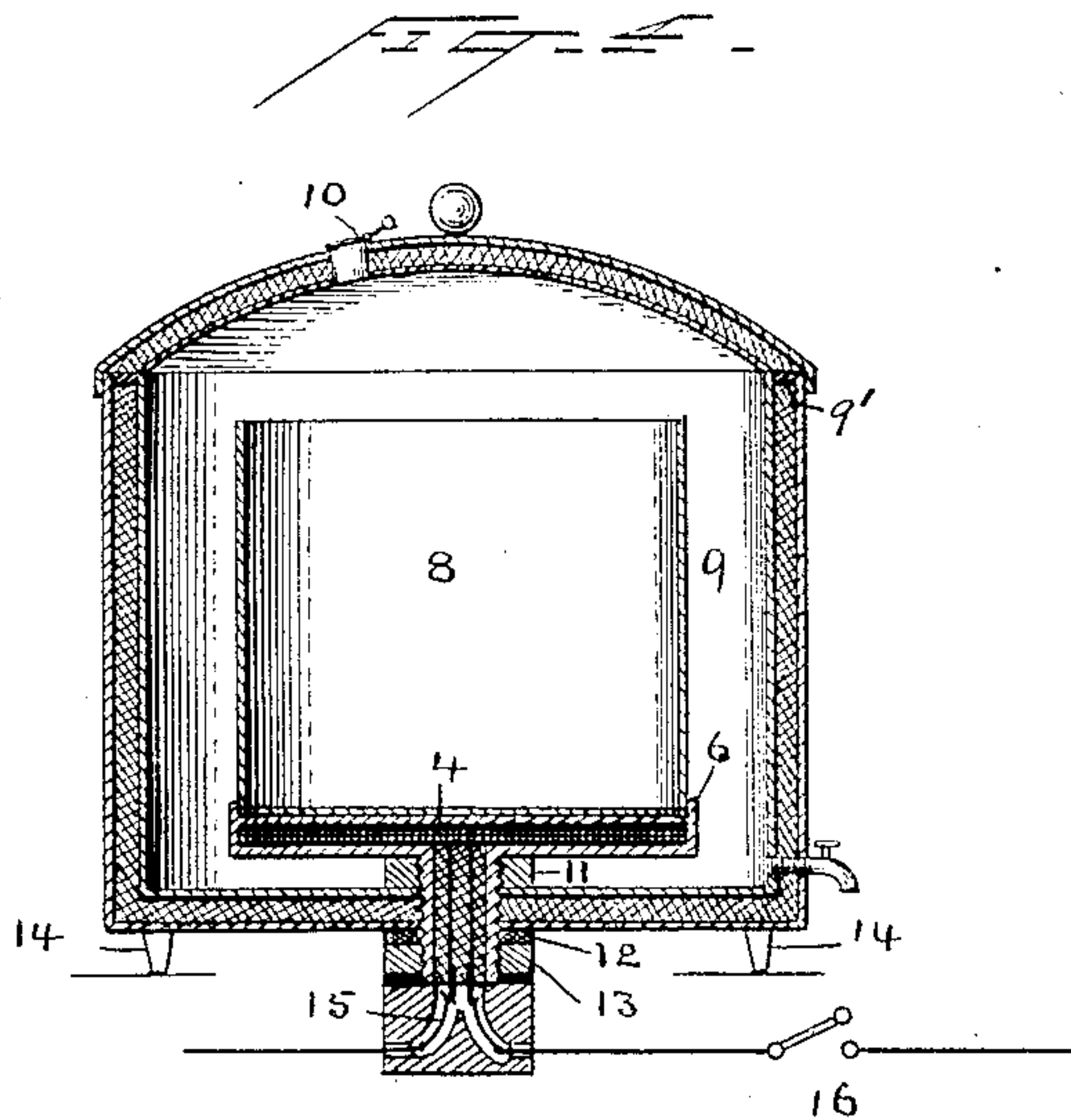
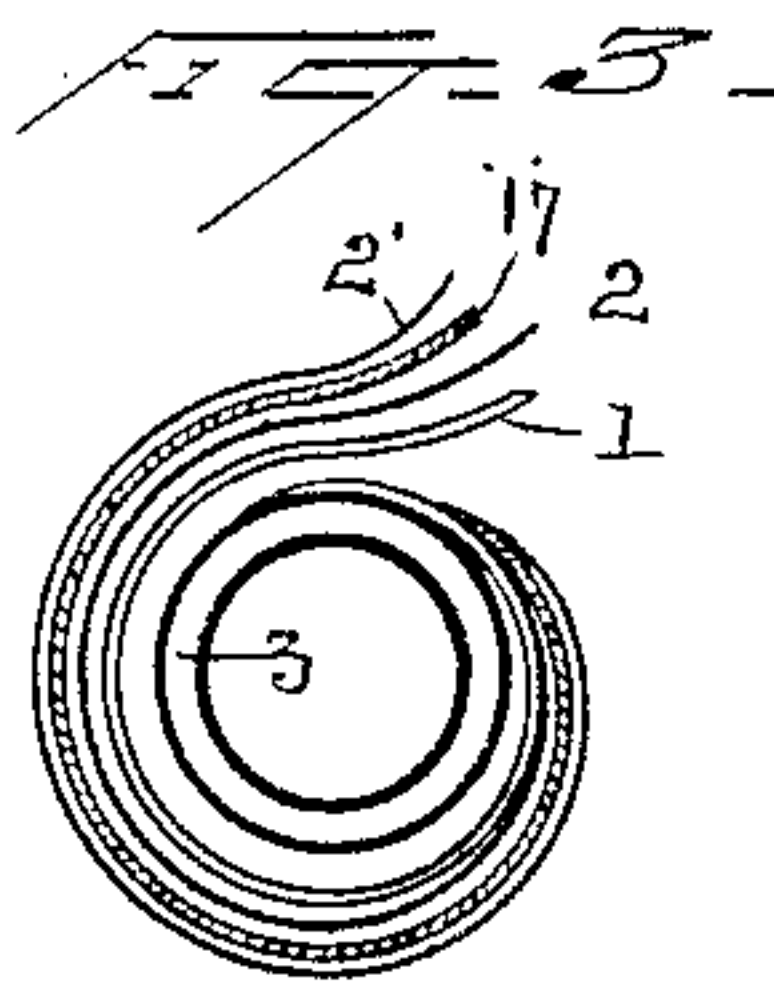
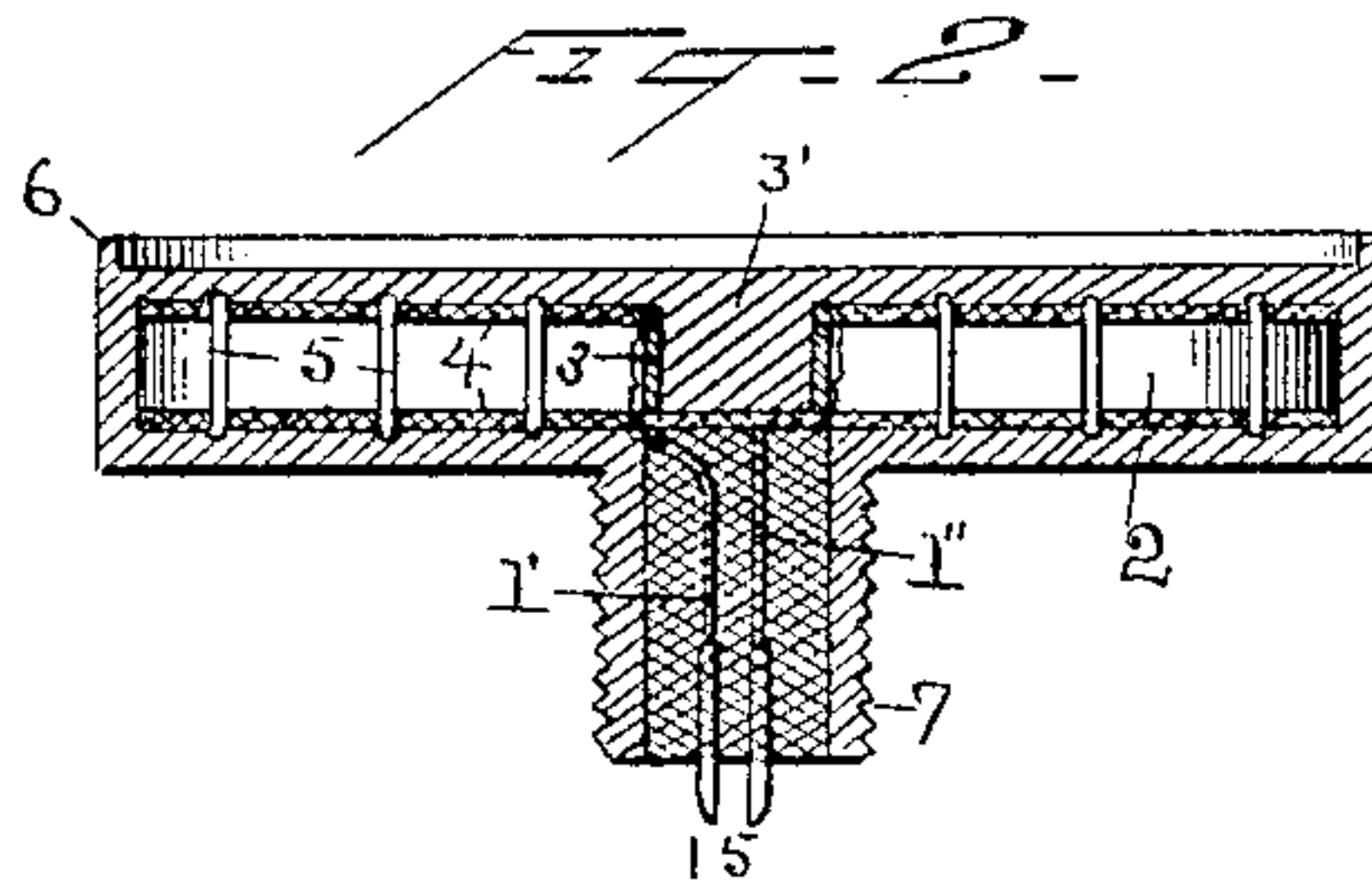
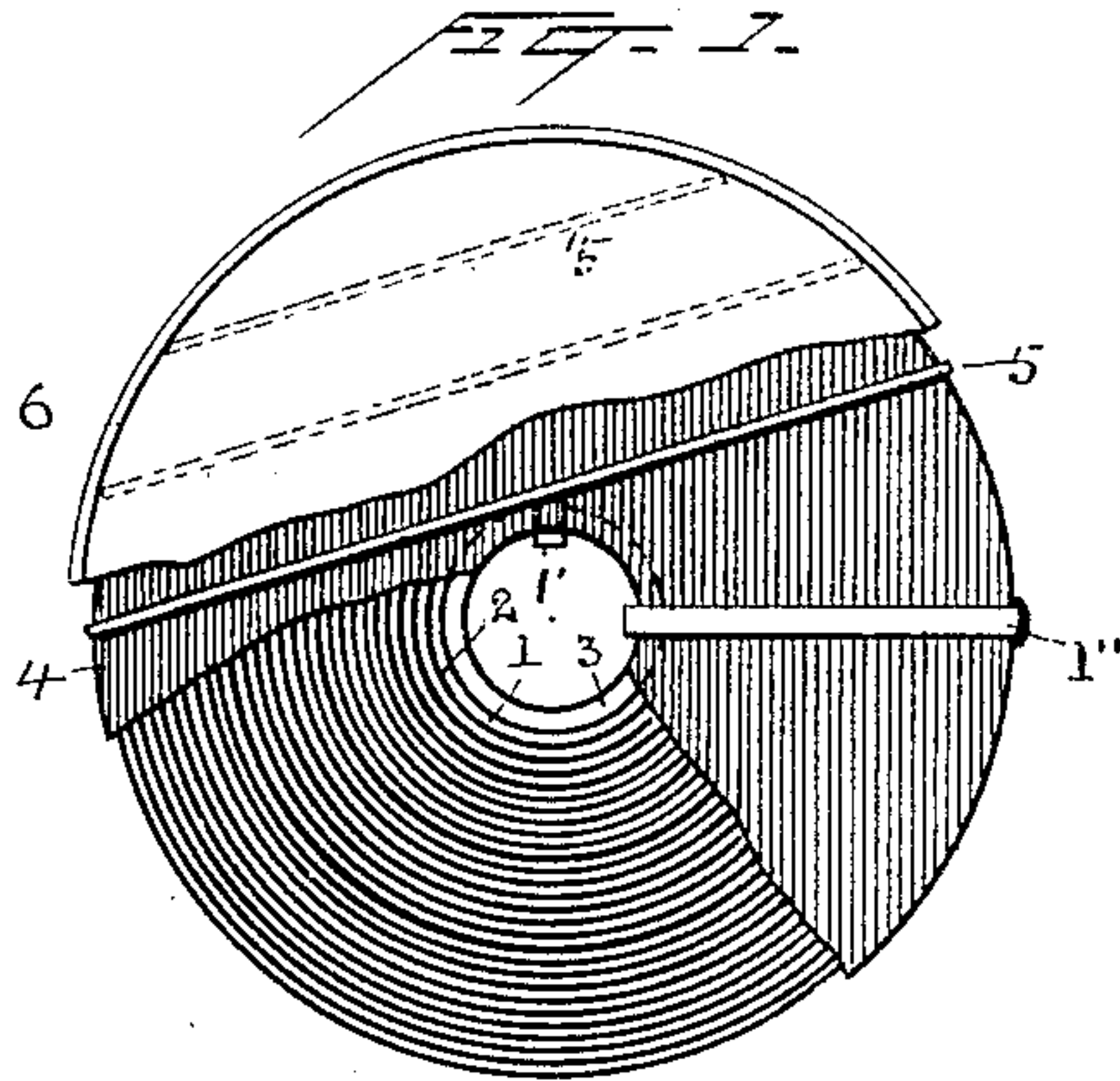


(No Model.)

J. V. CÀPEK.  
ELECTRIC HEATER.

No. 461,814.

Patented Oct. 27, 1891.



Witnesses  
Morris A. Clark  
*[Signature]*

Inventor  
J. V. CÀpek  
By his Attorneys  
*[Signature]*

# UNITED STATES PATENT OFFICE.

JOHN V. CÀPEK, OF NEW YORK, N. Y.

## ELECTRIC HEATER.

SPECIFICATION forming part of Letters Patent No. 461,814, dated October 27, 1891.

Application filed October 30, 1890. Serial No. 369,801. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN V. CÀPEK, a citizen of the United States, residing at New York city, have invented a certain new and useful Improvement in Electrical Heaters or Cooking Apparatus, of which the following is a specification.

My invention relates to electrical heaters, and especially to that class of heaters employed for cooking purposes.

My object is to provide a heater which shall be of simple construction and which shall be durable and of proper form and construction for the use to which it is applied; and the invention consists in the electrical heater and in the several combinations and features of construction hereinafter fully described, and specifically claimed.

In the accompanying drawings, which illustrate the invention, Figure 1 is a plan view of the heater proper, portions thereof being broken away to show the internal construction. Fig. 2 is a central section of said heater. Fig. 3 shows a modified arrangement of the heater-conductor, and Fig. 4 shows a cross-section of the heater in place in an inclosing vessel or oven.

The heating-conductor is preferably a narrow metal strip—for example, a strip of German silver of from one to three-sixteenths of an inch in width. Said conductor is wound into the form of a volute or flat spiral, the several turns being insulated from each other by a strip of insulating and heat-resisting material, such as prepared asbestos. The conducting and insulating strips are wound around a disk, or preferably a metal ring, the surface of which is insulated, said ring forming a core or support for the coil. In winding the conductor thereon that end of the conductor with which the winding is begun is allowed to project to one side of the ring, and when the coil is completed the opposite end of the conductor is bent and carried across one surface of the coil, but insulated therefrom, and is bent down through said ring. Both ends of the conductor are preferably connected with an enlarged brass or other metal contact-piece, as will be hereinafter described.

In the drawings, 1 is the heating-conductor,

and 2 the insulating-strip wound with said conductor.

3 is the insulated ring, around which the conductor and strip are wound. The end 1' of the conductor 1 is brought up to the ring from below, the conductor being then bent and wound around the ring in a plane parallel with the ring until a sufficient quantity has been wound, when the end 1'' is bent across the coil, as shown, and carried down through the ring.

4 is a sheet or film of insulating material placed over the coil. A similar sheet or film is placed over the opposite side of the coil. By this arrangement the top, bottom, and periphery of the heater are thoroughly insulated. If the insulating-strip used is wider than the conducting-strip, the conductor might be sufficiently insulated without the sheets just described. Around this insulated body I wind a wire of iron or other suitable metal, as indicated at 5, although in practice the turns of the wire are only about one-eighth of an inch apart. I then place the body in a suitable mold and cast a casing of iron, brass, or other suitable material around it in such manner as to cover and protect it. The object of coiling the wire, as described, is to form a firm union between the insulating-body and the casing.

To obviate the formation of air-holes in the casting, the conductor is previously heated, preferably by sending a current through it, whereby the air is expelled. Such heating will have the further advantage that it will make it possible to cast the metal at a slightly lower temperature than would otherwise be the case, so that the danger of melting the conductor during the operation is avoided. The casting is preferably made with a raised rim or edge 6, and also with a projecting part 7, which may be tubular and screw-threaded on its outer surface. It will be seen that the casting fills the space formed by the ring 3, as clearly shown at 3'. Around the conductors in this tubular extension is placed a suitable insulating material.

In Fig. 4 the heater is shown in place in condition for use. On the casting of the heater is a vessel 8, within the larger vessel or oven 9, said oven preferably having double



walls, with intermediate non-heat-conducting material, and having a cover similarly made and provided with an escape-valve 10 for steam. Vessel 8 in reality forms a permanent  
 5 part of the heater, and an additional cup or vessel containing material to be heated may be placed within 8. The two walls of the oven are held in proper relative position by a ring 9'. This ring also confines the non-  
 10 conductor of heat in the annular space between the inner and outer walls. The tubular extension of the heater is provided with a washer 11, of metal or some material not injured by the degree of heat to which it will  
 15 be subjected, which serves as a distance-piece to hold the heater above the bottom of the inclosing-chamber. On the extension outside of the inclosing wall is placed a washer 12, preferably of rubber, and a clamp-  
 20 ing-nut 13 for securing the parts together. With this arrangement a water-tight joint is formed around the tubular extension. The oven is provided with projecting lugs 14, which serve as legs. The conductor of the  
 25 heater may be connected to the circuit in any desired manner; but it is found convenient to arrange the circuit-terminals as indicated in Fig. 4, so that when the heater and oven are set in place the circuit will be automati-  
 30 cally made.

15 are the circuit-terminals, and are so arranged that when the oven is put in place over said terminals they make contact with the two ends of the heating-conductor, as will  
 35 be evident from the drawings.

16 is a switch for making and breaking the circuit independently of the heater.

In some cases it may be desirable to make heaters larger than they would be if made by  
 40 coiling a single conductor and insulating-strip of the necessary length. To do this I coil with the conductor and said insulating-strip one additional insulating-strip 2' and a copper strip 17, (which is entirely discon-  
 45 nected from the heating-conductor,) said copper strip serving not only to expand the heater, but as a heat-conveyer between the conductor of the heater and the casing.

In using the apparatus which I have de-  
 50 scribed it is evident that one material to be cooked may be placed in the central vessel and a different material in the outer or inclosing vessel, and both will be simultaneously cooked by the single heater, which heater forms  
 55 a support for the inner vessel. A cock is shown for drawing water from the outer vessel.

The arrangement of the heating-conductor which I have described—that is, the volute spiral formed of a conducting-strip—I con-  
 60 sider very important, since it enables me to accommodate a very long conductor in a small compass, and it allows a quicker and simpler mode of winding than any other form.

It will be obvious that the apparatus may  
 65 be varied in many details without departing from my invention. The rim around the edge of the casting is not essential. This might be

omitted and a similar rim be made to project downward from the vessel 8. So, too, the means for insulating the conductor may be  
 70 different from that described; but

What I claim is—

1. The combination, in an electrical heater, of a heating-conductor in the form of a volute spiral, the several turns being separated and  
 75 covered by insulating material, and an impervious casing therefor, substantially as described.

2. The combination, in an electrical heater, of a conductor in the form of a strip or rib-  
 80 bon wound in a volute spiral, the several turns being separated by insulating material, and a casing therefor, substantially as described.

3. The combination, in an electrical heater, 85 of a heating-conductor in the form of a volute spiral, the several turns being separated and covered by insulating material, and a cast-metal casing inclosing the insulated conductor, substantially as described. 90

4. The combination, in an electrical heater, of the heating-conductor in the form of a volute spiral wound on a central support, the several turns being separated and covered by  
 95 insulating material, an impervious casing therefor, and conductor-terminals extending to the outside of the casing, substantially as described.

5. The combination of an electrical heater, an oven inclosing the heater, and conductors  
 100 extending from the heater through the walls of the oven and terminating in contact plates or blocks held in position to make contact with terminals of the supply-circuit, substan-  
 105 tially as described.

6. The combination, in an electrical heater, of a heating-conductor in the form of a volute spiral wound on an insulated metal ring, the several turns of the conductor being separated and covered by insulating material, a casing  
 110 therefor, and conductor-terminals extending to the outside of the casing and held in position to co-operate with circuit-terminals, substantially as described.

7. An electrical heater consisting of an in-  
 115 sulated heating-conductor and an integral casing of cast metal inclosing the heater, substantially as described.

8. An electrical heater consisting of a heating-conductor, an insulating-strip wound to  
 120 form a volute spiral, and a casing of cast metal, substantially as described.

9. An electrical heater consisting of an in-  
 125 sulated heating-conductor and an insulating-strip wound to form a volute spiral, a winding of wire over the insulating material, and a casing of cast metal, substantially as described.

10. An electrical heater consisting of an in-  
 130 sulated heating-conductor, a winding of wire over the same, and a casing of cast metal, substantially as described.

11. An electrical heater consisting of a heating-conductor in the form of a volute spiral



and a casing of cast metal having a tubular extension, substantially as described.

12. An electrical heater consisting of a heating-conductor in the form of a volute spiral  
5 and a casing of cast metal having a tubular extension, the heating-conductor having terminals passing through said extension, substantially as described.

13. An electrical heater consisting of an insulated conductor and a metal casing therefor  
10 with raised edge, substantially as described.

14. An electrical heater consisting of an insulated conductor and a casing therefor with raised edge, in combination with a vessel fitting the same, substantially as described.  
15

15. The combination of an electrical heater, the casing of which has an extension, through which pass the supply-conductors, and which heater is adapted to support a vessel directly  
20 thereon, and an inclosing vessel therefor, substantially as described.

16. The combination, with an inclosing oven or vessel and an electrical heater therein, of a cover for the oven and an escape-valve in  
25 said cover, substantially as described.

17. An electrical heater consisting of a heating-conductor, and a casing having an extension

which forms a support for the heater, in combination with an inclosing vessel or oven, substantially as described. 30

18. An electrical heater consisting of a heating-conductor, and a casing having an extension which forms a support for the heater, in combination with an inclosing oven, a washer or packing forming a water-tight joint, and  
35 means for holding the heater in place, substantially as described.

19. An electrical heater consisting of a conductor, an insulating-strip therefor, and a spacing-strip, said conductor and strips being in the form of a volute or flat spiral, substantially as described. 40

20. An electrical heater consisting of a conductor, an insulating-strip therefor, and a heat-conducting strip, said conductor and  
45 strips being in the form of a volute or flat spiral, substantially as described.

This specification signed and witnessed this 15th day of October, 1890.

JOHN V. CÀPEK.

Witnesses:

CHARLES M. CATLIN,  
E. COURAN.