

No. 824,492.

PATENTED JUNE 26, 1906.

D McR. LIVINGSTON.

COOLER.

APPLICATION FILED NOV. 25, 1905.

2 SHEETS—SHEET 1.

Fig. 1,

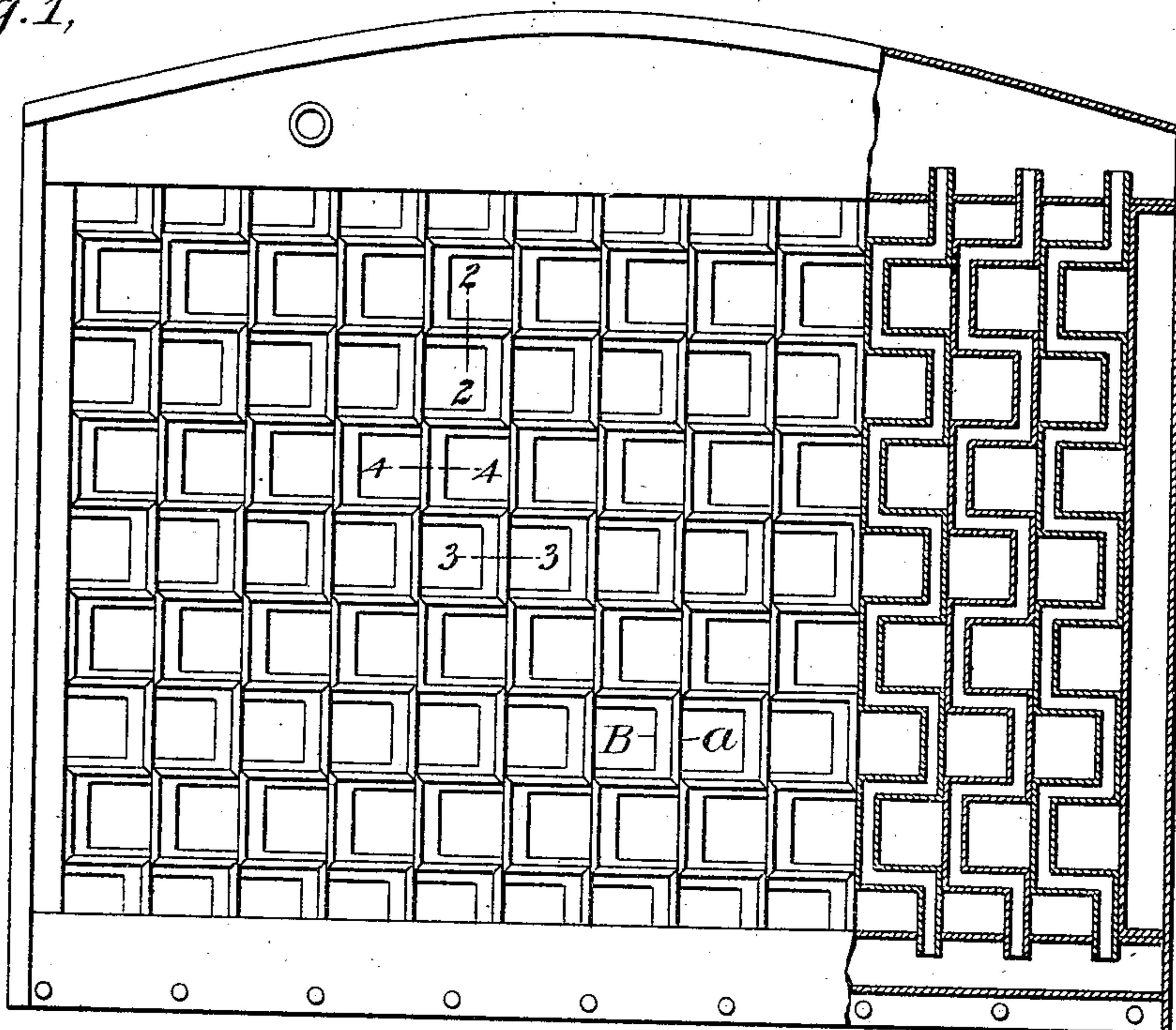


Fig. 3,

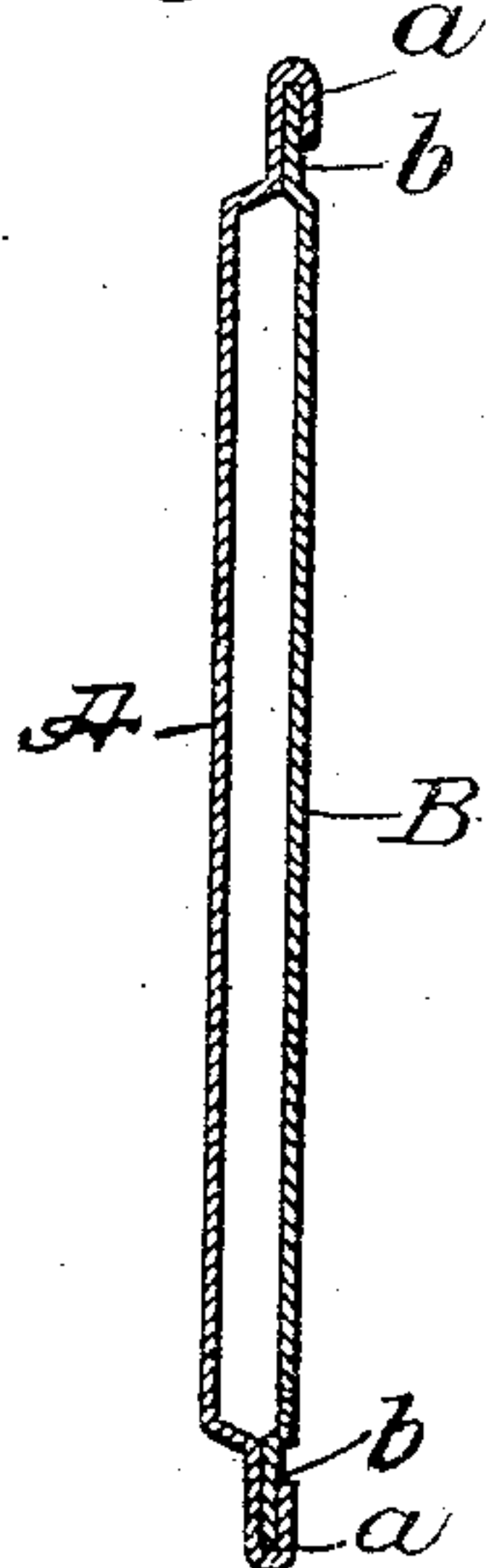


Fig. 2,

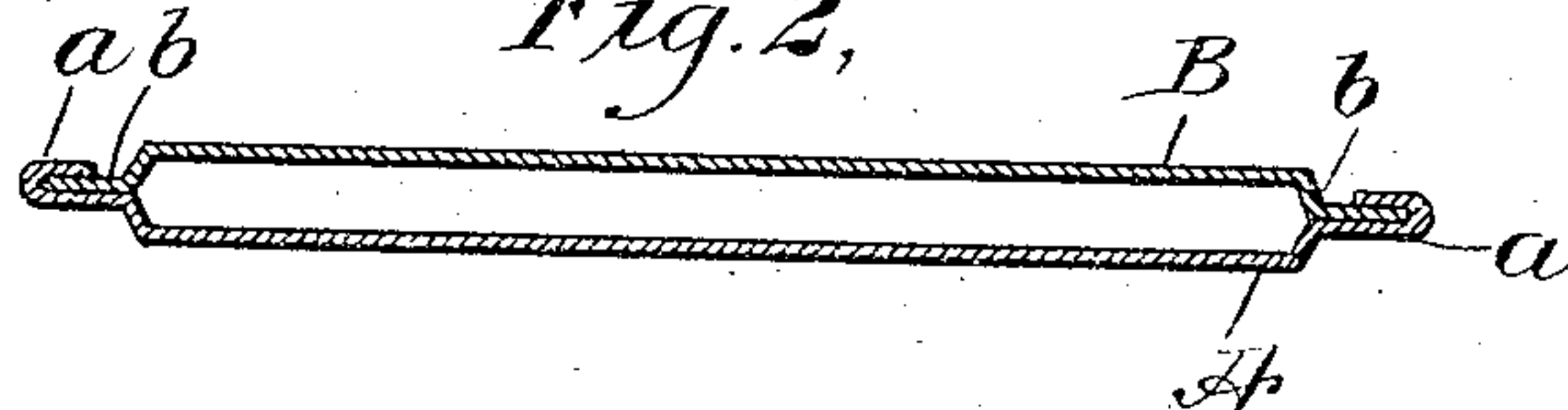


Fig. 4,

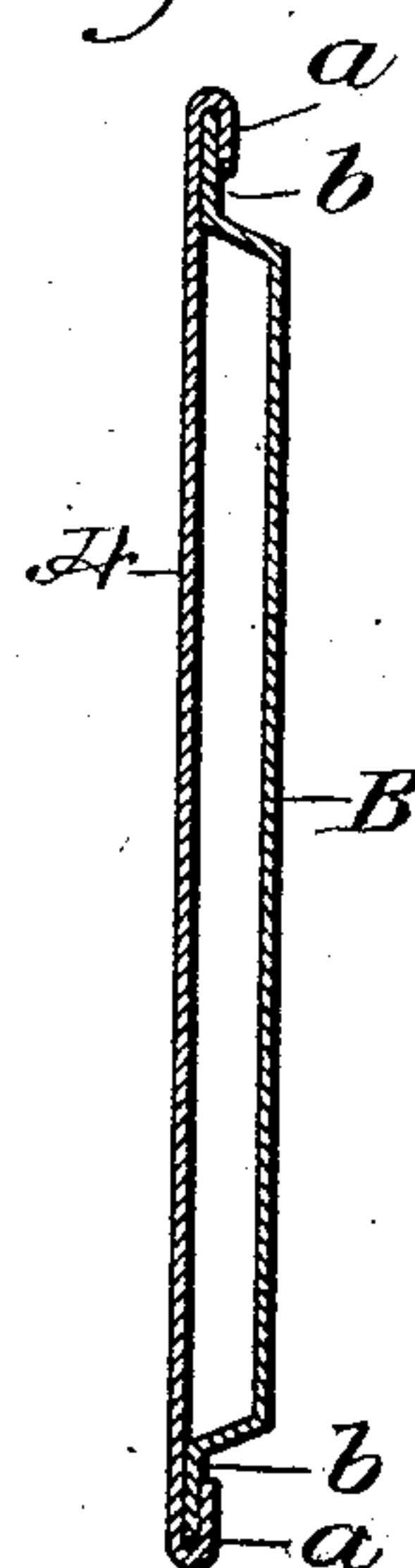
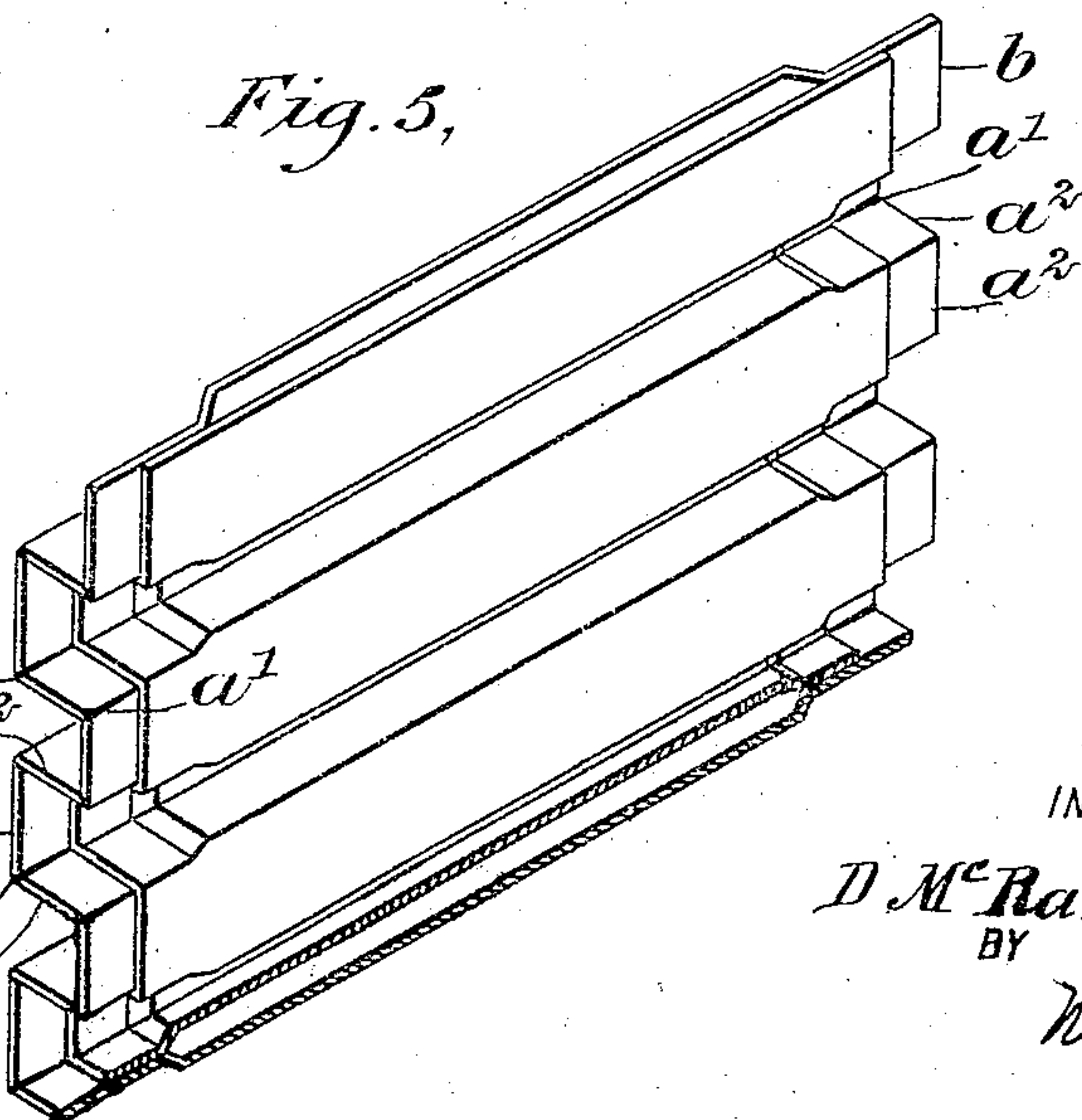


Fig. 5,



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2 SHEETS—SHEET 2.

Fig. 6,

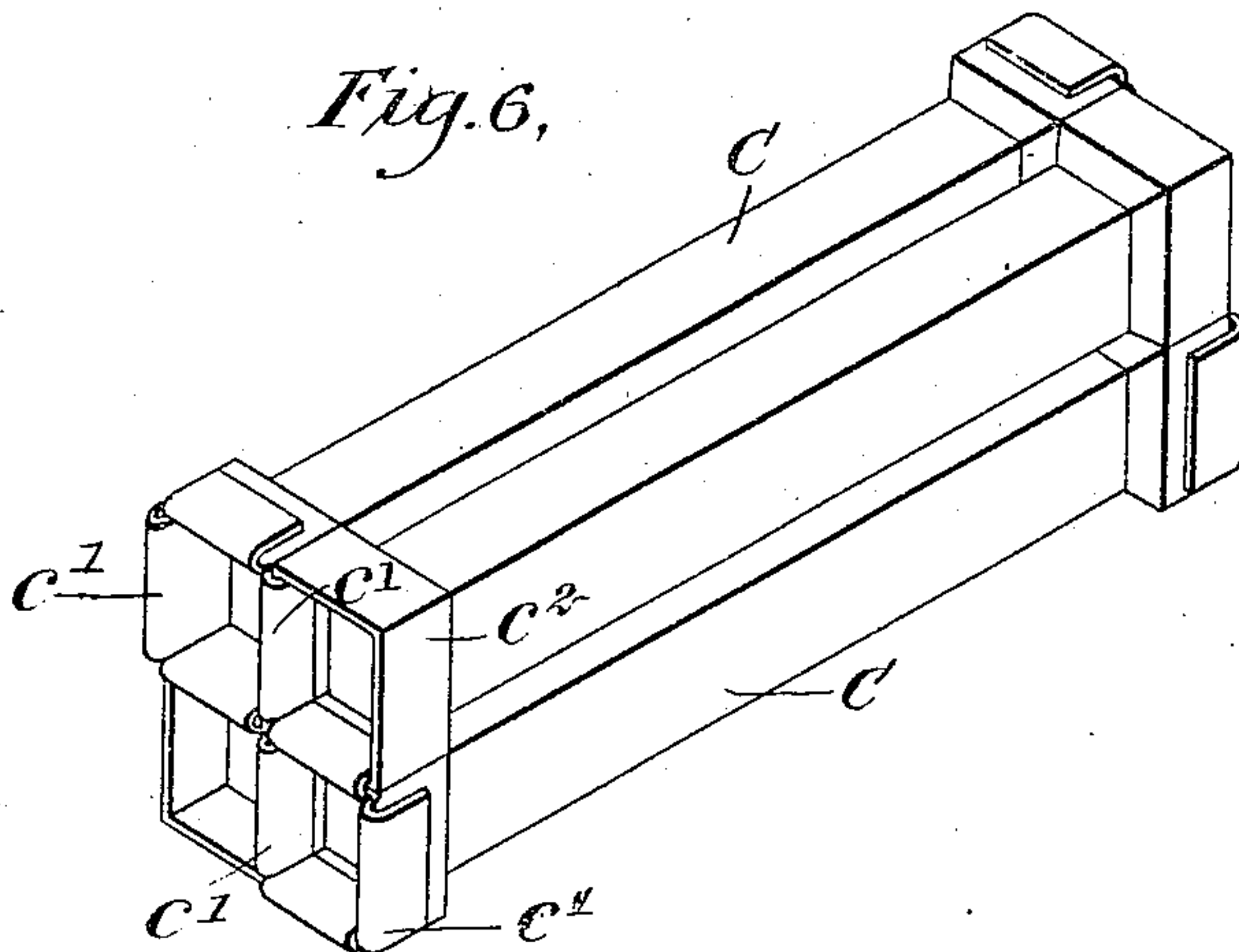


Fig. 7,

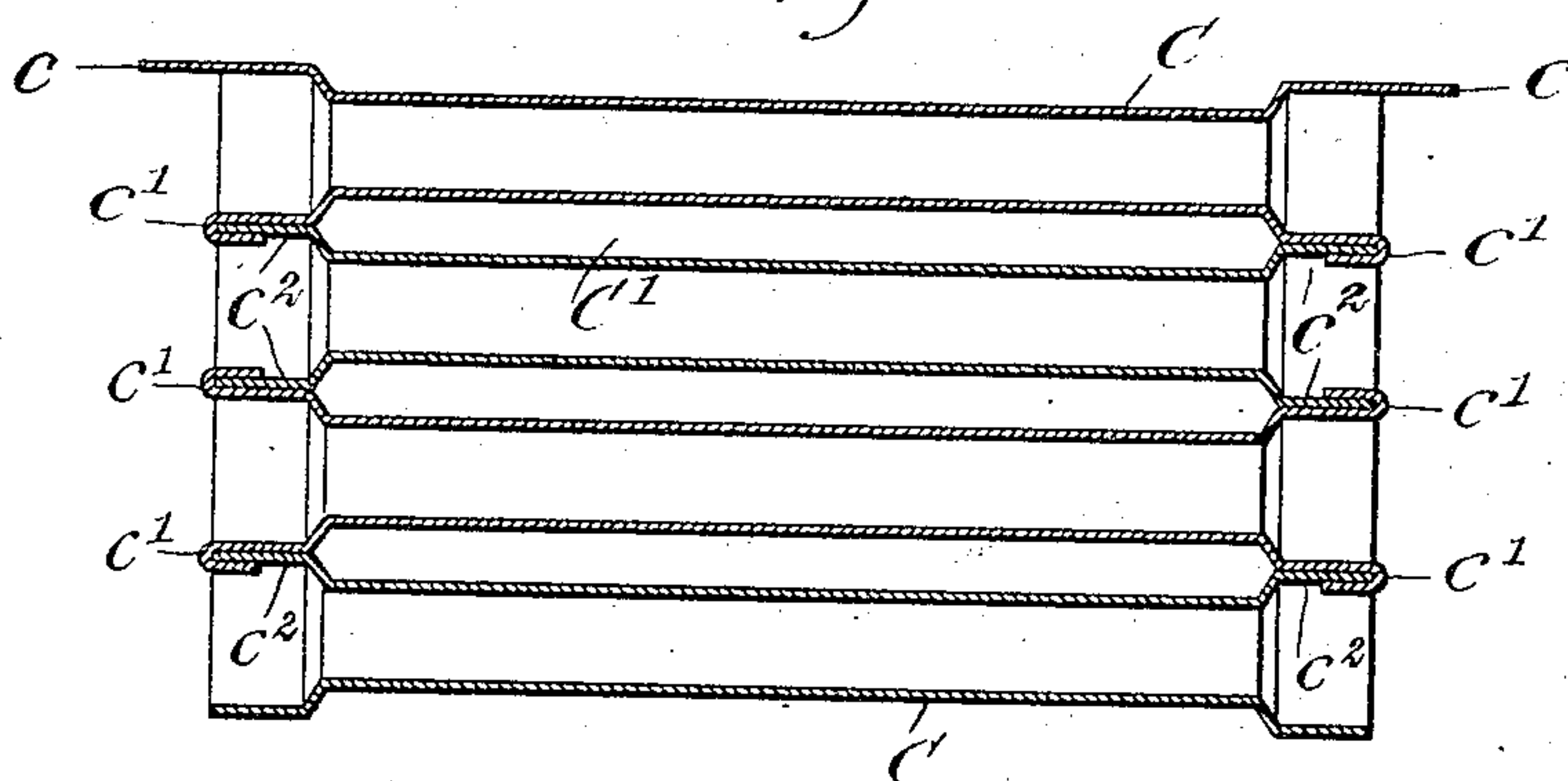
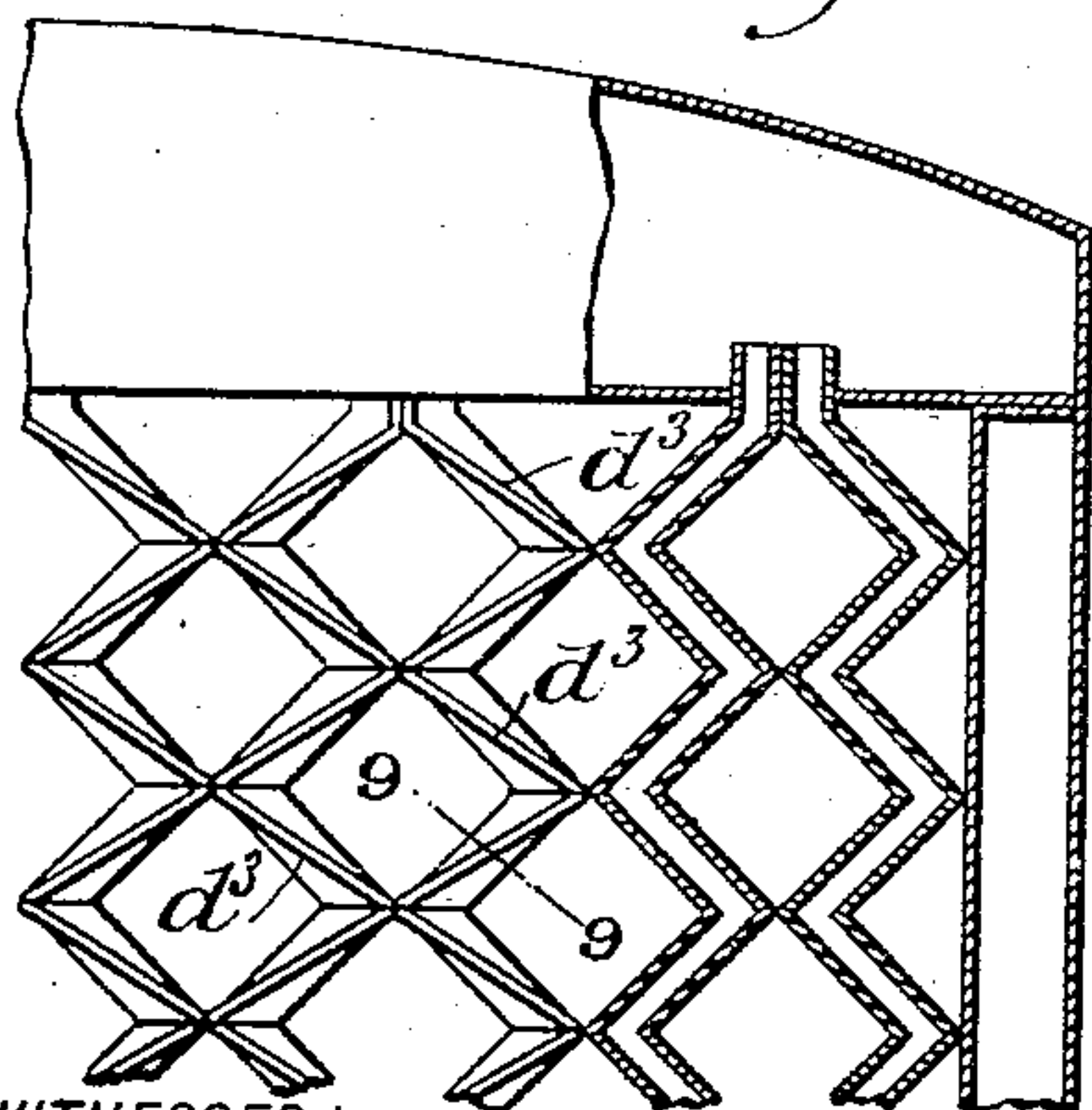


Fig. 8,



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Fig. 10.

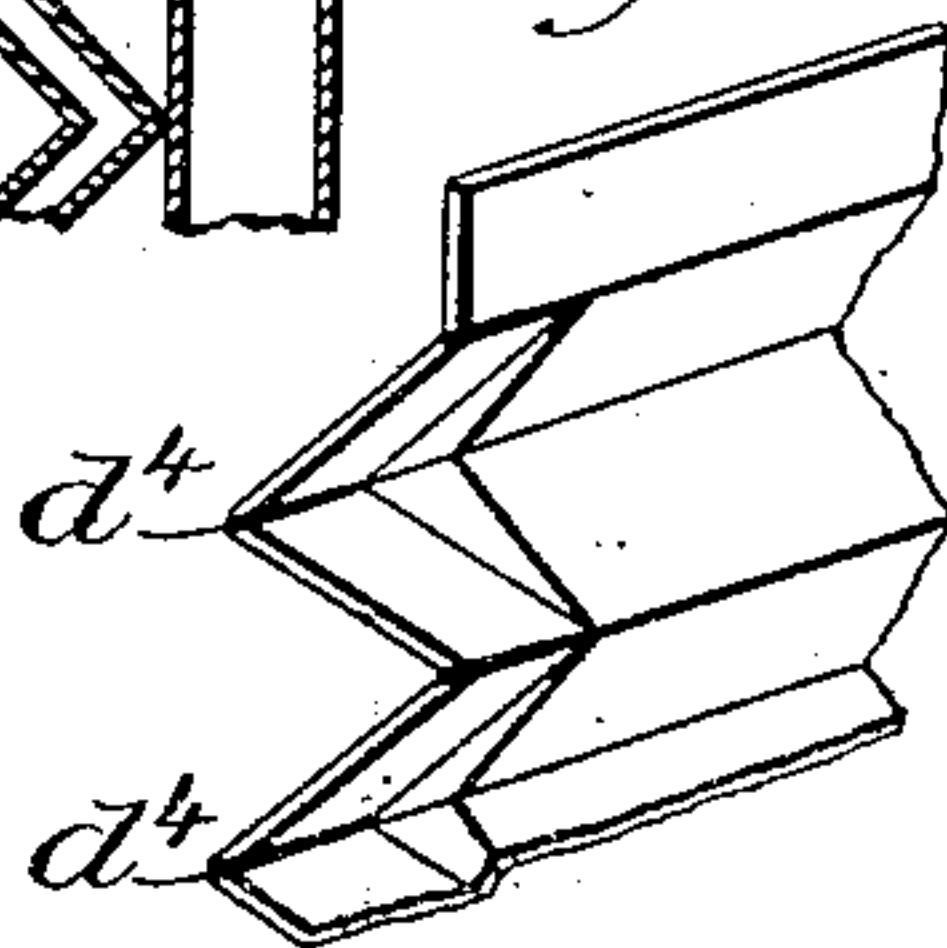
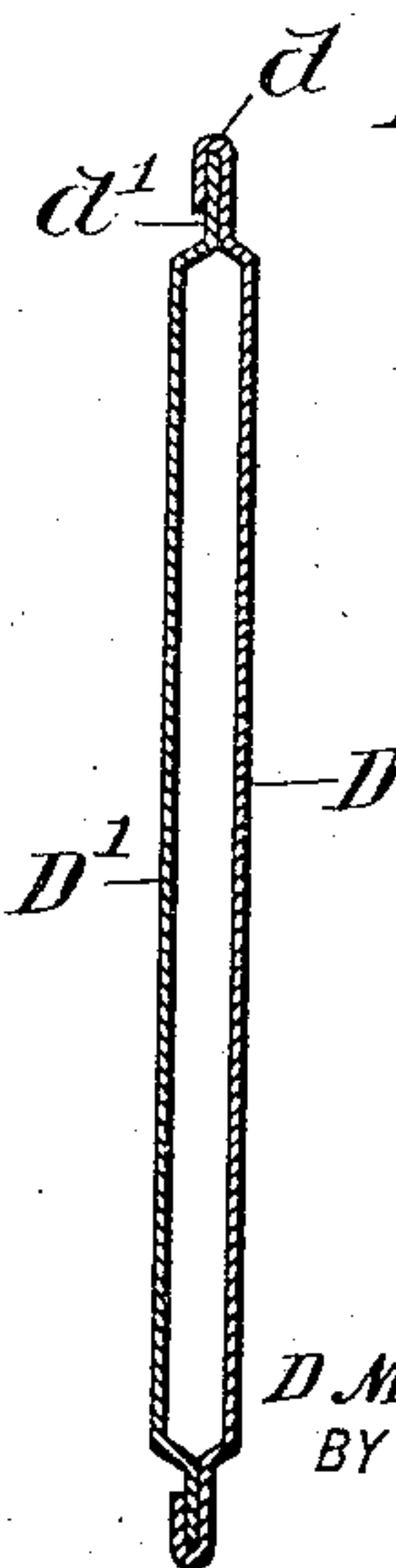


Fig. 9,



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UNITED STATES PATENT OFFICE.

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COOLER.

No. 824,492.

Specification of Letters Patent.

Patented June 26, 1906.

Application filed November 25, 1905. Serial No. 289,051.

To all whom it may concern:

Be it known that I, D McRA LIVINGSTON, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Cooler or Similar Apparatus, of which the following is a full, clear, and exact description.

The invention is more particularly intended for the coolers of motor-vehicles propelled by explosive-engines.

The present invention consists in a cooler having lapped joints at the side edges formed by means of return-bent or inwardly-projecting portions formed along the opposite edges of one plate or wall and outwardly-projecting plain portions on the two side edges of the companion plate or wall of the conduit through which the fluid to be cooled passes. In order that the hooked edge portions may be formed, I produce slits at the angles, as will be fully explained hereinafter.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is an elevation, partly in section, of a cooler embodying my present invention. Fig. 2 is an enlarged cross-section taken on the line 2 2 of Fig. 1. Fig. 3 represents an enlarged detail section taken on the line 3 3 of Fig. 1. Fig. 4 represents an enlarged detail section taken on the line 4 4 of Fig. 1. Fig. 5 is a fragmentary perspective view showing a pair of corrugated plates prior to the bending of the hooked portions. Fig. 6 is a perspective view illustrating the embodiment of my invention in a form of cooler composed of complete tube instead of corrugated plates. Fig. 7 is a longitudinal sectional view through a cooler of the form shown in Fig. 6. Fig. 8 is a sectional elevation illustrating the embodiment of my invention in a cooler in which the conduits are arranged to produce a diamond design—that is, with the bends of the conduit diagonal to the vertical and horizontal. Fig. 9 is an enlarged cross-section taken on the line 9 9 of Fig. 8, and Fig. 10 is a fragmentary detail view of one of the walls shown in Figs. 8 and 9.

In the form shown in Figs. 1 to 5 the conduits are corrugated so as to produce three sides of a square, said sides ranging alternately vertically and horizontally. Each conduit is formed of a pair of plates A B,

having, respectively, return bends or hooks *a* and outwardly-projecting plain portions *b*. The respective plates are offset at the side edges in such a way as to bring adjacent conduits into close contact at the side edges; but as the special manner of offsetting and forming the side edges does not form part of the present invention aside from the fact that the hooked portions are on both edges of one plate and the plain portions on both edges of the other plate the description will be confined to the manner of forming the return-bends. Thus, referring more particularly to Fig. 5, it will be seen that the plates A and B have been corrugated and that the former is wider than the latter, the side edges projecting beyond the plate B. In order that the projecting edges of the plate B may be returned to produce the inwardly-projecting hooks *b*, I form slits *a'* at the angles of the corrugations, whereby the three sides marked *a''* in this figure may be independently bent to the form shown in Figs. 2, 3, and 4.

In the form shown in Figs. 6 and 7 the cooler is formed of the tubes C, the end portions of which are expanded, as usual. In my invention certain sides of the expanded ends of the tubes are projected, as at *c*, Fig. 7, whereby they may be bent inwardly, as at *c'*, to engage an outwardly-projecting plain edge portion *c''* of an adjacent tube. It will be seen that each short run or section of a conduit *C'* is formed by the adjacent walls of adjacent tubes, and, as shown best in Fig. 7, one of said walls is formed with hooks *c'* on both ends, while the opposite walls of the conduit have plain edges *c''* on both ends, which are engaged by said hooks.

In the form shown in Figs. 8, 9, and 10 the side edges of the plates D D' are formed, respectively, with hooks *d* and plain portions *d'* in substantially the same manner as described in the forms shown in Figs. 1 to 5, except that the flanging of the side edges is produced on diagonal lines, as indicated at *d''* in Fig. 8, the flanged edge being slitted at the angles, as at *d''*.

In all the forms it will be observed that the conduits have bends forming circuitous passages for the fluid to be cooled.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A cooler or like apparatus having pairs of walls forming conduits affording a circuitous passage for the fluid to be cooled, one of

said walls having at both side edges return-bends or hooked portions engaging outwardly-projecting plain portions formed on opposite sides of the companion wall, the
5 side edges of the wall on which the hooks are formed being slit between said hooks.

2. A cooler composed of separate corrugated plates assembled in pairs and producing conduits affording circuitous passages for the
10 fluid to be cooled, one of said plates having on its two side edges return-bands or hooked portions, and the companion plate having

outwardly-disposed plain portions at both edges engaged by the hooks of the companion plate, the side edges of the plate formed
15 with hooks being slit at the angles between the hooked portions.

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

D McRA LIVINGSTON.

Witnesses:

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