

No. 673,805.

Patented May 7, 1901.

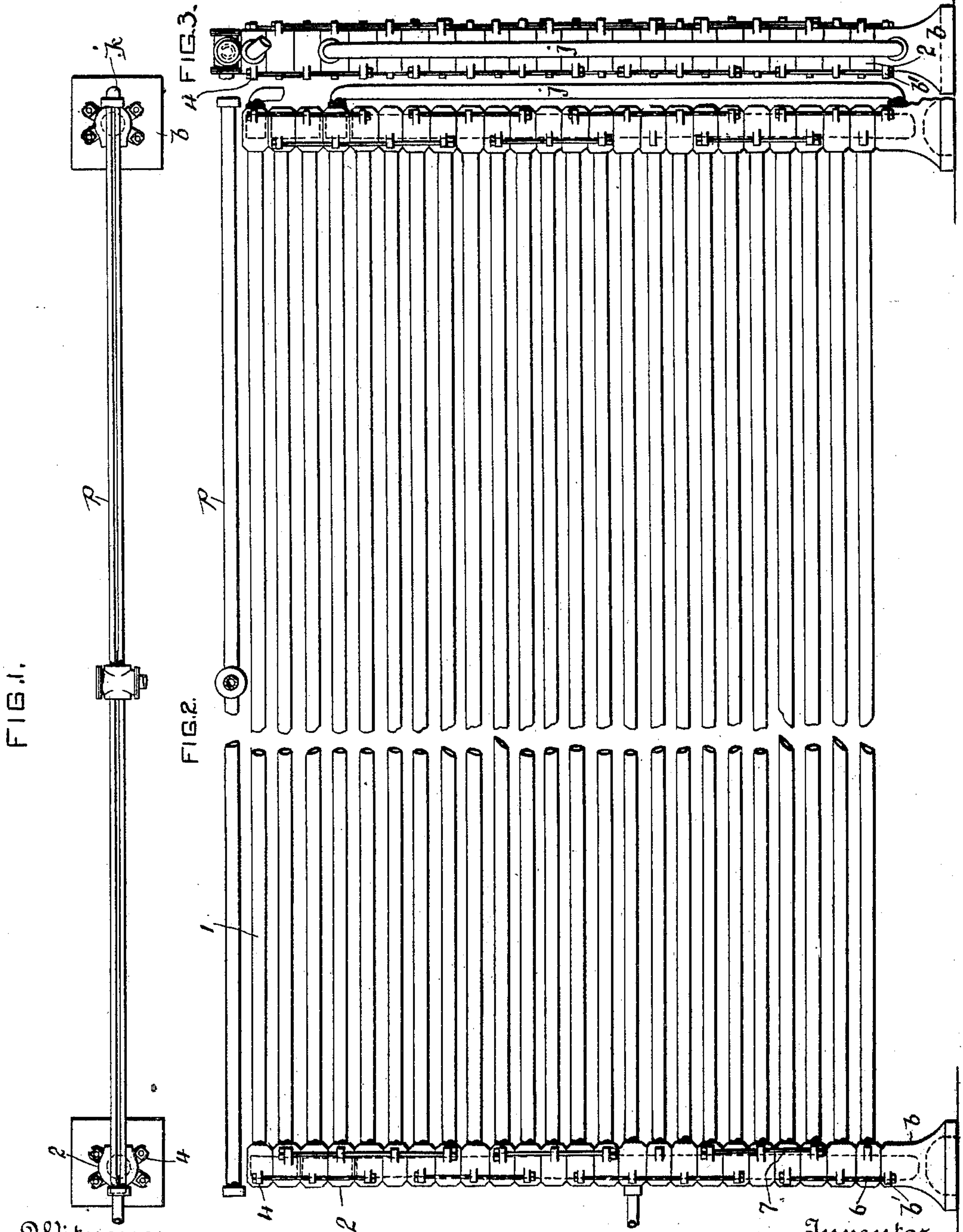
C. W. VOLLMANN.

CONDENSER FOR REFRIGERATING APPARATUS.

(Application filed June 21, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
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By his Attorney

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FIG. 4

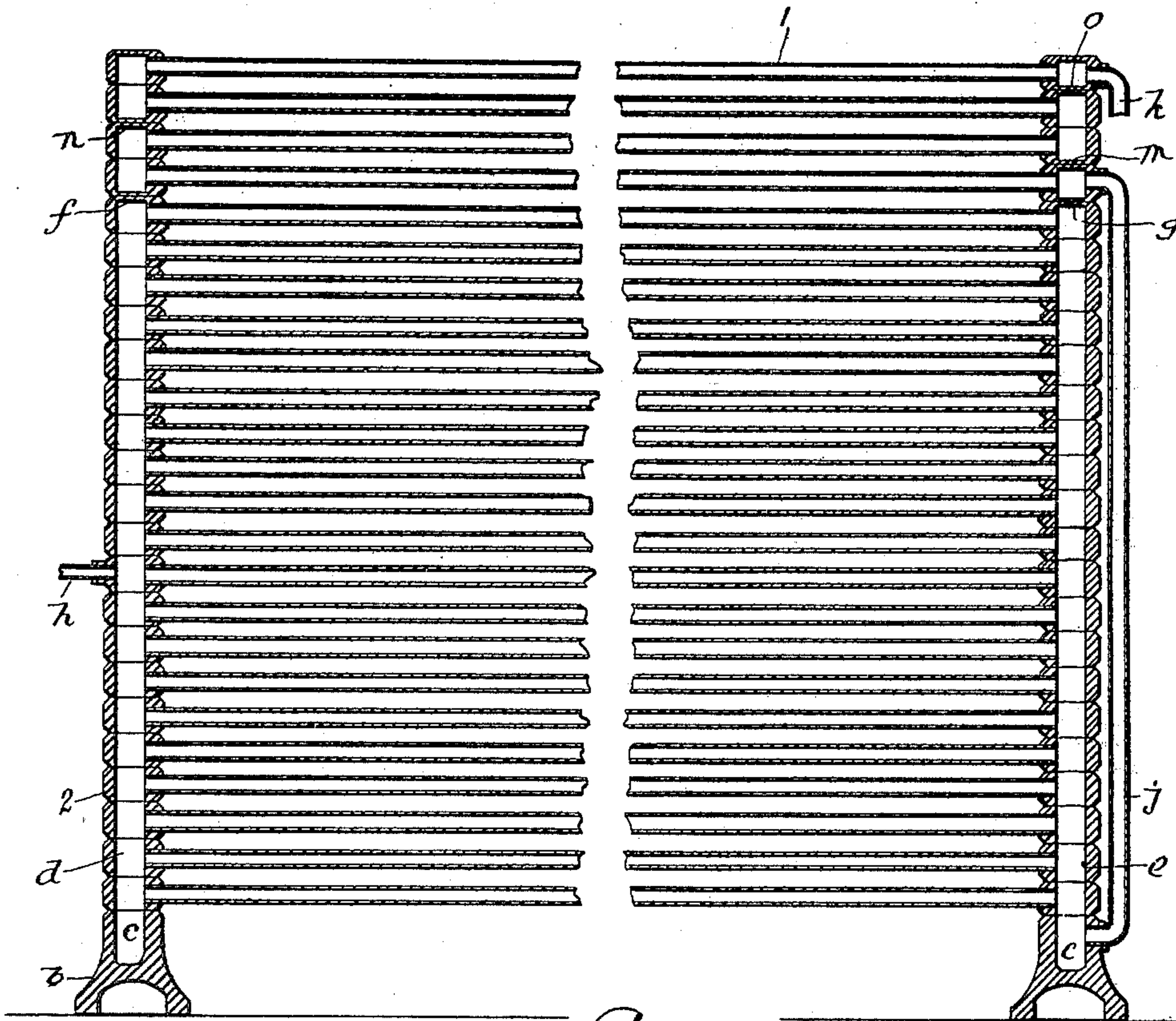


FIG. 5

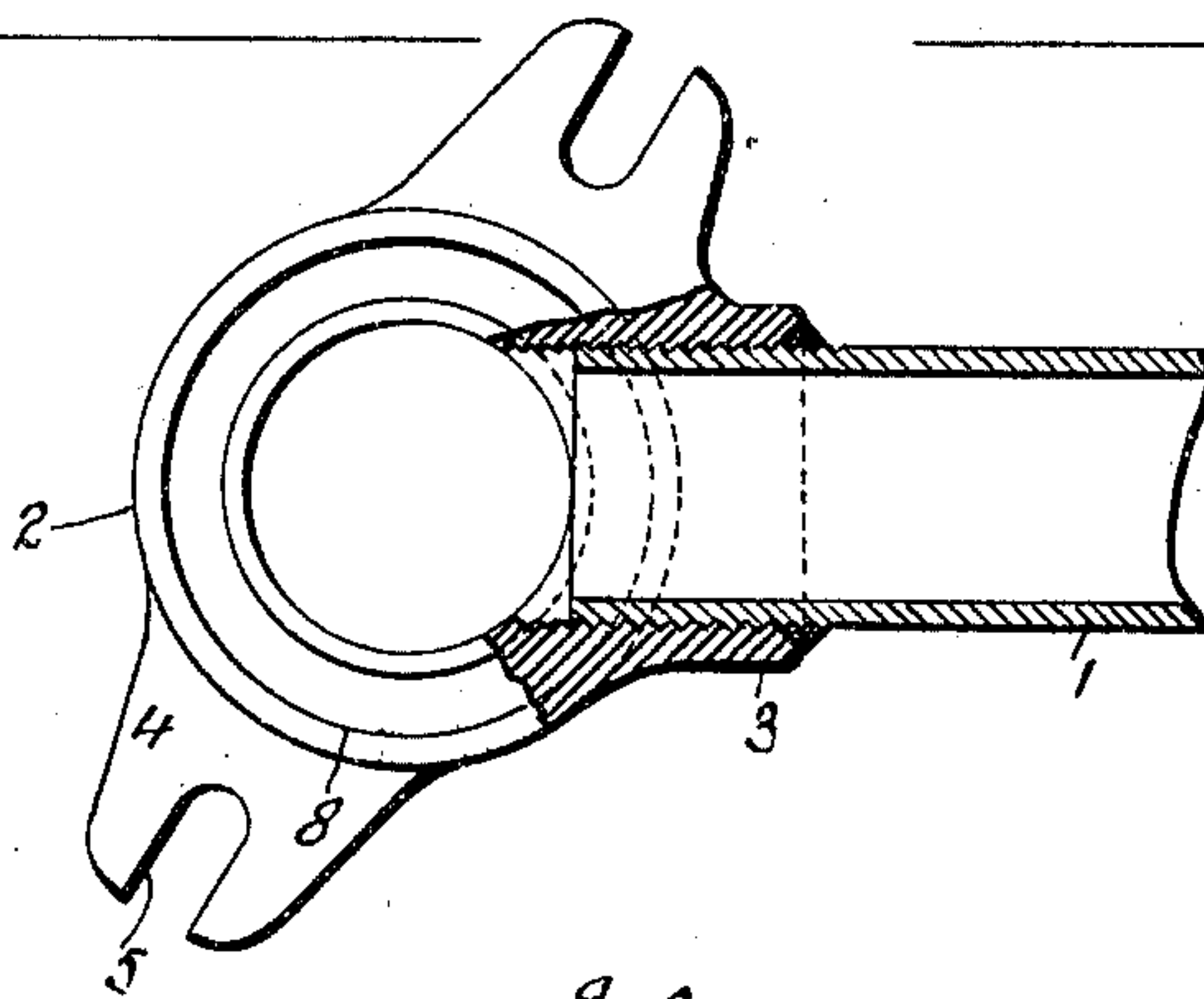
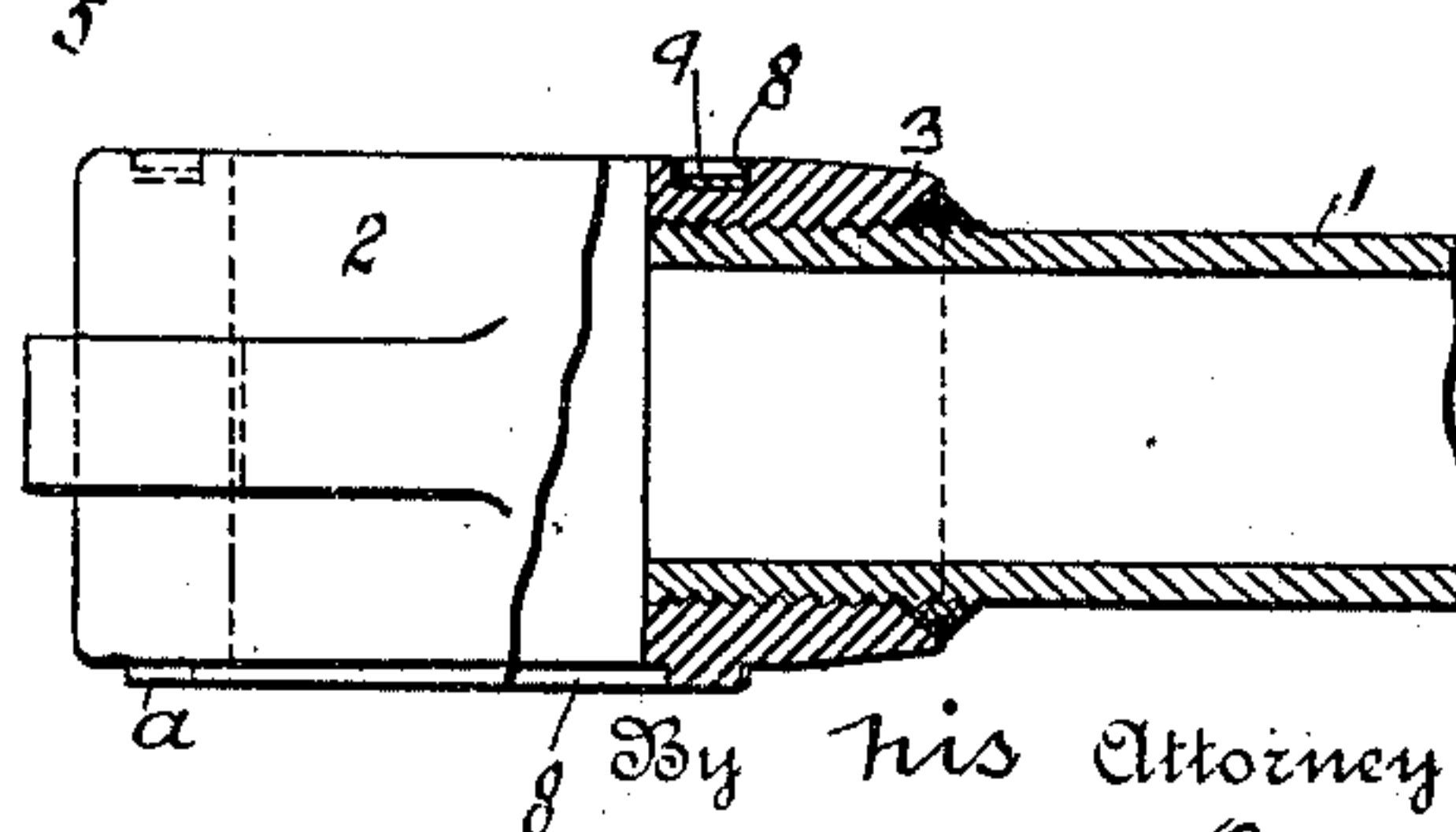


FIG. 6



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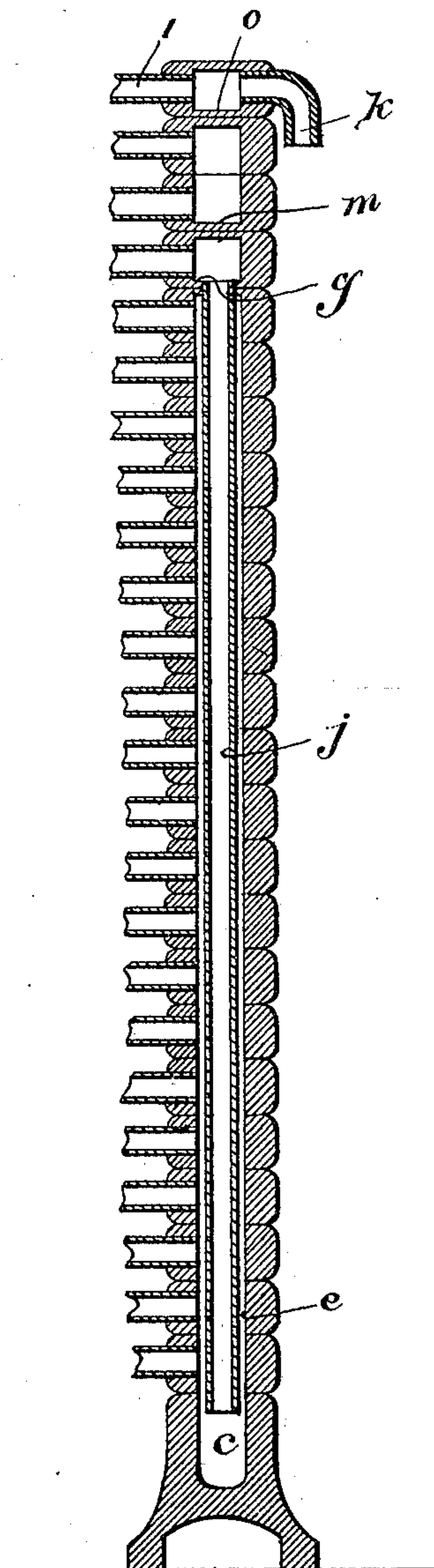
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3 Sheets—Sheet 3.

FIG. 7.



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CARL WILHELM VOLLMANN, OF MONTREAL, CANADA.

CONDENSER FOR REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 673,805, dated May 7, 1901.

Application filed June 21, 1900. Serial No. 21,117. (No model.)

To all whom it may concern:

Be it known that I, CARL WILHELM VOLLMANN, of the city of Montreal, in the district of Montreal and Province of Quebec, Canada, have invented certain new and useful Improvements in Condensers for Refrigerating Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the same.

10 This invention relates to the condensers of refrigerating apparatus, and has for its object to produce a simple, cheaply-constructed, and more effective condenser than those hitherto produced.

15 The construction of the condenser is such that the ammonia or other vapor first passes through a lower number of cooling-tubes to become liquefied and then from the lowest point of the condenser upward to the primary or upper cooling-section above the first-named tubes and immediately adjacent to the water-pipe, the water from which, in its coolest and freshest condition, first acts upon such primary cooling-section before reaching the lower cooling or liquefying tubes. For full comprehension, however, of the invention reference must be had to the annexed drawings, forming a part of this specification, in which like symbols indicate corresponding parts, and wherein—

30 Figure 1 is a plan view of my improved condenser; Fig. 2, a side elevation of same; Fig. 3, an end view, and Fig. 4 a vertical longitudinal section, thereof, Figs. 5 and 6 being respectively plan and side detail views, partly in section, of one of the tube end pieces or heads, whereby the tubes are fitted and connected together; and Fig. 7, a vertical sectional view of the right-hand end portion of the condenser.

40 The condenser is constructed of one or more series of plain straight horizontally-arranged tubes 1, screw-threaded at each end to take into heads or end pieces 2, adapted to be fitted and connected together to form a vertical passage at each end of a series of the tubes. The heads 2 are preferably of annular or ring form and provided with screw-threaded nozzles 3 to fit the screw-threaded ends of the tubes 1 and also having ears 4, either slotted, as shown at 5, or perforated, to accommodate connecting-rods 6 7 for holding the tubes to-

gether. It is preferable that half the heads of one series or column should be formed with their ears at one angle to the longitudinal axis of the nozzle and the other half of the series with the ears at another angle to such axis, so that small sets of—say five—tubes may be separately and alternately held by the connecting-rods 6 and 7, respectively, the upper ends of the rods 6, which bind the lowermost and every other alternate set, being overlapped by the lower ends of the rods 7, which hold the next lowest and every other alternate set and are connected with one of the heads of the set beneath.

Each headpiece 2 is formed with an annular groove 8 in its upper surface to receive a packing-ring 9 and a corresponding annular flange *a* on its under surface to fit such a groove in another head and form effective joints.

Each column of head or end pieces 2 is supported by a base or foot section *b*, formed with ears *b'*, similar to the ears 4, and hollowed, as at *c*, in line with the vertical passage formed by the heads.

The vertical passages at opposite ends of the tubes are lettered *d* and *e* and a number—say four—of the upper tubes are cut off from direct communication with such passages by diaphragms *f* and *g*, respectively, so that the ammonia or other vapor entering passage *d* through inlet *h* from any source of supply (not shown) may become liquefied by passing through the lower cooling-tubes located beneath such diaphragms and when so liquefied pass, by means of a pipe *j*, (arranged externally, as shown in Fig. 4, or internally within the passage *e*, as shown in Fig. 7,) extending between the base *b* at the foot of the passage *e* and the lowermost head of the upper cooling-section, to and through such cooling-section to the outlet *k*.

The liquid is compelled to travel in a zigzag course along the four tubes of the upper cooling-section by diaphragms *m n o* in the vertical passage-ways of such section and is thus subjected in a most advantageous manner to the effect of the fresh cold water trickling from the water-distributing tube *p*, immediately above the upper cooling-section.

From the foregoing it will be obvious that I secure the full benefit of the fresh cold water

issuing from the water-distributing pipe and trickling over the upper cooling-section, in which the ammonia liquid is circulating and that should it be necessary to remove one or more of the cooling-tubes for repairs, &c., such can be readily done by disconnecting the particular set containing such tube or tubes without disturbing the entire structure. It will also be apparent that when the hot vapor enters the passage *d* it will not, as usual, be confined to a zigzag course throughout the tubes, as in the usual constructions, but will freely distribute itself throughout the several tubes and fill up the empty spaces formed by the condensation of preceding vapor, the products of which immediately fall to the lowest point from each of the several tubes through passage *e*, thus avoiding considerable friction arising from the obstruction of the products of condensation, as in condensers of the usual form.

What I claim is as follows:

1. A condenser for refrigerating apparatus constructed of a series of horizontal tubes and divided into an independent upper cooling-section and a lower independent cooling-section with a water-distributing pipe above such upper section, an inlet for vapor in the lower section, a communicating passage between the lower end of the lower section and the upper section and an outlet from said upper section substantially as described.

2. A condenser for refrigerating apparatus constructed of a series of horizontal tubes communicating with vertical passages at their ends; diaphragms dividing such series of tubes and passages into independent upper and lower cooling-sections; an inlet for vapor at one side of the lower cooling-section and a pipe connection at the opposite side of such section, between the lower end thereof and the upper cooling-section, an outlet from said upper cooling-section, and a water-distributing pipe above such upper cooling-section substantially as described.

3. A condenser for refrigerating apparatus

having an upper cooling-section, with a water-distributing pipe above same, a lower cooling-section formed of a series of horizontal tubes communicating with vertical passages at their ends; an inlet for vapor in the lower section, a pipe connection between the lower end of the lower section and the upper section and an outlet from said upper section substantially as described.

4. A condenser for refrigerating apparatus, having plain straight cooling-tubes with screw-threaded ends, and for each end of each tube a separate and detachable annular or ring-shaped head or end piece provided with a radially-projecting screw-threaded nozzle to take onto a tube and projecting ears adapted to accommodate connecting-rods for holding a number of such heads together substantially as described.

5. In a condenser for refrigerating apparatus made up of a series of tubes, an end piece or head of annular or ring form for each tube and having a radially-projecting screw-threaded nozzle to take onto a tube, and projecting ears at an oblique angle to the common axis of said nozzle and tube, whereby the series of tubes may be connected in sets, substantially as described.

6. In a condenser for refrigerating apparatus made up of a series of tubes an end piece or head of annular or ring form, for each tube and having a radially-projecting screw-threaded nozzle to take onto a tube, and projecting ears at an oblique angle to the common axis of said nozzle and tube whereby the series of tubes may be connected in sets, an annular groove in the upper surface and a projecting flange on the lower surface of said end piece, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

CARL WILHELM VOLLMANN.

Witnesses:

FRED J. SEARS,

ARTHUR H. EVANS.