A. H. BAER.

AMMONIA CONDENSER AND LIQUID COOLER.

APPLICATION FILED MAY 6, 1905.

953,577. Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.

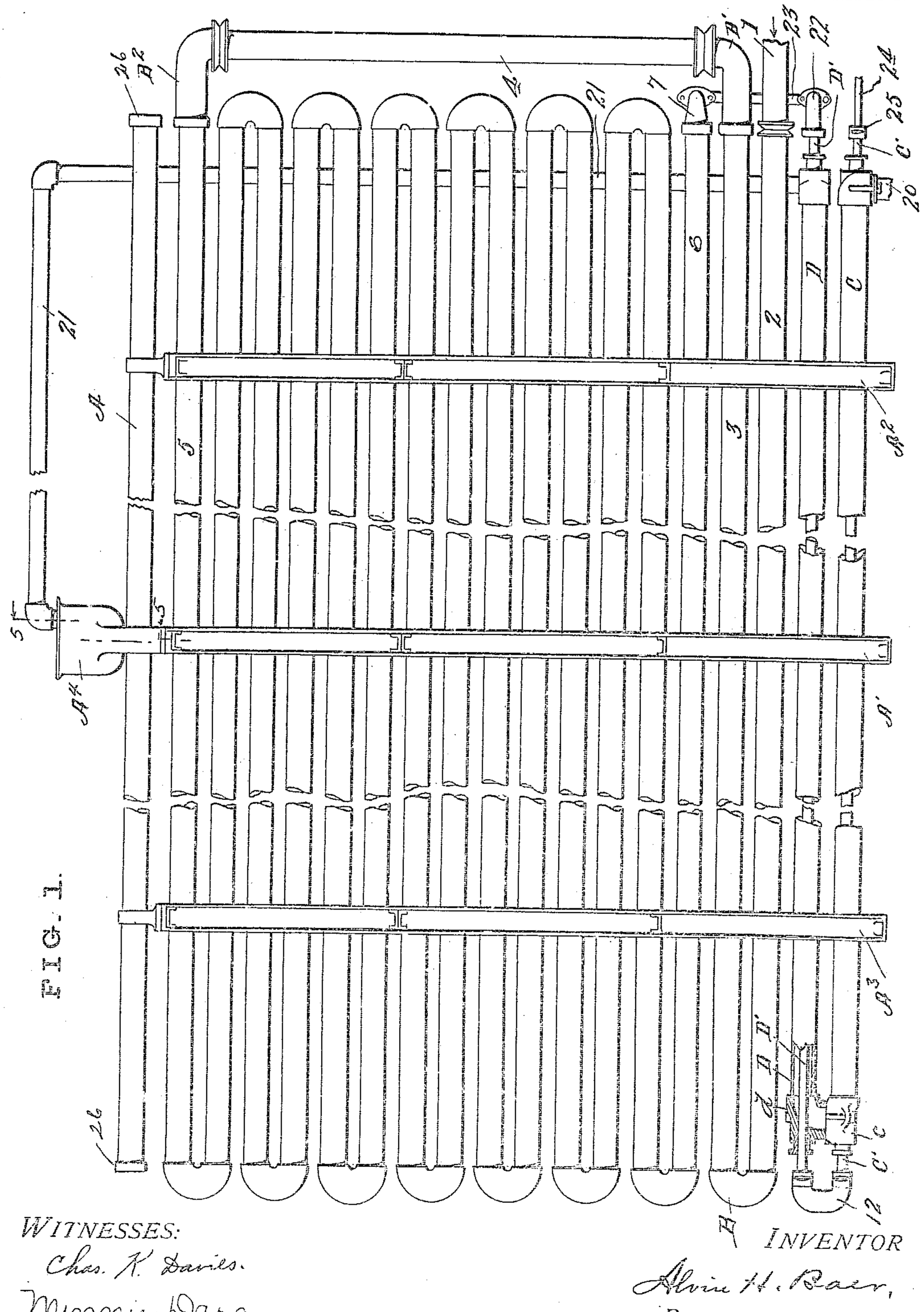

FIG. 1.

WITNESSES:

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2 SHEETS—SHEET 2.

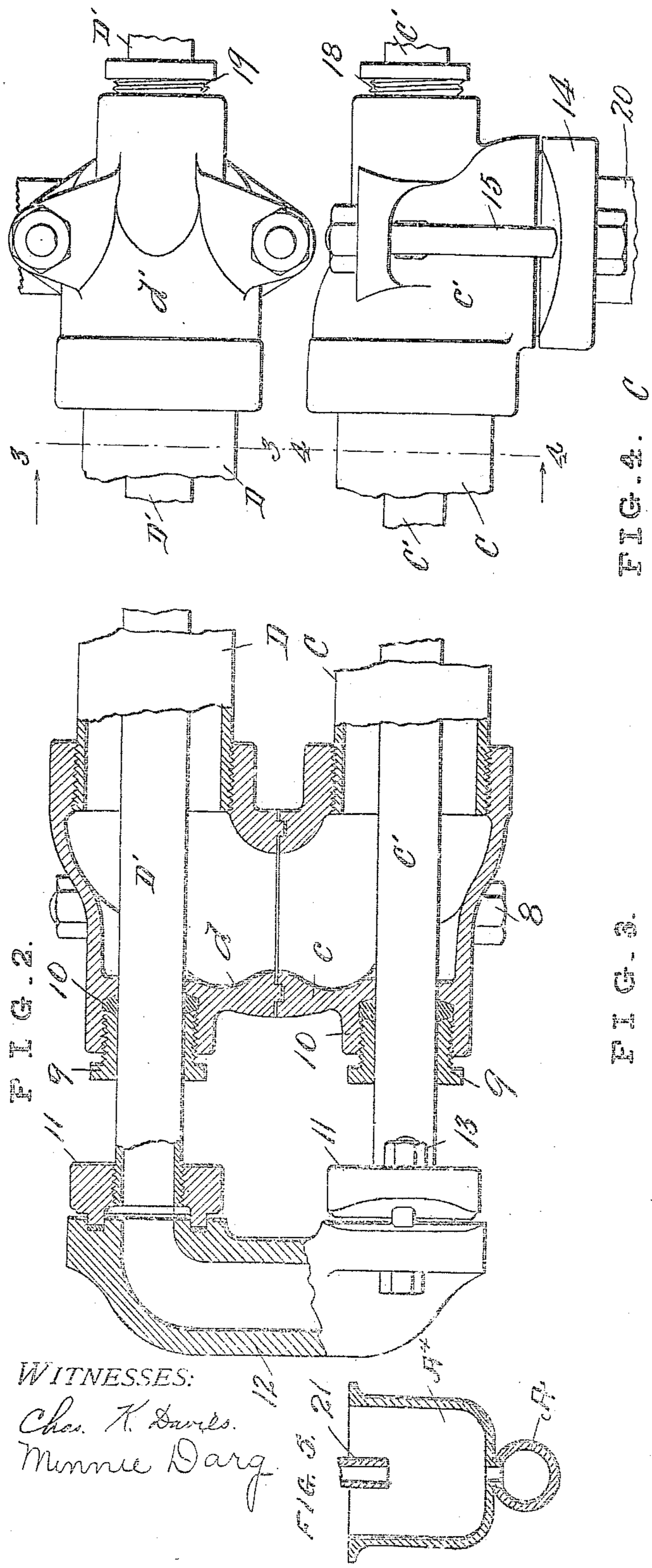

FIG. 4.

FIG. 2.

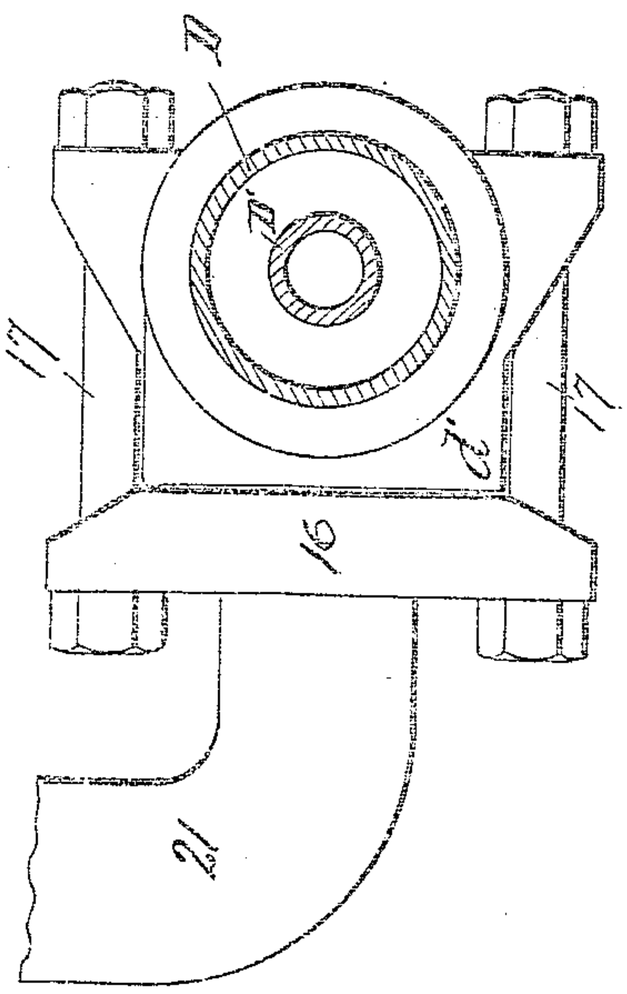

FIG. 3.

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UNITED STATES PATENT OFFICE.

ALVIN H. BAER, OF WAYNESBORO, PENNSYLVANIA, ASSIGNOR TO FRICK COMPANY, OF WAYNESBORO, PENNSYLVANIA, A CORPORATION.

AMMONIA-CONDENSER AND LIQUID-COOLER.

953,577. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed May 6, 1905. Serial No. 259,248.

To all whom it may concern:

Be it known that I, ALVIN H. BAER, a citizen of the United States, residing at Waynesboro, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Ammonia-Condensers and Liquid-Coolers, of which the following is a specification.

My invention consists in an improved arrangement of apparatus for condensing purposes and more particularly for condensing ammonia gases and vapors.

In the operation of ice making and refrigerating plants, in the majority of cases water is used for cooling and condensing purposes which holds in suspension a large amount of lime, magnesia and other mineral matter. In passing over the hot surfaces of a condensing or cooling coil this mineral matter is precipitated and collects in the form of scale on the hottest surfaces of such coils. This compels the use of condensing and cooling coils of the atmospheric type, *i. e.*, coils in which the cooling liquid trickles down over the outside surface of the coil, for in condensers and coolers of the inclosed or multitubular type the scale gradually increases until the water passages are entirely closed thereby, and since this scale cannot be removed without great cost the condensers are rendered practically useless.

The purpose of my invention, therefore, is to provide an atmospheric condensing and cooling coil of increased efficiency without undue increase in cost of manufacture, and one in which the condensed fluid will be cooled to a lower temperature with the use of a given quantity of the condensing fluid than is possible in the atmospheric condensers heretofore in use.

Referring to the accompanying drawings, which are made a part hereof and on which similar reference characters indicate similar parts, Figure 1 is an elevation of an atmospheric condenser in common use having attached thereto a liquid cooling section embodying my said invention, Fig. 2 a side elevation of the improved liquid cooling section shown partly in section and with the middle portion broken away to enable the ends to be shown on a larger scale, Figs. 3 and 4 cross sections on the dotted lines 3—3 and 4—4 respectively in Fig. 2, looking in the direction indicated by the arrows, and Fig. 5 a detailed section looking in the direction indicated by the arrows from the dotted line 5—5 in Fig. 1.

The common construction of atmospheric condensing coil as shown in Fig. 1 comprises the pipes 1, 2, 3, 4, 5 and 6, the bends B, fittings B′, B², discharge fitting 7, the distributing pipe A, the bowl A⁴ and the supporting stands A′, A² and A³, while the pipes C, C′, D, D′, and the fittings connected therewith comprise the improved liquid cooler embodying my said invention, which is arranged to form a part of and be combined with the said atmospheric condensing coil.

The outside pipes C and D, of the cooler are provided with fittings *c* and *d* at one end, which are joined together by a tongue and groove joint having a suitable compressible packing therein to insure a tight joint. Clamping bolts 8 serve to hold said fittings firmly together thus forming a passage or way joining said outside pipes C and D. The outer ends of said fittings are contracted in size and formed open to permit the inside pipes C′ and D′ to pass through them. Glands 9 and suitable compressible packing 10, as shown, serve to provide a tight joint around the said pipes. Suitable flanges 11 are secured to the extended ends of said pipes C′ and D′, and a bend or fitting 12 with a passage way therein is joined to said flanges by means of clamping bolts 13, a tight joint being provided by the usual tongue and groove construction with suitable compressible packing, as shown. A passage from pipe C′ to D′ is thus provided. At the opposite end, fittings *c′* and *d′* are mounted on said pipes being duplicates of fittings *c* and *d*, but are not connected, fitting *c′* being turned to have its opening extend downwardly, while fitting *d′* extends horizontally. A flange 14 similar to flange 11 is secured by bolts 15 to the mouth of fitting *c′* and a similar flange 16 is secured by bolts 17 to the mouth of fitting *d′*. Glands 18 and 19 are provided to compress a suitable packing around the pipes C′ and D′ in the fittings *c′* and *d′* at this end so as to insure a tight joint. A pipe 20 is screwed into flange 14 and a pipe 21 into flange 16.

Referring to Fig. 1, the pipe D′ is joined by the fitting 22 and the pipe 23 to the outlet fitting 7 of the atmospheric condenser proper. The pipe 24 is also joined to pipe C′ by fitting 25. The bowl A⁴ is hollow and is provided with an opening into pipe A.

The pipe A has a slot cut in its top side throughout its entire length and has caps 26 to close its ends. The pipe 21 connected with 16 is extended as shown in Fig. 1 to discharge into said bowl.

The operation of the common form of atmospheric condenser as heretofore constructed is as follows: The ammonia gas enters by means of pipe 1 and after passing through the first two pipes 2 and 3 is carried by means of fittings B′ and B² and pipe 4 to the top pipe 5, and thence through the several pipes of the coil until it reaches the lower pipe 6 and fitting 7 through which it leaves the condenser in its condensed form to other parts, not shown. The cooling fluid is delivered to the bowl A⁴ from any source of supply and from thence enters the pipe A having a slot in its top side. Said pipe is soon filled and the cooling fluid overflows through the slot and trickles down over the outside surface of the pipe coils beneath.

It will be seen that the cooling fluid trickling over the outside of the coils will be warmed somewhat when it reaches pipe 6 on which the outlet fitting 7 is placed and that the condensed ammonia leaving the condenser from this pipe cannot be cooled to a temperature colder than the temperature of the cooling fluid when it reaches this pipe.

When the apparatus is constructed to embody my improved liquid cooler the operation is as follows: The condensed ammonia instead of leaving the condenser from fitting 7 is carried through pipe 23 to the pipe D′ of said cooler from which it passes through fitting 12 to pipe C′ and is discharged through pipe 24 to other parts, not shown. The cooling fluid first enters the pipe C by means of pipe 20 and flows through this pipe, fittings *c* and *d* and pipe D into pipe 21 by which it is conducted to the bowl A⁴. It will thus be seen that the condensed ammonia in being carried through my said improved cooling section is brought into intimate contact with the cooling fluid before said cooling fluid is delivered to the warmest part of the condenser, and, further, the condensed ammonia leaves from the point at which the cooling fluid enters at its coldest temperature, and, further, that the condensed ammonia is contained in the inside pipes or passages which are completely surrounded by passages containing the coldest cooling fluid and no opportunity is afforded for the condensed ammonia to become warmed from the outside, therefore, the condensed ammonia will be cooled to a temperature at or near the coldest temperature of the cooling fluid when entering the apparatus. In this manner the condenser is rendered very efficient and its office in an ice making or refrigerating plant is more perfectly performed.

It is obvious that the improved liquid cooler, as well as the ammonia condenser proper, may consist of any number of pipes or coils or sets of coils which will be best adapted to the purposes desired.

It is understood that while I have described my invention as a liquid cooler section for combination with an atmospheric ammonia condensing or cooling coil, of the form above described it may be used in combination with atmospheric condensing or cooling coils of other forms and for other purposes with equal facility and efficiency and I do not therefore, confine myself to the specific form shown or any particular use but consider my invention as broad as defined in the following claims.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:—

In a condensing and cooling structure the combination of the condensing section comprising a stack of coils of pipe arranged to receive the fluid to be condensed through its lower coil, a branch leading from said lower coil to the upper coil, said coils being connected to form a passage for said fluid from said upper coil to the coil adjacent to said lower coil, a cooling agent distributing pipe above said stack of coils arranged to discharge the cooling agent over the exterior of said coils, and a cooling section comprising a coil of double pipes having passages through the inside pipe and between the pipes, the inside pipe being connected at its top with the discharge end of the condensing coil and at its lower end with a pipe leading to a receiver, and the outside pipe being connected at its lower end with the cooling agent supply and at its top with a pipe leading to discharge into the condenser cooling agent distributing pipe, substantially as set forth.

In witness whereof, I, have hereunto set my hand and seal at Waynesboro, Pennsylvania this second day of May, A. D. nineteen hundred and five.

ALVIN H. BAER. [L. S.]

Witnesses:
A. O. FRICK,
W. H. MANNS.