.

4. The combination of a plate having an arched lower edge, of an electric resistance coil wound vertically upon said plate, a housing for said plate and coil, said housing comprising two opposing sections one of which is adapted to telescope into the other, each of said sections having an arched lower edge adapted to conform approximately with the arch of said plate, said sections having opposing slotted apertures formed in their overhead walls, the said slots in one of said sections being adapted to cooperate with the slots of the opposite said section to form approximately circular apertures when said sections are telescoped together, said coil being grounded at one end, a binding post extending into said housing and insulated therefrom, said coil being electrically connected to said post, and fluid absorbing means positioned in said housing.

5. The combination of a plate or frame, an electric resistance coil wound vertically upon said frame, a housing for said frame said housing being open at the bottom, said housing having intake apertures formed in its side walls, said coil being grounded at one end, a binding post insulated from said housing, said coil being electrically connected with said binding post, and fluid absorbing material positioned within said housing in close proximity to said coil.

6. The combination of a plate or frame, an electric resistance coil wound thereon, a housing for said frame and coil, said housing being open at the bottom, a cover extending over and spaced from said housing at an angle thereto, said coil being grounded at one end on said housing, a spring contact interposed between said housing and said plate and adapted to electrically connect said housing with said cover, a binding post extending through said cover and through the upper face of said housing, said post being insulated from said cover and housing, said coil being electrically connected to said post.

7. The combination with an electric resistance coil of absorbent material inclosing two sides and the bends at one end of said coil, the bends at the opposite ends of said coil being exposed.

8. The combination with a fluid conduit having an enlarged chamber formed therein, of moisture absorbing means within said chamber, and an electric resistance member within said chamber in close proximity to said absorbing means and partly covered thereby.

In testimony whereof, I hereunto affix my signature.

LEONARD E. ASKE.