

No. 746,128.

PATENTED DEC. 8, 1903.

J. F. McELROY.
ELECTRIC HEATING ELEMENT.

APPLICATION FILED AUG. 31, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

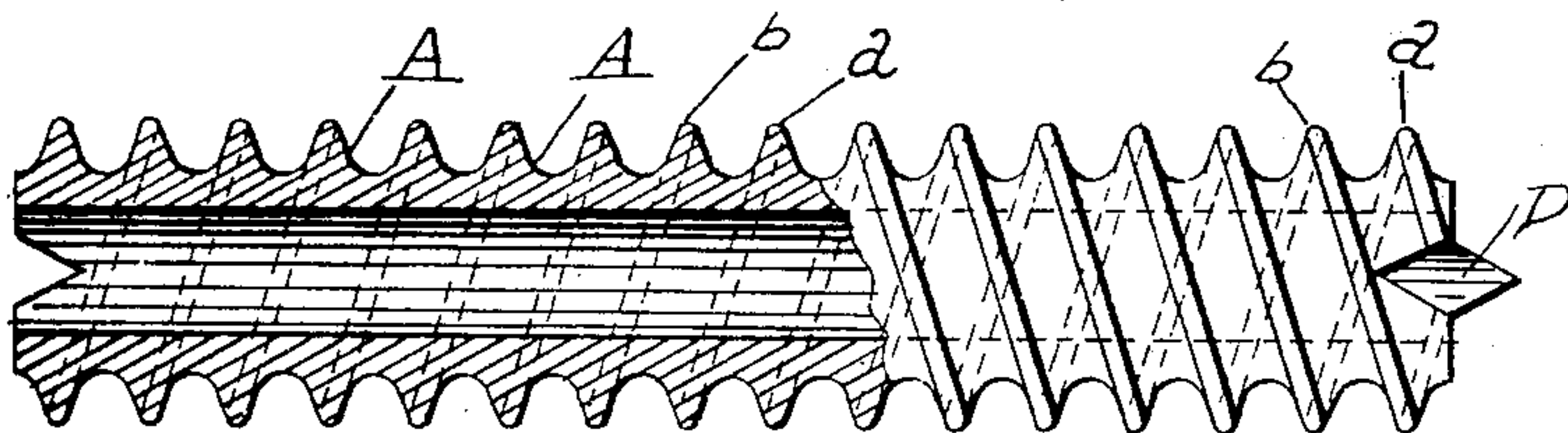


Fig. 1.

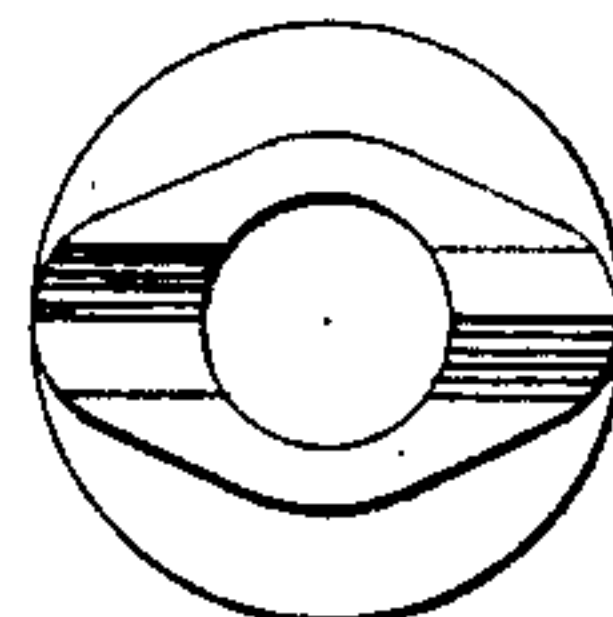


Fig. 2.

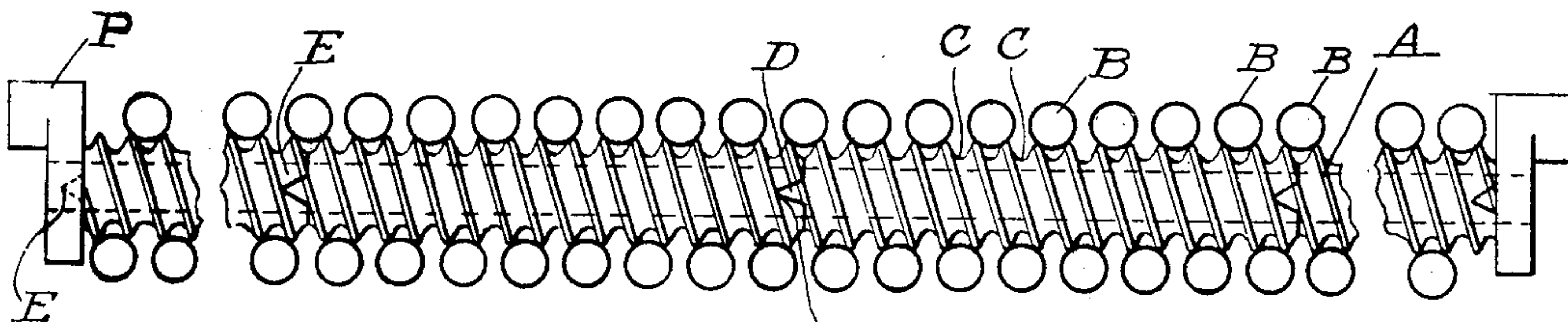


Fig. 3.

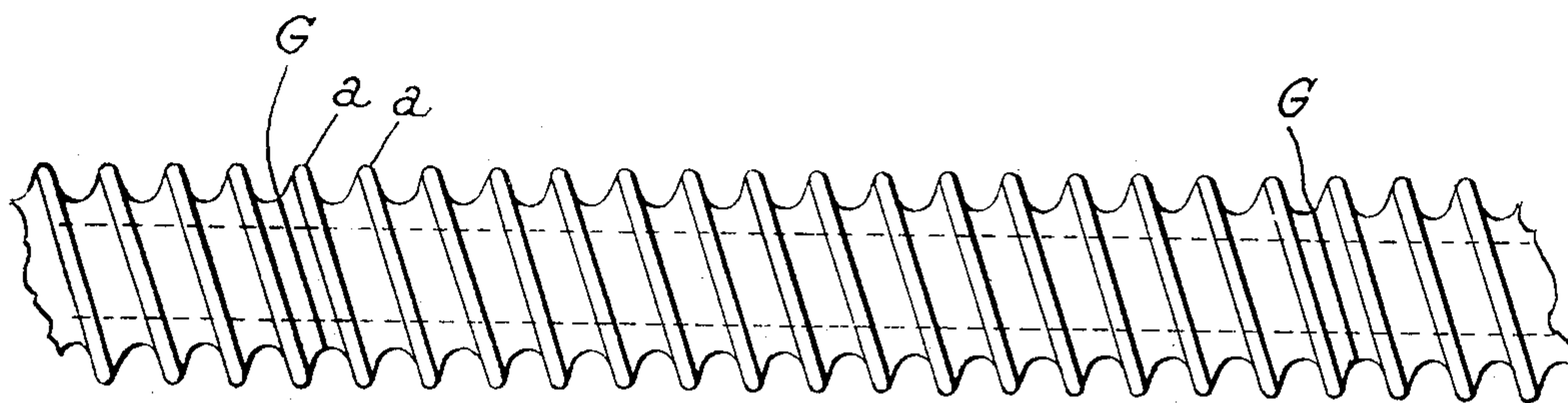


Fig. 4.

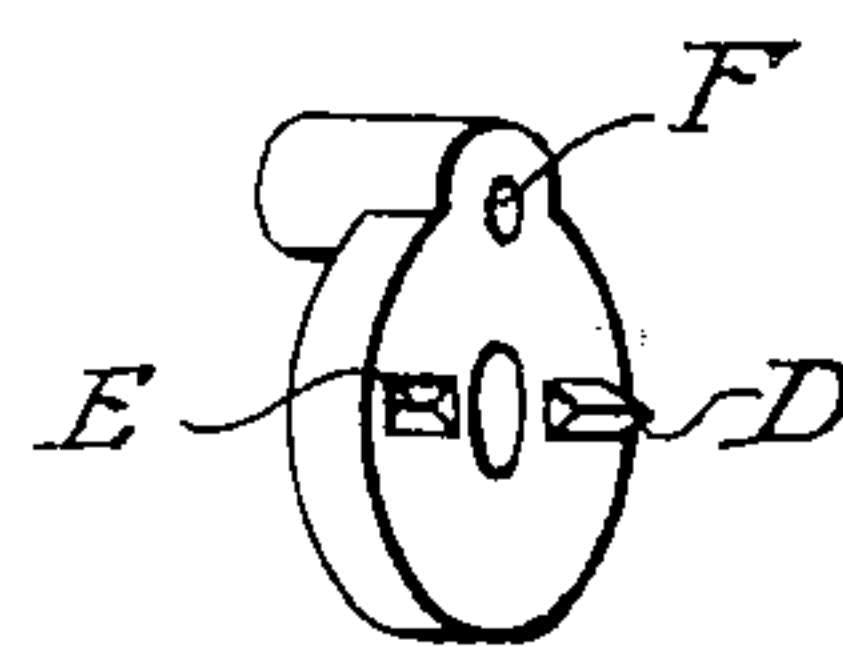


Fig. 5.

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NO MODEL.

2 SHEETS—SHEET 2.

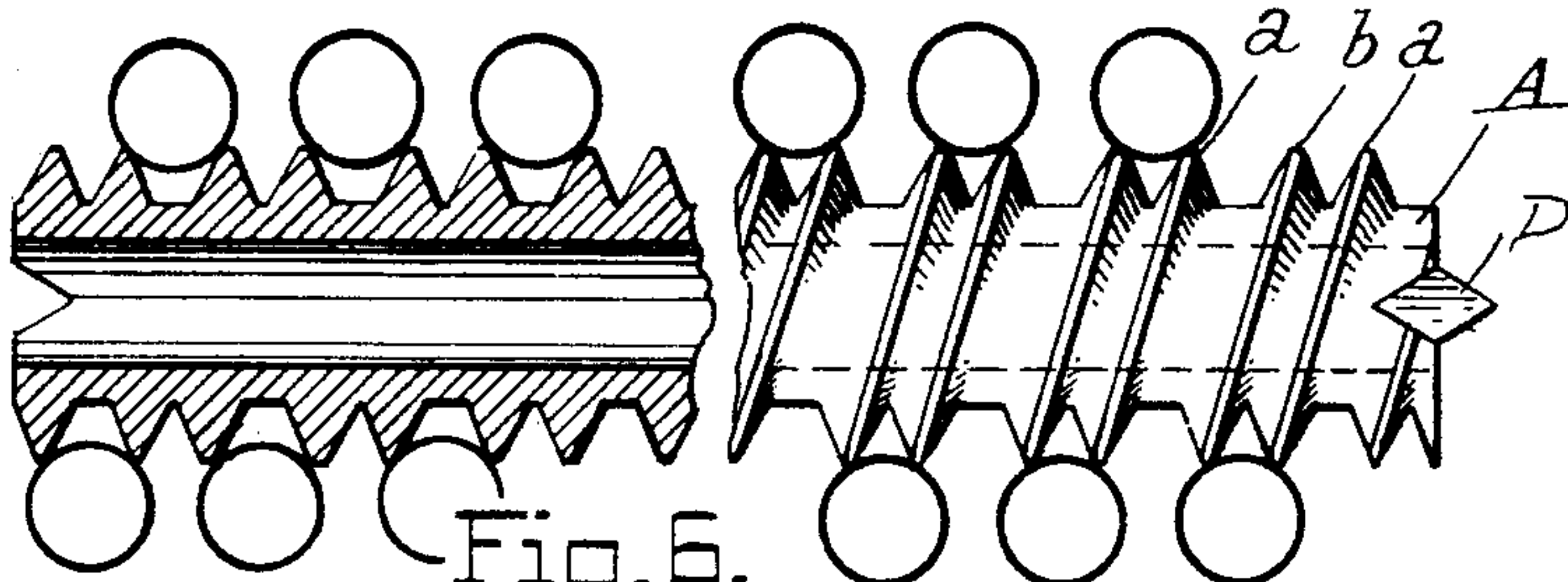


Fig. 6.

Fig. 7.

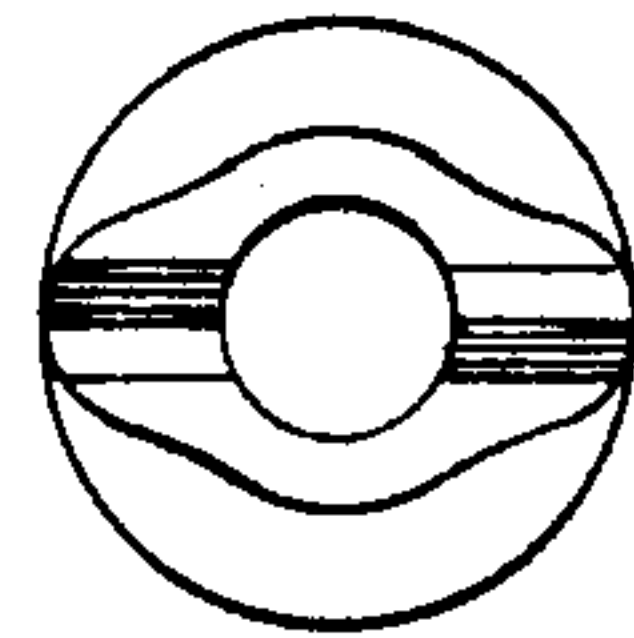


Fig. 8.

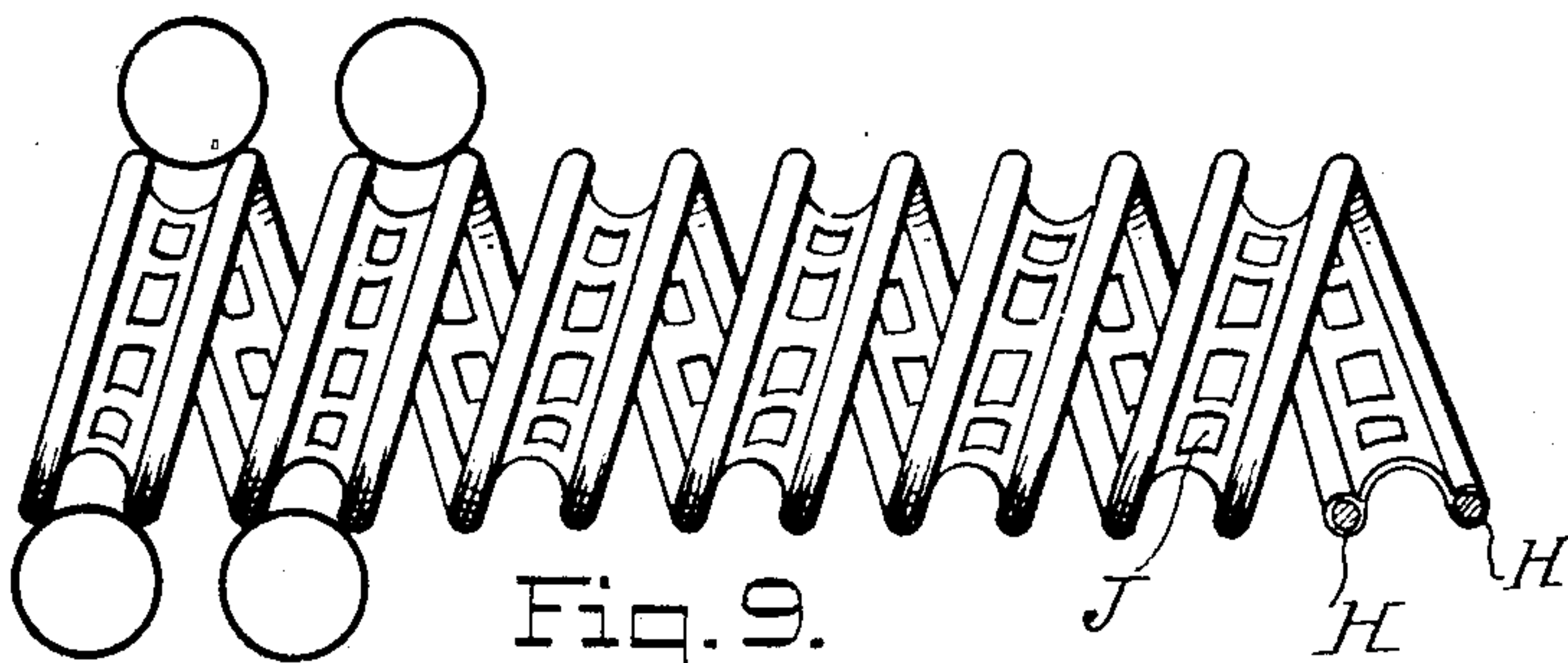


Fig. 9.

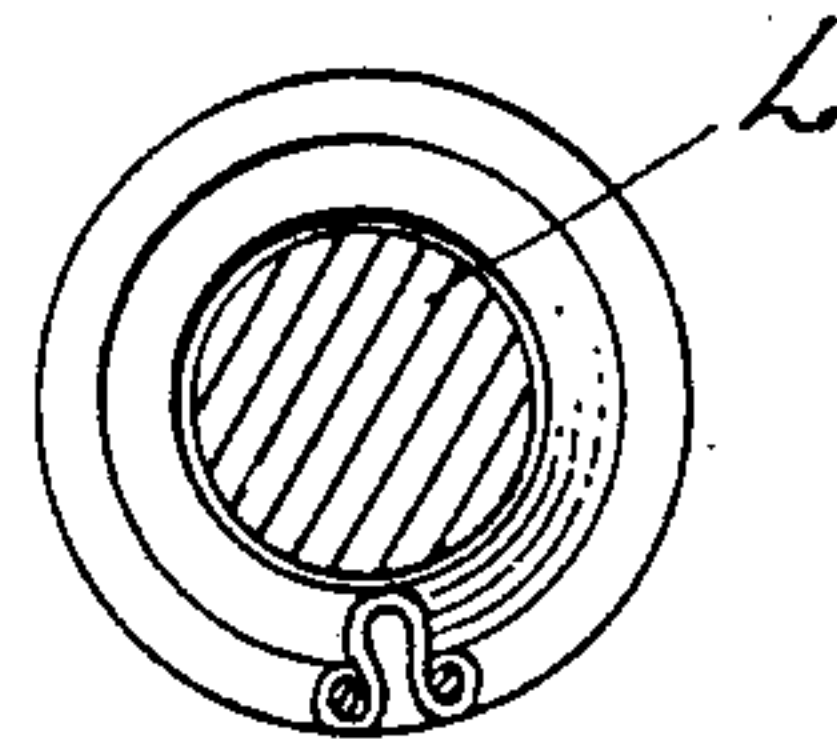


Fig. 10.

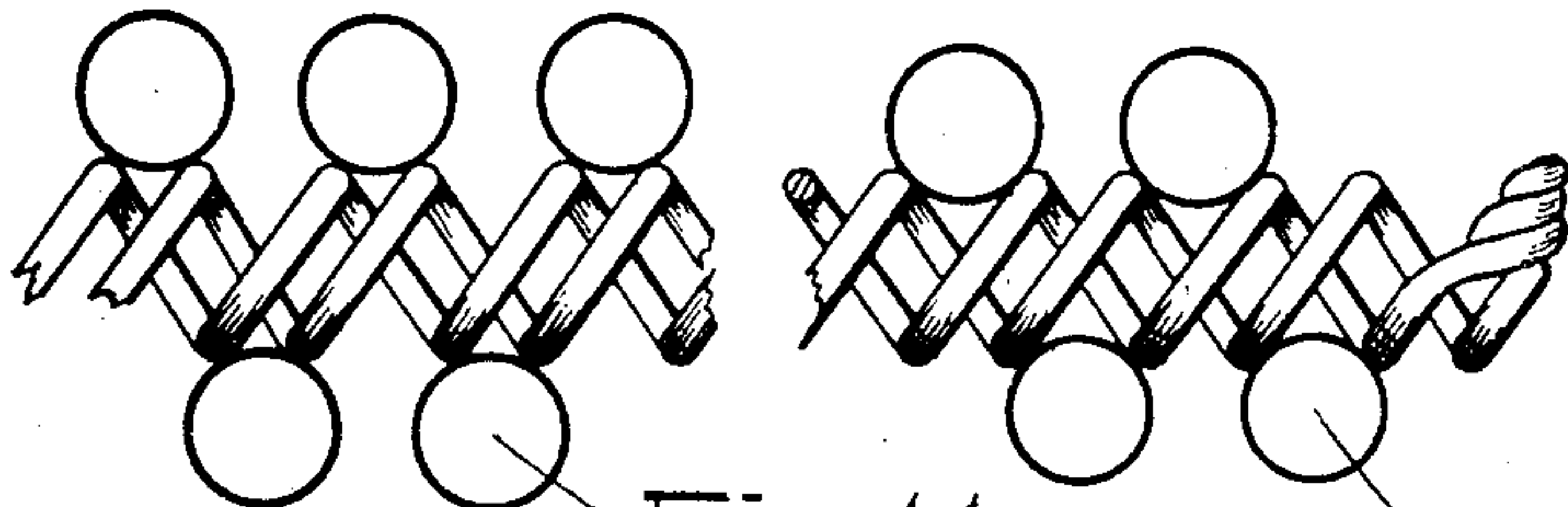


Fig. 11.

Fig. 13.

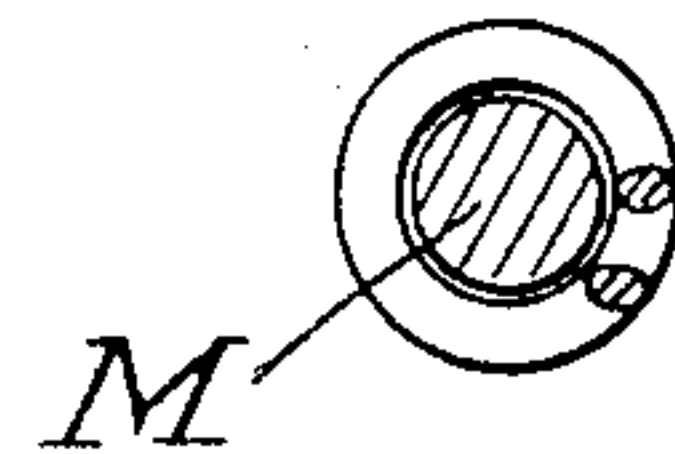


Fig. 12.

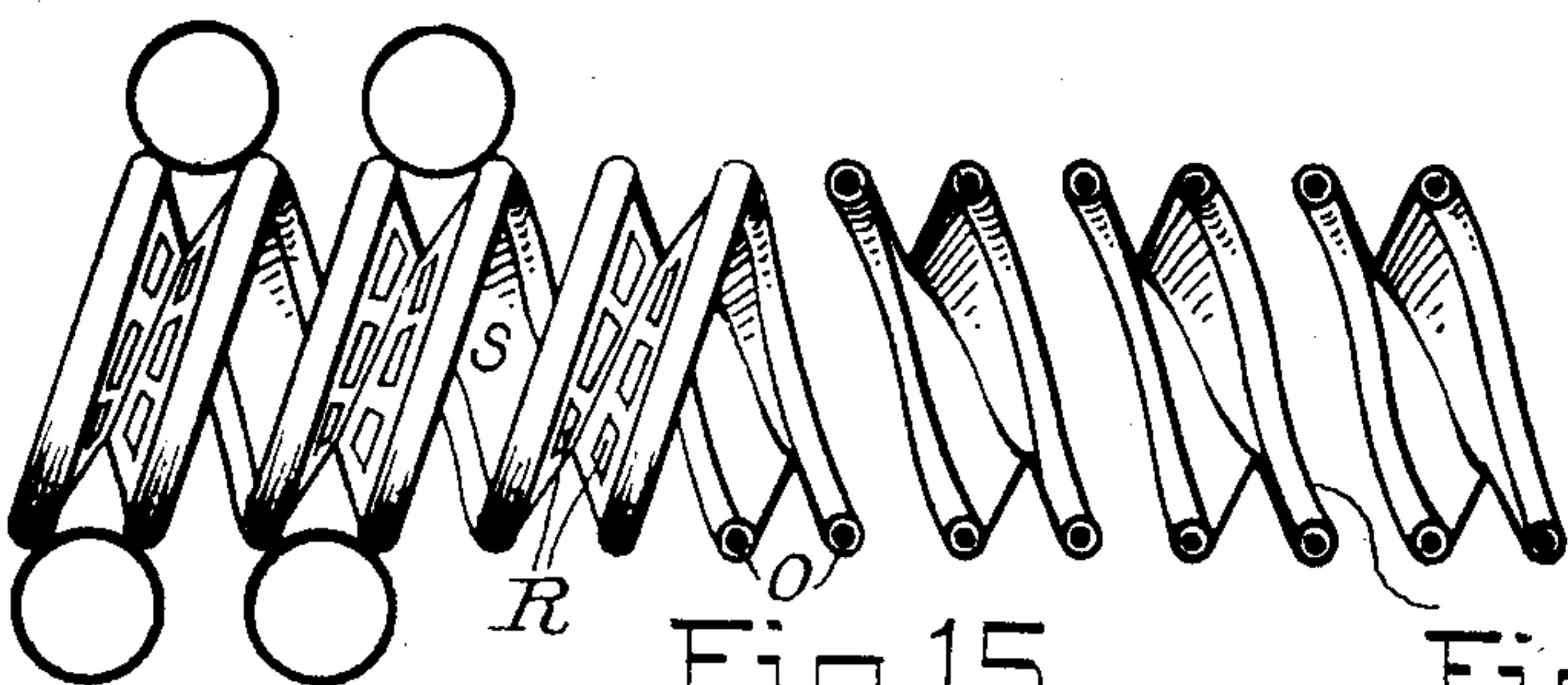


Fig. 15.

Fig. 16.

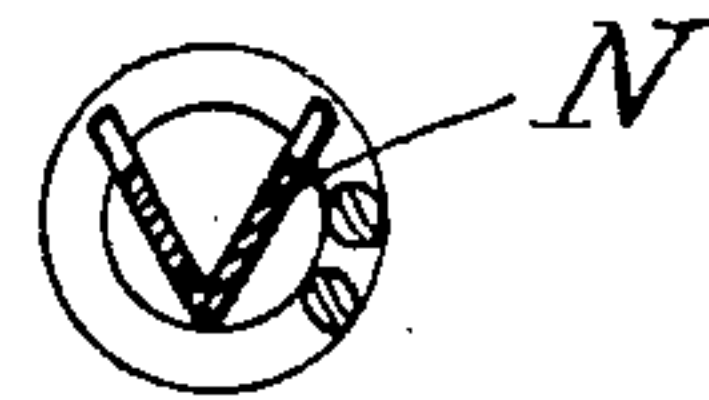


Fig. 14.

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UNITED STATES PATENT OFFICE.

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ELECTRIC HEATING ELEMENT.

SPECIFICATION forming part of Letters Patent No. 746,128, dated December 8, 1903.

Application filed August 31, 1901. Serial No. 73,982. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States of America, and a resident of the city of Albany, county of Albany, and State of New York, have invented certain new and useful Improvements in Electric Heating Elements, of which the following is a specification.

My invention relates to electric heaters.

10 The object of my invention is to provide an electric heater so constructed that the maximum amount of air may be brought in contact with the conducting-wire, providing not only for the passage of air through the adjacent layers of the conducting-wire, but also in contact with the major portion of the exterior surfaces of the coil of said conducting-wires; also, to provide a means whereby the several devices for the support for the conducting-wire shall be positively brought in proper relation to each other in mounting the support in position for receiving the conducting-wire, together with such arrangements and combinations as shall hereinafter be more particularly described and claimed. I attain these objects in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a plan partly in section. Fig. 2 is an end view of the device. Fig. 3 is a plan of a support with conducting-wire coiled thereon, illustrating a means provided for keeping the device in proper relation. Fig. 4 is a plan illustrating a modified form of my invention with modified form of means for securing the device together. Fig. 5 is a perspective view of the end plate P of Fig. 3. Fig. 6 is a section of a modified form. Fig. 7 is a plan of a modified form. Fig. 8 is an end elevation of Fig. 6. Fig. 9 is a plan of a modified form. Fig. 10 is an end elevation of Fig. 9 with the addition of a rod passing there-through. Fig. 11 is a plan of a modified form. Fig. 12 is an end view of Fig. 11 with a rod passing therethrough. Fig. 13 is a plan of a modified form. Fig. 14 is an end elevation of Fig. 13 with the addition of the V-shaped support placed therein. Fig. 15 is a plan of a modified form. Fig. 16 is a section of a modified form.

Similar letters refer to similar parts throughout the several views.

In order to provide for bringing the maximum amount of air to be heated in contact with the heating element, the conducting-wire, it is not only advisable to construct the support so that the air will pass therethrough and between the adjacent layers of the heating element, but also so as to provide for bringing as much air as possible in contact with the exterior surface of the heating element that is around and in contact with the sides of the conducting-wire. I have shown by the accompanying drawings the support made with a solid surface and so constructed as to provide for the maximum amount of air that may be brought in contact with the exterior surface of the heating element; also, arranged in such a manner that the support shall be perforated or open in part, so as to allow for the circulation of air through the support and through the openings between the adjacent layers of the heating element, as well as in contact with a large portion of the exterior surface of the heating element. Thus in Figs. 1, 3, 4, 6, and 7 I have shown a support the surface of which is unprovided with either perforations or openings of any kind, but so constructed that the largest possible amount of air will be brought in contact with the exterior surface of the heating element, while in Figs. 9, 11, 13, 15, and 16 I show in addition to this arrangement for bringing the largest possible amount of air in contact with the exterior surface of the heating element a means for also causing the air to circulate through the support and between the adjacent layers of the heating element.

In Figs. 1, 3, and 4 I arrange a support A, preferably constructed of porcelain or other non-conducting substance or of metal coated with non-conducting material and provided with two spiral ridges *a b*, extending from one end of the support to the other. In contact with the edges of two of the adjacent ridges *a b* is placed the coiled conducting-wire B, (the heating element,) as is shown in Fig. 3, there being between the adjacent coils of the heating element as thus placed on the sup-

port a spiral groove C, spacing the adjacent layers of the heating element for the passage of air in contact with the exterior surface thereof on each side thereof and extending
5 throughout the length of the support.

It is understood that the support for the heating element of an electric heater is ordinarily made up of several longitudinal sections which must be joined together end for
10 end before being placed in the heater-casing. In order to provide for the proper registration of these sections, so that when brought together the ridges and grooves formed thereon will register with each other, I have provided a lug D and recess E in each end portion of each section, the lug on one section
15 entering the recess in the other, insuring perfect alinement. This arrangement of lug and recess also prevents rotation of the sections of the support after they are mounted in the heater-casing. I also arrange at the end of the heater-support after the sections are placed together and ready for inserting in the heater-casing a plate P, provided with lug D
20 and recess E for the same purpose for which they are placed on the ends of the sections of the supports. Plate P is also provided with an opening F, through which the conducting-wire of the heating element passes.

In Fig. 4 I show a modified form of my invention relating to the means for uniting the sections of the support in such a manner that they will positively register and prevent rotation. This is done by cutting the ends diagonally parallel to the ridges *a*, as is shown
35 at G G in Fig. 4.

I may also arrange my support A as is shown in Figs. 6 and 7, in which the two spirals ridges *ab* differ in the distance from each
40 other, providing a means for placing more or less of the heating element upon the support, if desired, the heating element being placed in contact with the adjacent ridges closer together, making the heater of larger diameter and containing more wire and leaving a wider space between the adjacent layers of the heating element, as shown in Fig. 7, than when the heating element is placed in the wider spaces, as shown in Fig. 6.

In Fig. 9 I have shown a modified form of my invention in which the spiral ridges are formed by winding the support, preferably provided with heavy wires H H along the edges and preferably coated with some insulated material and provided with openings or perforations J, through which the air may pass in contact with and through the heating element, also provided with spaces between the adjacent layers of the heating element,
50 through which the air may readily circulate.

In Fig. 10 I show the same arrangement as shown in Fig. 9, with the exception that I provide a rod L, passing through the support for the purpose of rendering it more rigid.

65 In Figs. 11 and 13 I show a modified form of my invention in which I provide the two

ridges and arrange for spacing the distance between the ridges as described in reference to Figs. 6 and 7 and provide for allowing the circulation of air through the heating element,
70 as well as in contact with the sides thereof, also for arranging and placing a greater or less amount of the heating element upon the support, as shall be desired. This is done by winding two heavy wires, either round or half-
75 round wire, as desired, parallel, and coiled spirally from end to end of the support. In contact with these parallel adjacent wires is placed the heating element, leaving a space between them through which the air may circulate as well as through the heating element.
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In Figs. 12 and 14 I arrange for placing within the support a rod M, as shown in Fig. 12, or a V-shaped support, as shown in Fig. 14.

In Fig. 15 I show a modified form of my invention in which I provide two ridges preferably arranged with wire along the edges properly covered with insulating material, the body of the support consisting of metallic connecting-strip S, provided with perforations R, as shown in Fig. 15, or without the perforations, as shown in Fig. 16, it being understood that when arranged the spaces between the ridges are of equal distance or differing in distance, as desired.
95

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an electric heater a support; two parallel ridges formed thereon, extending spirally around the support from one end to the other; a coil of wire extending in the spiral path about said support in contact with the adjacent edges of the two adjacent ridges; that portion of the support adjacent to the ridges carrying the wire, grooved to allow the
100 air to pass in contact with sides of said wire.

2. In an electric heater a support for the heating element provided with two parallel projecting ridges, extending spirally from one end of the support to the other; a coil of
110 wire placed in contact with the edges of the adjacent ridges, said ridges carrying wire spaced from their adjacent spirals in their course about the support, allowing the air to pass beneath and in contact with the side of
115 said wire, substantially as described.

3. In an electric heater a support for the heating element consisting of two spirally-coiled ridges separated from each other, and the adjacent spiral of said ridges also separated with a coil of wire placed in contact with said ridges, so constructed that a free circulation of air will take place in contact with each side of said coil from the bottom to the top throughout its entire length, as well
120 as through the coil of wire between its convolution.

4. In an electric heater a support for the heating element consisting of two parallel spirally-coiled supports separated from each other, leaving spaces between the adjacent supports, in combination with the heating
130

element consisting of a coil of wires placed in contact with the adjacent supports, also constructed and connected up that a free circulation of air will take place in contact with the sides of the heating element from top to bottom, and also through the adjacent convolutions of the heating element, substantially as described.

5. In an electric heater a support for the heating element consisting of two parallel spirally-coiled ridges spaced from each other, two convolutions of each of said ridges separated from each other, in combination with the heating element consisting of a coil of wire adapted to be placed spirally about said support; said support so constructed and connected up that a free circulation of air will take place through the convolutions of the heating element, also in contact with the sides of the heating element from bottom to the top thereof, substantially as described.

6. In an electric heater a V-shaped support standing in the spiral path from one end to the other, provided along its edges with a non-conducting substance, in combination with coil of wire adapted to engage with said support, allowing for the circulation of air through and on each side of the heating element substantially as described.

7. In an electric heater a support for the heating element consisting of two parallel spirally-coiled ridges separated from each other by a ventilating-groove; a coil of heating-wire supported between said ridges so that air may circulate from the bottom to the top of the heater through said ventilating-groove.

8. In an electric heater a support for the heating element consisting of two parallel ridges carrying the heating-coil between them, and a ventilating-groove lying between consecutive turns of the two ridges forming a channel through which air may circulate from the bottom to the top of the heater between consecutive turns of the heating-coil, substantially as described.

9. In an electric heater a support for the heating element consisting of two parallel

ridges between which the heating-coil is wound, and provided with two ventilating-grooves, one between the ridges and under the heating-coil, and the other formed in the insulating-support between adjacent turns of the heating-coil, substantially as described.

10. In an electric heater a support for the heating-coil upon whose surface are raised supporting-ridges; the supporting-ridges being spaced apart at unequal distances, and presenting two paths of unequal lengths in which the heating-coil may be laid, substantially as described.

11. In an electric heater a support for the heating-coil upon whose surface are raised supporting-ridges; the supporting-ridges being spaced apart at unequal distances, and presenting two paths of unequal lengths in which the heating-coil may be laid, thus forming two ventilating-grooves between adjacent spiral supports, one being beneath the heating-coil, and the other between adjacent turns of the heating-coil, substantially as described.

12. In an electric heater a support for the heating element consisting of two parallel spirally-wound ridges with ventilating-grooves between the ridges; said support being made in sections and mounted upon a supporting-rod with means for causing the ends of the supporting-sections to register with each other, so that the spiral groove is continuous from one end of the heater to the other, substantially as described.

13. In an electric heater a support for the heating element consisting of sections of insulating material mounted upon a rod; the ends of which sections are caused to interlock and to be held in position by a projection on one section which registers with a groove in the adjacent section, substantially as described.

Signed at Albany, New York, this 28th day of August, 1901.

JAMES F. McELROY.

Witnesses:

CHARLES L. WEST,
ERNEST D. JANSEN.