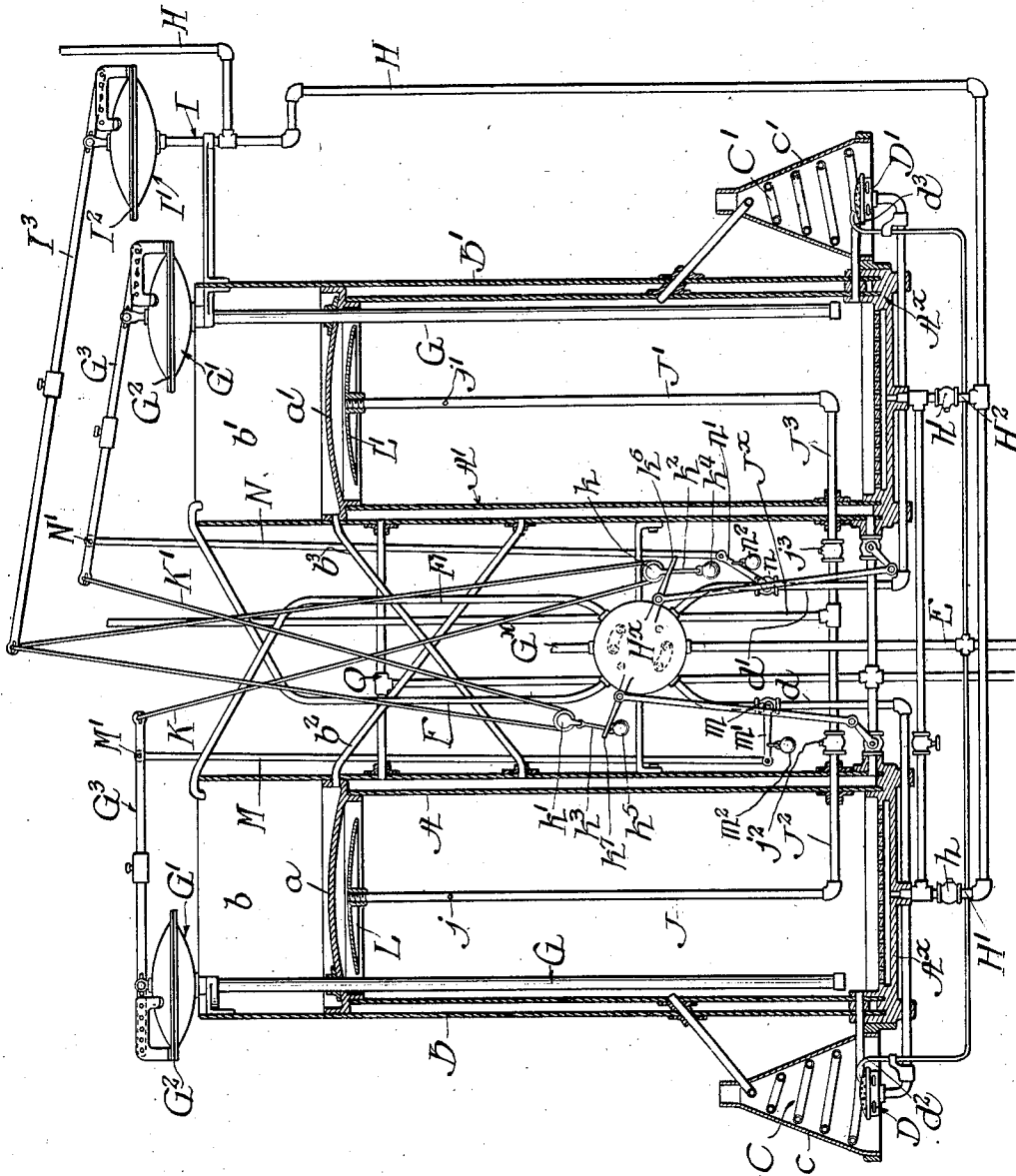


REFRIGERATING APPARATUS.
APPLICATION FILED MAR. 1, 1911.

Patented Dec. 3, 1912.



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UNITED STATES PATENT OFFICE.

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REFRIGERATING APPARATUS.

1,046,135.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, FRED W. WOLF, JR., and HARRISON H. SOUTHWORTH, citizens of the United States, and residents of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Refrigerating Apparatus; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to certain novel features of construction in automatically operating refrigerating apparatus and consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The invention is shown herein as applied to an automatic refrigerating apparatus of the alternating absorption type, and particularly to such an apparatus as is described in application filed by us on the 1st day of March, 1911, Serial No. 611,560.

The apparatus of the application referred to embraces a refrigerating system provided with two drums constituting generator-absorbers adapted to alternately act as absorbers and stills, and includes a controlling valve adapted for controlling the alternate application of heating and cooling means to the said drums, which controlling valve depends for its operation upon the temperature attained in the drum which is being heated, when substantially all the ammonia gas has been driven therefrom, and upon the back pressure developed in the drum which is being cooled at the time when the liquor contained therein reaches the desired degree of saturation. The invention, however, as will presently appear, is not limited to this particular apparatus, but may be applied to refrigerating apparatus which is operated in other ways.

In refrigerating apparatus of this general type, the absorption drums are connected by a common pipe leading from the refrigerating coils, check valves being provided at each drum to prevent the flow of liquor back into said pipe and thus from one drum to the other. It sometimes happens, however, that one of these check valves leaks, with the result that liquor will flow from

one drum to the other, thus increasing the amount of liquor in that drum above the normal amount it is intended to contain and decreasing the liquor in the other drum a like amount.

Another object of the invention is to provide a simple and efficient means for dehydrating the ammonia gas which is being driven from the drums.

The figure of the drawing illustrates a vertical elevation through the absorption drums showing the controlling valve and valve operating mechanism, and also the several pipe connections in front of the elevation.

A, A¹ indicate the absorption drums; B, B¹, water jackets surrounding the same, said water jackets and drums having a common bottom A^x, A^x; and C, C¹ indicate heating coils inclosed by conical hoods, c, c¹ connected respectively with the drums A, A¹, and adapted to be heated by burners D, D¹. Said burners are supplied by pipes d, d¹ and are started by pilot lights d², d³, which lead directly from a main gas supply pipe E.

F, F¹ indicate water supply pipes for cooling the drums and G^x, a main water supply pipe.

H^x is a controlling valve adapted in one position to respectively connect the main gas supply pipe E with the gas supply pipe d leading to the burner D, and to connect the main water supply pipe G^x to the water supply pipe F¹, and in the other position to respectively connect the main gas supply pipe E to the gas supply pipe d¹ leading to the burner D¹, and to connect the main water supply pipe G^x with the water supply pipe F.

G, G indicate pipes located in the drums A, A¹, respectively, closed at their lower ends and connected at their upper ends with diaphragm chambers G¹, G¹ having diaphragm members G², G² operatively connected with levers G³, G³ which they are adapted to raise when a fluid contained in one of said tubes G, G expands under the action of a predetermined temperature in one of said drums to expand one or the other end of the diaphragm members G², G².

H indicates a pipe leading from the refrigerating coils and connected by branch pipes H¹, H², respectively, with the drums A, A¹. Said branch pipes contain check

valves h , h^1 which prevent the liquor in said drums A, A^1 from passing into said branch pipes.

I is a branch pipe connected with the pipe H leading to a diaphragm chamber I^1 having a diaphragm I^2 which is adapted to actuate a lever I^3 when the back pressure in said pipe H reaches a predetermined point.

K, K^1 indicate flexible members in the form of ropes or light chains, one of which, K has an end fixed to one of the levers G^3 , and its other end fixed to a lever I^3 and which is looped about a pulley carried by a pulley block k and the other of which, k^1 has one end fixed to the other lever G^3 , and its opposite end fixed to the lever I^3 , and which is looped about a pulley carried by a pulley block k^1 . Said pulley blocks are connected by links k^2 , k^3 to weights k^4 , k^5 , said links passing through apertures in crank arms k^6 , k^7 , which are connected to the movable member of the controlling valve H^x .

m indicates an auxiliary controlling valve located in the gas supply pipe d between the main controlling valve H^x and the burner D and n represents a similar valve located in the gas supply pipe d^1 between the main controlling valve and the burner D^1 . Said valves are adapted to be closed by crank arms m^1 and n^1 respectively, said crank arms being provided with weights m^2 , n^2 , and being connected by links M, N, as indicated at M^1 , N^1 , to the levers G^3 , G^3 .

The mechanism thus far described for controlling the alternate application of the cooling and heating means to the absorption drums, is substantially like that described in the application above referred to, and as it forms no part of the present invention, needs no description.

As above stated, the invention is not limited to an apparatus as herein, the control of the cooling and heating means and of the alternate application of said means to the absorption drums is operated as in the apparatus described in said application.

J, J^1 indicate vertical pipes located respectively in the drums A, A^1 and connected at their lower ends with pipes J^2 , J^3 which extend through the drums and their respective jackets and are there connected with a pipe J^x leading to the condensing coils (not shown). Near the top of each pipe at a predetermined level, which is the maximum level desired for the liquor in each of said drums to attain, is located a small hole or opening j , j^1 . Said pipes J, J^1 are preferably extended above this point to a level near the top of their respective drums and are there connected to deflector or baffle-plates L, L^1 through which they open. In the pipes J^2 , J^3 are located check valves j^2 , j^3 , which open outward and will permit

a flow from each of the pipes J, J^1 toward the pipe J^2 but will prevent a flow in the opposite direction.

The casings forming the water jackets B, B^1 are each extended above their respective drums A, A^1 and the top walls a , a^1 of said drums are extended radially beyond said drums and closed against the inner wall of said jackets. By this construction, chambers b , b^1 are formed above the respective drums. The chamber b is connected by a pipe b^2 with the jackets surrounding the drum A^1 , while the chamber b^1 above the drum A^1 is connected by a pipe b^3 with the jackets surrounding the drum A.

The operation of the apparatus is as follows: Assume the controlling valve in that position shown in the drawing, in which the main gas supply pipe is connected with the pipe d so as to direct the gas into the burner D, and the main water supply pipe G^x is connected to the pipe F^1 , which is adapted to direct the supply of cooling water into the chamber b above the tank A, and whence it will flow through the pipe b^2 into the jacket B^1 surrounding the absorption drum A^1 . With the parts in this relation, we have the drum A being heated and the drum A^1 being cooled; at the same time the top wall a of the drum A is also being cooled. As the gas is driven from the liquor in the drum A it passes up about the deflector or baffle-plate L, and by reason of the location of said baffle-plate near the top wall of said drum is forced into contact with said cold top wall of the drum in its passage toward and into the upper open end of the pipe J, which it must seek as the only practical exit. The contact with the cold wall a condenses the water in the ammonia gas and thus tends to de-hydrate it before it passes into the pipe J.

When the strong liquor in the drum A or A^1 begins to be heated and the pressure therein rises above the pressure of the condenser, should any of said liquor rise above the level of the opening j or j^1 in the pipes J or J^1 , as the case may be, it will pass through said opening into the said pipe J or J^1 and thus pass out into said pipe with the ammonia gas to the condensing coils and thence to the receiver. From there it will ultimately work its way through the refrigerating coils back to the other drum, which is at low pressure and able to receive it, and thus tend to maintain a like net amount of liquor in each of said drums. It is to be noted that the openings j and j^1 when the baffle-plate is used, are made quite small so as not to offer a ready passage for the ammonia gas which is intended to pass into the discharge pipe J or J^1 after it has passed up about said baffle-plate.

While we have shown the two features of our invention in conjunction in the same ap-

paratus, it is apparent that either may be used without the other, the extension of the pipes J , J^2 above the level of the openings J , J^1 being required only when the two features are thus conjointly used, as described.

We claim as our invention—

1. In a refrigerating apparatus of the alternating absorption type, including generator-absorbers arranged in pairs, means for heating and cooling said generator-absorbers in alternation, condensation coils, and a conduit adapted for leading the expanded ammonia gas to each of said generator-absorbers, means for conducting the ammonia gas from each generator-absorber to said condensation coils, said means being provided with an opening for the discharge of liquor with said ammonia gas when the liquor in the generator-absorber rises to a predetermined level.

2. In a refrigerating apparatus of the alternating absorption type including generator-absorbers arranged in pairs, means for heating and cooling said generator-absorbers in alternation, condensation coils, and a conduit adapted for leading the expanded ammonia gas to each of said generator-absorbers, means for discharging the ammonia gas from said generator-absorbers to the condensation coils comprising an upright pipe located in each generator-absorber, said pipes being provided with means for the outflow of liquor when the level thereof rises above a predetermined point, said pipes extending through the walls of said generator-absorbers at points near the bottom thereof, and means provided in said pipe to prevent a return flow therethrough.

3. In a refrigerating apparatus of the alternating absorption type including generator-absorbers arranged in pairs, means for alternately heating and cooling said generator-absorbers, condensation coils, and a conduit adapted for leading the expanded ammonia gas to each of said generator-absorbers, means for discharging the ammonia gas from said generator-absorbers to the condensation coils comprising an upright pipe located in each generator-absorber, and provided with an aperture at a predetermined level, one end of each pipe extending to a

point near the top of the generator-absorber, and the other end extending through the wall of said generator-absorber near the bottom, a baffle-plate located in each generator-absorber, near the top thereof, each of said pipes opening at its upper end through an associated baffle-plate, a common discharge pipe to which said first-named pipes are connected, means located in said pipes to prevent back flow from said common discharge pipe, a water chamber on top of each generator-absorber, and means for supplying cooling water to said water chamber of each generator-absorber while said generator-absorber is being heated.

4. In a refrigerating apparatus of the alternating absorption type including generator-absorbers arranged in pairs, means for alternately heating and cooling said generator-absorbers, condensation coils, and a conduit adapted for leading the expanded ammonia gas to each of said generator-absorbers, means for discharging the ammonia gas from said generator-absorbers to the condensation coils comprising an upright pipe located in each generator-absorber, one end of each pipe extending to a point near the top of the generator-absorber and the other end extending through the wall of said generator-absorber near the bottom, a baffle-plate located in each generator-absorber near the top thereof, each of said pipes opening at its upper end through an associated baffle-plate, a common discharge pipe to which said first-named pipes are connected, means located in said pipes to prevent back flow from said common discharge pipe, a water chamber on top of each generator-absorber, and means for supplying cooling water to said water chamber of each generator-absorber while said generator-absorber is being heated.

In testimony that we claim the foregoing as our invention we affix our signatures in the presence of two witnesses this 8th day of February, A. D. 1911.

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Witnesses:

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