A. FAGET.

REFRIGERATING SYSTEM.

APPLICATION FILED DEC. 10, 1909.

971,182. Patented Sept. 27, 1910.

2 SHEETS—SHEET 1.

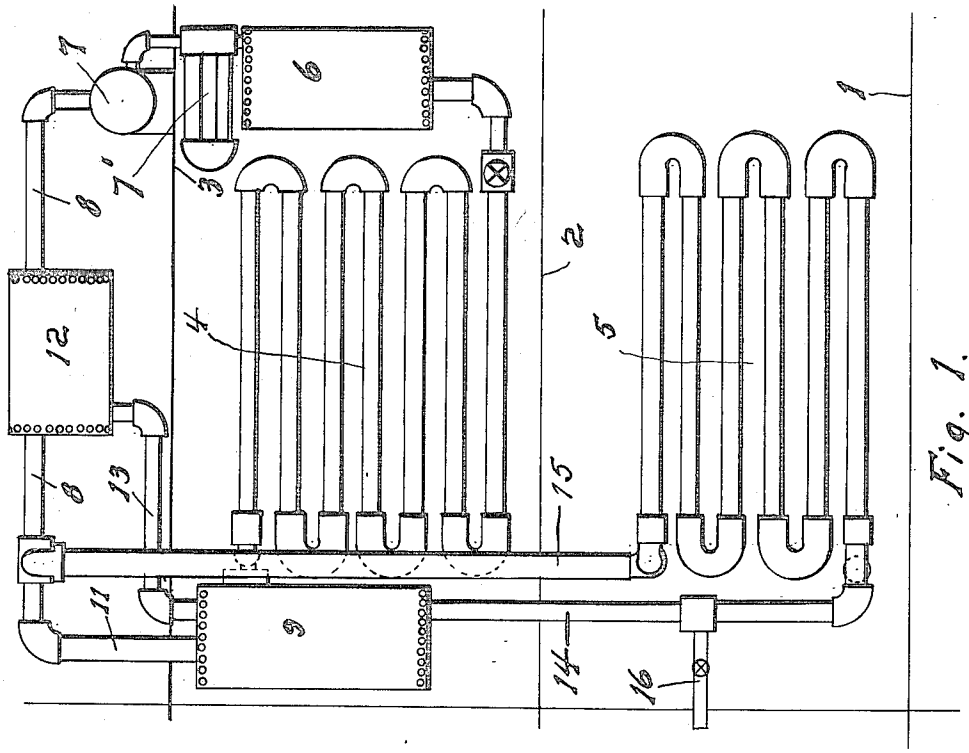

Fig. 1.

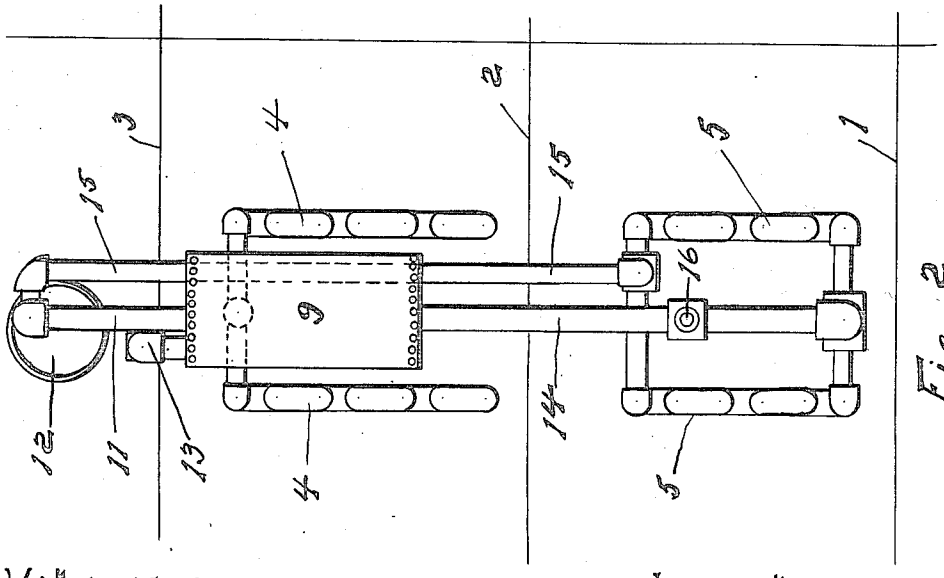

Fig. 2.

Witnesses.
Roswell P. Rogers.
Sidney Hotchner

Inventor.
Arthur Faget. by,
Carlos P. Griffin Atty.

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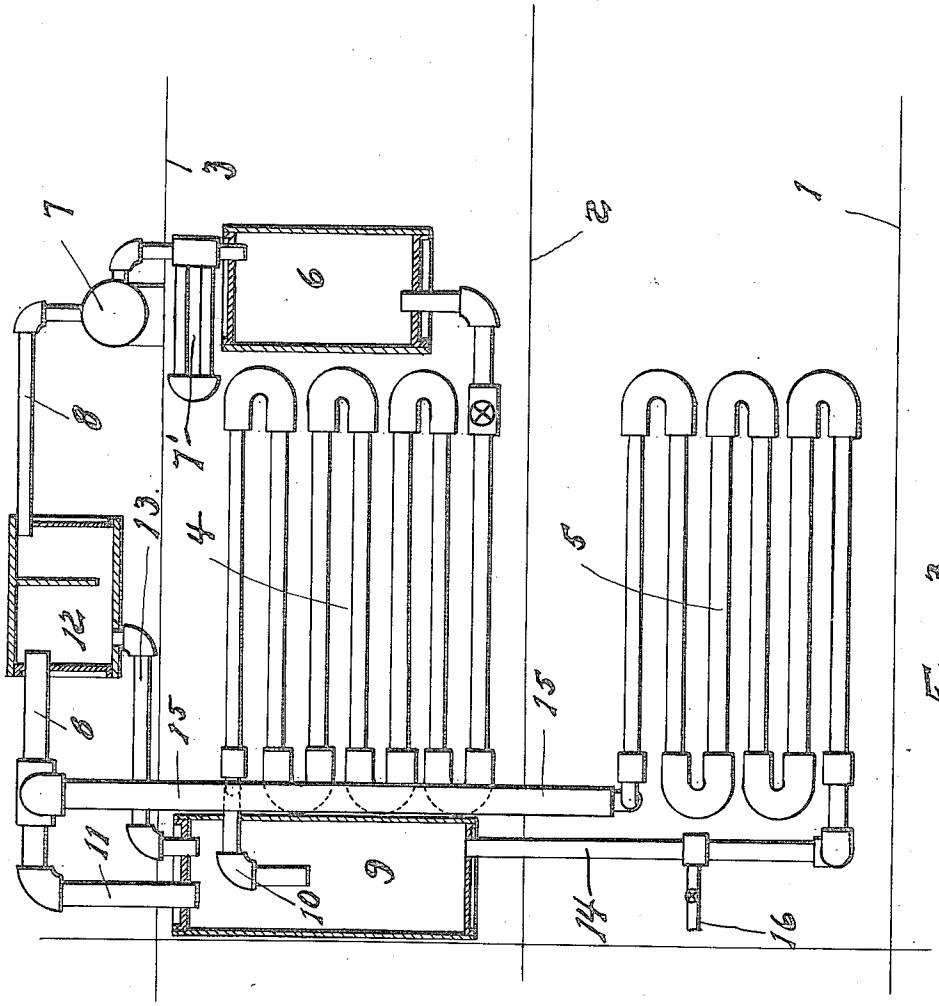

Fig. 3.

Witnesses
Roswell P. Rogers.
Eugene C. Brown

Inventor,
Arthur Faget. by,
Carlos P. Griffin Atty.

UNITED STATES PATENT OFFICE.

ARTHUR FAGET, OF SAN FRANCISCO, CALIFORNIA.

REFRIGERATING SYSTEM.

971,182. Specification of Letters Patent. Patented Sept. 27, 1910.

Application filed December 10, 1909. Serial No. 532,513.

To all whom it may concern:

Be it known that I, ARTHUR FAGET, citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented a new and useful Refrigeration System, of which the following is a specification in such full and clear terms as will enable those skilled in the art to construct and use the same.

This invention relates to a system for cooling air, gases or liquids, as may be desired, the object of which is to obtain the greatest possible cooling effect with the least possible expenditure of energy.

It will be understood by those skilled in the art that it has been the practice to permit a substance, such, for example, as ammonia, to expand to produce the extremely low temperatures used in refrigeration systems; but this method of producing the desired low temperatures is disadvantageous for the reason that the regulation of the quantity of ammonia used must be very nicely adjusted, since more or less than the desired quantity will be liable to escape from the regulating valve. In the present instance, the object is carried out by maintaining the cooling coils flooded with liquid ammonia at all times, the gas being drawn therefrom as it accumulates in the coils, suitable traps being used to prevent the liquid ammonia from carrying over into the compressor plant at times of sudden agitation and movement of the liquid ammonia in the coils, due to additional heat being suddenly applied thereto.

In the drawings, in which the same numeral of reference is applied to the same portion throughout the several views, Figure 1 is a side elevation of two sets of ammonia coils, Fig. 2 is an end elevation thereof, and Fig. 3 is a view partly in section of all of the separators used.

It will be understood that while only a small number of coils has been illustrated, the number of coils may be increased indefinitely, as desired.

Numeral 1 represents the first floor of a building in which the coils are installed, 2 the second floor thereof, and 3 the upper floor thereof. The numeral 4 represents the upper set of coils, and 5 the lower set of coils. The upper set of coils is fed directly from the reservoir 6, in which is maintained liquid ammonia at all times, the compressor 7 taking the gaseous ammonia from the pipe 8 leading from the several sets of coils. The ammonia after leaving the compressor 7, passes into a condenser system 7′ from which system, the liquid ammonia is delivered to the reservoir 6. The upper pipe of the coils 4 discharges into a large cylinder 9, an elbow 10 causing the liquid to pass into the bottom of said cylinder instead of into the return pipe 11, leading to the pipe 8. The pipe 8 is also provided with a separator 12, which is in turn connected with the cylinder 9 by means of a pipe 13, so that any liquid which may be carried over into the return pipe will be at once returned to the cooling coils. The bottom of the cylinder 9 is connected by means of a pipe 14 with the lowest pipe of the coils 5, and the upper pipe of said coils 5 is connected with a large pipe 15, said large pipe leading to the return pipe 8. Since the amount of ammonia used in the system may vary considerably, an auxiliary pipe 16 is connected with the pipe 14 and the quantity of ammonia in the coils 4 and 5 is thus kept up to the proper amount.

It will be understood by those skilled in the art that suitable valves are placed throughout the system to control the flow of ammonia therein.

In operation the coils 4 are fed with liquid ammonia, and the fluid to be cooled is passed over them. Since the liquid ammonia is liquid only under very low temperatures unless under a very heavy pressure, it at once tends to form more or less gas, which latter passes out of the elbow 10 and into the separator 9. Since the pipes 4 are kept flooded with liquid ammonia, this will cause more or less of the liquid ammonia to pass over into the lower pipe system, and since the air or fluid to be cooled is passed over that set of pipes as well, more or less gas forms in the fluid, and passes up through the pipes 5 into the large pipe 15, from which latter it is drawn to the compressor 7, then to the condenser coils 7′ and then to the reservoir 6, to be ready for use again. Since there are wide changes in the temperatures of the substances passed over the coils 4 and 5, it sometimes happens that considerable quantities of liquid ammonia may even pass into the pipe 8, in which event the separator 12 will direct the liquid back to the separator 9, and from there it is returned to the coils 5. The quantity of liquid ammonia in the pipes is determined by the frost-line thereon.

The advantage of this system of fluid cooling is that it gasifies no more of the ammo-

nia than is actually needed, and it combines the method of liquid and gas cooling, and the large separators used prevent the flooding of and injury to the ammonia compressor.

The amount of attention given the plant is reduced to a minimum for the reason that the total quantity of liquid ammonia used is never as great as the capacity of the pipes and separators.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a refrigeration system, a series of coils, a condenser connected with said coils, a compressor discharging into said condenser and drawing from said coils, a liquid separator adapted to prevent liquids from passing from the coils into the compressor, a secondary set of coils so connected with said separator that it will receive any liquid deposited therein, a secondary separator interposed in the pipe line between the first separator and the compressor, and a pipe leading from the bottom of the secondary separator into the first-named separator, substantially as set forth.

2. In a refrigeration system, a series of coils, a condenser connected with said coils, a liquid ammonia supply tank connected with said coils, a separator into which said coils discharge, a secondary set of coils so connected with said separator that it will receive any liquid deposited therein, a secondary liquid separator with which said secondary coils are connected, and a pipe connecting said secondary separator with a compressor, as set forth.

3. In a refrigeration system, a series of coils, a condenser, a compressor discharging into said condenser, a liquid ammonia supply tank connected with said coils, a separator into which said coils discharge, a secondary set of coils so connected with said separator that it will receive any liquid deposited therein, pipes connecting each of said sets of coils with the compressor, and a liquid separator in the pipe leading to the compressor, substantially as described.

4. In a refrigeration system, a series of coils, a condenser, a compressor discharging into said condenser, a liquid ammonia supply tank connected with said coils and with said condenser, a separator into which said coils discharge, a secondary set of coils so connected with said separator that it will receive any liquid deposited therein, pipes connecting each of said sets of coils with a compressor, a liquid separator in the pipe leading to the compressor, and a pipe leading from the bottom of the last-mentioned separator into the first mentioned separator, as set forth.

5. In a refrigeration system, a series of coils, a condenser, a compressor discharging into said condenser, a liquid ammonia supply tank connected with said coils, a separator into which said coils discharge, a secondary set of coils so connected with said separator that it will receive any liquid deposited therein, pipes connecting each of said sets of coils with the compressor, and a pipe leading from the bottom of the last-mentioned separator into the first mentioned separator, and means to regulate the quantity of the refrigerant supplied to the coils, substantially as described.

6. In a refrigeration system, a condenser, a compressor discharging into said condenser, a liquid ammonia supply, a set of defrigeration coils, a liquid separator into which said coils discharge, a secondary set of coils so connected with said separator that it will receive any liquid deposited therein, pipes connecting said sets of coils with the compressor, and an auxiliary liquid ammonia feed pipe connected with the secondary set of coils, substantially as set forth.

7. In a refrigeration system, a liquid ammonia supply, a set of refrigeration coils, a condenser, a compressor discharging into said condenser, a liquid separator into which said coils discharge, a secondary set of coils so connected with said separator that it will receive any liquid deposited therein, pipes connecting said sets of coils with the compressor, a secondary separator in the pipe leading to the compressor, and an auxiliary liquid ammonia feed pipe connected with said secondary set of coils, substantially as described.

In testimony whereof I have hereunto set my hand this 29th day of November A. D. 1909, in the presence of the two subscribed witnesses.

ARTHUR FAGET.

Witnesses:
W. MacImis,
C. P. Griffin.