

C. THERYC & E. MASLIN.  
HEAT EXCHANGING APPARATUS.  
APPLICATION FILED FEB. 23, 1904.

Fig. 1.

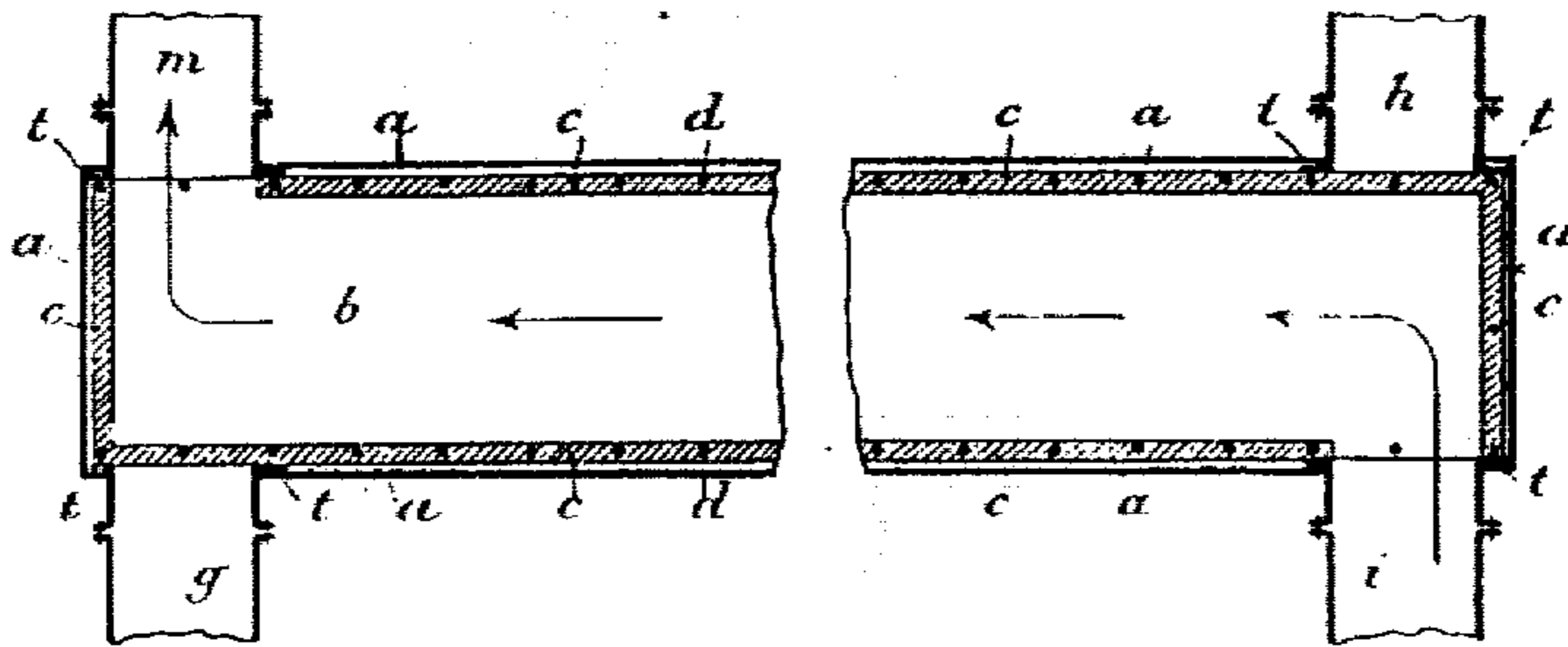


Fig. 2.

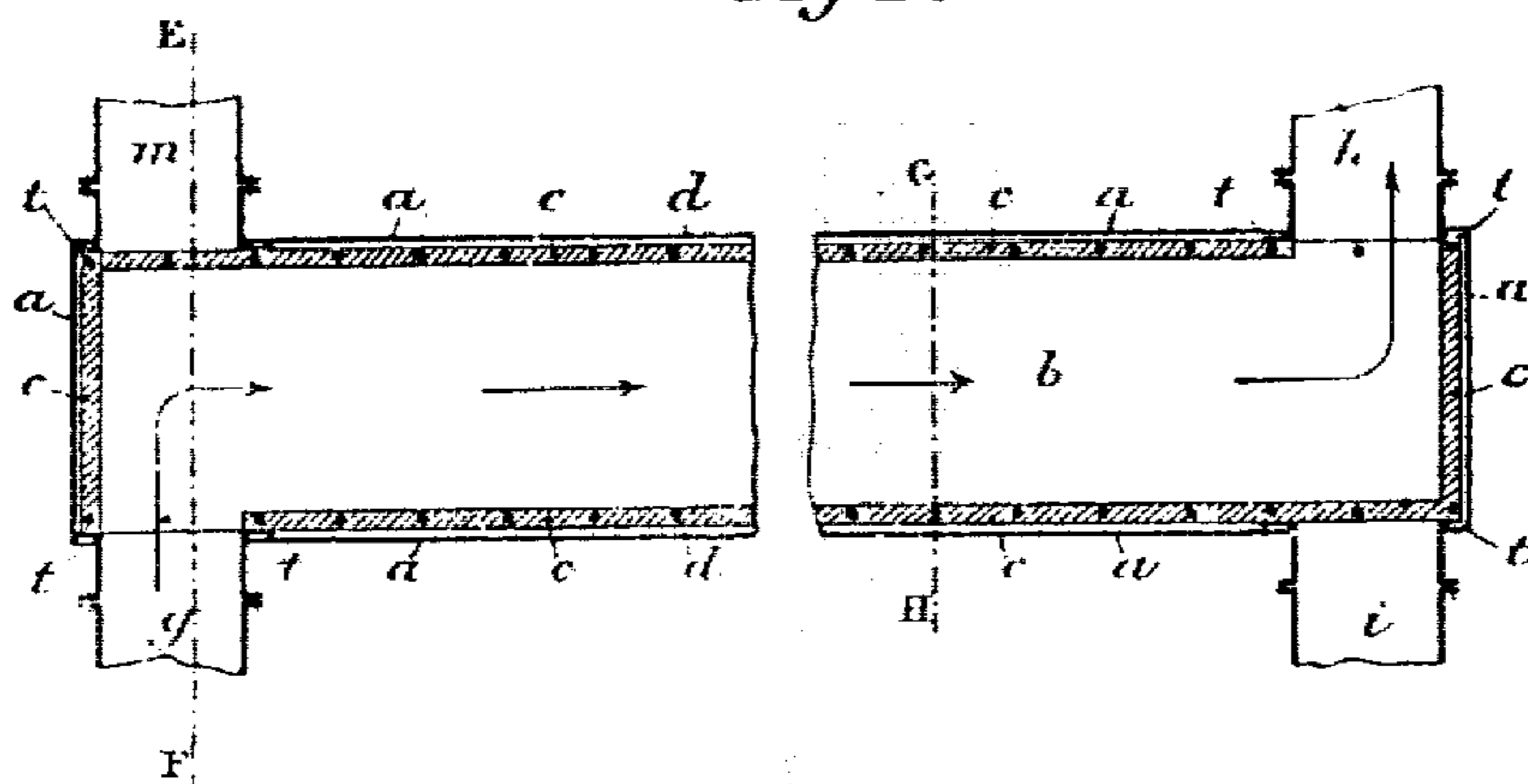


Fig. 3.

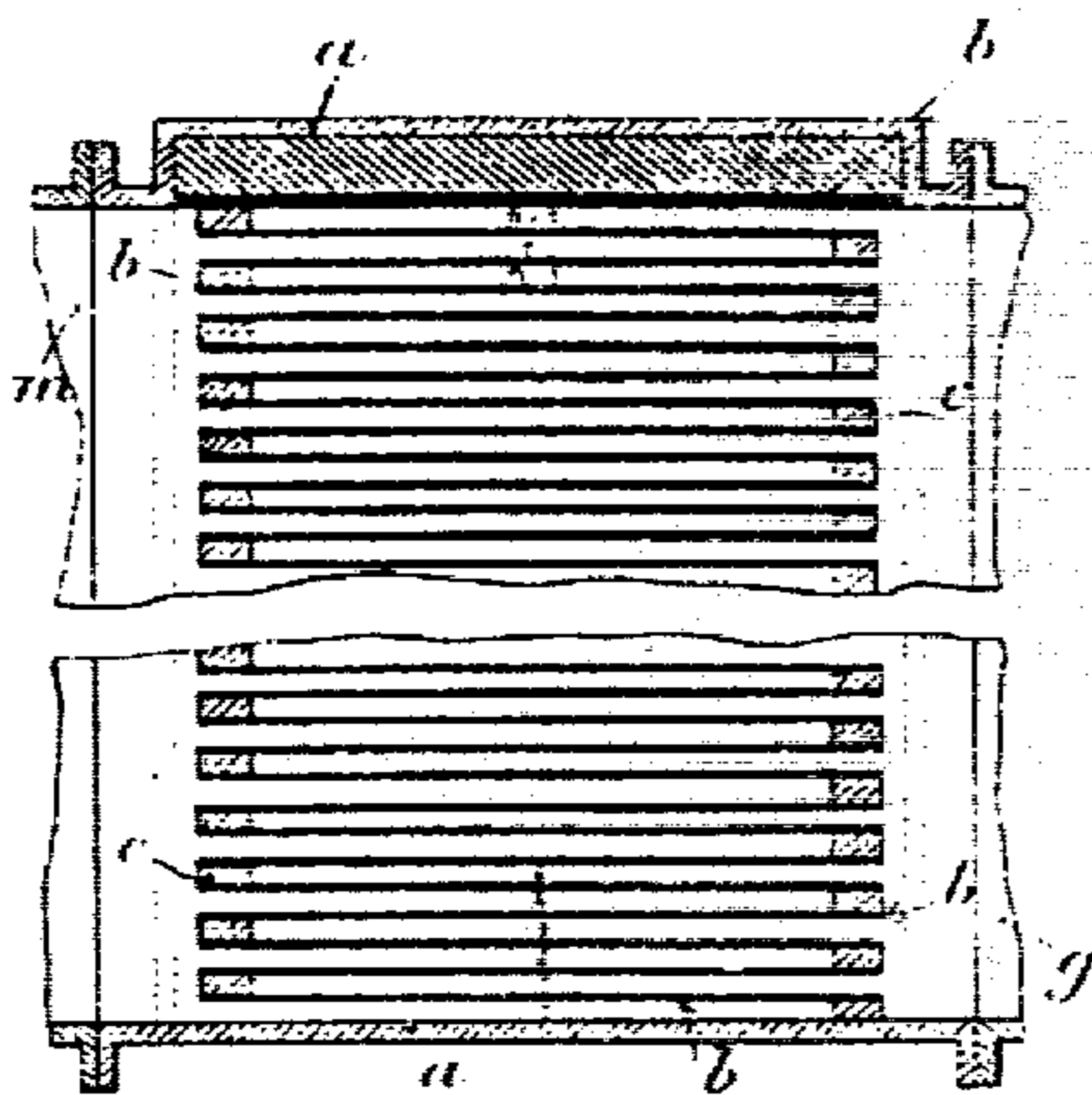
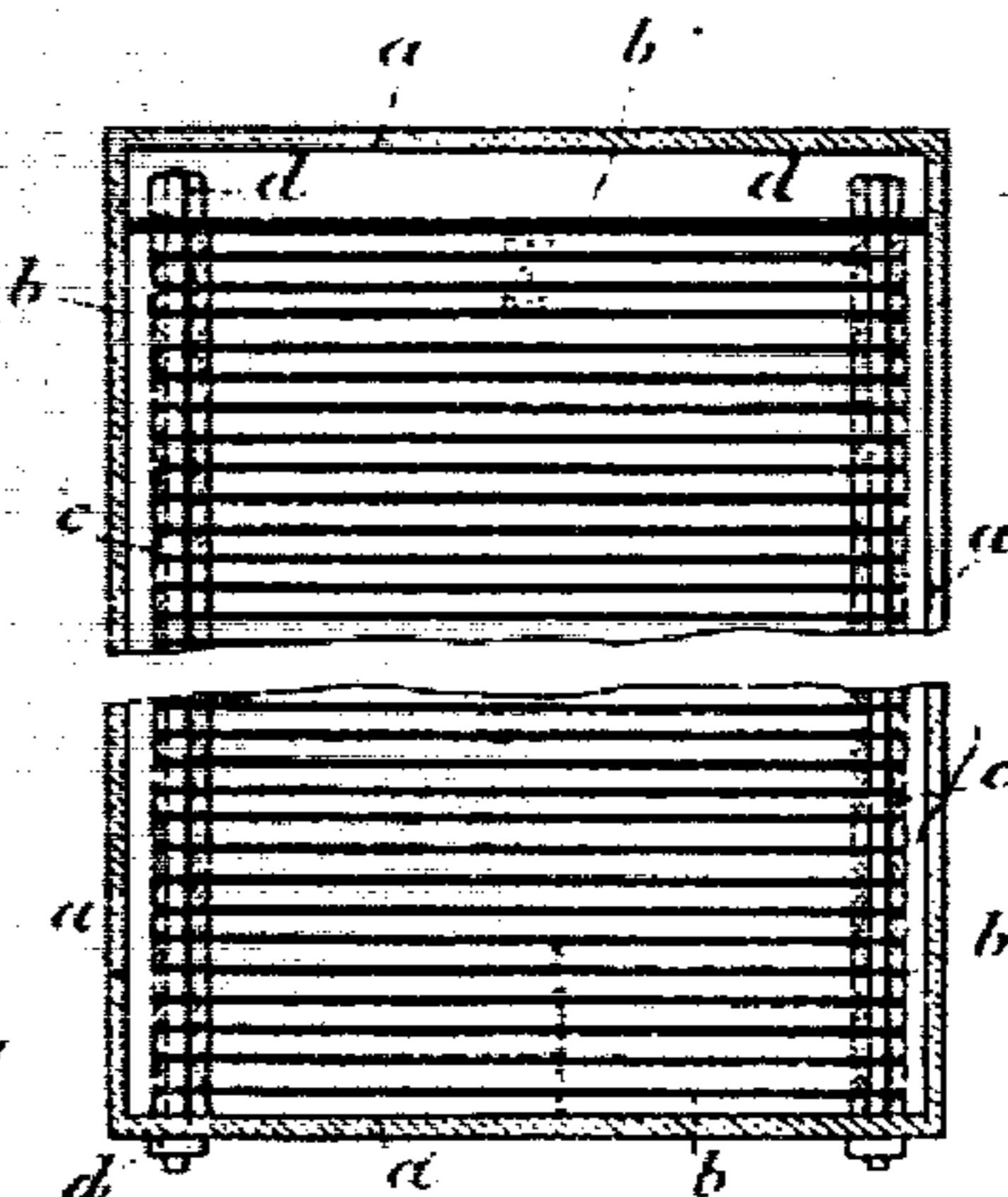


Fig. 4.



Witnesses.  
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Inventors.  
Emile Maslin.  
Charles Theryc.  
By James L. Norris.  
Att'y.

# UNITED STATES PATENT OFFICE.

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## HEAT-EXCHANGING APPARATUS.

No. 837,146.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Original application filed February 5, 1902, Serial No. 92,736. Divided and this application filed February 23, 1904. Serial No. 194,852.

*To all whom it may concern:*

Be it known that we, CHARLES THERYC, residing at 32 Rue Grignan, and EMILE MASLIN, residing at 6 Boulevard Tricon, Marseille, France, citizens of the French Republic, have invented certain new and useful Improvements in Heat-Exchanging Apparatus, of which the following is a specification.

This invention relates to regenerators or heat-exchanging apparatus, and has for its object a new construction of such apparatus which is a very economical one and of a comparatively small bulk, while being very efficient in its action, and is a division of our joint application, Serial No. 92,736, filed February 5, 1902.

The main feature of the present invention is that the device only consists of flat parallel plates, which are superposed and held apart by means of strips arranged along the outer edges of said plates, these strips having diagonally-opposed apertures or interruptions which form large passages connected with collectors for the entrance and the exhaust of the fluids circulating between the plates.

In the accompanying drawings, Figure 1 is a plan view of one of the plates, showing the arrangement of the strips and passages in the same. Fig. 2 is a similar view of the plate just above or below that of Fig. 1. Fig. 3 is a vertical section of the whole apparatus, on an enlarged scale, through line E F of Fig. 2. Fig. 4 is a vertical section, on an enlarged scale, through line G H of Fig. 2.

The regenerator or heat-exchanger according to this invention consists of a series of thin flat sheet-iron plates *b*, which are arranged parallel to each other and held apart at a suitable distance by means of metallic strips *c*, placed along their edges. These strips form tight joints, thus converting the spaces between the plates into compartments which are entirely closed, except at two diagonally opposite edges, where the strips are interrupted, so as to form large passages, being diagonally opposed for the purpose of causing the fluid to traverse the whole length of the compartment.

On Figs. 3 and 4 the compartments are numbered 0, 1, 2, 3, etc., so as to permit to explain that in all the divisions or compartments of even set the passages are arranged

at the extremities of the same diagonal of the plates, Fig. 1, and that in all the compartments of uneven set the passages are arranged at the ends of the other diagonal, Fig. 2. The cold fluid passes, say, in the uneven compartments, entering through the passages *g* and escaping through the passages *h*. The hot fluid passes into all the compartments of the even set, entering by the passage *i* and escaping by the passage *m*.

The apparatus is inclosed into a casing *a*, and in order to insure tightness at the spots where the passages *g h i m* traverse the casing suitable packings *t*, of hemp, fiber, and so on, may be arranged along the joints.

All the elements of the apparatus are tightened together by means of bolts or tie-rods *d*.

The apparatus presents the following advantages over the heat-exchangers as hitherto constructed: The whole surface of the plates operates in the transmission of the heat, which result is not obtained by the common construction of heat-exchangers having two concentric tubes, as only the surface of the interior tube acts in this case for the exchange of heat, and the surface of the exterior tube, although greater than that of the interior one, becomes not only inactive, but forms, on the contrary, a serious source of loss by radiation by reason of its great surface. Moreover, in such an apparatus with concentric tubes the contact of the fluids on the metallic walls is by no means as perfect as in the present recuperator, where the fluids are divided into very thin layers.

The metallic separating-strips may be replaced by strips of hemp, packing, or india-rubber when the temperature of the hot fluid is moderate. The bolts and tie-rods may also be replaced by any suitable device.

Having now particularly described and ascertained the nature of the present invention and in what manner it may be carried into practice, we declare that what we claim is—

A regenerator or heat-exchanging apparatus, comprising a plurality of superposed parallel flat plates, a pair of L-shaped strips interposed between each pair of plates, thereby forming a plurality of superposed compartments and constituting side and end walls for said compartments, the elongated member of each of said strips arranged at the side margins of a pair of the plates and the shorter

member of each of said strips arranged at the end margins of a pair of the plates, said elongated members of said strips of less length than the length of the plates, thereby forming each of the compartments with a pair of passages constituting an inlet and an outlet, the pair of strips in every alternate compartment alternately arranged with respect to the pair of strips in the other compartments, thereby alternately positioning the inlets and outlets of one set of compartments with respect to the position of the inlets and outlets of the other set of compartments, an inlet-pipe communicating with the inlets of one set of compartments, a separate inlet-pipe

communicating with the inlets of the other set of compartments, an outlet-pipe communicating with the outlets of one set of compartments, an outlet-pipe communicating with the outlets of the other set of compartments, means for securing the plates together, and an inclosing casing for the said plates. 20

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

CHARLES THERYC.  
EMILE MASLIN.

Witnesses:

M. CAMPAU,  
ALLAN MACFARLANE.