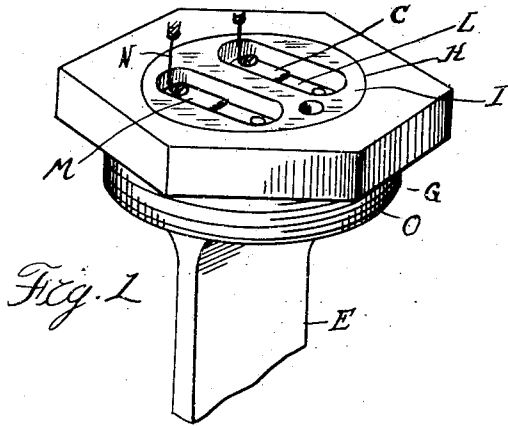
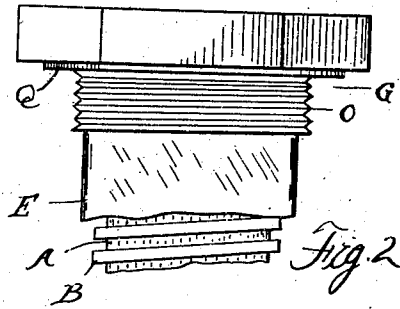
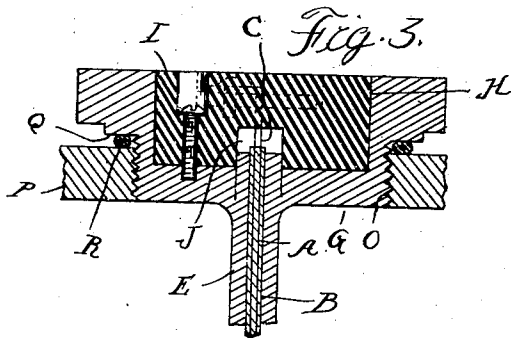
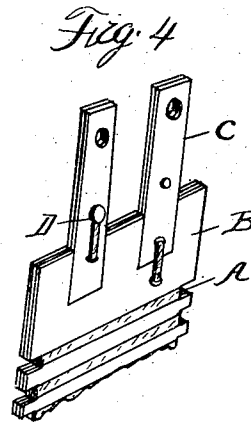
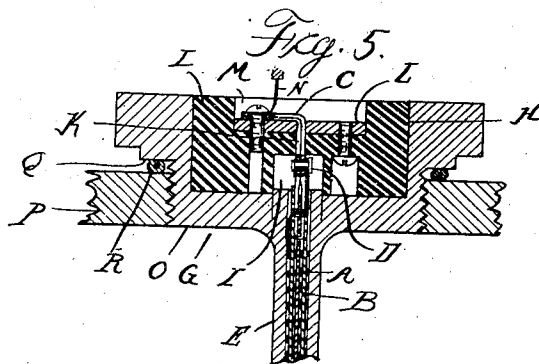


F. KUHN AND J. A. HAND.
ELECTRICAL HEATING UNIT.
APPLICATION FILED JAN. 25, 1919.

1,376,209.

Patented Apr. 26, 1921.



Inventors
Frank Kuhn
Jay A. Hand

By Whittmore Hulbert & Whittmore

Attorneys

UNITED STATES PATENT OFFICE.

FRANK KUHN AND JAY A. HAND, OF DETROIT, MICHIGAN, ASSIGNORS TO AMERICAN ELECTRICAL HEATER COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

ELECTRICAL HEATING UNIT.

1,376,209.

Specification of Letters Patent.

Patented Apr. 26, 1921.

Application filed January 25, 1919. Serial No. 273,080.

To all whom it may concern:

Be it known that we, FRANK KUHN and JAY A. HAND, both citizens of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful improvements in Electrical Heating Units, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to armored electrical heating units designed for immersion in liquids, and the invention consists in the construction as hereinafter set forth.

In the drawings:

Figure 1 is a perspective view of the unit;

Fig. 2 is a side elevation thereof;

Fig. 3 is a longitudinal section;

Fig. 4 is a perspective view of the resistor element detached from its armor;

Fig. 5 is a section similar to Fig. 3 but in the plane of one of the terminals.

For use in water heaters and for similar purposes it is frequently desirable to provide for the insertion of the heating unit through the wall of the container. This necessitates a waterproof armor for the resistor and also means for forming a watertight joint with the casing. This we have accomplished by the combination of a closure plug or cap and a projecting seamless casing integrated therewith, having its outer end in open communication with a recess in the plug. Within this recess an insulator conductor block is located and the connections between the terminals of the resistor and the external conductors are mounted on this block. Thus the resistor and its connections are protected from moisture and the unit may be readily inserted or removed from the liquid container.

In detail, A is the resistor, which is preferably wound upon a flat core B, having notched edges and formed of mica or other suitable insulating material. C are terminals formed of strips of sheet-metal, which are mechanically connected to the core B by threading through a slit therein and bending to form a loop, as shown in Fig. 5. The end of the resistor is preferably passed through an aperture in the terminal strip and then secured by a rivet D, which also serves to clamp the two plies of the strip to each other. E is a metallic housing or armor,

preferably formed of a piece of seamless tubing, which is flattened and has one end, F, closed by welding or in any other suitable manner. G is a plug or cap to which the outer end of the tube E is attached, preferably by electric welding. The plug G is recessed at H and the tube E is in open communication with this recess so that the insulated resistor element may be inserted through the open end, leaving the terminals C projecting upward in the recess. After insertion of the insulated resistor the tube E is flattened under pressure so as to force the walls thereof into clamping engagement with the insulated resistor and to also form good heat conducting contact. I is an insulator block inserted in the recess H, said block being slotted transversely on its inner face, as indicated at J, to form a clearance for the projecting portion of the core B and overlying insulator strips. The terminals C pass through slits K in the block I and are then bent over and secured to connector plates L located in recesses M in the outer face of the block. The external conductors N are also attached to the connectors L and thus the electric circuit is completed.

The plug G is preferably provided with a threaded portion O which is adapted to engage a correspondingly threaded aperture in the wall of the container P. Outside of this threaded portion is a seat portion Q which may be engaged with a suitable gasket R to form a liquid-tight seal. The projecting portion of the plug is preferably polygonal for convenience in engaging a wrench or other tool for screwing it into the casing.

The construction described is one particularly adapted for commercial manufacture, inasmuch as the electrical unit and the armor therefor may be separately constructed. Thus the tube E may be flattened, closed at its lower end and welded at its outer end to the threaded plug G. The electrical unit comprising the core B, resistor A and outer insulator strips S may then be inserted through the open outer end of the tube E and secured by the compression of the tube, as before described. The block I may then be inserted, the terminals C being threaded through the slits in said block and then bent down and secured to the connector plates L in the recesses M. Thus the work of assembly requires little skill and no elec-

trical knowledge, while the work of forming the armor and plug is purely mechanical. The joint between the tube E and plug is preferably welded and by flowing in molten metal a fillet is formed at each side, increasing the strength and insuring a perfect water seal.

What we claim as our invention is:

1. An electrical heating unit, comprising a flattened tube closed at one end, a plug or cap secured to the opposite end and recessed to be in open communication with the interior of the tube, an insulated resistor inserted in the flattened tube, said insulated resistor and flattened tube being in good heat conducting engagement, a terminal on said resistor projecting into the recess in the plug, an insulator block in said recess slitted for the passage of said terminal therethrough, and means for connecting said terminal to external conductors mounted on said insulator block.

2. An electrical heating unit, comprising a flattened seamless tube closed at one end, a threaded plug integrated with the opposite end of said tube, said plug having a recess in open communication with the interior of the tube, an insulated resistor inserted in said tube and projecting into said recess, an insulator block in said recess slot-

ted on its under side to receive the projecting portion of the insulated resistor, a terminal mechanically connected to the insulator of said insulated resistor and electrically connected with the resistor, said terminal passing through a slit in said block, and means for connecting said terminal with the external conductor mounted on said block.

3. An electrical heating unit, comprising a flattened tube closed at one end, a plug or cap integrated with the opposite end and provided with a recess into open communication with the interior of the tube, a flat insulator core, a resistor mounted on said core, a terminal in the form of a loop passing through a slit in the insulator core to form a mechanical connection therewith, said terminal being electrically connected with the resistor, an insulator block in said recess slitted for the passage of the terminal therethrough, the projecting portion of said terminal being bent over said block to retain the same, and means mounted on said block for connecting said terminal to the external conductor.

In testimony whereof we affix our signatures.

FRANK KUHN.
JAY A. HAND.