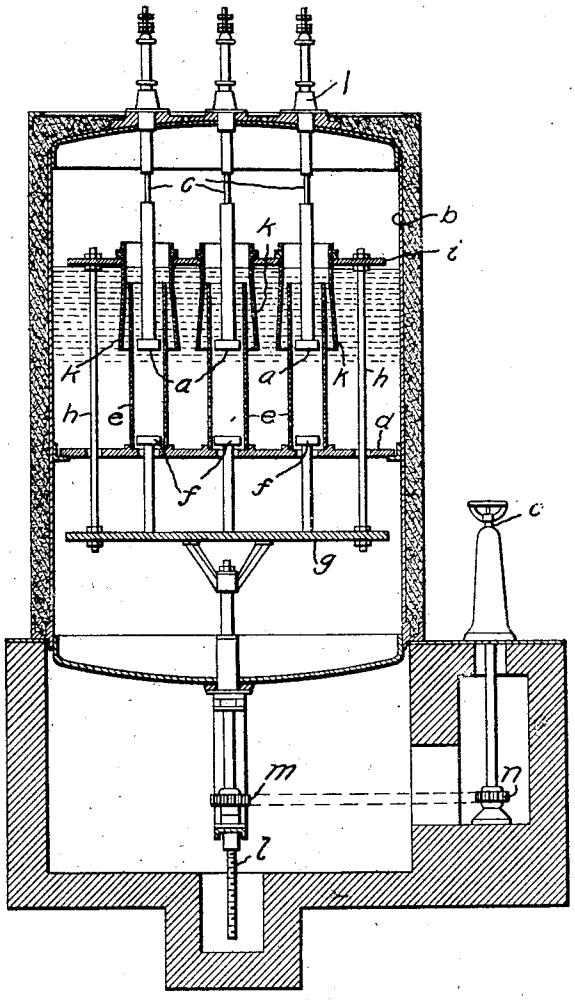
Feb. 17, 1925. 1,526,759

P. RAUCHFUSS

ELECTRIC HEATER

Filed Nov. 1, 1922



Inventor:
Paul Rauchfuss;
by Albert G. Davis
His Attorney.

Patented Feb. 17, 1925. 1,526,759

UNITED STATES PATENT OFFICE.

PAUL RAUCHFUSS, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC HEATER.

Application filed November 1, 1922. Serial No. 598,402.

To all whom it may concern:

Be it known that I, PAUL RAUCHFUSS, a citizen of the German Realm, residing at Berlin, Germany, have invented certain new and useful Improvements in Electric Heaters, of which the following is a specification.

This invention relates to electric heaters, particularly to those provided with stationary electrodes having stationary tubes placed over them, such for example, as used in steam boilers, and has for its object the provision of means whereby such heaters may be regulated in a simple, reliable and efficient manner.

In one form of my invention, the regulation or variation of the resistance of the path of the liquid forming the heating resistance between the electrodes is accomplished by the lifting and lowering, or the approach and withdrawal of counter-electrodes inside the stationary insulating tubes, which counter-electrodes form the neutral point of a three-phase supply source, and by the simultaneous lifting and lowering of special conical insulating cylinders arranged above the stationary insulating tubes. The movement of the counter-electrodes and of the insulating cylinders may to advantage be accomplished by means of a common rod through the cooperation of rack-bars, spindles, gear wheels or some transmission of similar character, from a conveniently accessible regulating rod. By means of the simultaneous actuation of the counter-electrodes and of the conical insulating cylinders, a very gradual and extremely fine regulation is obtained without danger of a sudden rush of current or similar occurrence.

One illustrative embodiment of the invention is shown in longitudinal section in the drawing:

Referring to the drawing, the electrodes *a* are arranged rigidly on the current supply rods *c* which are inserted, insulated, in the boiler *b* so as to be immersed in the liquid to be heated, and are surrounded by the insulating tubes *e* mounted rigidly on a suitable foundation *d*. The oppositely mounted counter-electrodes *f*, which also extend into the insulating tubes *e*, are attached to a common holder *g* and form the neutral point of a three-phase electrical supply system, that is, they are, like the boiler itself, connected to the ground. The holder *g* moreover carries a frame *i*, by means of the rods *h* which pass loosely through the foundation *d*, to which frame are attached special conical insulating cylinders *k* which are placed over the free open ends of the insulating tubes *e*. The holder *g* may be lifted and lowered from the regulating rod *o* from below through the cooperation of the rack-bar or spindle *l* and the gear wheel transmissions *m* and *n*. By lifting or lowering the holder *g* the electrodes *f* are brought toward and removed from the electrodes *a* proper, and also the insulating cylinders *k* are at the same time slipped more or less over the insulating tubes *e*. Accordingly, the path of the liquid is varied between the electrodes *a* and the oppositely situated electrodes *f* within the insulating tubes *e*, as well as between the insulating tubes *e* and the insulating cylinders *k*, whereby the path of the liquid between the electrodes *a* themselves is varied. In this way there results a very finely graduated, and very gradual variation of the resistance of the liquid, and with it a very effective regulation of the consumption of energy.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An electric heater for liquids comprising a plurality of stationary electrodes immersed in the liquid to be heated, stationary and movable insulating members surrounding one of said electrodes, a movable electrode cooperating with one of said stationary electrodes, and means for adjusting said movable electrode and said movable insulating member so as to simultaneously vary the liquid path between said movable electrode and its cooperating stationary electrode and between said stationary electrodes themselves.

2. An electric heater for liquids comprising a plurality of stationary electrodes immersed in the liquid to be heated, stationary insulating tubes surrounding said electrodes, movable insulating cylinders cooperating with said insulating tubes, movable electrodes cooperating with said stationary electrodes, means for adjusting said movable electrodes, and an operating connection between said insulating cylinders and said movable electrodes, whereby the path of the liquid may be varied simultaneously between said stationary and movable electrodes and

between said stationary electrodes themselves.

3. An electric heater for liquids comprising a plurality of stationary electrodes, stationary insulating tubes surrounding said electrodes, oppositely situated electrodes movable in said insulating tubes, movable conical insulating cylinders surrounding said stationary electrodes and cooperating with said stationary insulating tubes, and an operating connection between said insulating cylinders and said movable electrodes so that the path of the liquid may be varied simultaneously between said stationary and movable electrodes and between said stationary electrodes themselves.

4. An electric heater for liquids comprising a plurality of stationary electrodes, stationary insulating tubes surrounding said electrodes, oppositely situated movable electrodes in said insulating tubes, said movable electrodes being connected to the neutral point of the source of electrical supply for said stationary electrodes, movable conical insulating cylinders surrounding said stationary electrodes and cooperating with said stationary insulating tubes, a support for said movable electrodes and said cylinders, and operating mechanism for adjusting said support so as to vary the liquid path simultaneously between said stationary and movable electrodes and between said stationary electrodes themselves.

In witness whereof, I have hereunto set my hand this 9th day of October, 1922.

PAUL RAUCHFUSS.