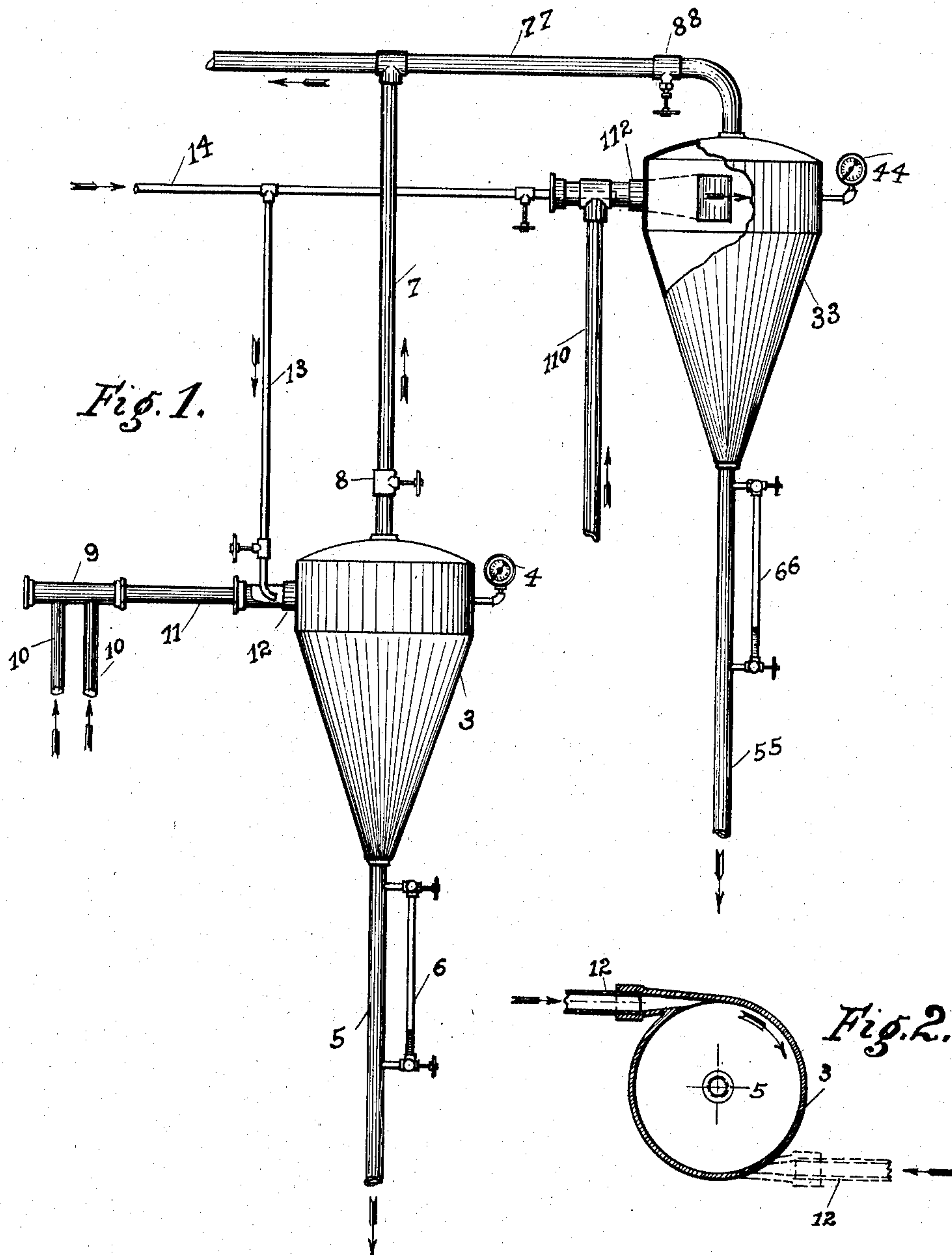


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REFRIGERATING APPARATUS.
APPLICATION FILED NOV. 16, 1908.

928,546.

Patented July 20, 1909.



WITNESSES:

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JOSEPH SCHNEIBLE, OF CHICAGO, ILLINOIS.

REFRIGERATING APPARATUS.

No. 928,546.

Specification of Letters Patent.

Patented July 20, 1909.

Application filed November 16, 1908. Serial No. 462,766.

To all whom it may concern:

Be it known that I, JOSEPH SCHNEIBLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Refrigerating Apparatus, of which the following is a specification.

My invention relates to an improvement in the class of refrigerating apparatus employing a liquid volatile refrigerant; and it relates particularly to an improvement in a known system of refrigeration wherein the primary object is attained of keeping the whole refrigerating-coil "flooded" with the liquid refrigerant by charging it into and circulating it from a receiving and discharging vessel, forming a separator for returning the gas to the compressor and the liquid to the refrigerating coil.

The primary object of my invention is to produce such effective separation of the gas from the liquid as will insure the return of the gas in a dry state to the compressor or absorber; and this and other objects are accomplished by the construction illustrated in the accompanying drawing, in which—

Figure 1 is a broken view showing a duplicate set, for the purpose hereinafter explained, of my improved apparatus in elevation, and Fig. 2 is a plan section through the separator, showing a modification by dotted representation.

The separator 3 is preferably constructed of metal in the general conoidal shape represented and is equipped with a pressure-gage 4. A discharge-pipe 5 carrying a liquid-gage 6 leads from the lower narrow end of the separator to a refrigerator coil or chamber (not shown) of the system, and a gas-discharge pipe 7, containing a valve 8 for controlling the pressure in the separator against disturbance in the system, leads centrally from the top of the latter to the compressor or absorber (not shown) of the refrigerating system. A header 9, to which one or more pipes 10 lead from the discharge-end of the said coil or chamber, has a pipe connection 11 with a nipple 12 leading tangentially into the top-portion of the separator for discharging therein the refrigerant in liquid and vapor form from the coil or chamber, and into this nipple leads a valved branch 13 of a supply-pipe 14, extending from a suitable source (not shown) for the refrigerant in liquid form, for replenishing therewith the coil or chamber by way of the

separator; the end of the branch in the nipple being deflected, as shown, for properly directing the discharge therein.

The remainder of the apparatus illustrated in Fig. 1 is a substantial duplicate of the details of that described, for the purpose hereinafter explained, and involves a separator 33 equipped with a pressure-gage 44, a pipe 55 carrying a liquid-gage 66, a gas-discharge pipe 77 containing a pressure-regulating valve 88 and to which the pipe 7 is shown to be coupled, a nipple 112 leading tangentially into the larger end of the separator and a pipe 110 connecting therewith the discharge-end of the coil or chamber, with the valved pipe 14 projecting into the nipple past the point of discharge into it of the pipe 110.

In instances it may be desirable to duplicate the nipple 12 (and 112), as indicated in Fig. 2, and cause the two to communicate tangentially with the upper portion of the separator at diametrically opposite points thereof.

For the purpose of the following description of the operation, which need, in the main, relate only to the first described apparatus, anhydrous ammonia may be regarded as the refrigerant employed, though it is to be understood that my invention contemplates the use of any other suitable liquefiable gas.

The tangential discharge into the upper part of the separator of the liquid refrigerant and vaporized portion carried by it is so forcible as to cause it centrifugally about the inner surface of the separator-wall, leaving the interior of the separator, meaning the space therein bounded by the centrifugally-coursing refrigerant, open. The force of the centrifugal action separates into this space, from the flowing liquid and vapor, the gas in a dry condition, in which it flows through the space to the compressor through the pipe 7.

The gist of my invention lies in the centrifugal action of the refrigerant in the separator whereby the liberation is effected of the gas in a dry state, and this whatever means be employed for producing that action; so that my invention is not intended to be limited to the particular means for the purpose shown and described.

To maintain the desired flooded condition of the refrigerator coil or chamber, the supply of liquid ammonia in the system may be replenished in the separator from time to

time, under guidance of the gage 6, on opening the valve in the pipe 13. Moreover, an important advantage ensues from introducing this replenishing supply by way of the nipple, since it instantaneously assumes the temperature of the refrigerant in the latter and enhances precipitation of the heavier vapor against the separator-wall.

The valve 8 in the gas-return pipe 7 serves to regulate the pressure in the system according to the degree to which a liquid or other matter to be refrigerated requires to be cooled, such as wort requiring to be cooled to about 40° F. and fermented beer to about 30° F.; and thus enables the "boiling" (evaporating) point of the liquid refrigerant to be controlled in accordance with the degree of refrigeration sought. This provision permits the use of one suction-pressure in a refrigerating system involving a plurality of my improved apparatus for simultaneously cooling liquids or other material requiring to be cooled to different temperatures, by maintaining the suction-pressure adapted for the lowest temperature of refrigeration. Thus, in the illustrated apparatus, the regulating valve 8 may be set for maintaining a maximum pressure in the separator 3 for allowing the temperature in a coil connected with the pipe 5, for cooling to 30° F. fermented beer, while the valve 88 may be set for maintaining a lower pressure in the separator 33 for attaining the temperature in a coil connected with the pipe 55 for cooling wort, while the suction-pressure in the pipe 77 is that for the lowest of these two temperatures.

What I claim as new and desire to secure by Letters Patent is—

1. In a refrigerating system of the character described, a separator for the liquid and gaseous portions of a volatile refrigerant circulating in the system, said separator having discharge-pipes leading from its upper and lower parts respectively to the compressor and the refrigerating coil or chamber and an inlet for refrigerant from the discharge-end of said coil or chamber; and means for imparting centrifugal action to the refrigerant in the separator, for the purpose set forth.

2. In a refrigerating system of the character described, a separator for the liquid and gaseous portions of a volatile refrigerant circulating in the system, said separator having discharge-pipes leading from its upper and lower parts respectively to the compressor and the refrigerating coil or chamber and an inlet for refrigerant from the discharge-end of said coil or chamber, a valve supply-pipe for liquid refrigerant discharging into the separator through said inlet, and means for imparting centrifugal action to the refrigerant in the separator, for the purpose set forth.

3. Means for separating the liquid and gaseous portions of a volatile refrigerant circulating in a refrigerating system of the character described, comprising a separator having discharge-pipes leading from its upper and lower parts respectively to the compressor and the refrigerating coil or chamber, and a nipple leading tangentially into the upper part of the separator from the discharge-end of said coil or chamber, for the purpose set forth.

4. Means for separating the liquid and gaseous portions of a volatile refrigerant circulating in a refrigerating system of the character described, comprising a separator of general conoidal form having discharge-pipes leading from its upper and lower parts respectively to the compressor and the refrigerating coil or chamber, and a nipple leading tangentially into the upper part of the separator from the discharge-end of said coil or chamber, for the purpose set forth.

5. Means for separating the liquid and gaseous portions of a volatile refrigerant circulating in a refrigerating system of the character described, comprising a separator having a gas-discharge pipe leading from its upper part to the compressor and provided with a regulating-valve and a liquid-discharge pipe leading from its lower part to the refrigerating coil or chamber, with a liquid-gage on said lower discharge-pipe and a pressure-gage on the separator, and a nipple leading tangentially into the upper part of the separator from the discharge-end of said coil or chamber, for the purpose set forth.

6. In a refrigerating system of the character described, the combination of a separator for the liquid and gaseous portions of the circulating volatile liquid refrigerant, having discharge-pipes leading from its upper and lower parts respectively to the compressor and the refrigerating coil or chamber, a nipple leading tangentially into the upper part of the separator from the discharge-end of said coil or chamber, and a valved supply-pipe for the liquid refrigerant discharging into the upper part of the separator, for the purpose set forth.

7. In a refrigerating system of the character described, the combination of a separator of general conoidal form for the liquid and gaseous portions of the circulating volatile liquid refrigerant, having a gas-discharge pipe leading from the upper part of the compressor and provided with a regulating-valve and a liquid-discharge pipe leading from its lower part to the refrigerating coil or chamber, a nipple leading tangentially into the upper part of the separator from the discharge-end of said coil or chamber, and a valved supply-pipe for the liquid refrigerant discharging into the separator through said nipple, for the purpose set forth.

8. In a refrigerating system of the character described, the combination of a separator for the liquid and gaseous portions of the circulating volatile liquid refrigerant, having discharge-pipes leading from its upper and lower parts respectively to the compressor and the refrigerating coil or chamber, a nipple leading tangentially into the upper part of the separator from the discharge-end of said coil or chamber, and a valved supply-pipe for the liquid refrigerant discharging into the upper part of the separator, for the purpose set forth.

ter described, the combination of a plurality of separators for the liquid and gaseous portions of the circulating volatile liquid refrigerant, each separator having a gas-discharge pipe leading from its upper part to the compressor and provided with a regulating valve and a liquid-discharge-pipe leading from its lower part to a different refrigerating coil or chamber, a nipple leading into the upper part

of each separator from the discharge-end of the respective coil or chamber, and a valved supply-pipe for the liquid refrigerant discharging into the upper part of each separator, for the purpose set forth.

JOSEPH SCHNEIBLE.

In presence of—

CHAS. E. GAYLORD,
R. A. SCHAEFER.