

No. 778,189.

PATENTED DEC. 20, 1904.

J. GROUVELLE & H. ARQUEMBOURG.
COOLER OR CONDENSER, ALSO APPLICABLE FOR USE AS HEATER
OR EVAPORATOR.

APPLICATION FILED AUG. 21, 1902.

NO MODEL.

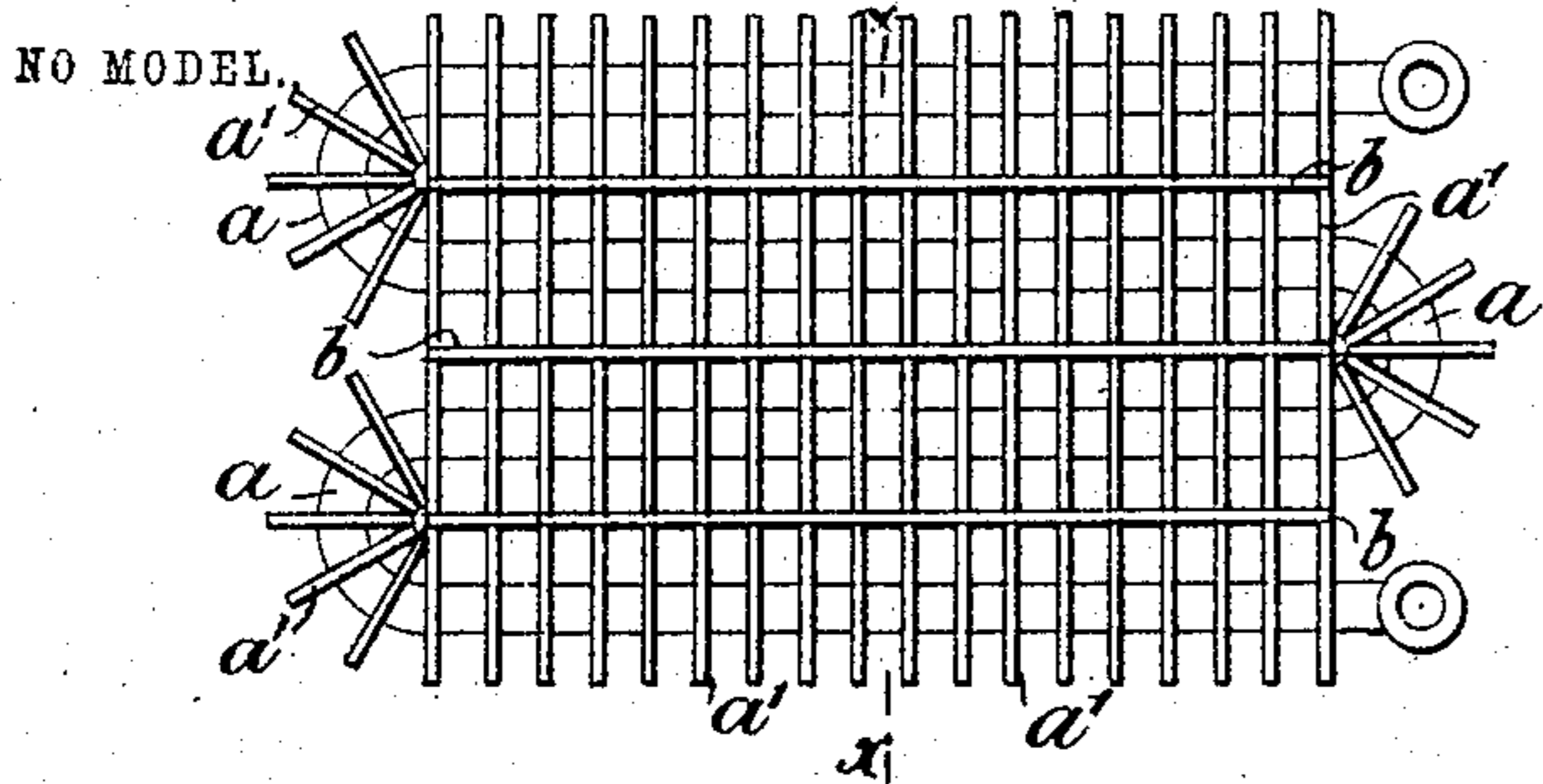


Fig. 1.

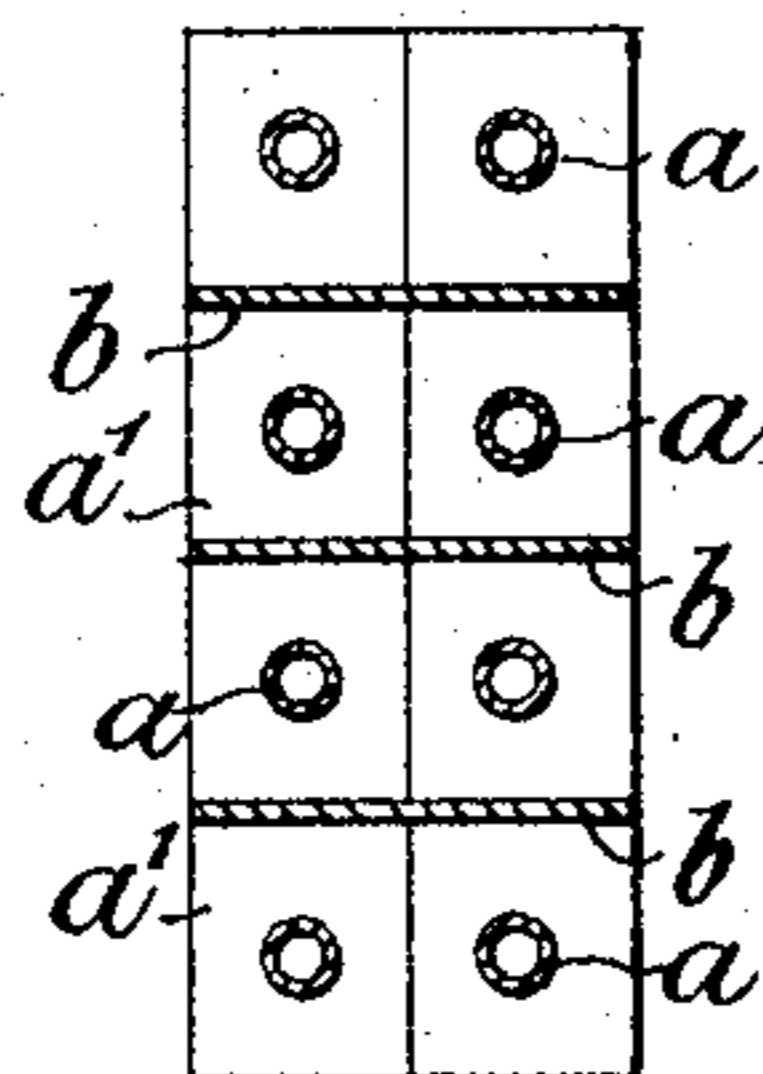


Fig. 2.

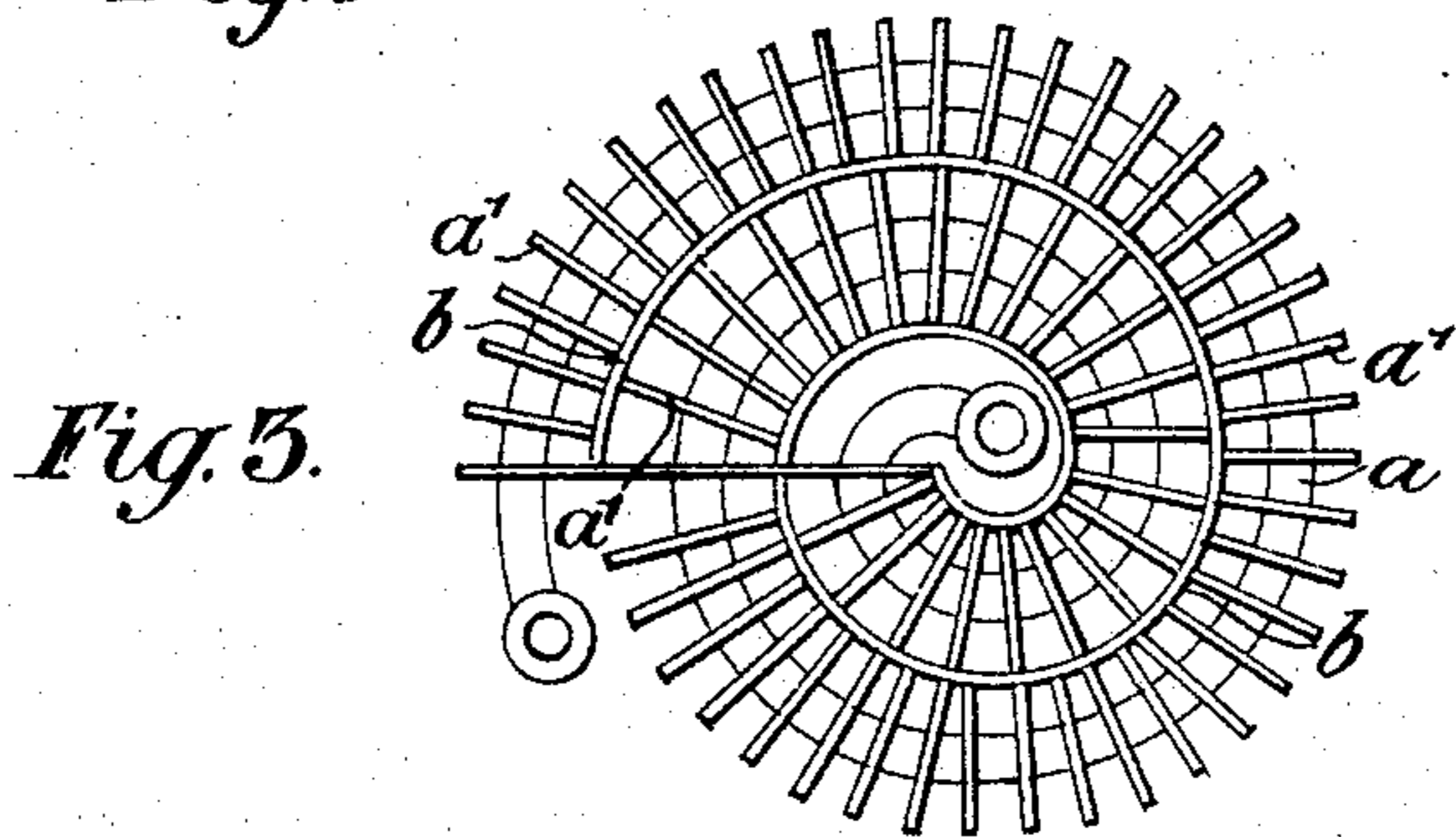


Fig. 3.

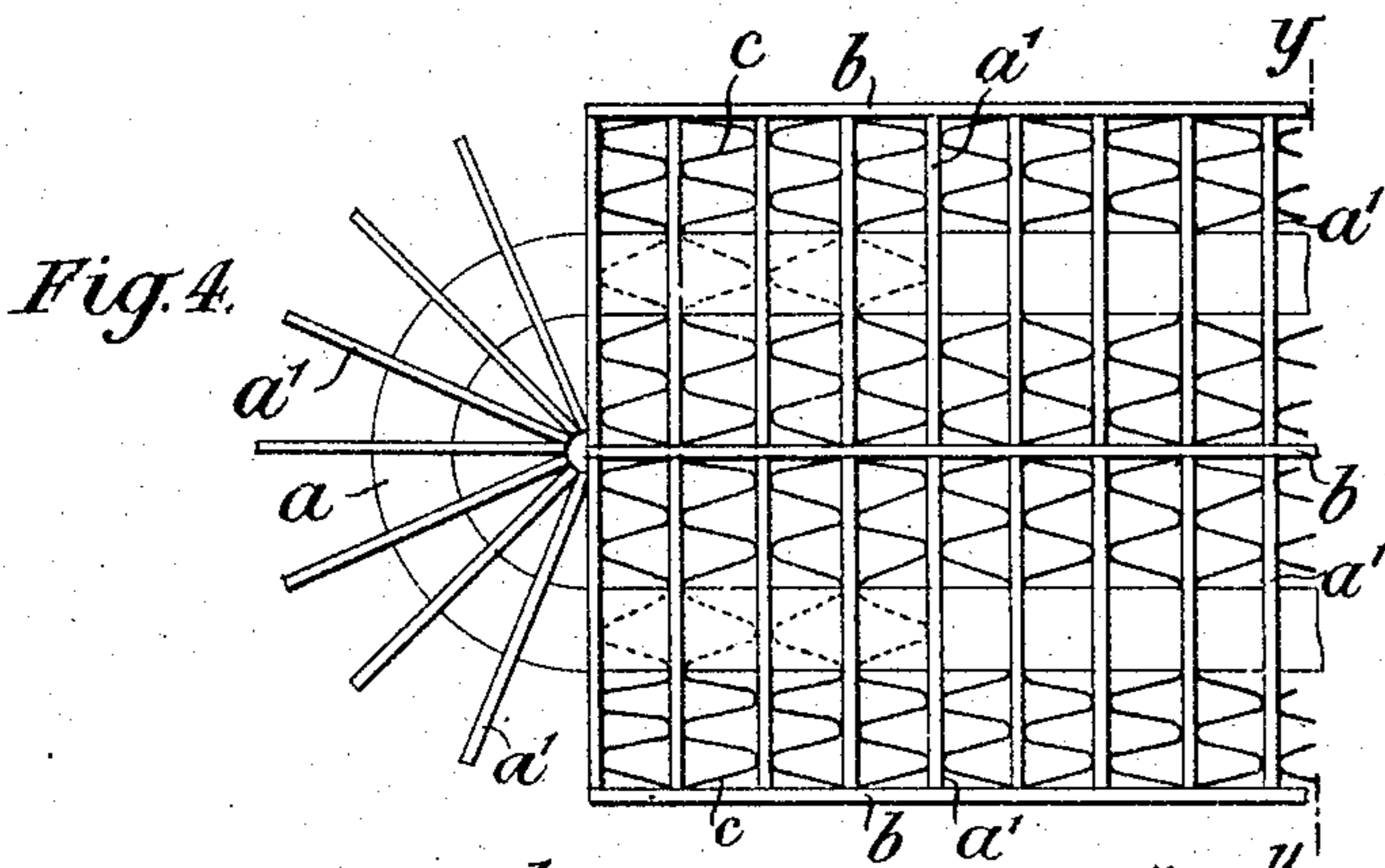


Fig. 4.



Fig. 5.

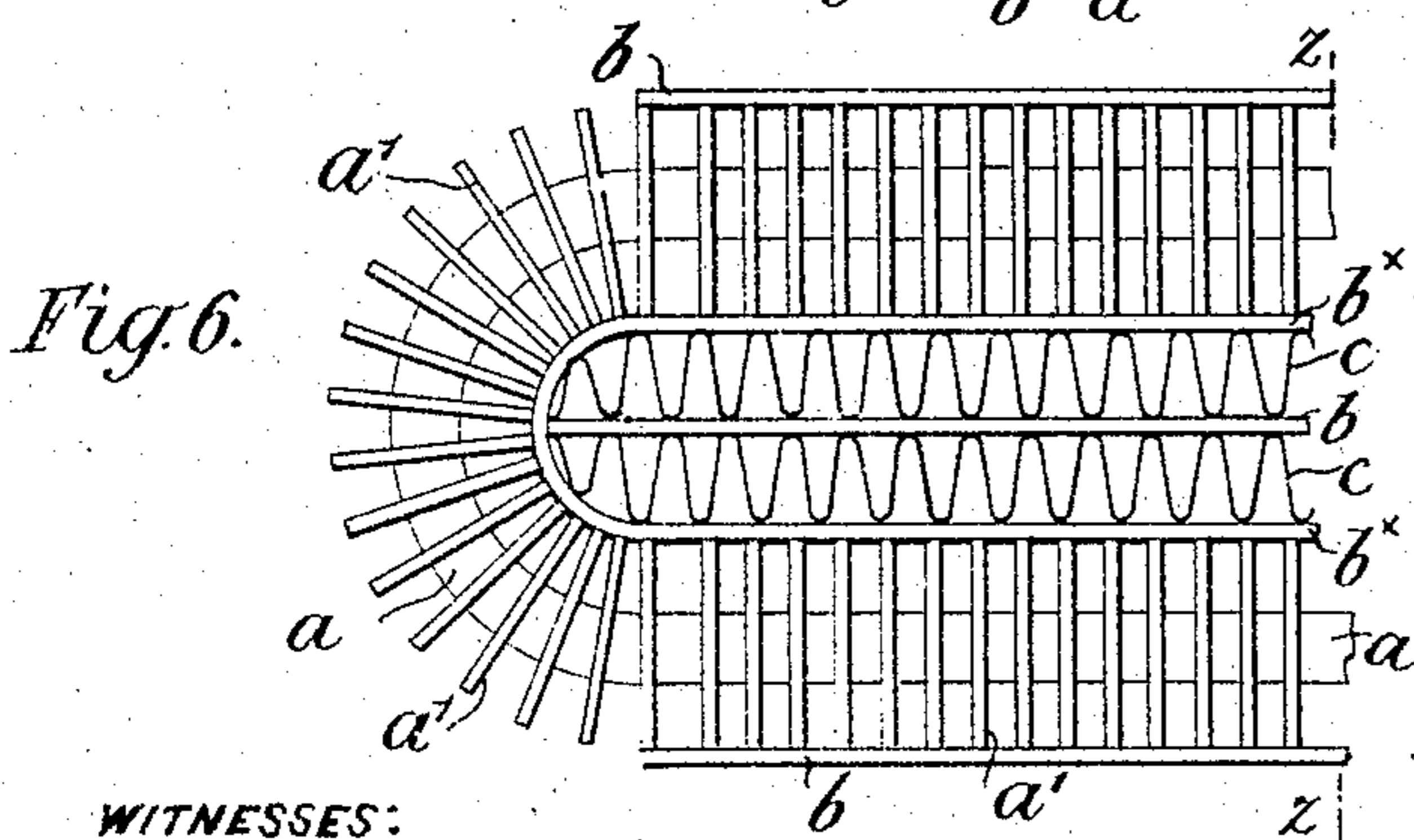


Fig. 6.

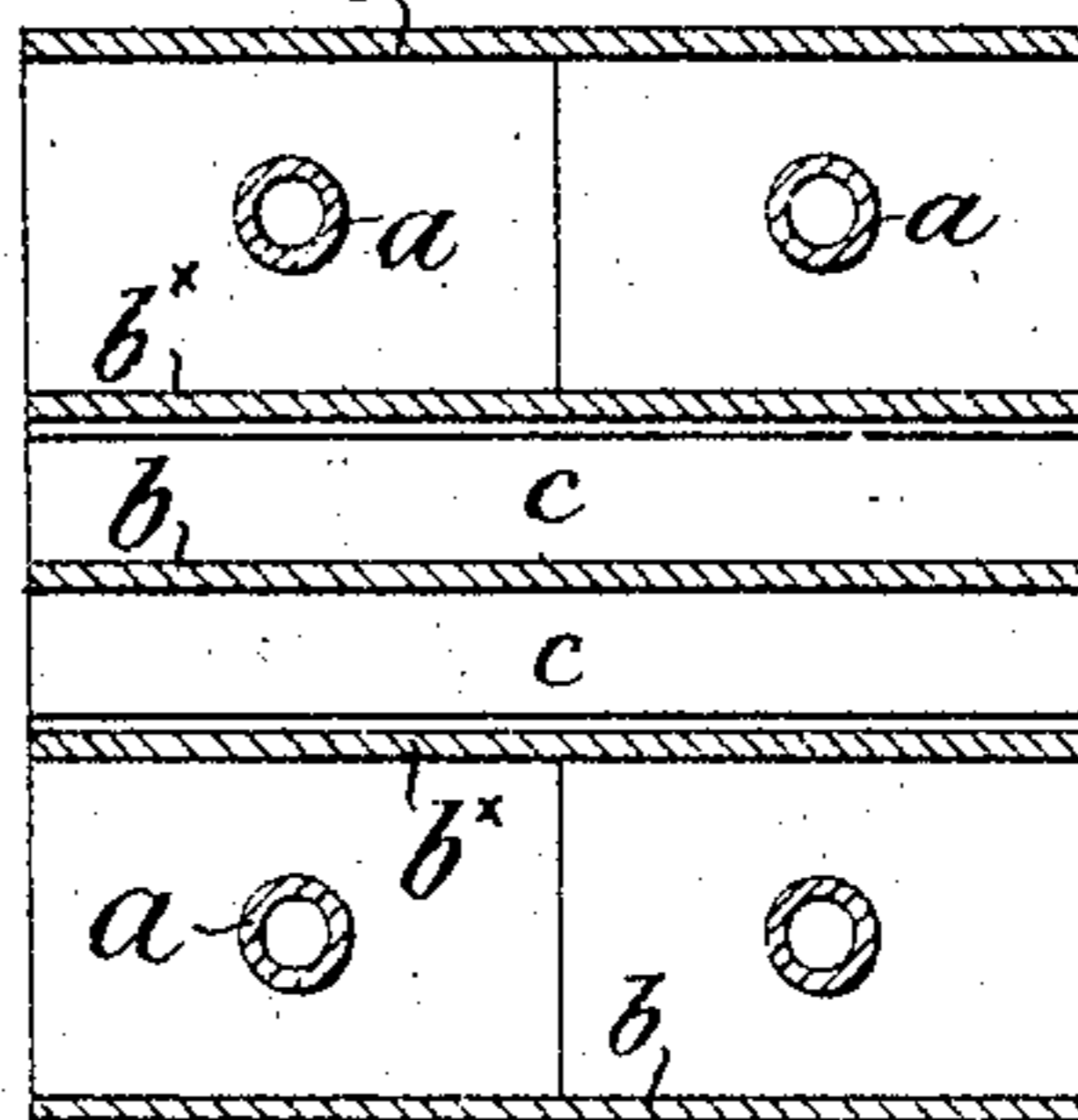


Fig. 7.

WITNESSES:

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UNITED STATES PATENT OFFICE.

JULES GROUVELLE AND HENRI ARQUEMBOURG, OF PARIS, FRANCE.

COOLER OR CONDENSER, ALSO APPLICABLE FOR USE AS HEATER OR EVAPORATOR.

SPECIFICATION forming part of Letters Patent No. 778,189, dated December 20, 1904.

Application filed August 21, 1902. Serial No. 120,455.

To all whom it may concern:

Be it known that we, JULES GROUVELLE and HENRI ARQUEMBOURG, citizens of the French Republic, residing at 71 Rue du Moulin-Vert, Paris, in the French Republic, have invented Improvements in Coolers or Condensers, also Applicable for Use as Heaters or Evaporators, of which the following is a specification.

This invention relates to an improved construction of apparatus applicable for use as coolers or condensers or inversely as heaters or evaporators, the apparatus being particularly adapted for employment in connection with autocars for cooling water, for condensing steam, for reheating, or for evaporating liquids.

In the accompanying drawings we have illustrated, by way of example, several forms of our improved apparatus.

Figures 1 and 2 are respectively an elevation and a transverse section of an elongated serpentine form of cooler or condenser, the section in Fig. 2 being taken along the line $x x$ in Fig. 1. Fig. 3 is an elevation of a volute form of the apparatus. Figs. 4 and 5 are respectively an elevation and a transverse section of a part of an elongated serpentine form of cooler or condenser provided with fillings whereby the effectiveness of the apparatus is improved, the section in Fig. 5 being taken along the line $y y$ in Fig. 4. Figs. 6 and 7 are views, respectively, similar to Figs. 4 and 5, illustrating an alternative construction of a serpentine form of cooler or condenser provided with fillings, the section in Fig. 7 being taken along the line $z z$ in Fig. 6.

Apparatus constructed according to our improved method and adapted for effecting the objects above referred to consist, essentially, of "winged" or "gilled" metal pipes a of any appropriate kind arranged in serpentine, volute, or other desired form, the juxtaposed portions of the convolutions being separated by interposed partitions b , forming metallic tie-pieces, and to the faces of which the wings or gills a' , or some of them, are secured by immersing the structure in a bath of solder, a consolidated structure resulting. When the metal pipes are tinned exteriorly, the

wings or gills a' and the partitions b may be composed of tinned sheet metal, the close adherence of the whole being obtained by simply applying heat to the structure, so as to cause the tin coating to run into all the joints. In some instances it may be expedient to adopt both methods; but in such cases we prefer to first heat the structure and then to immerse the same in the bath of solder. When the apparatus is to comprise two or more serpentines or volutes, they are arranged side by side, the partitions b extending by preference across the full width of the compound structure.

From the foregoing it will be seen that the metal partitions b possess many advantages over the ordinary wooden tie-pieces, as by their use the bulk of the consolidated apparatus is considerably reduced and the surface available for the purpose of cooling or condensing, heating, or evaporating is increased.

In order to further improve the effectiveness of the apparatus, fillings c , composed of metal sheets of corrugated, wavy, or zigzag form, may be employed between the partitions b and the wings or gills a' , the pipe in some instances passing through the said fillings c . These fillings may, however, be arranged upon either side of each partition b and be interposed between a continuous partition b^x , whereof the side remote from the said filling is attached to the wings or gills a' of the pipe a .

A compact device is thus obtained, in all cases having an extensive continuous conductivity. The partitions and the fillings, moreover, reach a lower temperature than the exterior surface of the tube; but the transmission is further assisted by the radiation on the said partitions and fillings from the said exterior surface of the tube.

The wings or gills may be of rectangular, square, polygonal, circular, or any other convenient form, and the gilled pipes may be constructed according to the method described in the specification of our Letters Patent of the United States dated May 8, 1900, No. 649,204.

Although we have only exemplified some forms of the apparatus, it will be understood that the arrangement of the gilled pipes, par-

titions or tie-pieces, and fillings may be varied almost indefinitely. For instance, an effective construction could be arrived at by embodying some of the features of each of the arrangements above referred to by way of example.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. An apparatus for the purpose specified, having a gilled metal pipe, and a metal plate forming a tie, said plate extending substantially parallel with the pipe and secured at its opposite faces to the outer edges of the gills thereon.

2. An apparatus for the purpose specified comprising a plurality of gilled metal pipes placed abreast, and a metal plate forming a tie and disposed between adjacent pipes and extending substantially parallel therewith, said plate being secured at its opposite faces to the outer edges of the gills on the pipes at its opposite sides.

3. An apparatus for the purpose specified comprising a plurality of gilled metal pipes placed abreast and arranged in a curved or serpentine form, and a metal plate forming a tie and disposed between adjacent portions of the pipes and secured at its opposite faces to the outer edges of the gills on the pipes at its sides.

4. An apparatus for the purpose specified, comprising a gilled metal pipe, metal plates forming ties connecting the outer edges of the gills on the pipe and secured thereto, and fillings between the gills consisting of zigzag metal plates.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JULES GROUVELLE.

HENRI ARQUEMBOURG.

Witnesses:

EDOUARD CARÉNON,
GABRIEL THAREAU.