No. 682,324. Patented Sept. 10, 1901.

J. P. ERIE.

ELECTRIC HEATER.

(Application filed Sept. 22, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 2.

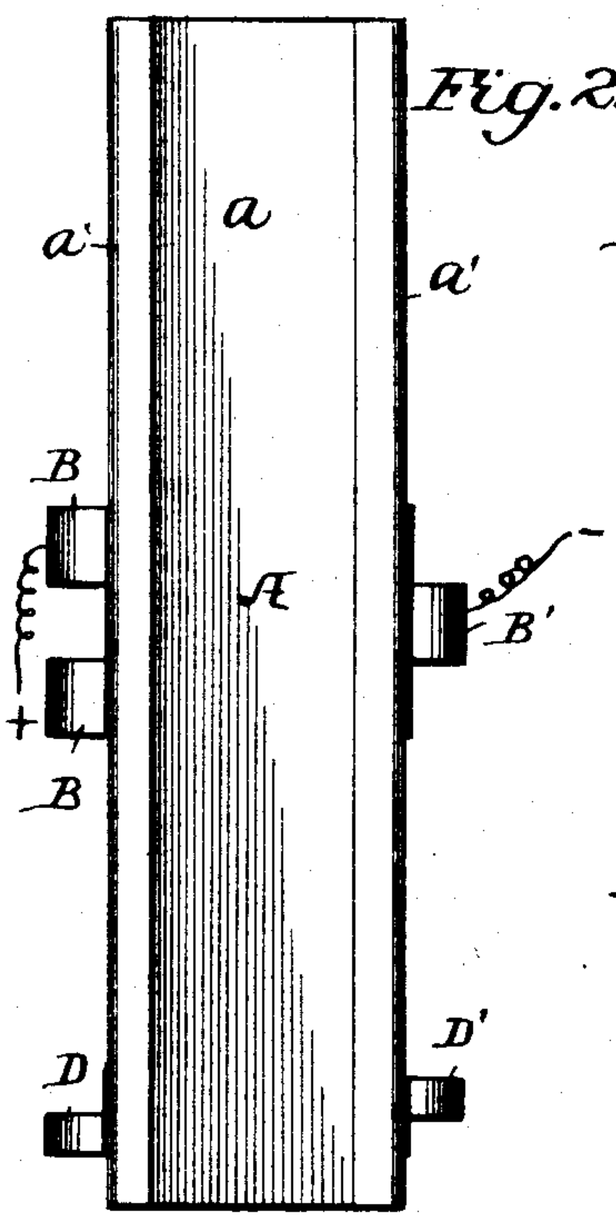

Fig. 1.

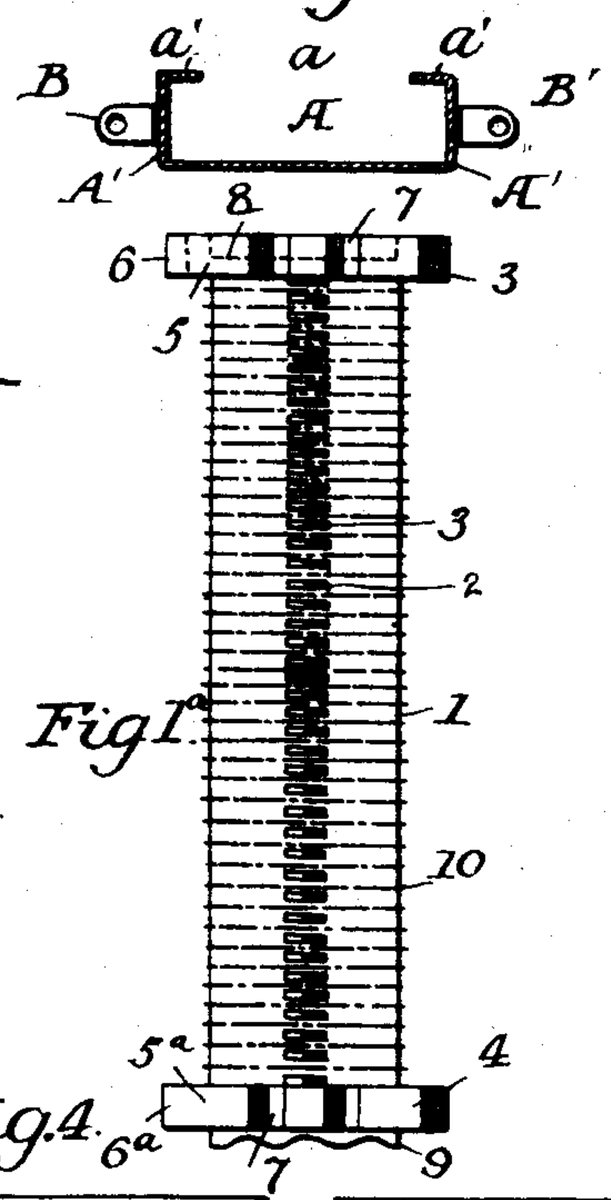

Fig. 3.

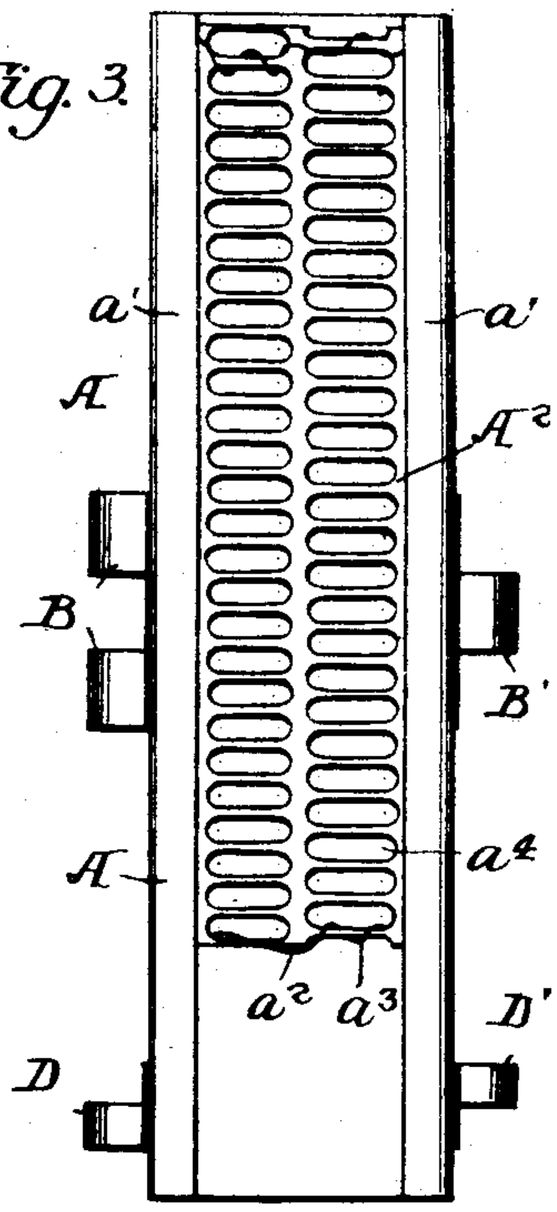

Fig. 4.

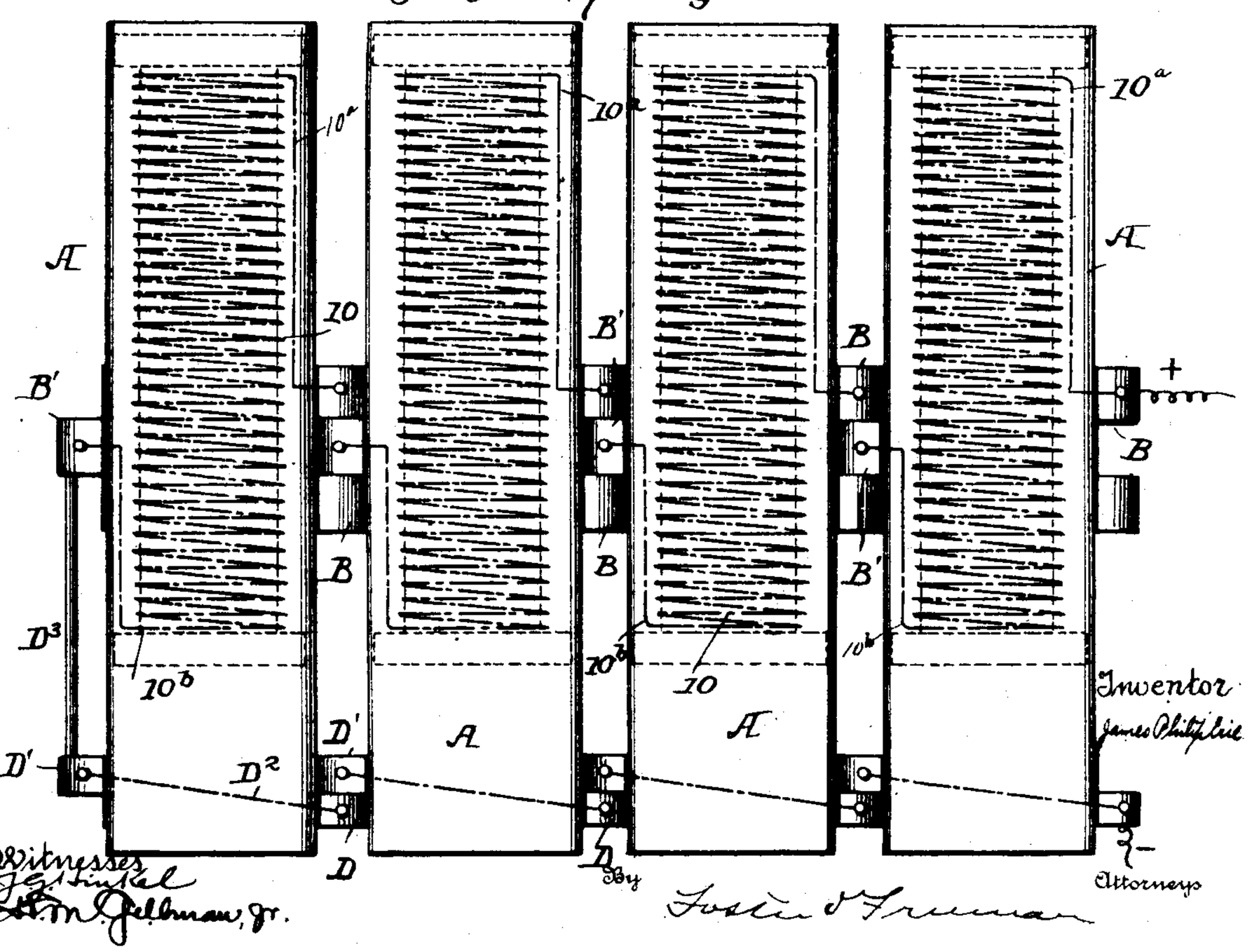

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Fig. 6

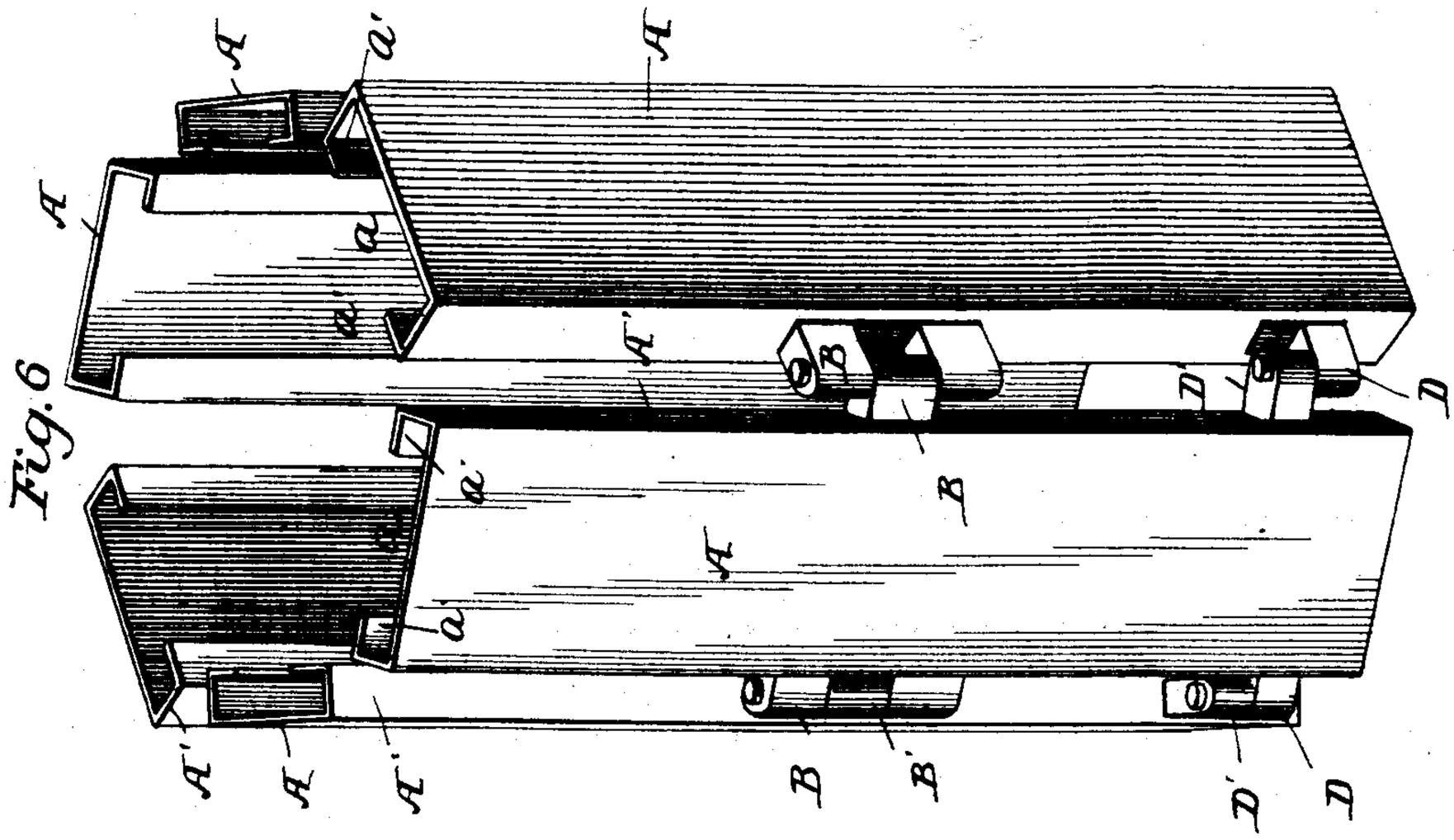
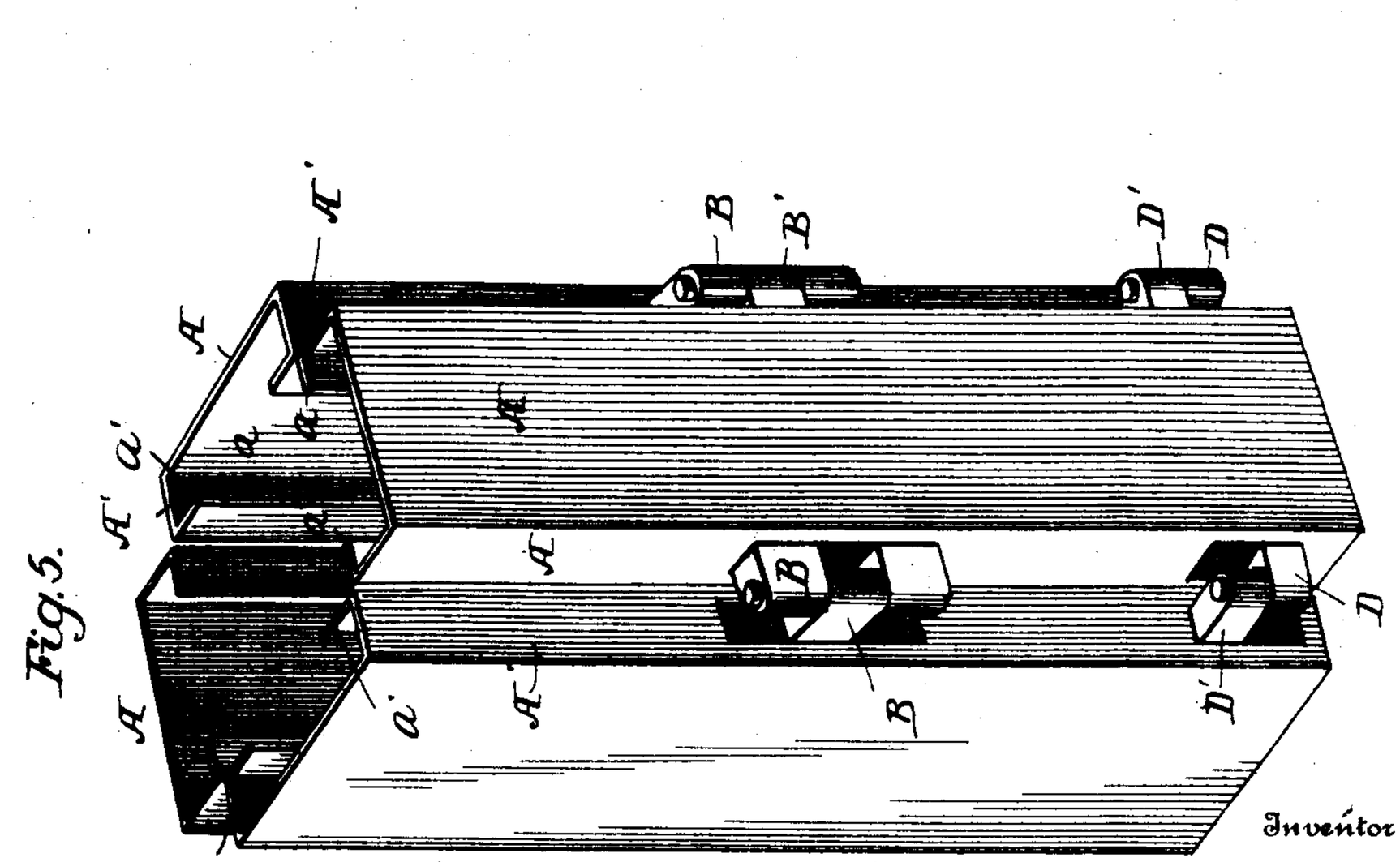


Fig. 5.



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3 Sheets—Sheet 3.

Fig. 7.

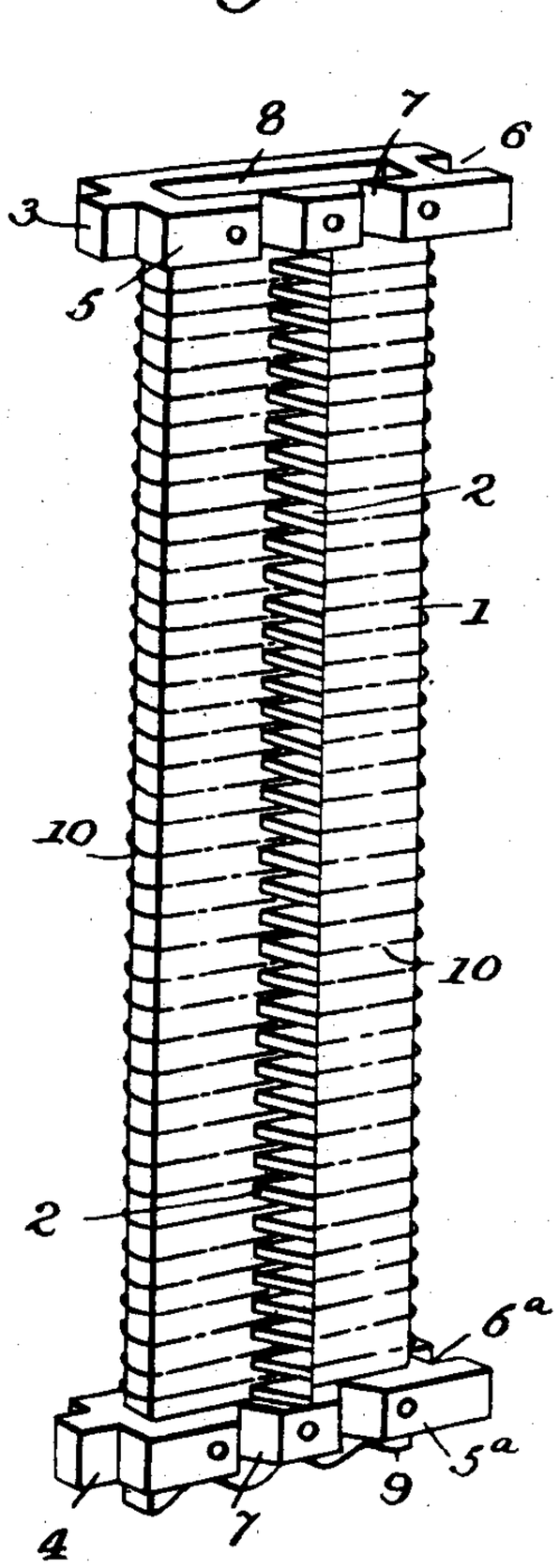
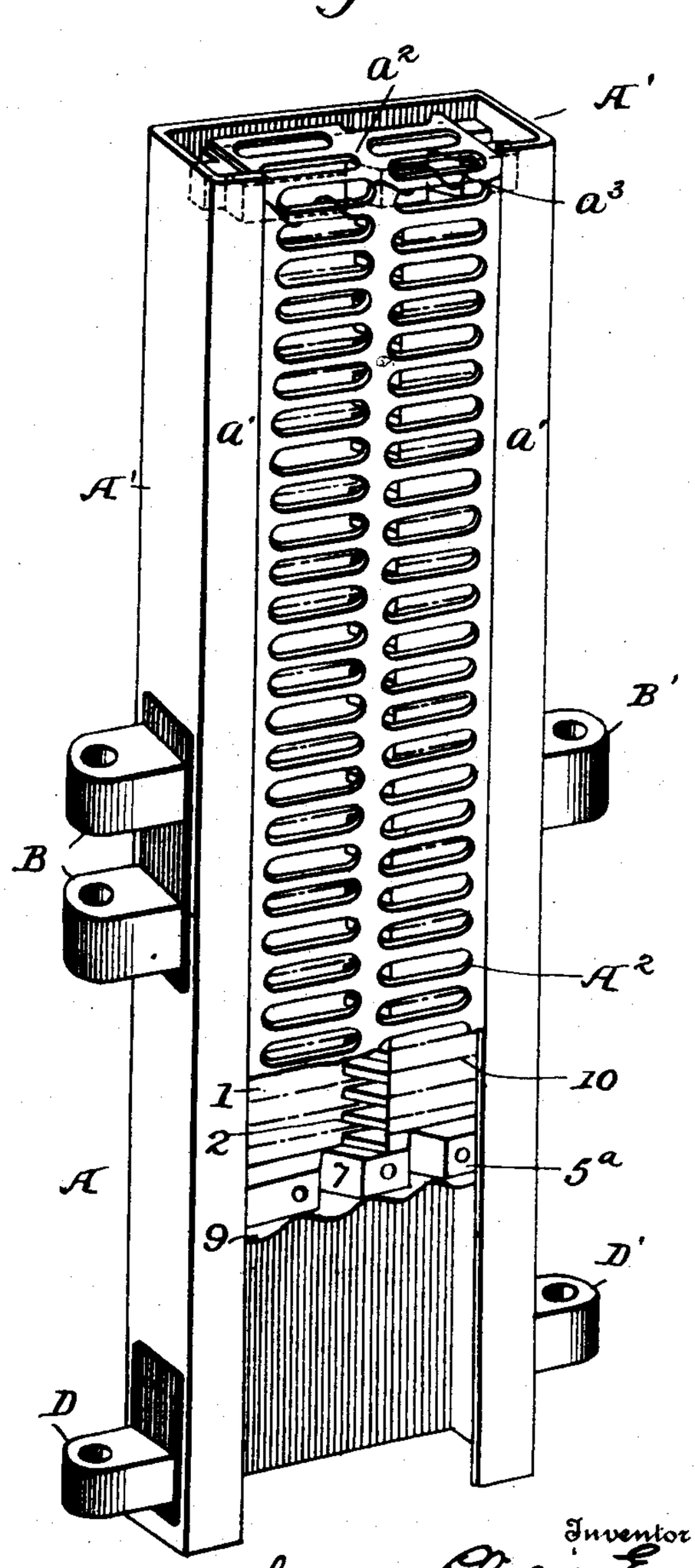


Fig. 8.



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UNITED STATES PATENT OFFICE.

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ELECTRIC HEATER.

SPECIFICATION forming part of Letters Patent No. 682,324, dated September 10, 1901.

Application filed September 22, 1900. Serial No. 30,826. (No model.)

To all whom it may concern:

Be it known that I, JAMES PHILIP ERIE, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Electric Heaters, of which the following is a specification.

My invention relates generally to electric heaters; and it has for its object to provide an improved standard heater or heater section or element which may be used either by itself or a number connected together to constitute a heater for broiling, toasting, boiling, or, in fact, for any purpose desired; and to these ends my invention consists in a heater embodying features of construction and adapted to be arranged and operated substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, Figure 1 is a vertical transverse section of the holder. Fig. 1ª is a front elevation of the insulating strip or core. Fig. 2 is a plan view of the holder. Fig. 3 is a similar view of the holder, showing a grid in position in the holder, forming a complete standard heater-section. Fig. 4 is a plan view showing a series of four heater-sections joined together with their flat surfaces uppermost. Figs. 5 and 6 are perspective views showing ways of using the heater. Fig. 7 is a perspective view of the insulating-strip, and Fig. 8 is a perspective view of the complete heater section or element.

As above indicated, one of the main objects of my invention is to provide what I have termed a "standard" heater or heater section or element which shall in itself be capable of being used as a heater for many purposes and which shall be of such construction and arrangement that a number of them may be connected together to form heaters of various shapes, sizes, and adapted for different purposes, and a further object is to provide a cheap effective commecial article and one that is not open to many of the objections of those heretofore suggested.

I will first describe in detail the construction of one of the stantard heaters or heater-sections and then show to some extent how said sections may be combined and arranged to form heaters adapted for various purposes.

The heater-section comprises a holder or frame A, which is preferably made of metal and has open ends and one open side *a*, the edges A′ being preferably turned inward to form flanges *a*′. Such a holder can be cheaply made of any desired size; but preferably I make it of a size adapted to receive and hold one or more of my standard insulating strips or cores, such as are described in my application, Serial No. 29,928, filed concurrently herewith. Such a standard insulating strip or core is illustrated in Fig. 1ª, and its construction need not be set forth in great detail herein, reference being made to the above-named application, and it is sufficient to state that it comprises a body portion 1, having arranged on one or both sides one or more rows of projections 2 and being provided with a footpiece 3 and a headpiece 4, each having side extensions 5 5ª and edge extensions 6 6ª, there being suitable recesses 7 in these extensions for the passage of wire and preferably having a recess 8 in one, as the footpiece, and an extension 9 on the headpiece, so that two or more of them may be joined together longitudinally. This strip or core is preferably made of insulating material, such as molded porcelain, and fine wire 10 is wound around the same to offer the desired resistance to the passage of the current, the coils of wire being separated from each other by the projections 2 and the extensions on the head and foot pieces serving to support the strip in its surrounding case or holder, so that there is no danger of contact between the wire and said case or holder, in a manner more fully set forth in my aforesaid application. One or more of said standard insulating-strips are inserted in the holder A, one being shown in the present instance, although it is evident that a number of them may be supplied, the holder being of a proper size to receive them.

In order to make what I call a "standard" heater or heater-section, it is desirable that the electric terminals be so arranged that a number of heater-sections can be joined together and the circuit completed therethrough without disturbing the internal arrangement

of circuits, and in order to accomplish this I provide the holder with means for securing the sections together, both mechanically and electrically, and I have shown the holder as provided on its edges with connectors, shown in the form of hinge-sections B B′, which constitute a combined mechanical and electrical connector, said sections being insulated from the holder and connected to the terminals 10^a 10^b of the coil surrounding the insulating-core. The insulating-strips in the holder A are preferably covered on their upper side by a grid or foraminous shield A^2, preferably made of metal and fitting the space between the flanges a' and being flush therewith, and these may be secured detachably or permanently to the holder in any suitable way, and I have shown their ends a^2 as bent down over the insulating strip or core and as being secured to the holder by a wire a^3, passing through openings a^4 in the holder and through the openings in the gird or shield. These covers or shields not only serve to protect the insulating-strips and secure them in the holder, but being perforated or foraminous they furnish a heating-surface which is best adapted for some particular purposes, allowing the heat to radiate directly from the conductor and pass through the openings onto the substance being heated or into the air.

In some instances it is preferable to have a smooth surface for the heater, and it will be seen that the other side of the holder is solid and closed and furnishes a smooth heating-surface in close juxtaposition to the conductor, but prevents any access to the conductor of juices or other extraneous matter from the material being heated on this surface of the heater.

Ordinarily the leading wires from the electric circuit will be secured to the connector-hinge, which is, as before stated, connected to the terminals of the resisting or heating conductor, or if a number of heating-sections are joined together, forming a heater of larger dimensions, the terminals of the electric circuit are connected to the outside connectors or hinge portions, as shown by the conductors marked + and — in the various figures. Sometimes, however, it is desirable to have the leading-in wires extend from one side only of the heater or heater-section, and in order to adapt the standard for this purpose supplemental hinges or contacts D D′ may be attached to the edges of the holder, and these may be connected by a conductor D^2 of low resistance. When a number of sections are joined together, one of these supplemental hinges, as D′, may be connected to the hinge-section B′ by a pin or wire or conductor D^3 or in any other suitable way. When thus constructed and a number of heater-sections are joined together, leading-in wires may be connected to one of the hinge-sections B on one side of one of the sections, as shown in Fig. 4, and the other leading wire may be connected to the supplemental hinge D of the same section on the same edge, and the various heating-conductors of the standard heater-sections are then connected in series, as will be apparent from Fig. 4.

Of course any other equivalent means of electrically connecting the heater-sections together may be adopted, and I need not herein explain them in detail, as they will readily suggest themselves to those skilled in the art; but the manner above set forth and described is practical and effective.

Referring to one heater-section, which may be used alone and, as before intimated, may be of any size desired, containing one or more of the insulating strips or cores, it will be seen that it forms a desirable heater, which can be used for many and various purposes and in many and various positions, and that it has a flat continuous surface on one side and a perforated side on the other, and its ends are open, so that air-currents may readily reach the heating-conductor and impinge directly thereon or on the surface of the holder.

When a number of the heater-sections are joined together, as by means of connectors in the form of hinges or otherwise, I can form a heater of any desired size and can fold the sections in different ways—such, for instance, as is shown in Figs. 5 and 6, in one of which I have shown four sections hinged together and standing on end, with their perforated sides toward each other, and any article to be heated can be set upon the upper end of the heater or combined heater-sections, or, as in Fig. 6, I have shown six heater-sections joined together and made to embrace the article to be heated, as indicated, forming a substantial cylindrical heater. Other combinations of the standard heater-sections may be made and will readily suggest themselves and need not be specifically pointed out, and it will be seen that in all cases the leading-in wires are connected simply at two terminals, either on one heater-section or on the opposite edges of two (the external) heater-sections, the connections between the heater-sections being made at the hinges or other devices by means of which they are secured together. In all instances and arrangements of the heater-sections it will be observed that the heating-conductor is protected and is not liable to be in contact with the heater-frame or other matter, so that it is not liable to injury or to injure extraneous devices by coming in contact therewith. Of course the hinges or other connectors should be so arranged on the edges as not to project above the holder on either side, so that there will be no danger of short-circuiting the heater-sections by placing a pan or other article of a conducting material directly on the faces of the sides.

Having thus described the preferred construction of my improved standard heater-sec-

tion and various ways of combining and using the same, it will be understood that I do not limit myself to the precise construction and arrangement shown.

What I claim is—

1. An electric heater section or element, comprising a holder, a conductor mounted in the holder, and hinge-sections secured to the holder and connected to the terminals of the conductor and forming mechanical and electric connectors for uniting a plurality of heater sections or elements, substantially as described.

2. An electric heater-section, comprising a holder, an insulating strip or core mounted therein and carrying an electric conductor, hinges secured to the edges of the holder forming electric terminals and connected to the terminals of the conductor on the strip, and supplemental hinges or contacts mounted on the holder and adapted to form a return-circuit, substantially as described.

3. An electric heater, comprising a series of electric heater-sections, each section comprising a holder containing an insulting-strip and conductor thereon, each holder being provided with electric terminals connected to the conductor on the strip, and hinges connected to the edges of the sections serving as mechanical connections between the sections and to complete the electric connections through the same, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES PHILIP ERIE.

Witnesses:
H. M. GILLMAN, Jr.,
W. CLARENCE DUVALL.