

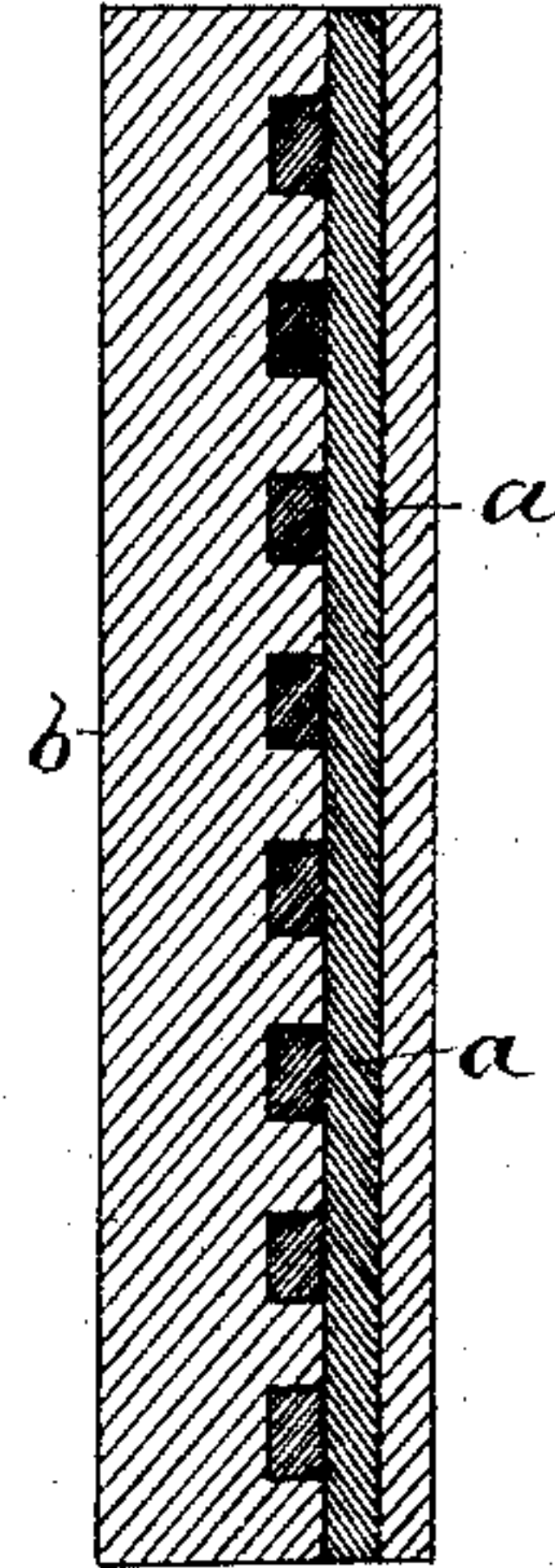
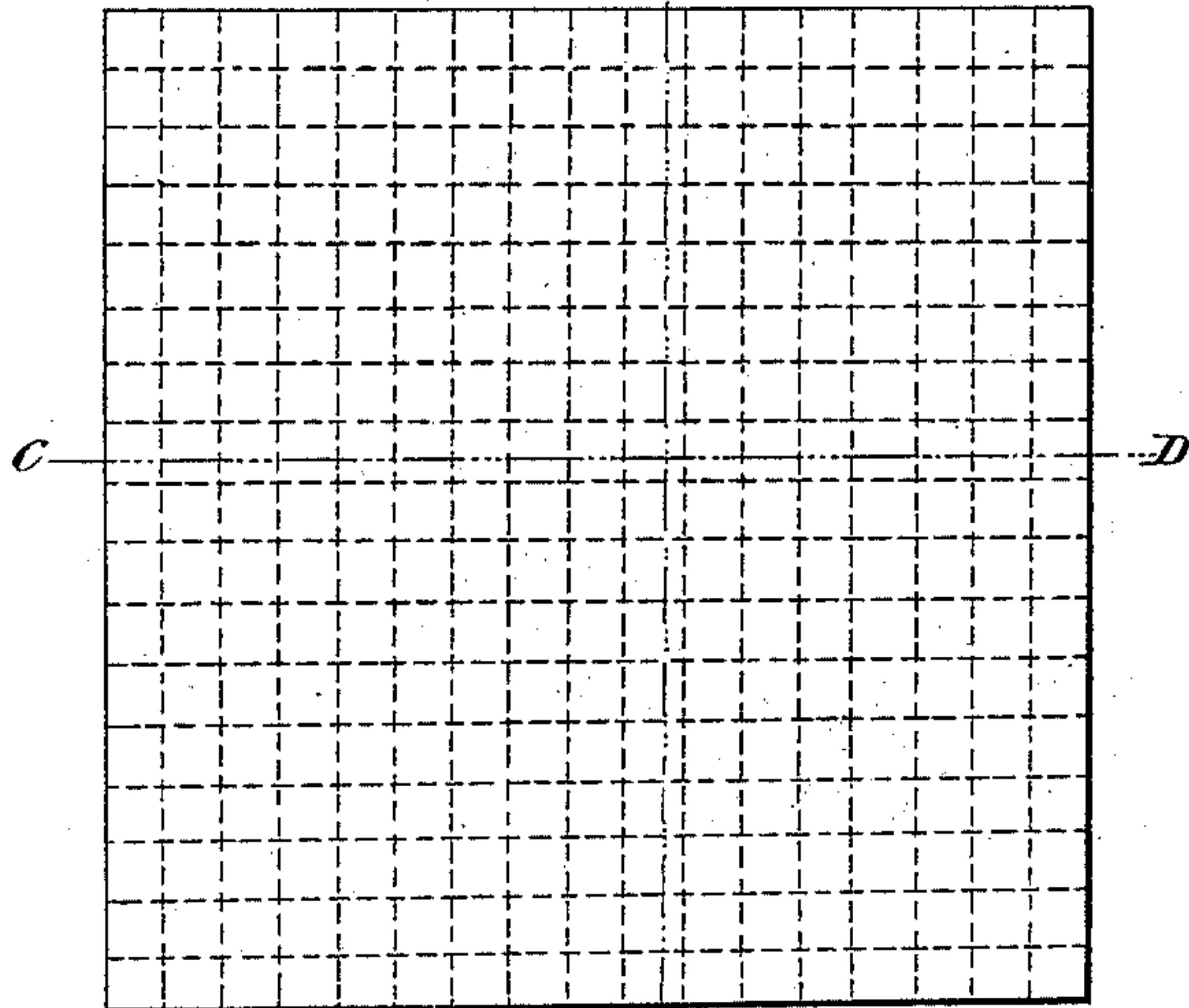
H. C. S. DYER.

MANUFACTURE OF COMPOUND ARMOR PLATES.

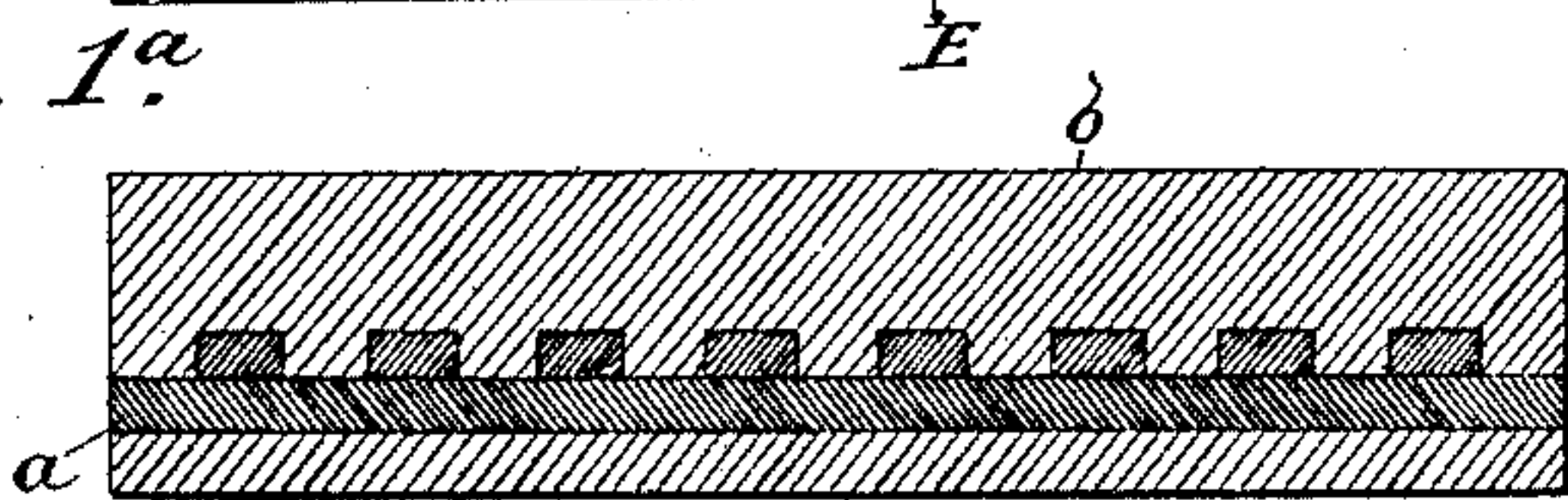
No. 371,129.

Patented Oct. 4, 1887.

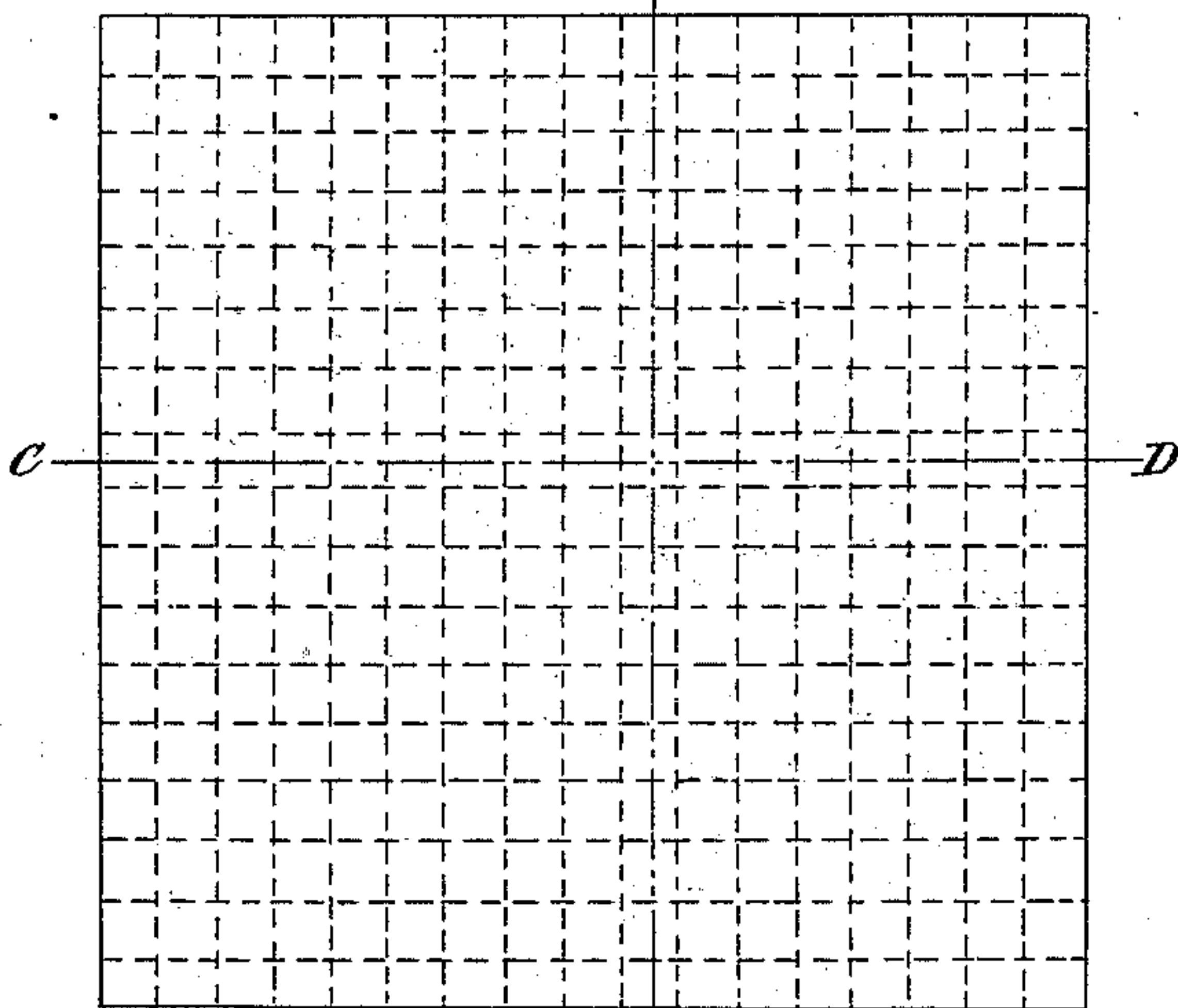
*Fig. 1.* *Fig. 1<sup>b</sup>.*



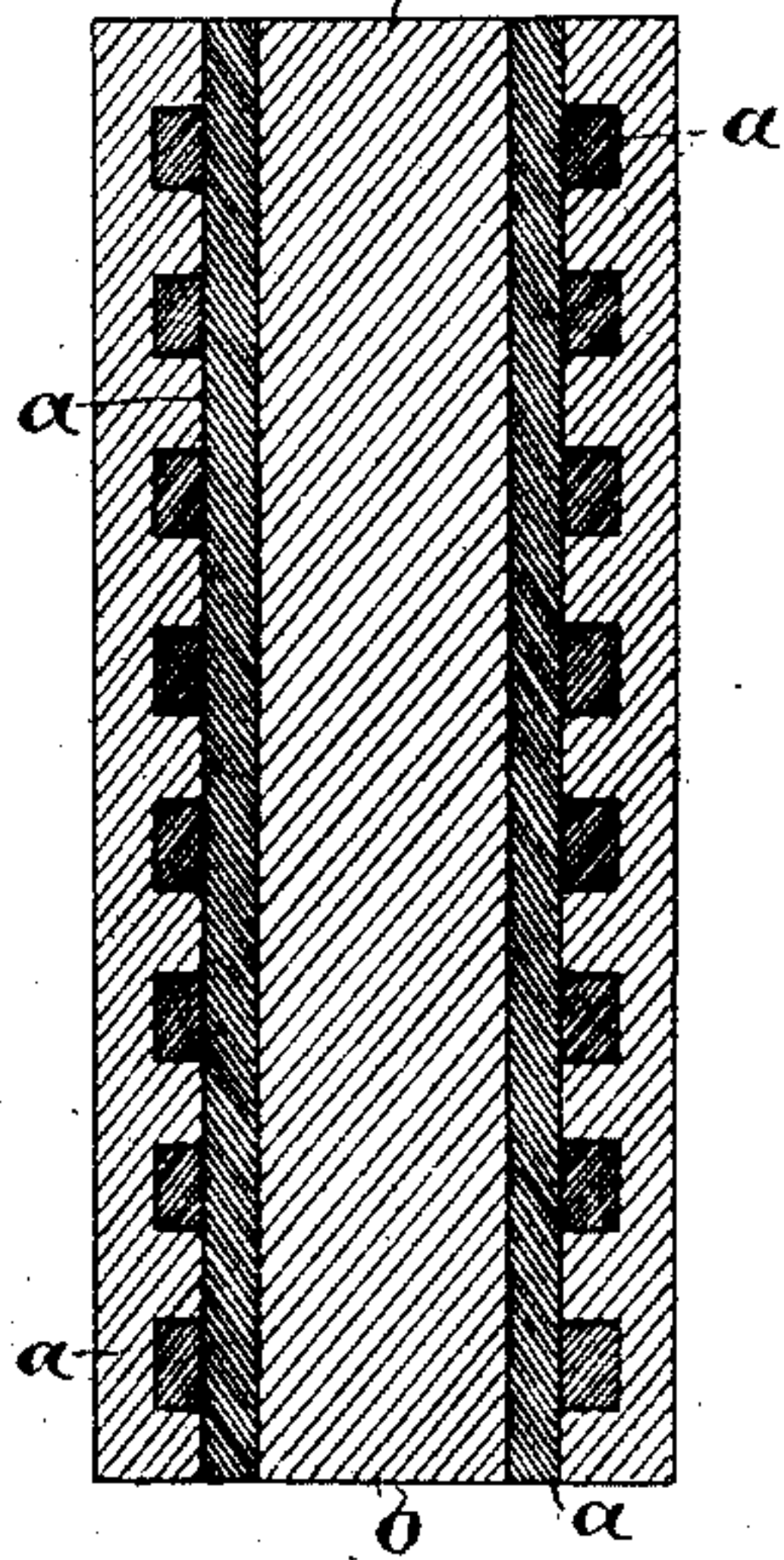
*Fig. 1<sup>a</sup>.*



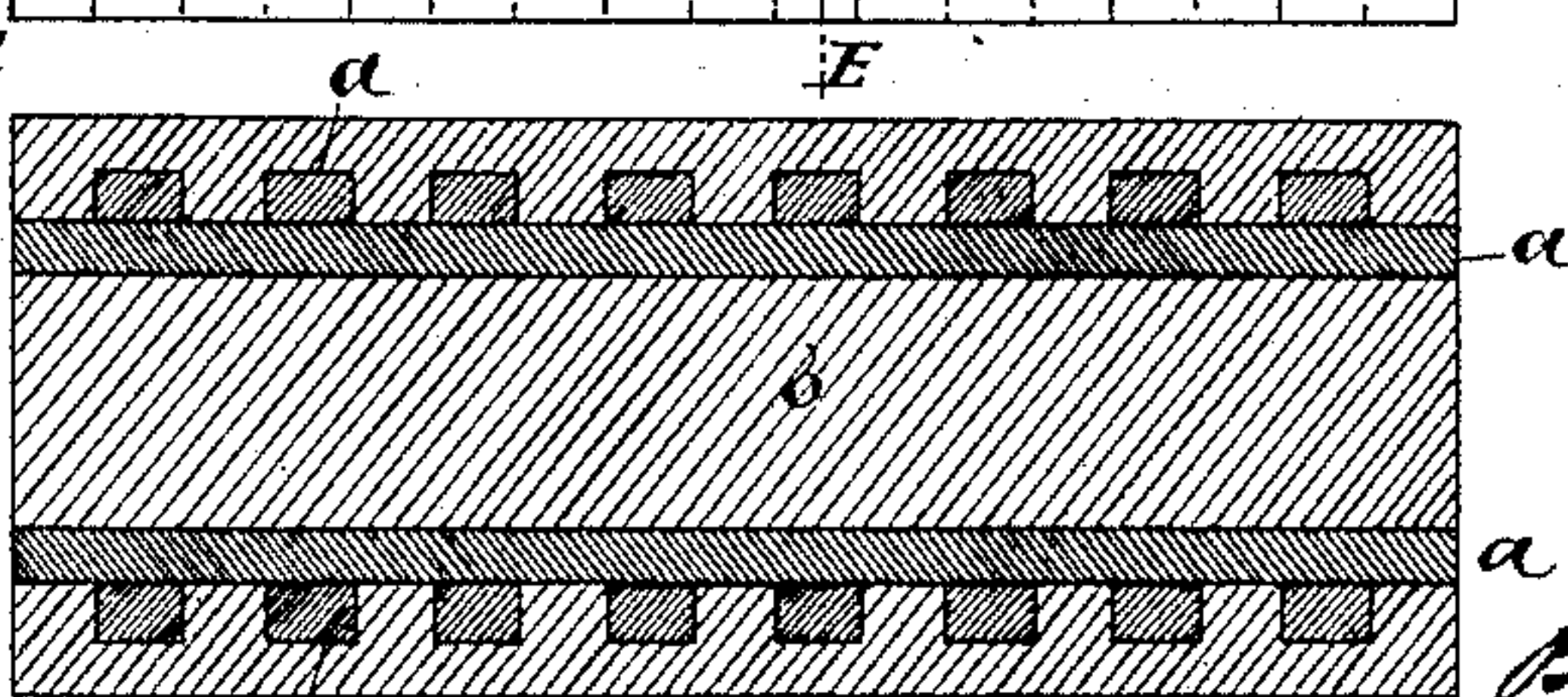
*Fig. 2.*



*Fig. 2<sup>b</sup>.*



*Fig. 2<sup>a</sup>.*



Witnesses

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H. L. Holmes

Inventor

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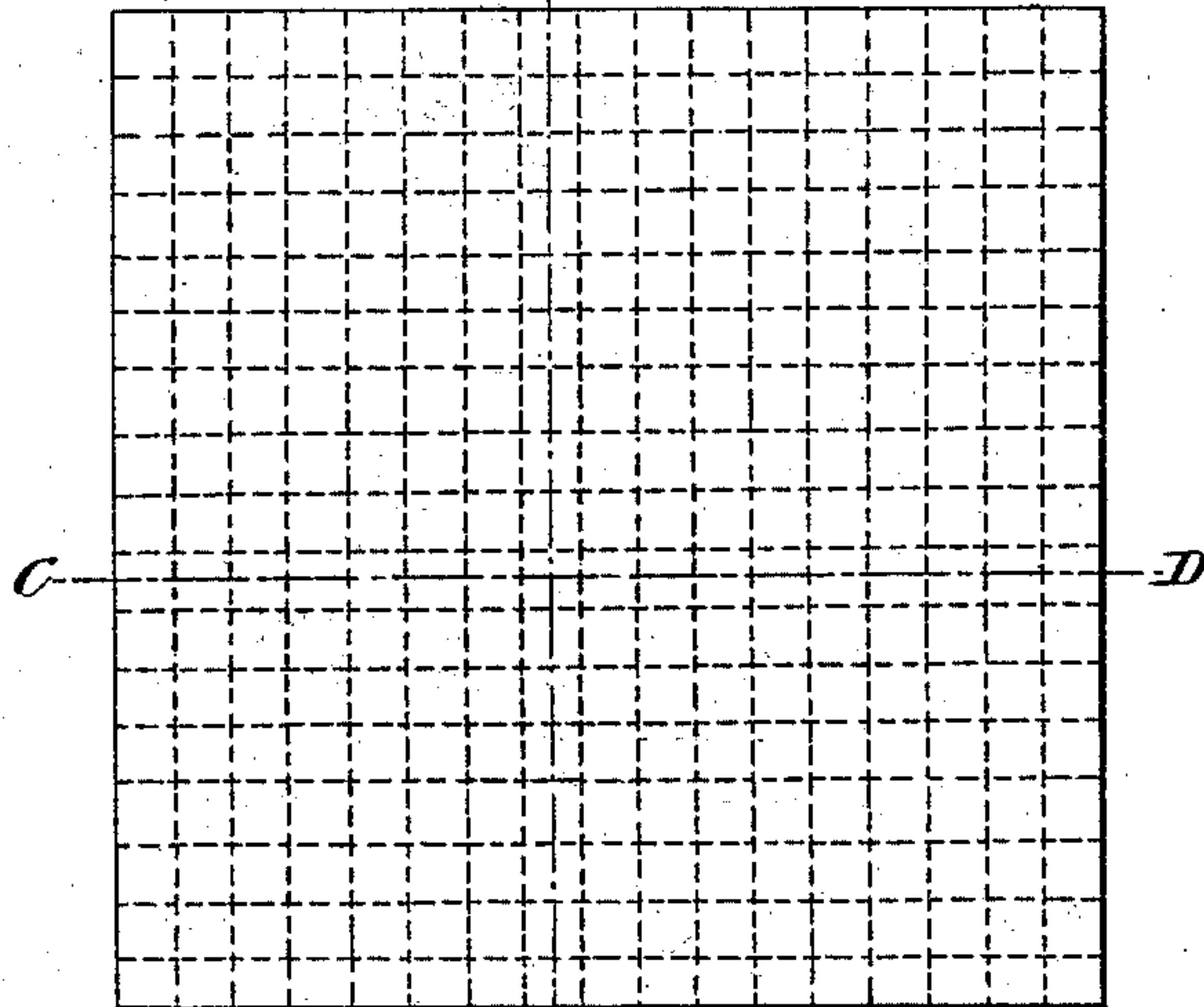
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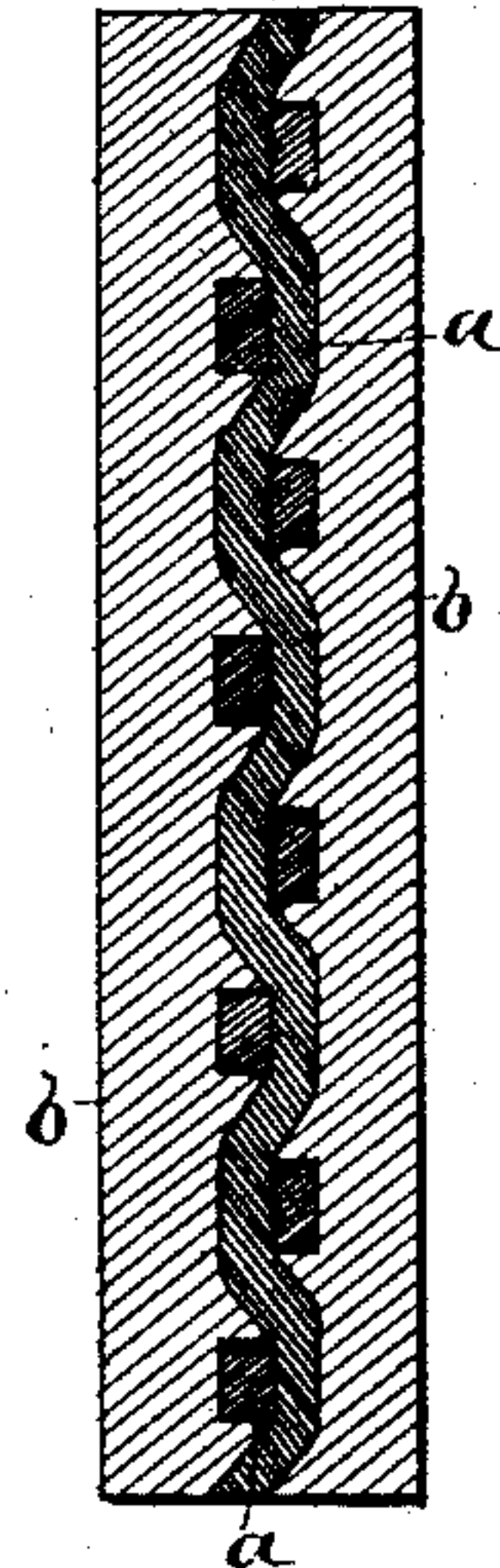
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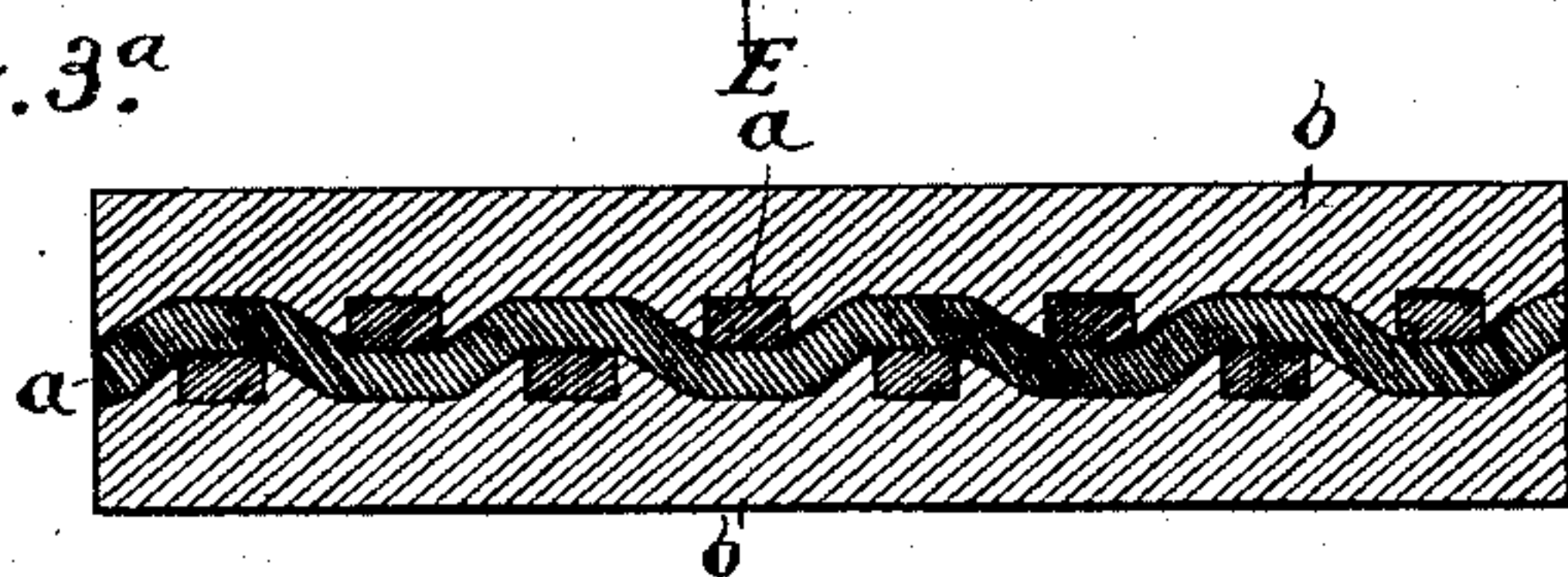
*Fig. 3.*



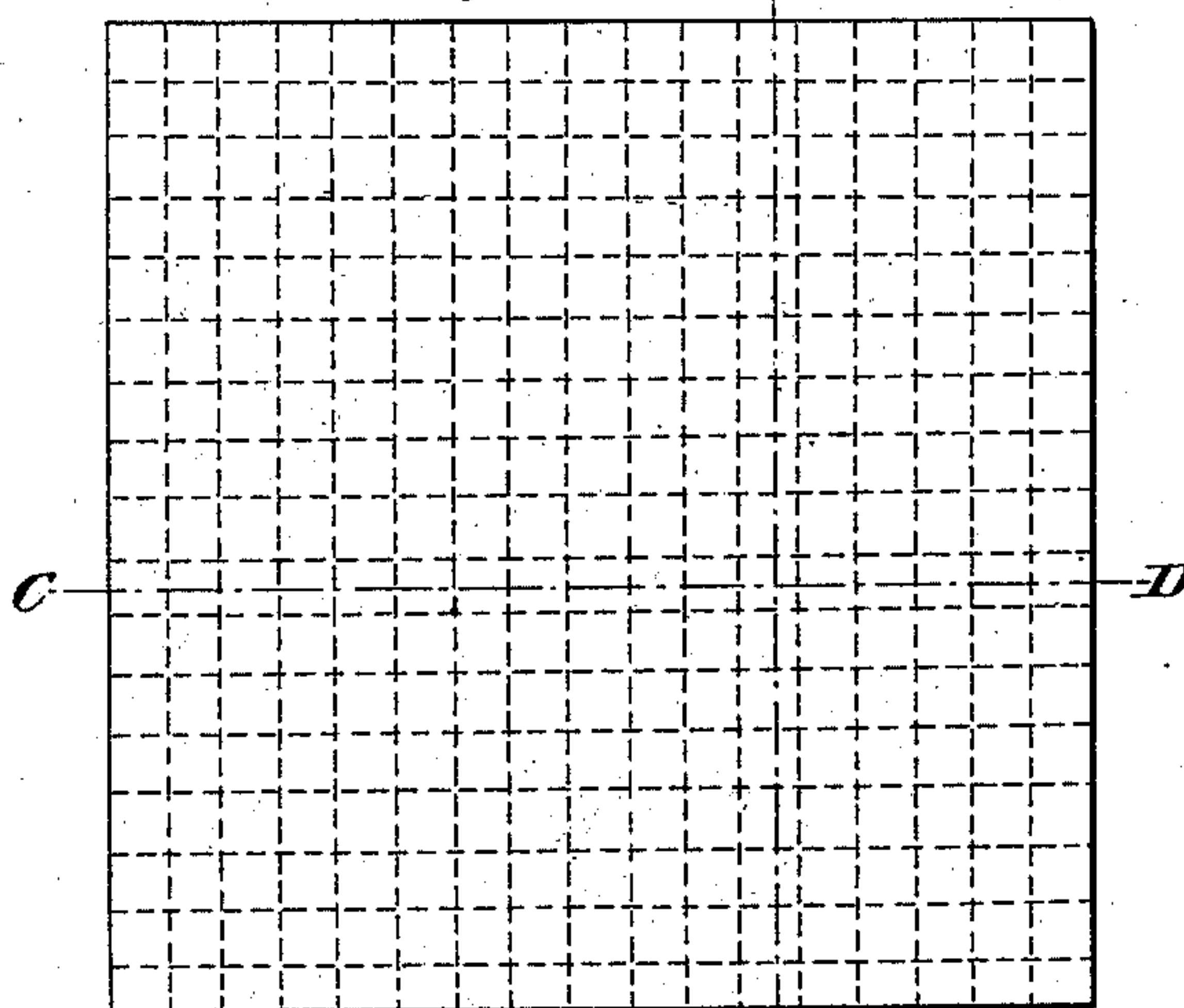
*Fig. 3<sup>b</sup>*



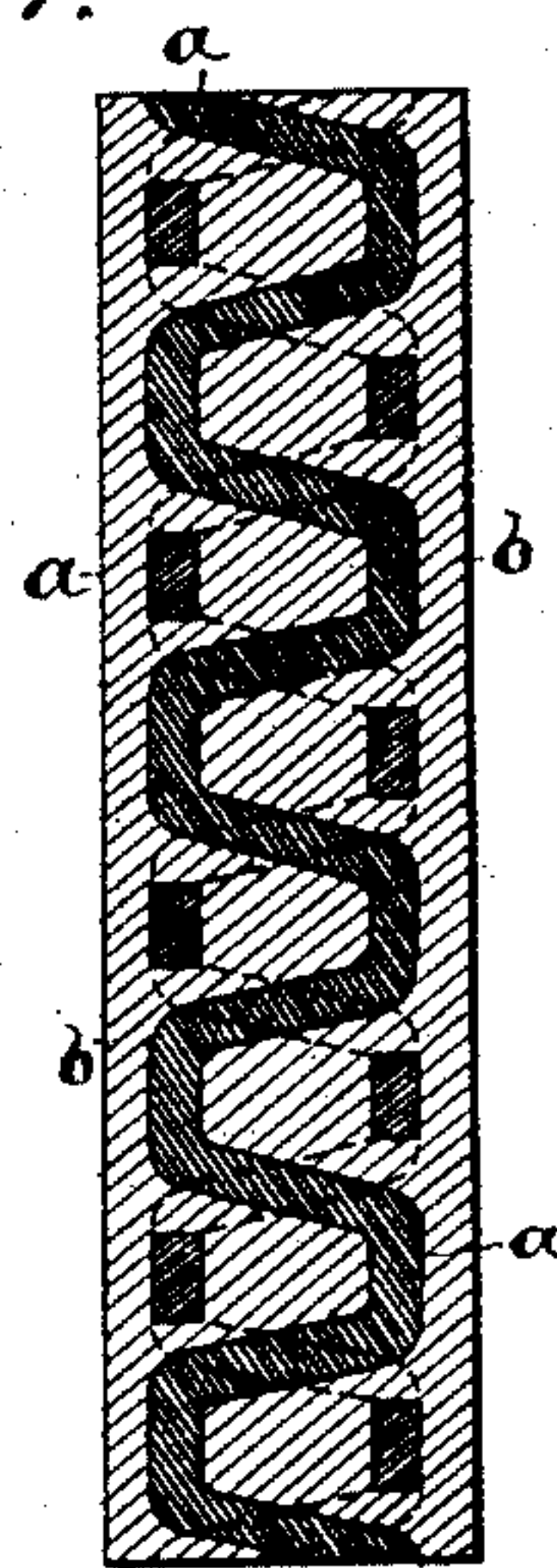
*Fig. 3<sup>a</sup>*



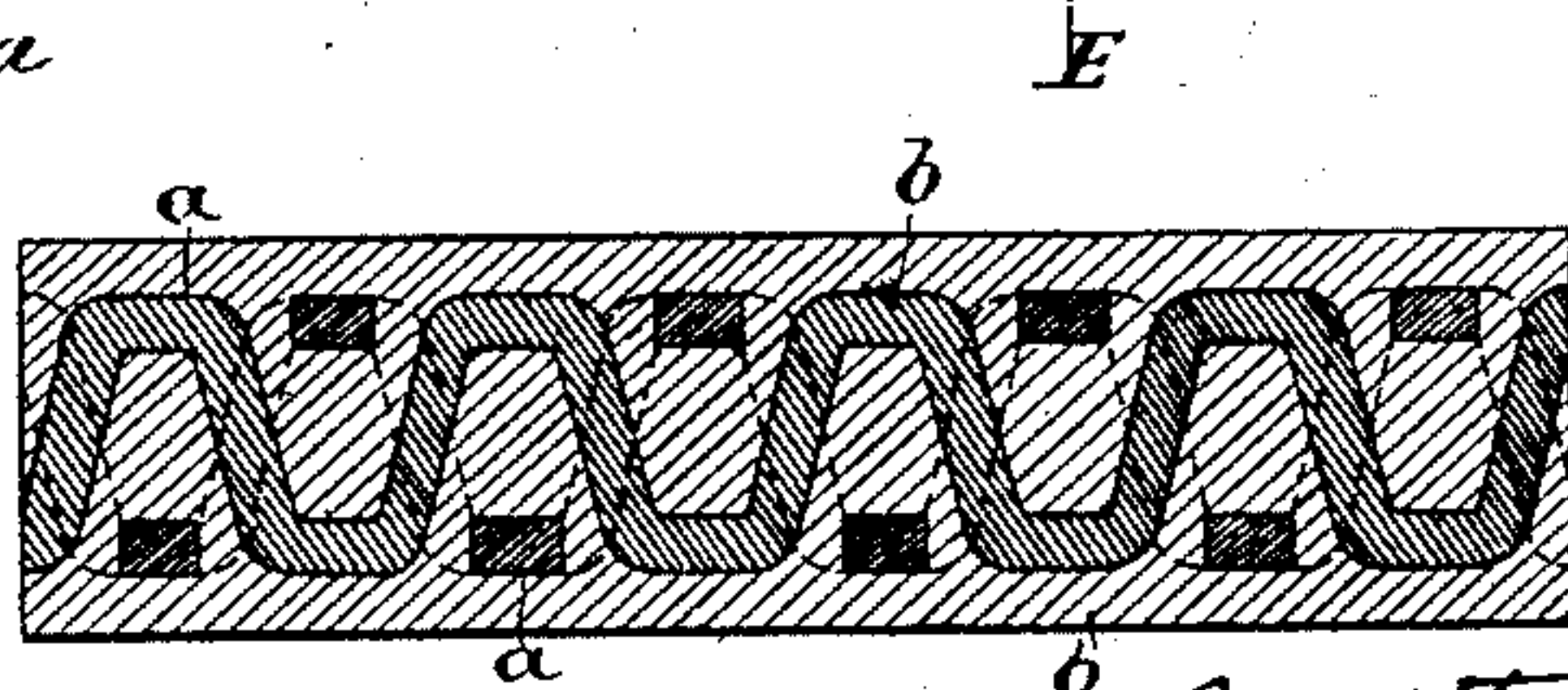
*Fig. 4.*



*Fig. 4<sup>b</sup>*



*Fig. 4<sup>a</sup>*



Witnesses

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(No Model.)

3 Sheets—Sheet 3.

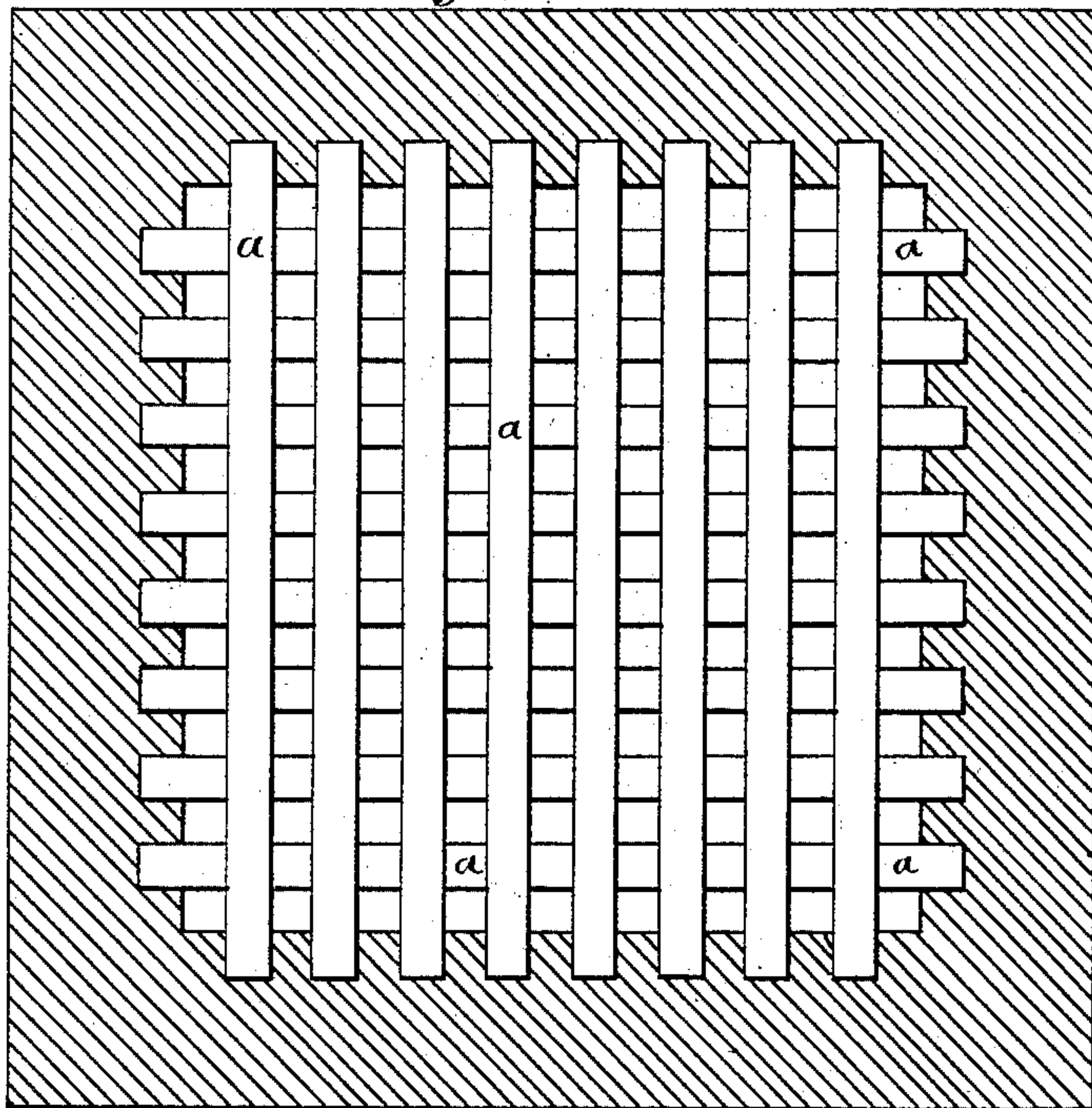
H. C. S. DYER.

MANUFACTURE OF COMPOUND ARMOR PLATES.

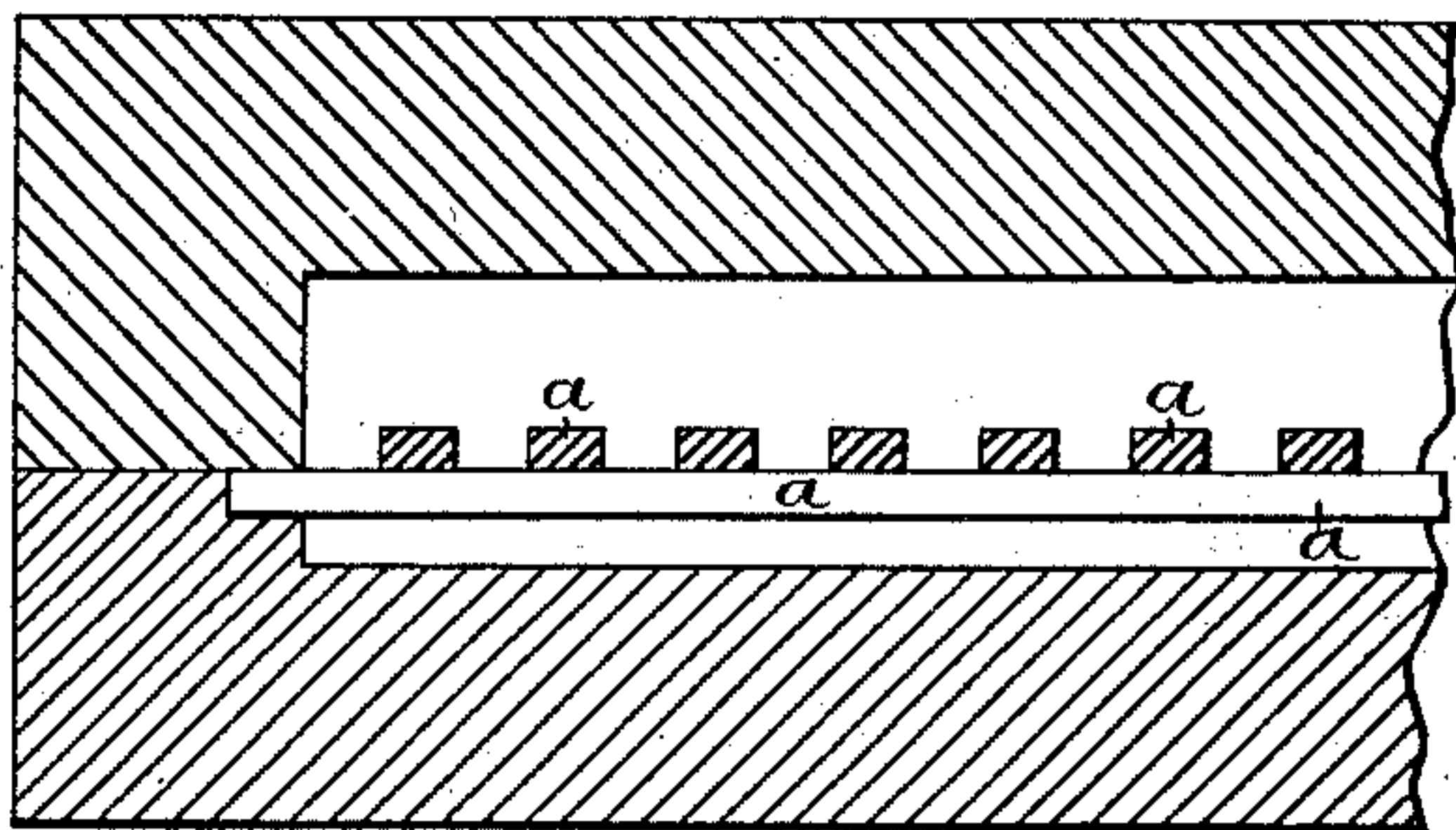
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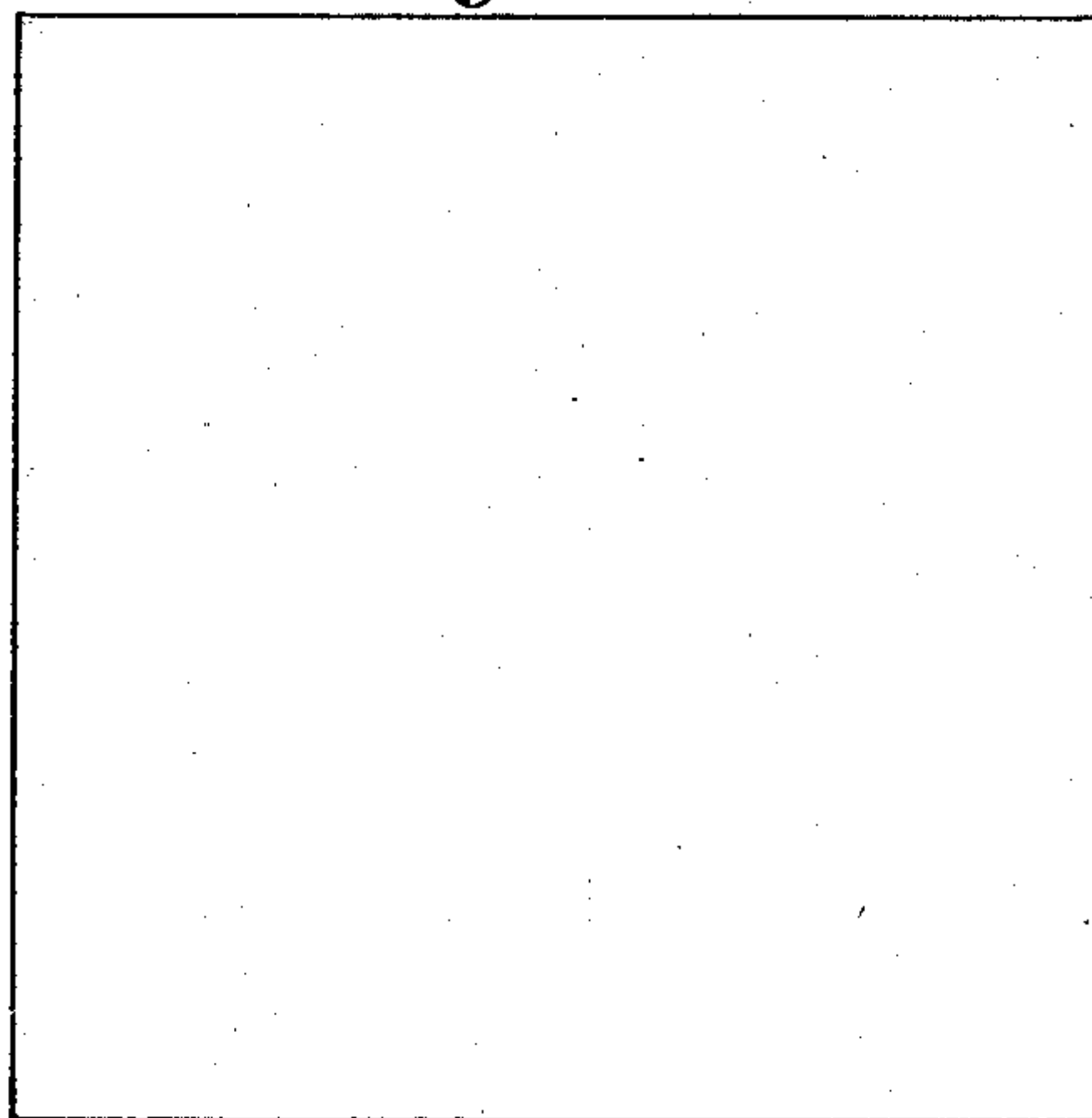
*Fig. 5.*



*Fig. 6.*



*Fig. 7.*



WITNESSES

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# UNITED STATES PATENT OFFICE.

HENRY CLEMENT SWINNERTON DYER, OF WESTHOPE, COUNTY OF SHROPSHIRE, ENGLAND.

## MANUFACTURE OF COMPOUND ARMOR-PLATES.

SPECIFICATION forming part of Letters Patent No. 371,129, dated October 4, 1887.

Application filed November 8, 1886. Serial No. 218,322. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY CLEMENT SWINNERTON DYER, of Westhope, in the county of Shropshire, England, have invented a certain  
5 new and useful Improvement in the Manufacture of Compound Armor-Plates, of which the following is a specification.

My object is to provide compound armor-plates which, while sufficiently hard to possess to the requisite degree the quality of impenetrability, shall also be of great toughness, so as to lessen the liability of fracture and decrease the extent of cracks resulting from the impact of projectiles.

15 To this end my improvement relates to the formation of compound armor-plates of cast-steel re enforced by bars of wrought-iron, or of steel tougher than the cast-steel of which the plates are mainly composed.

20 In accordance with my invention I form the plates by casting steel about the re-enforcing bars and then forging the compound plates so produced.

In the annexed drawings, which show several forms of compound plates, Figure 1 is a plan view with the re-enforcing bars represented by dotted lines; and Figs. 1<sup>a</sup> and 1<sup>b</sup> show sections on the lines C D and E F, respectively, of Fig. 1. Fig. 2 is a view similar to Fig. 1 of another form of compound plate; and Figs. 2<sup>a</sup> and 2<sup>b</sup> show sections on the lines C D and E F, respectively, of Fig. 2. Fig. 3 is a view similar to Fig. 1 of another form of compound plate; and Figs. 3<sup>a</sup> and 3<sup>b</sup> show sections on the lines C D and E F, respectively, of Fig. 3. Fig. 4 is a plan view similar to Fig. 1 of another form of compound plate; and Figs. 4<sup>a</sup> and 4<sup>b</sup> show sections on the lines C D and E F, respectively, of Fig. 4. Fig. 5 is a view showing the re-enforcing bars in plan, with the mold in horizontal section preparatory to the admission to the mold of the molten metal; and Fig. 6 is a section of the mold with the re-enforcing bars in elevation ready for the casting of the steel. Fig. 7 is a plan of the completed armor-plate on a reduced scale.

In carrying out my invention I proceed as follows: The re-enforcing bars *a*, of wrought iron or steel of requisite quality, after being  
30 made to the required form, are cleaned or pickled to free them from all oxide, or otherwise treated so as to prepare them most effect-

ually for the molten metal to adhere to their surfaces, and are then placed in the required position in a mold made in the ordinary manner. The re-enforcing bars are of a length somewhat in excess of the dimensions of the interior of the mold and of the cast-steel portion of the compound plate to be produced, so that when the bars are properly arranged their ends are embedded in the sides of the mold to support them, as shown by Figs. 5 and 6. The molten steel is then allowed to flow through the mold until the temperature of the bars is raised, so that the molten metal will readily adhere to them. The outlet in the mold is then closed, so as to allow the mold to be filled in the ordinary way; or the re-enforcing bars may first be heated to the required temperature and the molten metal then run into the mold, in the ordinary manner. The compound plate thus formed is removed from the mold and then forged to shape to form an armor-plate, and hardened and tempered in the ordinary manner.

The amount of forging in consolidating and compacting the compound plate will be regulated by circumstances; but preferably there is a reduction to from one half to one third of the original thickness of the plate.

As shown in the accompanying drawings, the re-enforcing bars *a* of the plates may be near the face, near the back, or in the center of the cast-steel, *b*, to give toughness and power to resist fracture by the impact of projectiles.

I am aware that it is not new, broadly considered, to produce a compound metal plate by casting one metal about another, and I do not unqualifiedly claim such a compound plate.

I claim as my invention—

The manufacture of compound armor-plates of cast-steel and re-enforcing bars of greater toughness than the cast-steel by casting the steel about the bars and forging the compound plate so obtained, substantially as and for the purpose set forth.

HENRY CLEMENT SWINNERTON DYER.

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