No. 843,282. PATENTED FEB. 5, 1907.

J. C. KITTON.

SYSTEM OF PIPING FOR CIRCULATING SYSTEMS.

APPLICATION FILED NOV. 27, 1905.

Fig. 1.

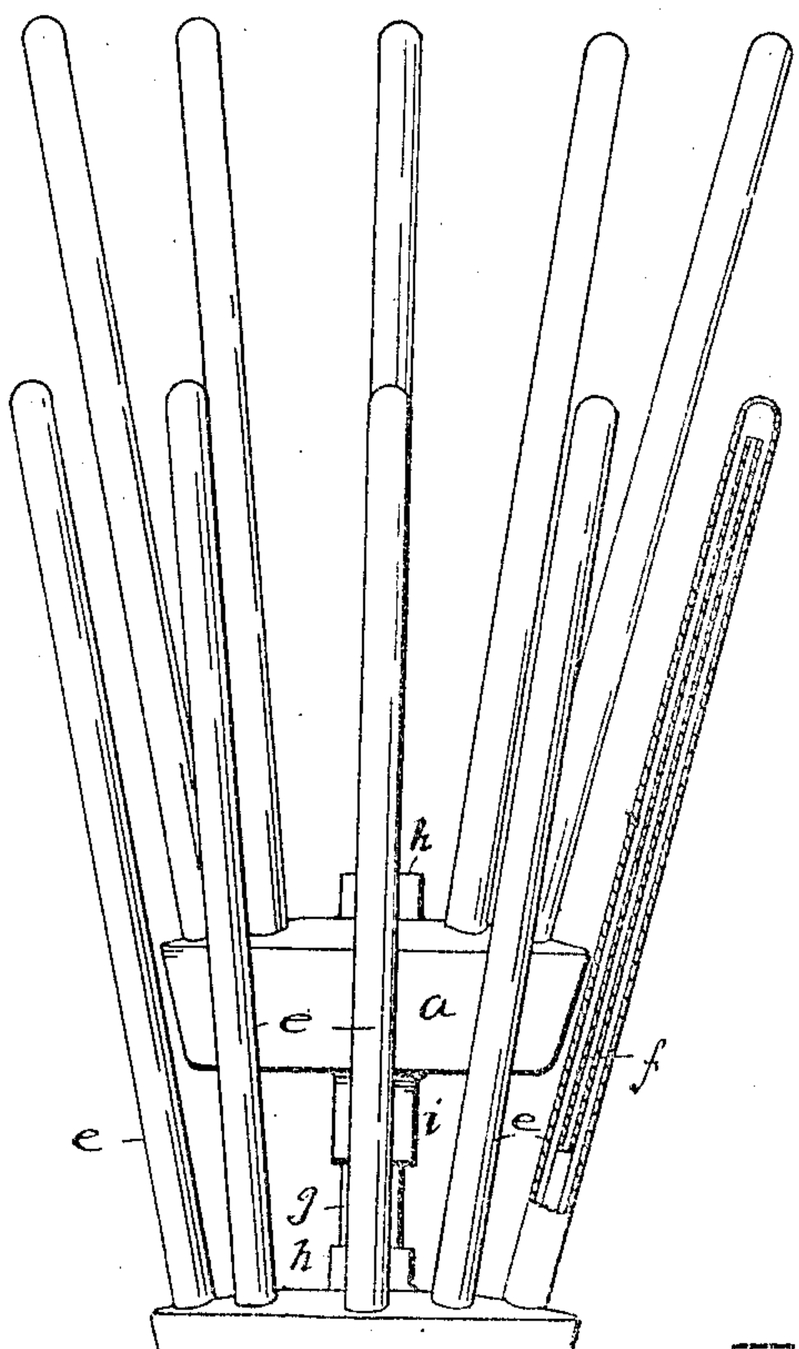


Fig. 3.

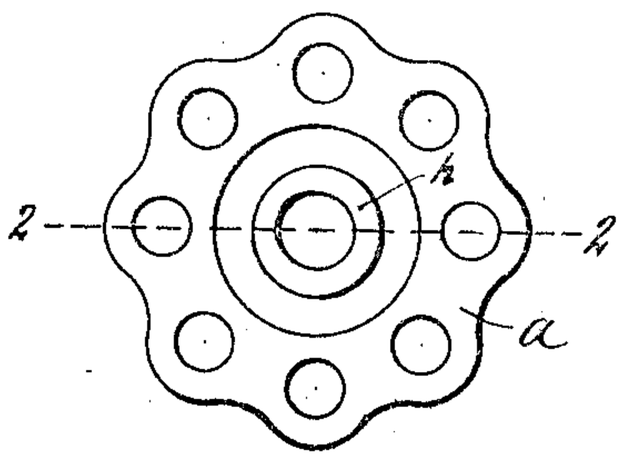
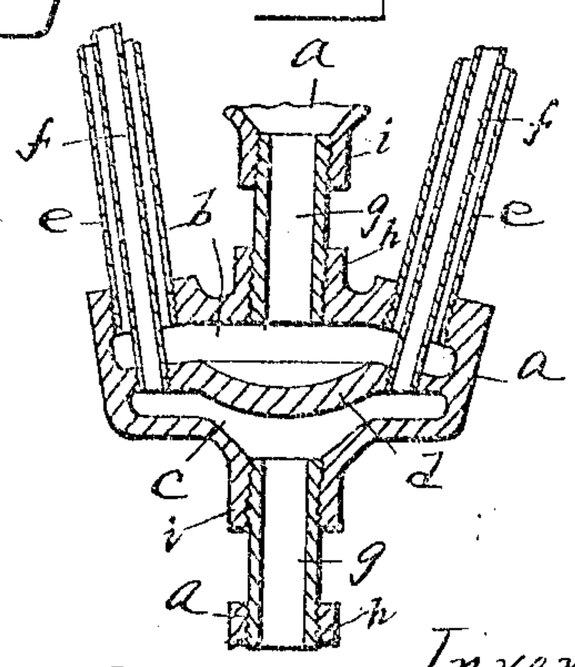


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SYSTEM OF PIPING FOR CIRCULATING SYSTEMS.

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Application filed November 27, 1905. Serial No. 289,262.

To all whom it may concern:

Be it known that I, JOHN C. KITTON, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Systems of Piping for Circulating Systems, of which the following is a specification, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to a system of piping for a circulating system adapted for various purposes—as, for example, a refrigerating system—although the essential features of the invention might also be employed in a heating system. I will, however, describe my invention as applied to a refrigerating system where heat is to be absorbed, the object being to retard the flow through the piping. I would have it understood, however, that my invention contemplates as coming within its scope all uses to which it may be applied.

My invention consists in the mechanism hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a view showing in elevation certain features of my invention, one of the pipes shown partly in section. Fig. 2 is a view of the header on the line 2 2, Fig. 3; and Fig. 3 is a plan view of the header, the pipes being removed.

I will describe my invention for the purposes of illustration as applied to a refrigerating system; but I would have it definitely understood that I do not limit myself solely thereto.

In a refrigerating system, it will be understood, ammonia-gas is circulated through the piping, and that in conjunction with an absorber a condenser is employed. After expanding the ammonia used in the refrigerating system it is to be compressed and condensed.

My invention may be briefly characterized as comprising a plurality of sections, each section comprising a header, each constructed with a receiving-chamber and with a discharge-chamber and having in combination therewith a series of exterior tubes communicating with one of said chambers and a series of interior tubes communicating with the other of said chambers and with the exterior tubes, the discharge-chamber of one header communicating with the receiving-chamber of the adjacent header, the tubes of one section being preferably arranged to partially surround the header and tubes of the next section above.

In the drawings, *a* represents one or more pipe-headers, each of the headers being constructed with plural chambers, a receiving-chamber being indicated at *b* and a discharge-chamber being indicated at *c*, said chambers separated by a diaphragm *d*. Into the receiving-chamber *b* enters a series of exterior pipes, (indicated at *e*,) within which are located corresponding interior pipes *f*, the interior pipes leading through the corresponding diaphragm *d* and into the discharge-chamber *c*. Ordinarily, it will be understood, a series of pipe-headers will be employed provided with piping *e* and *f*, arranged as above described. The various headers of the series are shown connected by connecting-pipes *g*, leading, respectively, from the discharge-chamber *c* of one header into the receiving-chamber *b* of the adjacent header. The interior pipes *f* open at their outer ends into the corresponding pipes *c*, as shown in Fig. 1. It will be seen that the ammonia enters the receiving-chamber of the header and passes upward between the exterior pipe *e* and the interior pipe *f* and downward through the inner pipe and thence into the discharge-chamber *c* before it can pass into the second header. The gas entering into the second and each successive header passes through the same arrangement of pipes one after another through the entire series of headers. The ammonia thus travels through the exterior pipes of each section in one direction and through the interior pipes in the opposite direction. The interior and exterior pipes of each section are preferably of such comparative sizes as to form a limited or narrow chamber or passage between the inner and the outer pipes, so that the gas is admitted into the exterior pipe and travels therethrough in a thin film, facilitating the absorption of heat rapidly thereby on account of the ammonia being thus passed in a thin film into contact with the piping in its travel. At the same time the gas enters the headers with the condenser-pressure behind it.

It will be evident that as the liquid ammonia enters into the receiving-chamber of the first header of the series the liquor is arrested or retarded therein, the liquor being prevented from going over the corresponding

pipes into the corresponding discharge-chamber, the ammonia-gas, more or less saturated, passing upward through the restricted passages between the interior and exterior pipes and downward into the discharge-compartment of the header, from whence it passes into the receiving-chamber of the header therebeneath. Any ammonia that may pass into the receiving-chamber of the successive headers of the series as a liquor (owing to the saturation of the gas) is again arrested or retarded in its further flow, the ammonia-gas from each receiving-chamber passing upward through the restricted passages and downward into the corresponding discharge-chamber of the header. It will be understood that no ammonia passes from one receiving-chamber to another in the series in the form of liquor, the ammonia passing from one header to another only as a saturated gas, each header arresting any ammonia liquor that may enter its receiving-chamber, owing to the saturation of the gas, the process continuing, the ammonia-gas passing over from one header to another with less and less saturation from one header of the series to another until it has finally all become a dry gas.

If the system of piping was a continuous system without any interposed headers, the ammonia liquor would pass straight through the circulating system without any interruption; but by the interposition of the headers the pipes are never full of ammonia liquor, as if, for example, water were being circulated through the system; but, as above described, the ammonia liquor is arrested and retarded in its circulation from one system of piping to another by the interposed headers. The object of this construction is to control the passage of the ammonia on the absorption side of the system, so that it shall flow as slowly as possible. This operation may be continued through as many sections of headers and corresponding pipes as may be desired or required.

In order that a series of pipe-headers may be connected together, the headers are shown constructed with interiorly-threaded nipples *h* and *i* to receive the corresponding connecting-pipes *g*. Moreover, in order that a series of headers may be so connected I prefer to arrange the pipes *e* and *f* at an angle to the perpendicular, as shown, the pipes diverging toward their upper ends, so that the pipes connected with one header may project above and about the exterior of the header thereabove, as shown.

Experience has shown that when brine in a refrigerator system has been reduced to, say, 14° below zero applicant has been enabled to carry a back pressure of fifteen pounds, where other systems have not permitted a pressure to be carried of over three or four pounds. Experience also proves that the retarding of the flow of the ammonia allows more absorption of heat than through other systems heretofore employed.

I do not limit myself solely to the method of travel of a gas or liquid through the piping above described, as within the scope of my invention the travel might be reversed or the system of piping might be inverted.

By this construction and arrangement the gas going up one pipe and traveling back in a reverse direction through the inner pipe will liberate more of its heat than would be the case if the travel was all in one direction.

It will readily be seen that for heating purposes water may be circulated through the system of piping in the same way, heat being applied to the piping in any customary manner. This system of piping may be employed also for hot-air heating purposes.

What I claim as my invention is—

1. A system of piping for a circulating system embodying a plurality of sections arranged in substantially vertical alinement, each section comprising a header constructed with a receiving-chamber and with a discharge-chamber, a series of upwardly-diverging exterior pipes each opening into one of said chambers and having a closed outer end, and a series of interior pipes projecting within the exterior pipes, each opening into the other of said chambers at its lower end and into the corresponding exterior pipe at its upper end, the discharge-chamber of one header communicating with the receiving-chamber of the adjacent header.

2. A system of piping for a circulating system embodying a plurality of sections arranged in substantially vertical alinement, each section comprising a header constructed with a receiving-chamber and with a discharge-chamber, a series of upwardly-diverging exterior pipes each opening into one of said chambers, and a series of interior pipes projecting within the exterior pipes each opening into the other of said chambers at its lower end and into the corresponding exterior pipe at its upper end, the discharge-chamber of one header communicating with the receiving-chamber of the adjacent header, the two corresponding exterior and interior pipes arranged to form a restricted passage-way therebetween whereby the flow will be retarded and directed into each of the receiving-chambers and over into the interior pipes and therethrough into the discharge-chamber.

3. A system of piping for a circulating system embodying a plurality of sections arranged in series one below another, each section comprising a header constructed with a receiving and a discharge chamber, a series of exterior pipes each opening into one of said chambers, and a series of interior pipes projecting within the exterior pipes each opening into the other of said chambers at its lower end and into the corresponding ex-

terior pipe at its upper end, the discharge-chamber of one header communicating with the receiving-chamber of the adjacent header throughout the series of sections, the two corresponding exterior and interior pipes arranged to form a restricted passage-way therebetween, whereby the flow will be retarded and directed into each of the receiving-chambers one after another and thence through the corresponding restricted passage-way into the corresponding discharge-chamber.

4. A system of piping for the passage of gases or liquids embodying a plurality of sections arranged in vertical series, each section comprising a header having a series of exterior pipes and a series of interior pipes, the interior pipes arranged to permit the gas or liquid passing in one direction between the interior and the exterior pipes and back in the opposite direction through the interior pipe, the pipes of one section arranged to partially surround the header and pipes of the next section above, and the headers communicating one with another.

5. A system of piping for the passage of gases or liquids, embodying a plurality of sections arranged one above the other, each section comprising a header having two compartments, a series of exterior pipes communicating with one of said compartments and having closed outer ends, and a series of interior pipes each opening into the corresponding exterior pipe and into the other compartment of the header whereby the gas or liquid may pass in one direction through one of said pipes and back in a reverse direction through the other of said pipes, the headers communicating one with another, and the pipes of one section arranged to partially surround the header and pipes of the section above.

6. A system of piping for a circulating system embodying a plurality of sections each formed with a receiving-chamber and with a discharge-chamber, and with a plurality of radiating pipes establishing communication between said receiving-chamber and said discharge-chamber, the discharge-chamber of the first section communicating with the receiving-chamber of the next succeeding section, whereby the flow is directed into each of the receiving-chambers one after the other and thence through the corresponding radiating pipes into the corresponding discharge-chamber.

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

JOHN C. KITTON.

Witnesses:
N. S. WRIGHT,
O. M. MURPHY.