

(No Model.)

2 Sheets—Sheet 1.

T. AHEARN.  
ELECTRIC HEATER.

No. 483,124.

Patented Sept. 27, 1892.

Fig. 1.

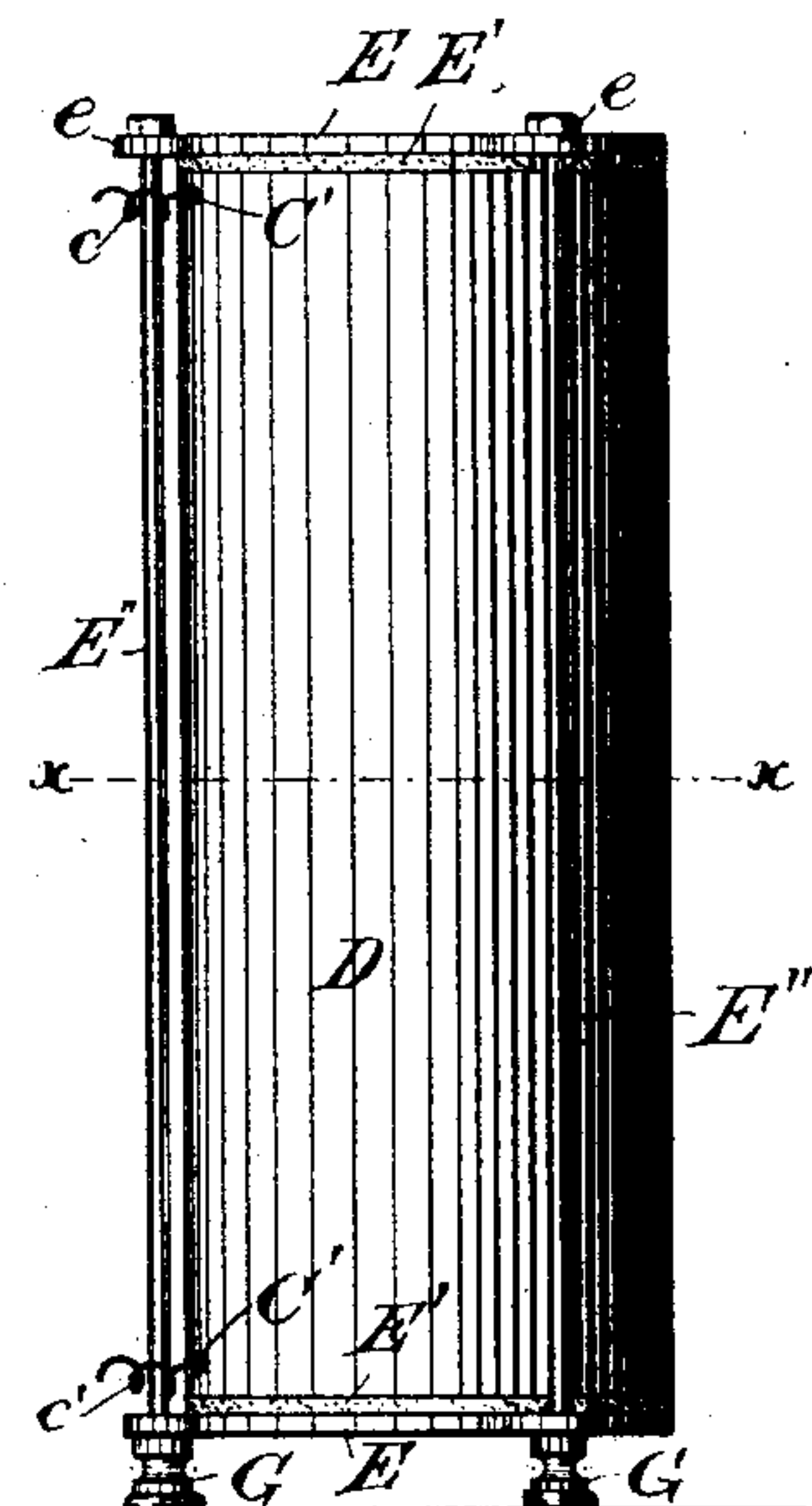


Fig. 4.

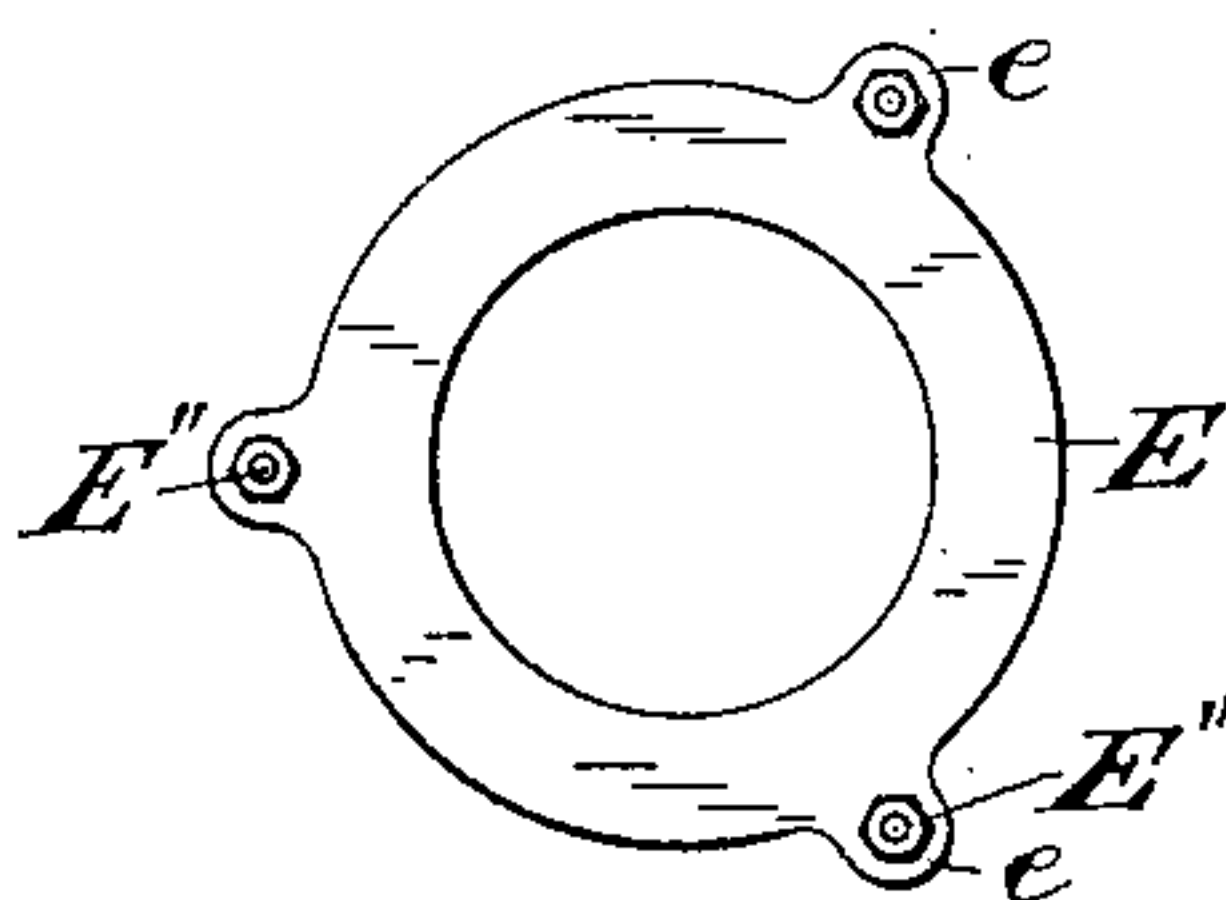


Fig. 2.

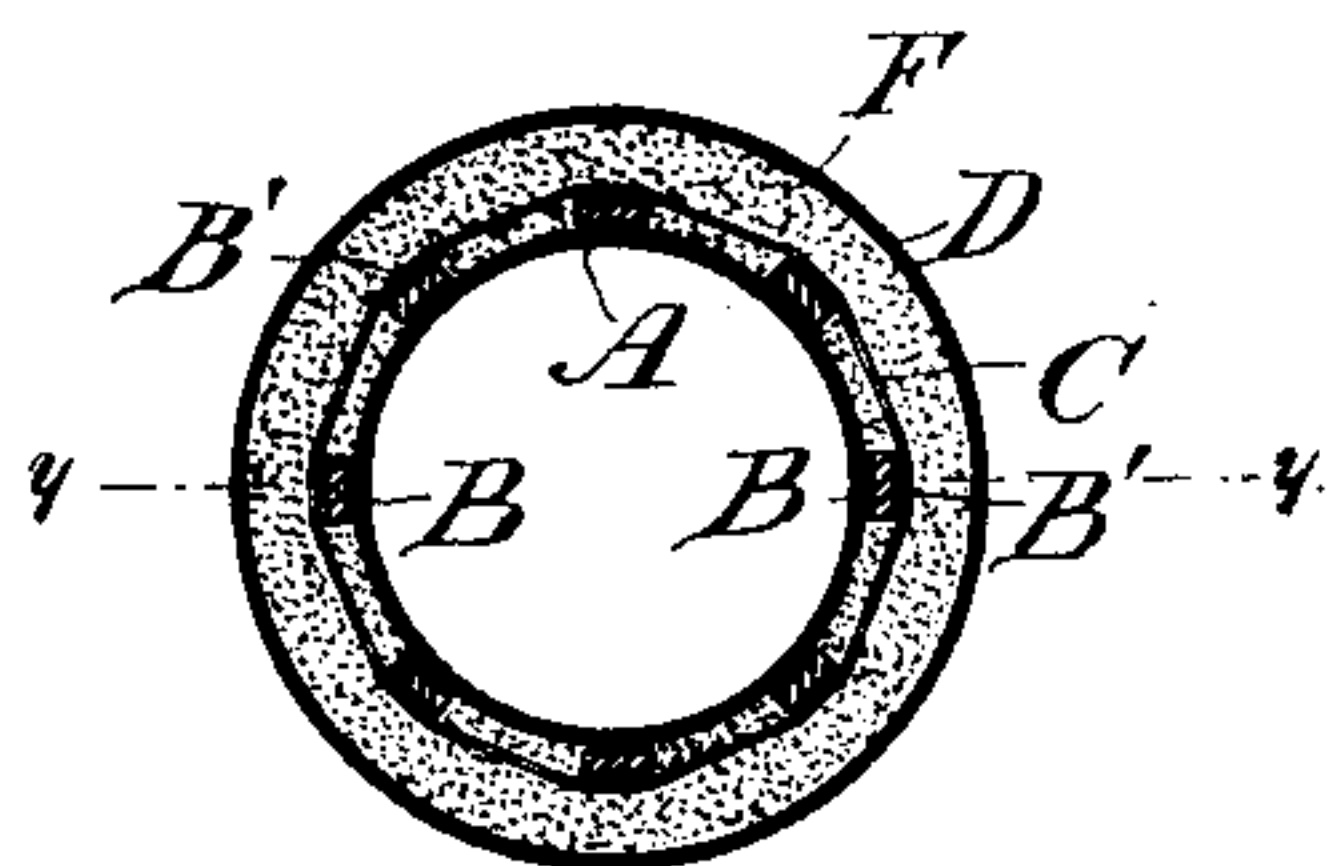
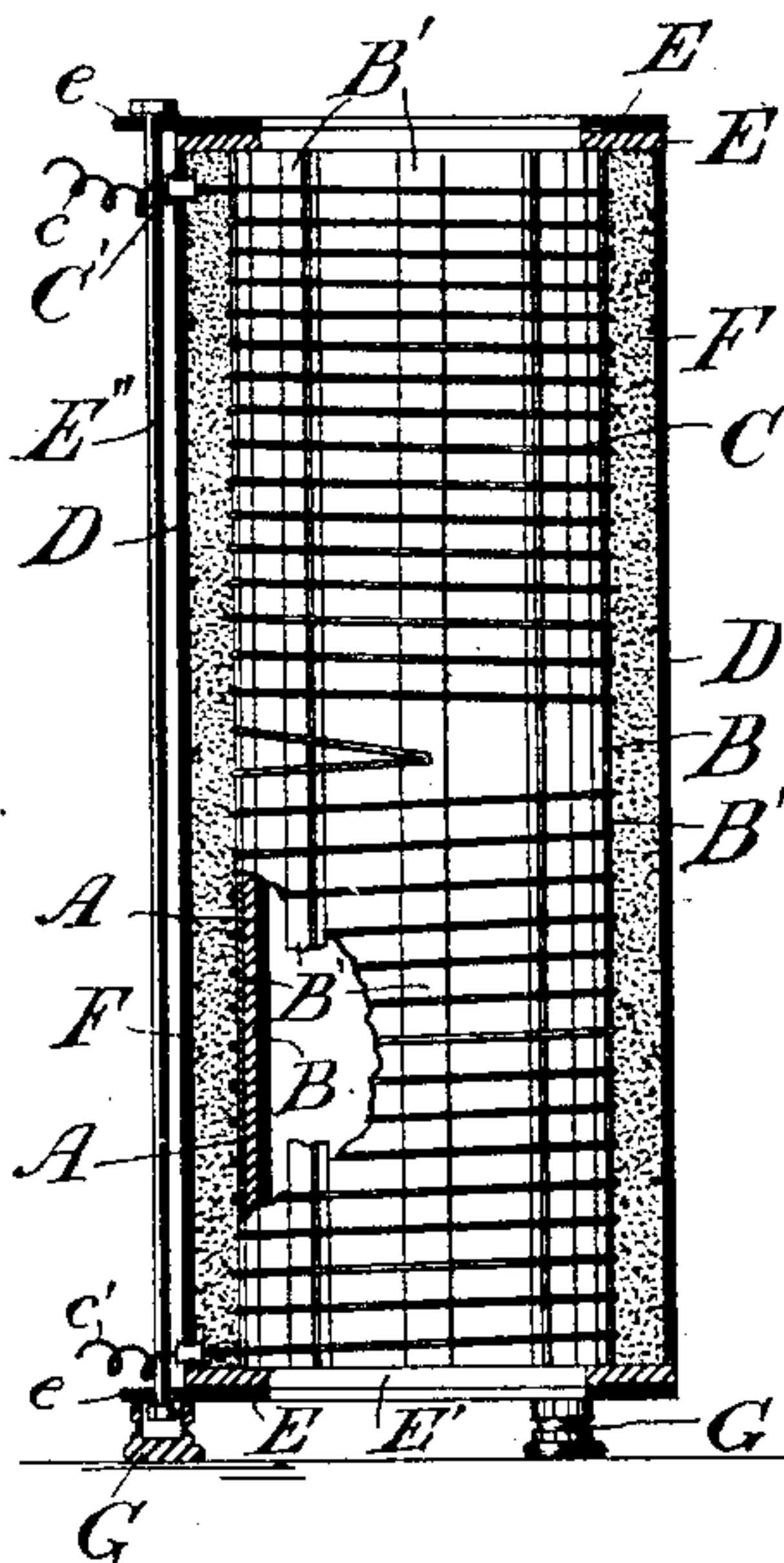


Fig. 3.



Witnesses:

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Arthur Cantin.

Thomas Ahearn  
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Fig. 5.

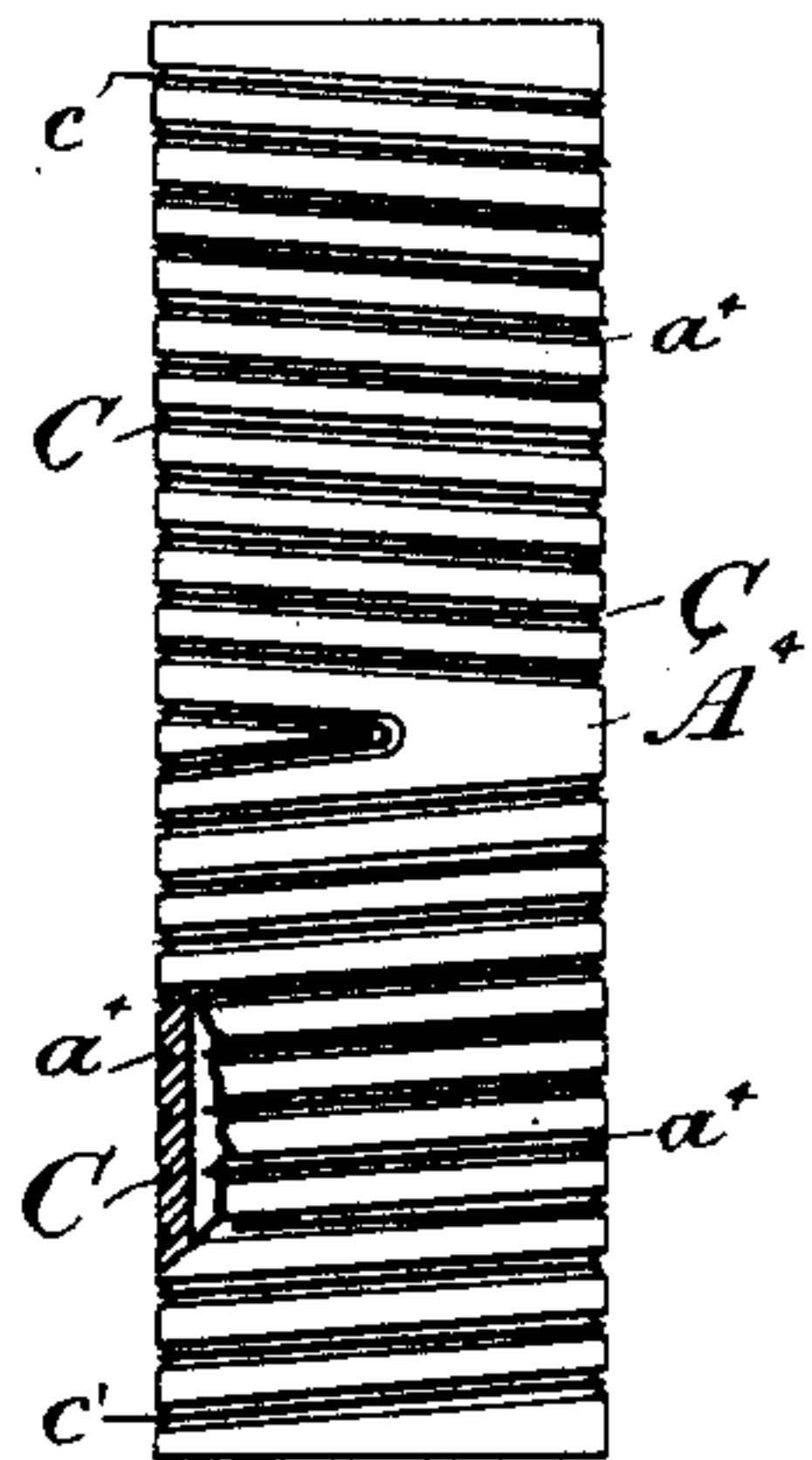


Fig. 6.

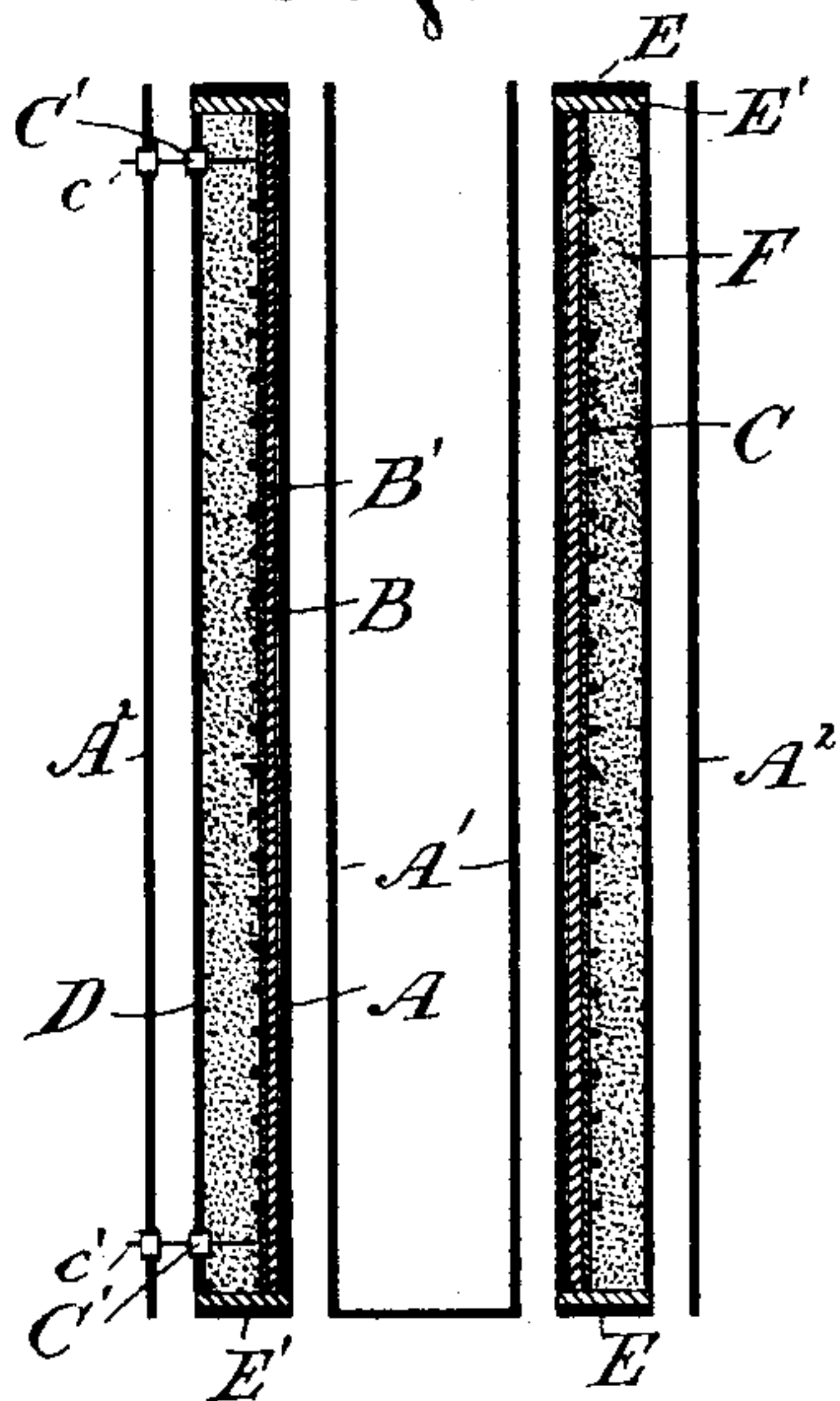


Fig. 7.

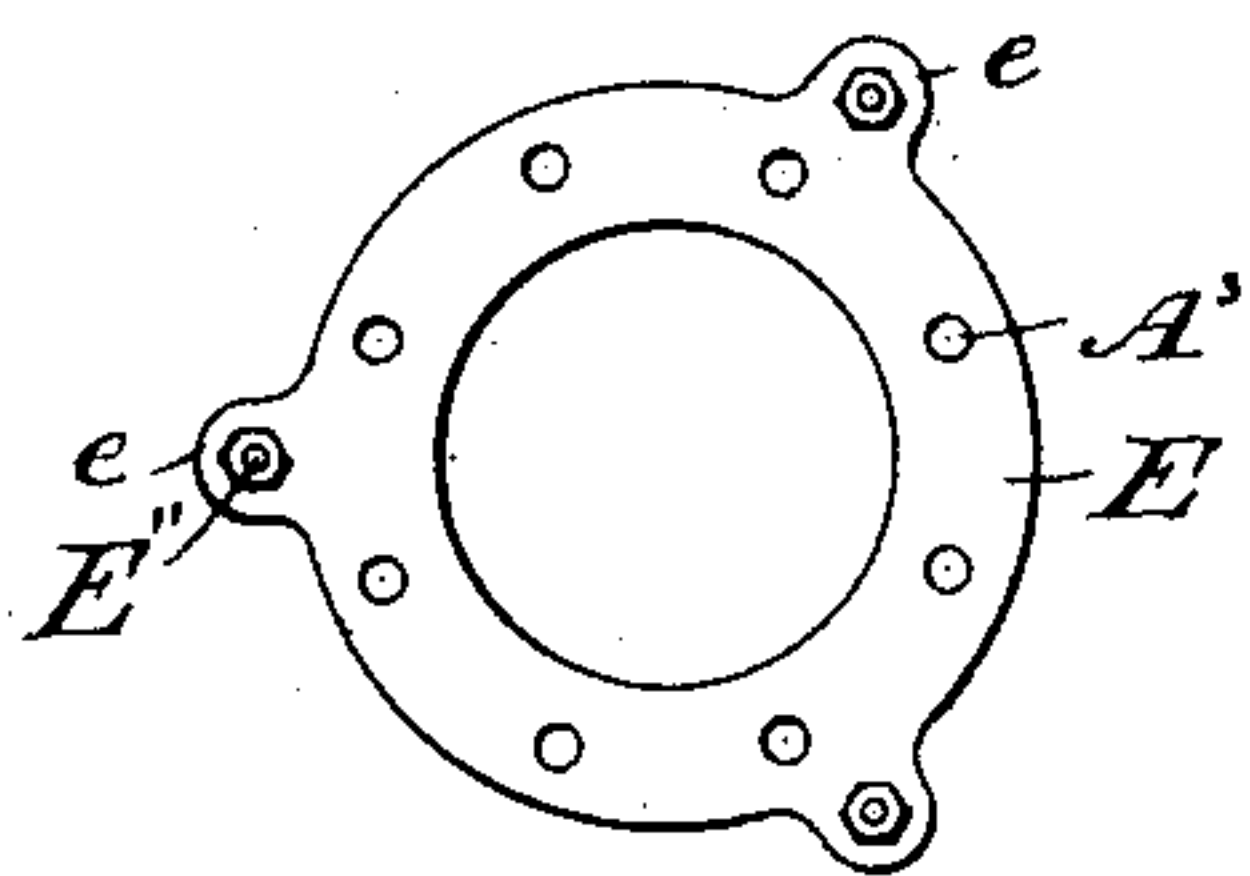


Fig. 8.

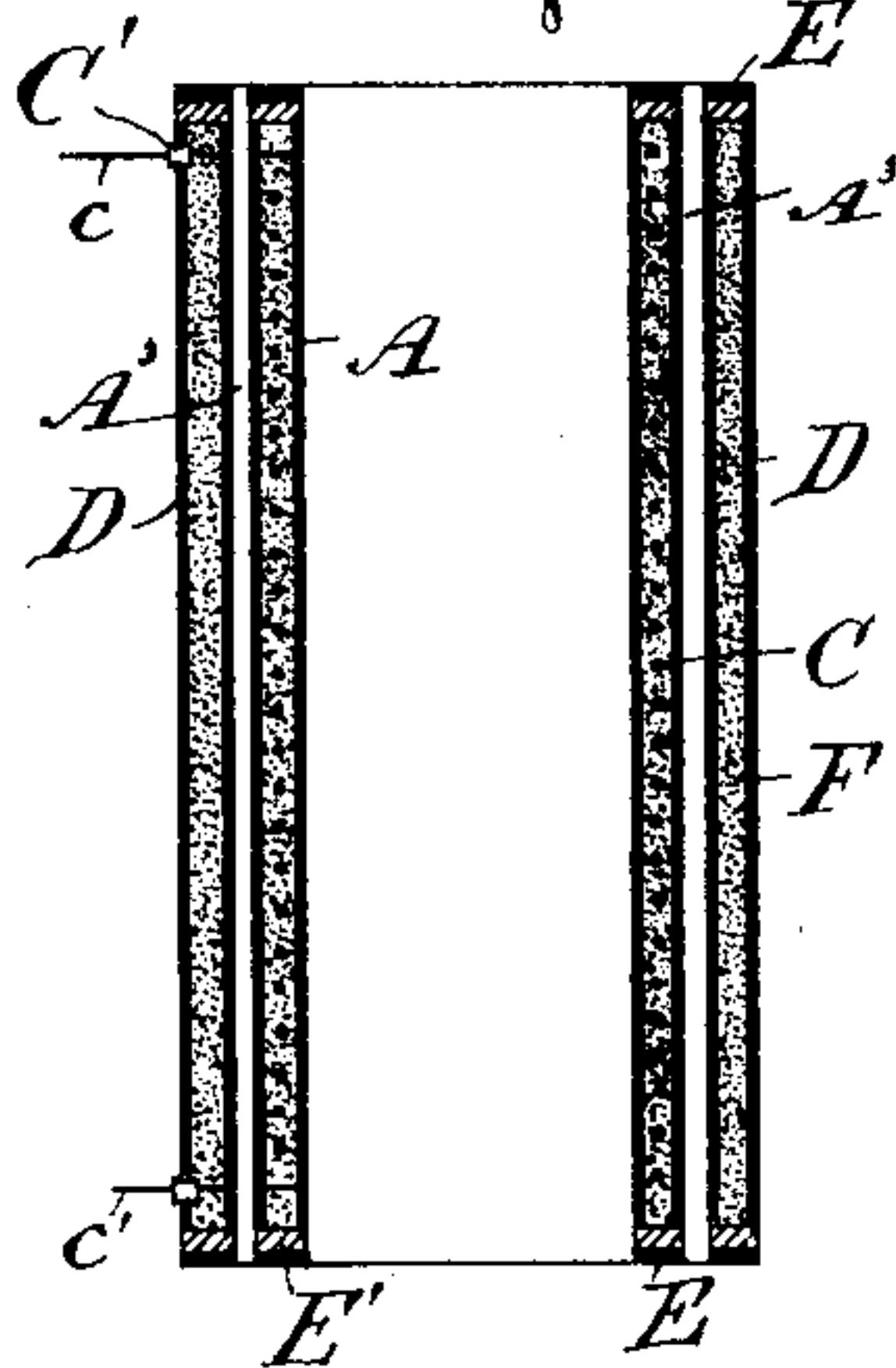
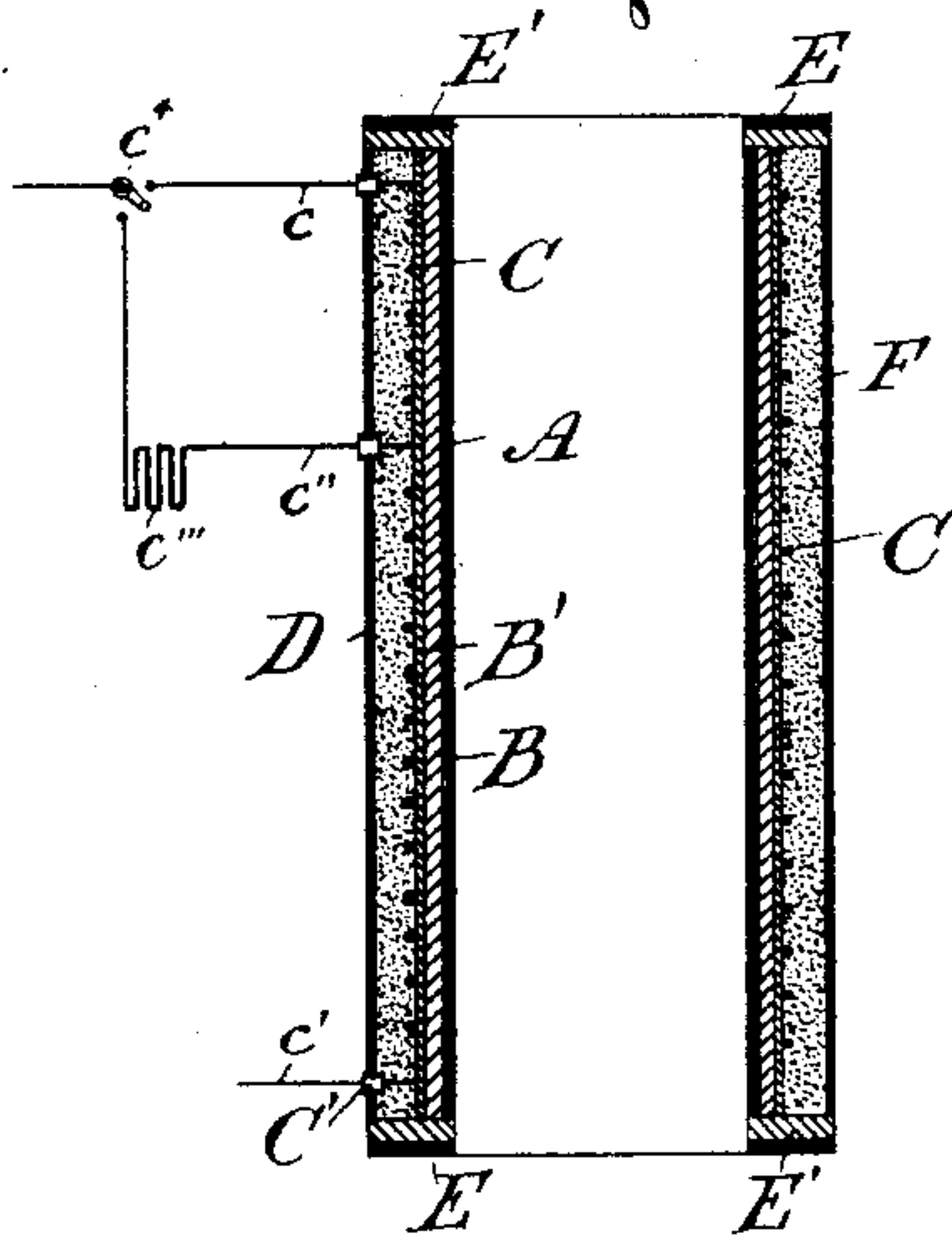


Fig. 9.



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# UNITED STATES PATENT OFFICE.

THOMAS AHEARN, OF OTTAWA, CANADA.

## ELECTRIC HEATER.

SPECIFICATION forming part of Letters Patent No. 483,124, dated September 27, 1892.

Application filed April 4, 1892. Serial No. 427,759. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS AHEARN, of the city of Ottawa, in the county of Carleton and Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Electric Heaters; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part hereof.

My invention, which will be hereinafter fully set forth and claimed, relates to appliances for obtaining and utilizing heat from an electric current.

Figure 1 is an elevation of my improved heater. Fig. 2 is a horizontal section of the same on line  $x x$ , Fig. 1. Fig. 3 is a vertical section of the same on line  $y y$ , Fig. 2, showing the inner tube in elevation, a part being broken out to show the section. Fig. 4 is a top view of the same. Fig. 5 shows a modification of the core. Fig. 6 is a vertical section of a modification having an additional inner and outer casing. Figs. 7 and 8 are top view and horizontal section of another modification having additional radiating or air tubes, and Fig. 9 is a vertical section of another modification.

A is a tube of a (preferably) good heat-conducting material, such as iron, shown of circular cross-section in the drawings, but which may be square or polygonal, plain or corrugated, or of any other desired cross-section. Upon the outer surface of this are laid longitudinally and at short distances apart strips of asbestos B, and upon these again strips of mica B', these latter being so-called non-combustible materials and non-conductors of electricity. Upon these strips is wound a coil C, of wire or strips of refractory metal of low electric conductivity, such as German silver and the like, the terminals of which are connected with leads  $c$  and  $c'$ , and each of these is passed through an insulator C', which is afterward secured in the outer metallic casing. This resistance-coil is preferably wound in opposite directions to check induction.

D is the outer casing, consisting of a metallic tube having the same length as the inner tube A and large enough to allow a clear annular space between its inner surface and that of the cored coil, and being of such a shape in

cross-section as to correspond with the outline of the latter. The annular space thus formed is packed with powdered fire-clay, whiting, or other powdered non-conducting material F. An asbestos packing-ring E' is placed at each end, covering the space so filled and the edges of the two tubes, and these rings are held in place by a cover E at each end provided with lugs  $e$ , through which pass bolts E''. The lower cover is provided with insulator-feet G, so as to raise it sufficiently off the floor to allow free access to a current of air to enter into and pass through the inner tube. This construction admits of numerous modifications, of which a few are shown in Figs. 5, 6, 7, 8, and 9.

Instead of a metallic tube A, provided with insulating-strips B and B', a non-metallic non-combustible tube—such as fireproof tile-pipe A<sup>4</sup>, Fig. 5—may be employed. In these a spiral groove  $a^4$  is cut to receive the resistance-coil C, which is wound directly upon the material in said groove, and the groove afterward filled flush with non-combustible powdered or plastic material.

To condense and accelerate the air-current passing through the inner tube A, another light tube A', Fig. 6, closed at the bottom and allowing an annular space between the two, may be inserted. An air-current may also be caused to pass along the surface of the outer tube D by inclosing it in another light casing A'', open at the bottom. In this construction direct radiating will not be obtained.

The heating-surface of the tubes A and D may be increased by corrugations and projections, and may also be augmented by additional radiating or air tubes A''', inserted or formed between the inner and outer tubes A and D, open at top and bottom, as shown in Figs. 7 and 8.

In Fig. 9 one of the intermediate coils is provided with a lead  $c''$ , having a resistance-coil  $c'''$ , inserted and connected with the main lead by a switch  $c^4$ , so that a portion of the coils may be "cut out" and the heating capacity thus reduced at will. This may be done with a number of the coils.

In operation the electric current heats the coil C, which is insulated from the metallic casings A and D by the asbestos and mica (or asbestos alone) on one side and the powdered



material F' on the other, while the latter conducts the heat generated to the incasing-tubes, or principally to one or other of them, if so desired, whence it is taken up by the current of  
5 air by radiation.

I claim as my invention—

1. In an electric heater, the combination of a tube A, strips of asbestos B, laid upon said tube longitudinally, strips of mica B', laid  
10 upon said asbestos strips, a coil of wire or strip C, of refractory metal of low electric conductive power, wound upon said strips and its terminals connected with leads, an outer tube D, inclosing said coil and leaving an annular  
15 space, a filling of powdered non-combustible non-electric-conducting material in said annular space, insulating packing-rings E', closing the ends of said annular space, covers E, having lugs e upon said packing-rings, and  
20 bolts E'', passing through said lugs and holding said covers together, substantially as set forth.

2. In an electric heater, the combination of

a tubular core A, insulated with strips of asbestos B and mica B', carrying a coil C, of  
25 wire or strip of refractory metal of low electric conductive power, an outer tube D, inclosing said core and forming an annular space around said core and containing insu-  
30 lators through which pass the leads connecting the terminals of said coil, a powdered non-electric-conducting material filling F in said annular space, insulated covers E, closing said  
35 annular space and held in place by bolts E'', insulating-feet G on one of said covers, an inner tube A', closed at the bottom, and a casing A'' around the external tube D, open at the bottom and forming an annular space around the same, substantially as set forth.

In testimony whereof I have signed in the  
40 presence of the undersigned witnesses.

THOMAS AHEARN.

Witnesses:

A. HARVEY,  
A. TROWSE.