

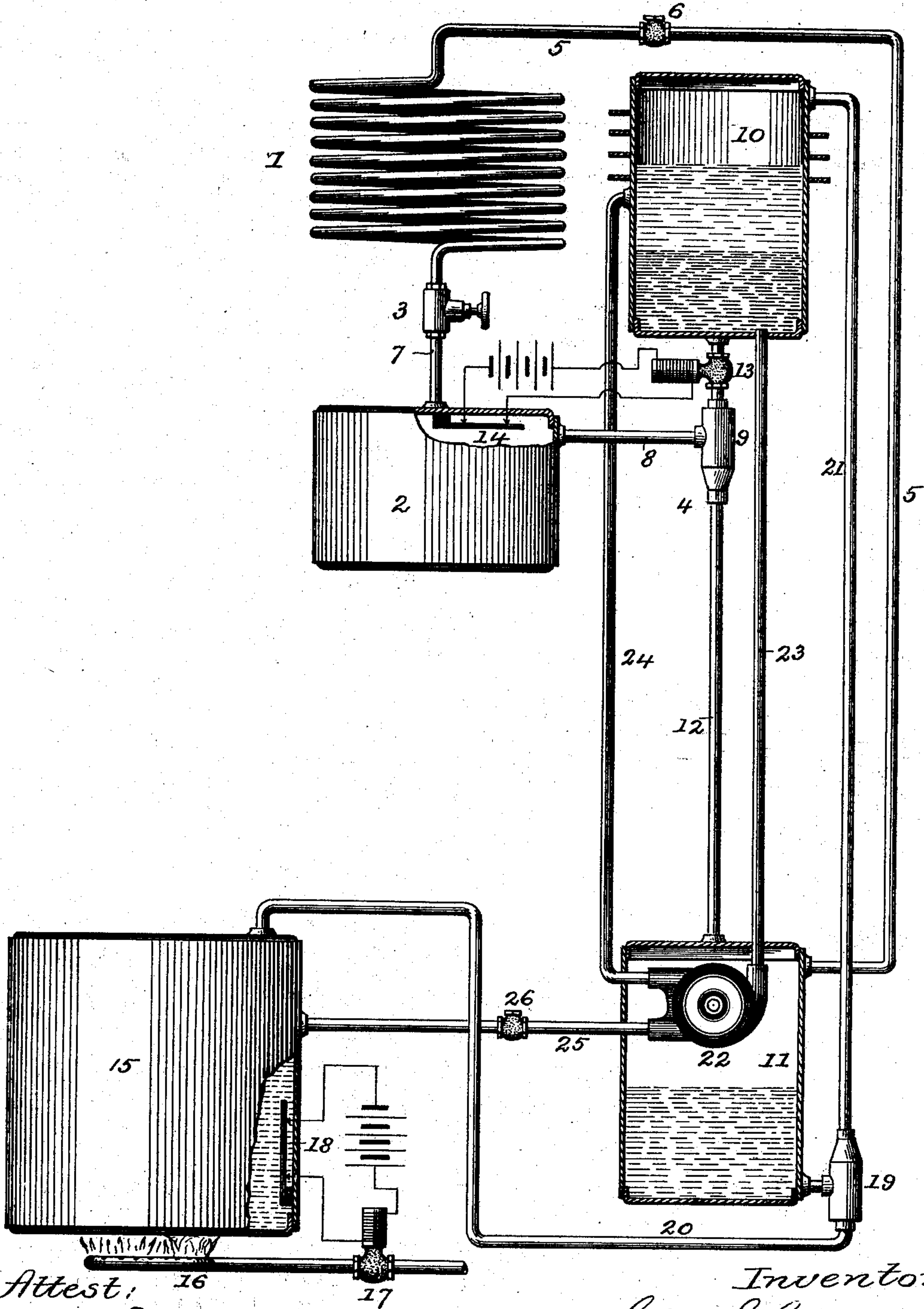
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C. J. COLEMAN.
REFRIGERATION SYSTEM.

APPLICATION FILED JAN. 12, 1900. RENEWED AUG. 25, 1902.

NO MODEL.



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UNITED STATES PATENT OFFICE.

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REFRIGERATION SYSTEM.

SPECIFICATION forming part of Letters Patent No. 757,393, dated April 12, 1904.

Application filed January 12, 1900. Renewed August 25, 1902. Serial No. 120,962. (No model.)

To all whom it may concern:

Be it known that I, CLYDE J. COLEMAN, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Refrigeration Systems, of which the following is a specification.

This invention relates to automatic refrigeration systems and apparatus, and more particularly to the type of the same which constitutes the subject-matter of my prior application for Letters Patent, Serial No. 733,689, filed October 19, 1899, and in which the positive transfer of the refrigerant medium from the cooling-chamber to the storage-chamber is effected in an automatically-controllable manner.

The object of the present improvement is to provide a simple and efficient apparatus in which the various operations of the system are performed in succeeding cycles and are automatically controlled in order to maintain a predetermined degree of temperature in the cooling-chamber, as will hereinafter more fully appear, and be more particularly pointed out in the claims.

The accompanying drawing, illustrative of the present invention, is an elevation in section of a refrigeration apparatus, illustrating a preferred form of the present improvements.

Referring to the drawing, 1 represents the storage-chamber; 2, the cooling-chamber; 3, the expansion-valve, and 4 the compression apparatus by means of which the expanded refrigerant medium is drawn from the cooling-chamber and forced into the storage-chamber.

In the construction shown the outlet end of the compression apparatus is connected to the storage-chamber 1 by a pipe connection 5, provided with a check-valve 6 to prevent a return flow of the refrigerant medium from such storage-chamber.

The storage-chamber 1 is connected to the cooling-chamber 2 by a pipe connection 7, in which is arranged the expansion-valve 3, heretofore described, and the cooling-chamber is in turn connected with the inlet or suction

end of the compression apparatus 4 by the return-pipe connection 8, as shown.

The system and apparatus herein shown may involve either the use of the same fluid medium in common in both the cooling or refrigeration portion and in the thermal pressure-generating portion of the apparatus or the use of separate fluid medium best adapted to each particular use.

One portion of the present invention involves the use of a jet pump or injector for exhausting the expanded refrigerant medium from the cooling-chamber and forcing such medium into the storage-chamber in connection with a thermally-actuated generator and a secondary jet pump or injector for effecting a constant circulation of the denser intermediate fluid, preferably mercury, that actuates the main jet pump or injector to positively transfer the refrigerant medium from the cooling to the storage chamber of the system.

In the construction shown 9 is a jet pump or injector receiving its supply of the denser intermediate actuating fluid, usually mercury, from an elevated tank 10, the inlet or suction end of such injector being connected by pipe connection 8, as heretofore described, with the cooling-chamber 2 of the system and adapted to draw or exhaust the expanded refrigerant medium therefrom.

11 is a closed tank or receiving-chamber into which the eduction-pipe 12 of the injector 9 discharges the motive liquid, leaving the refrigerant medium in the upper portion of such chamber, from which it passes through pipe connection 5, heretofore described, into the condensing or storage chamber 2 for reuse in the process of refrigeration.

13 is an electromagnetic controlling-valve in the motive-fluid supply to the main injector 9, and 14 is a thermostat located within the influence of the cooling-chamber 2 and adapted to open or close the electromotive circuit of the operating-electromagnet of the valve 13 to regulate the operation or speed of the said injector in accordance with the varying conditions existing in the cooling-chamber 2 of the system.

15 is a thermal pressure-generator provided with a gaseous-fuel-supply pipe and burner 16, the supply of fuel-gas thereto being regulated and controlled by an electromagnetic
 5 controlling-valve 17 and a thermostat 18, located within the influence of the thermal generator 15 and adapted to open or close the electromotive circuit of the operating-electromagnet of the valve 17 to regulate the supply
 10 of fuel-gas in accordance with the variation of temperature within the generator.

19 is an auxiliary jet pump or injector receiving its supply of actuating gaseous pressure from the thermal generator 15 through
 15 pipe connection 20. The inlet or suction end of such injector is connected with the lower end of the receiving tank or chamber 11 and is adapted to force the motive fluid of the main injector 9 from the lower tank 11,
 20 through pipe connection 21, into the elevated supply-tank 10. In the construction shown the motive gaseous pressure fluid collects in the upper end of the chamber 10, from whence it is returned in an automatic manner into the
 25 thermal generating-chamber 15 by the following means:

22 is a pumping-engine of any suitable and well-known type arranged within one of the closed tanks forming part of the system, and
 30 preferably the lower receiving-tank 11.

23 is a pipe connecting the engine with the elevated supply-chamber 10 and adapted to conduct a supply of the denser intermediate fluid medium from said tank to the pumping-
 35 engine to operate or drive the same.

24 is a pipe connection between the elevated tank 10 and the inlet portion of the pumping-engine and adapted to introduce into such pumping-engine a supply of the
 40 condensed motive fluid collected in the upper part of the chamber 10, as heretofore described.

25 is a pipe connection between the outlet or discharge end of the pumping-engine and
 45 the thermal generator 15 and adapted to convey the aforesaid motive fluid from such pumping-engine 22 back into the thermal generator 15.

26 is a check-valve in the pipe connection
 50 25 to prevent a backflow from the thermal generator into the pumping-engine 22. This portion of the present invention involves, broadly, the operation of the pumping-engine 22 through the agency of the thermal pressure fluid and preferably through the instrumentality of the intermediate motive-fluid or mercury supply that actuates the main compression-injector, as clearly illustrated in the drawing.

60 In the operation of the present apparatus the expanded refrigerant medium is drawn from the expansion-chamber 2 by the injector 9 and compressed into the upper part of the receiving or separating chamber 11, from
 65 whence it passes through pipe connection 5

to the storage-chamber 1 to be again expanded in the expansion-chamber in the continued operation of the apparatus.

Having thus fully described my said invention, what I claim as new, and desire to secure 70 by Letters Patent, is—

1. In an automatic system of refrigeration, the combination with the storage-chamber and the cooling-chamber, of a compression apparatus arranged intermediate of such chambers, means connected with the cooling-chamber for automatically controlling the action of such compression apparatus, a primary pressure-generator, means actuated by such primary generator for imparting movement 80 to the motive fluid of such compression apparatus, and a pumping-engine operated through the agency of the motive pressure to return the motive-pressure fluid to the primary generator, substantially as set forth. 85

2. In an automatic system of refrigeration, the combination with the storage-chamber and the cooling-chamber, of a compression apparatus arranged intermediate of such chambers, means connected with the cooling-chamber for automatically controlling the action of such compression apparatus, a primary pressure-generator, means actuated by such primary generator for imparting movement 95 to the motive fluid of such compression apparatus, and a pumping-engine operated by the intermediate motive fluid of the compression apparatus and through the agency of the motive pressure to return the motive-pressure fluid to the pressure-generator, substantially 100 as set forth.

3. In an automatic system of refrigeration, the combination with the storage-chamber and the cooling-chamber, of a compression apparatus arranged intermediate of such chambers means connected with the cooling-chamber for automatically controlling the action of such compression apparatus, a primary pressure-generator, means actuated by said primary generator for imparting movement 110 to the motive fluid of such compression apparatus, a separating-chamber, and a pumping-engine operated through the agency of the motive pressure to return the motive-pressure fluid to the primary generator, substantially 115 as set forth.

4. In an automatic system of refrigeration, the combination with the storage-chamber and the cooling-chamber, of an injector arranged intermediate of such chambers, means connected with the cooling-chamber for automatically controlling the action of such injector, a primary pressure-generator, means actuated by such primary generator for imparting movement to the motive fluid of such injector, 125 and a pumping-engine operated through the agency of the motive pressure to return the motive-pressure fluid to the primary generator substantially as set forth.

5. In an automatic system of refrigeration, 130

the combination with the storage-chamber and the cooling-chamber, of an injector arranged intermediate of such chambers, means connected with the cooling-chamber for automatically controlling the action of such injector, a primary pressure-generator, means actuated by such primary generator for imparting movement to the motive fluid of such injector, and a pumping-engine operated by the intermediate motive fluid of the injector and through the agency of the motive pressure to return the motive-pressure fluid to the pressure-generator, substantially as set forth.

6. In an automatic system of refrigeration, the combination with the storage-chamber and the cooling-chamber, of an injector arranged intermediate of such chambers, means connected with the cooling-chamber for automatically controlling the action of such injector, a primary pressure-generator, means actuated by such primary generator for imparting movement to the motive fluid of said injector, a separating-chamber, and a pumping-engine operated through the agency of the motive pressure to return the motive-pressure fluid to the primary generator, substantially as set forth.

7. In an automatic system of refrigeration, the combination with the storage-chamber and the cooling-chamber of a main injector arranged intermediate of such chambers, means connected with the cooling-chamber for automatically controlling the action of such injector, a primary pressure-generator, an auxiliary injector actuated by said primary generator for imparting movement to the motive fluid of the main injector, and a pumping-engine operated through the agency of the motive

tive pressure to return the motive-pressure fluid to the primary generator, substantially as set forth. 40

8. In an automatic system of refrigeration, the combination with the storage-chamber and the cooling-chamber of a main injector arranged intermediate of such chambers, means connected with the cooling-chamber for automatically controlling the action of such injector, a primary pressure-generator, an auxiliary injector actuated by said primary generator for imparting movement to the motive fluid of the main injector, and a pumping-engine operated by the intermediate motive fluid to the main injector and through the agency of the motive pressure to return the motive-pressure fluid to the primary generator, substantially as set forth. 55

9. In an automatic system of refrigeration, the combination with the storage-chamber and the cooling-chamber, of a main injector arranged intermediate of such chambers, means connected with the cooling-chamber for automatically controlling the action of such injector, a primary pressure-generator, an auxiliary injector actuated by said primary generator for imparting movement to the motive fluid of the main injector, a separating-chamber, and a pumping-engine operated through the agency of the motive pressure to return the motive-pressure fluid to the primary generator, substantially as set forth. 70

Signed by me at New York, N. Y., this 10th day of January, 1900.

CLYDE J. COLEMAN.

Witnesses:

ROBERT BURNS,
M. H. HOLMES.