(No Model.)

J. WIEST.

ELECTRICAL HEATING APPARATUS.

No. 389,729. Patented Sept. 18, 1888.

Fig. 1.

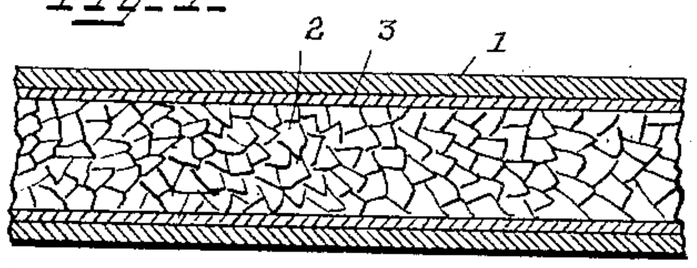


Fig. 2.

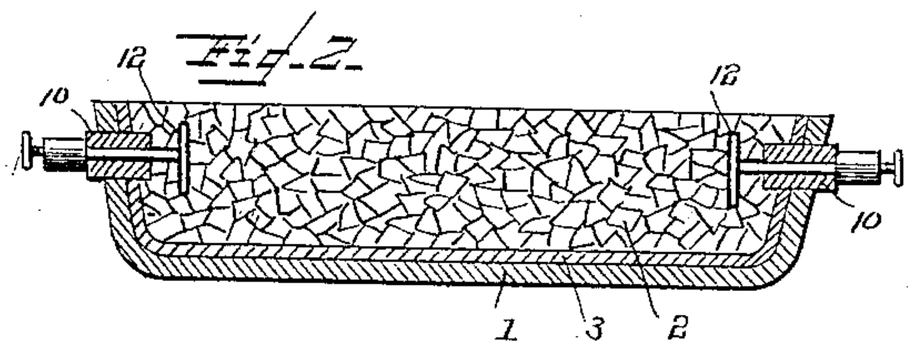


Fig. 3.

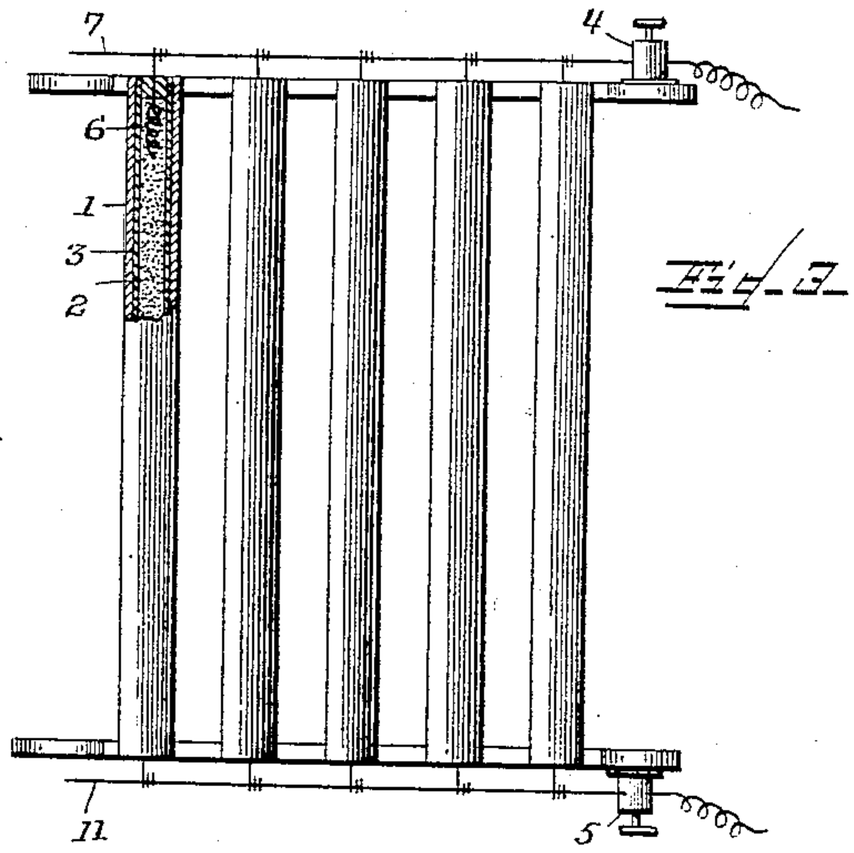


Fig. 4.

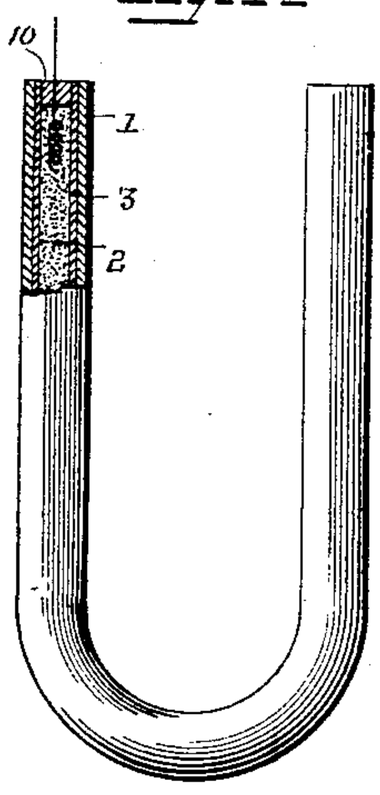


Fig. 5.

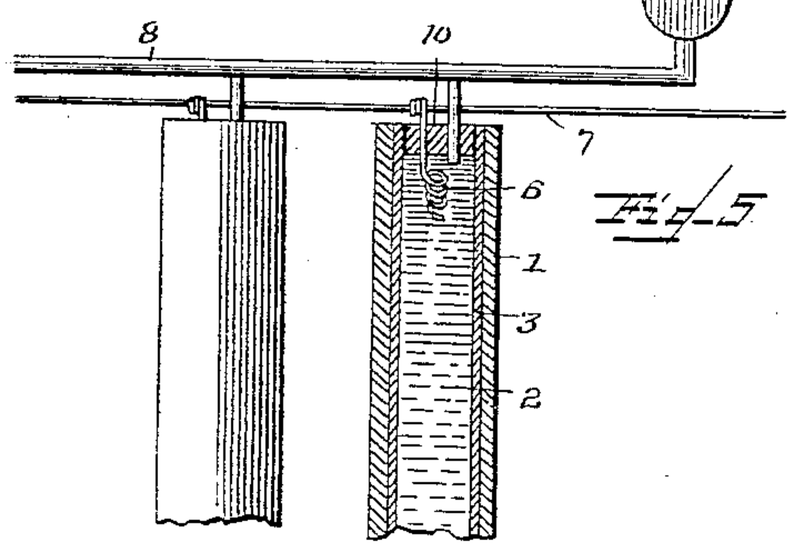


Fig. 6.

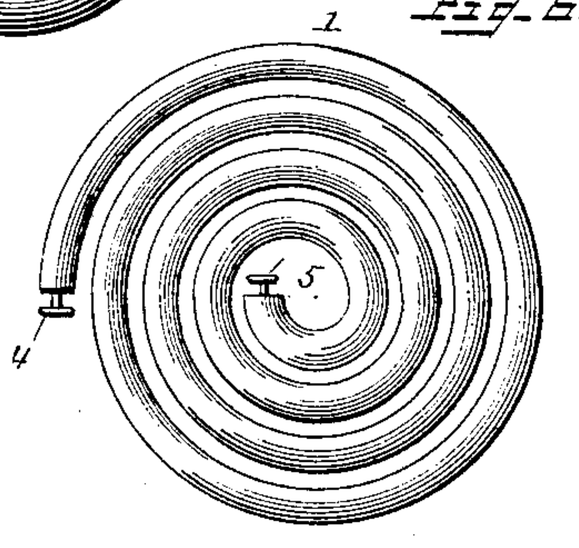
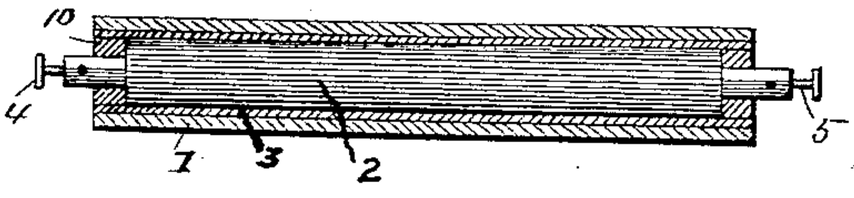


Fig. 7.



WITNESSES

Edwin L. Yewell,

E. H. Bond.

INVENTOR

John Wiest

by Robt. H. Read

his Attorney

UNITED STATES PATENT OFFICE.

JOHN WIEST, OF YORK, PENNSYLVANIA.

ELECTRICAL HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 389,729, dated September 18, 1888.

Application filed June 15, 1888. Serial No. 277,255. (No model.)

To all whom it may concern:

Be it known that I, JOHN WIEST, a citizen of the United States, residing at York, in the county of York and State of Pennsylvania, have invented certain new and useful Improvements in Electric Heaters; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to electric heaters, and has for its object the production of a device of this character which will yield a greater efficiency in the amount of heat developed from a given strength of current than any device heretofore brought before the public.

It has heretofore been proposed to develop heat from electricity by passing a current through a resisting metallic conductor; but the difficulty has been with systems involving this idea that the heat-radiating surface was necessarily very small in order to make the conductor of sufficient resistance to become hot. It has also been proposed to line a hollow metallic body with asbestus cloth as a heat-resisting and non-conducting material and convey a current through a suitable electric resisting material within the asbestus lining. The difficulty encountered with this system is that the asbestus is a very poor conductor of heat, both by reason of its nature and because of the air-spaces between the filaments of the fabric into which it is woven, so that but a very small proportion of the heat developed in the resisting electric conductor reaches the radiating-tube, which must distribute the heat to the outside air. By my invention these difficulties are overcome. I line a radiating metallic tube with a material which is at once a good conductor of heat and an insulator of electricity, and inclose within the tube a resisting material to carry the developing-current.

My invention therefore embodies a metallic heat-radiator separated from the resisting material by a heat-conducting and electric insulating substance—such as a silicate of an alkali or compound containing the same.

My invention also embodies certain specific features, which will be hereinafter fully described in this specification, and then clearly indicated in the appended claims.

In the accompanying drawings, Figure 1 shows a section of a metallic tube lined with my insulating heat-conducting material and filled with fragments of some poor conductor of electricity—as, for example, broken carbon. Fig. 2 is a sectional view of an open heater constructed in accordance with my invention. Fig. 3 is an elevation, partly in section, of a heater formed of a number of heat-radiating tubes. Fig. 4 is a detached bent tube, partly in section, which may in some cases be preferred to the straight tubes shown in Fig. 3. Fig. 5 is a view illustrating a form in which a liquid resistance is used as the heating medium. Fig. 6 represents a heater in the form of a coil. Fig. 7 is a sectional view showing a rod or stick of resisting material as the heating medium.

1 is a good heat conductor, as iron or brass. Gas-pipe answers well for cases in which tubing is used as the radiating-surface, as in Figs. 1, 3, 4, 5, 6, 7. These tubes are lined with a silicate of an alkali—as soda, potassa, or magnesia—alone or mixed with pulverized glass, pulverized earth, limestone, flint, or plaster-of-paris. The silicate in a fluid or pasty condition is applied to the inner face of the pipes and made to evenly coat the same, as shown at 3. It is then allowed to dry, preferably being baked at a moderate temperature. It becomes very hard and tenacious and adheres strongly to the surface of the metal. It is a good conductor of heat and an excellent insulator of electricity. The tubes are then filled with a comparatively poor conductor of electricity, 2. As shown in Figs. 1 and 2, broken retort-carbon or pieces of arc-light carbons are used. In Figs. 3 and 4 pulverized carbon is used. In Fig. 5 a resisting-liquid, as water, is used; in Fig. 7, a stick of carbon or carbon commingled with clay or other non-conducting material. I do not, however, restrict myself to any specific material or compound, as a wide range of materials may be adopted. These materials, however, should be such as do not contain moisture, unless means are provided for the escape of gases of decomposition.

The pipes are provided with conductors at

their ends, as 6, which are secured in position by plugs 10 of the silicate or silicate compound. In Fig. 3 a series of pipes is shown connected in a frame, the conductors 6 being connected to supply-conductors 7 11, which communicate with binding-posts 4 5, one at least of which is insulated from the frame. The heater may be given any desired form with a view to good radiating capacity. For example, it may consist of a series of parallel pipes, or a series of coils, such as shown in Fig. 6. If a liquid is used as the resisting material traversed by the heat-generating current, means for keeping up a supply and carrying off the gases should be provided, as shown in Fig. 5, where 8 is a supply-pipe connecting with a reservoir, 9, suitable branch pipes, as shown, leading into the respective pipes. Any gases electrolytically developed may find vent through these pipes. An open metallic dish may be lined with the compound, and suitable binding posts insulated by plugs 10 of the silicate provided, conductors 12 leading the developing current into the broken or powdered carbon. (See Fig. 2.) It will thus be seen that a large radiating surface is obtained, and the material in which the necessary resistance to develop the heat exists is brought close to said radiating surface, the space between the two being a heat-conductor, but electric insulator.

The silicate or silicate compound does not deteriorate, although the pipes be raised to a red heat, and does not crack from the expansion and contraction to which the pipes are subjected when in use. The pipes should be of such an internal diameter that when lined the broken carbon or other resisting material will have the proper resistance to utilize the current to best advantage, the tubes being longer or of less internal diameter when connected in multiple arc, as in Fig. 3, and of greater diameter when coiled, as in Fig. 6.

In operation the passage of a current of electricity through the broken carbon creates a great number of small arcs between adjacent fragments, and the heat from these arcs soon brings the mass of carbon and the containing-tube to a high heat. In addition to the heat of the arcs the carbon becomes heated from its inherent resistance to the flow of the current. The formation of the arcs, however, is one of the chief advantages derived from the use of fragments. The arcs form a scintillating mass of sparks scattered throughout the containing-vessel, and when the latter is open, as in a grate form, present a very beautiful appearance. An arc at any given point lasts only for a moment, until the electric resistance varies sufficiently to force the current to follow some less resisting path. The arcs thus keep shifting from point to point.

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

1. An electric heater comprising a metallic container or vessel having on its walls a lining of an adhesive film of insulating material and in contact with said film the electric resisting material.

2. In an electric heater, the combination of a metallic radiator, a coating for said radiator of a silicate of an alkali, an electric resisting material in contact with the silicate coating, and supply-conductors for making circuit-connections.

3. In an electric heater, the combination of a metallic tube, a lining for said tube of an alkali-silicate compound, a filling within the lining of broken or pulverized carbon, and supply-conductors for making circuit-connections with the carbon.

4. In an electric heater, the combination of a heat-radiating surface lined with silicate of soda applied in a fluid state, an electric resisting material within the lining, and conductors for supplying current to the resisting material.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN WIEST.

Witnesses:
J. O. BAUGHMAN,
B. F. HUBLEY.