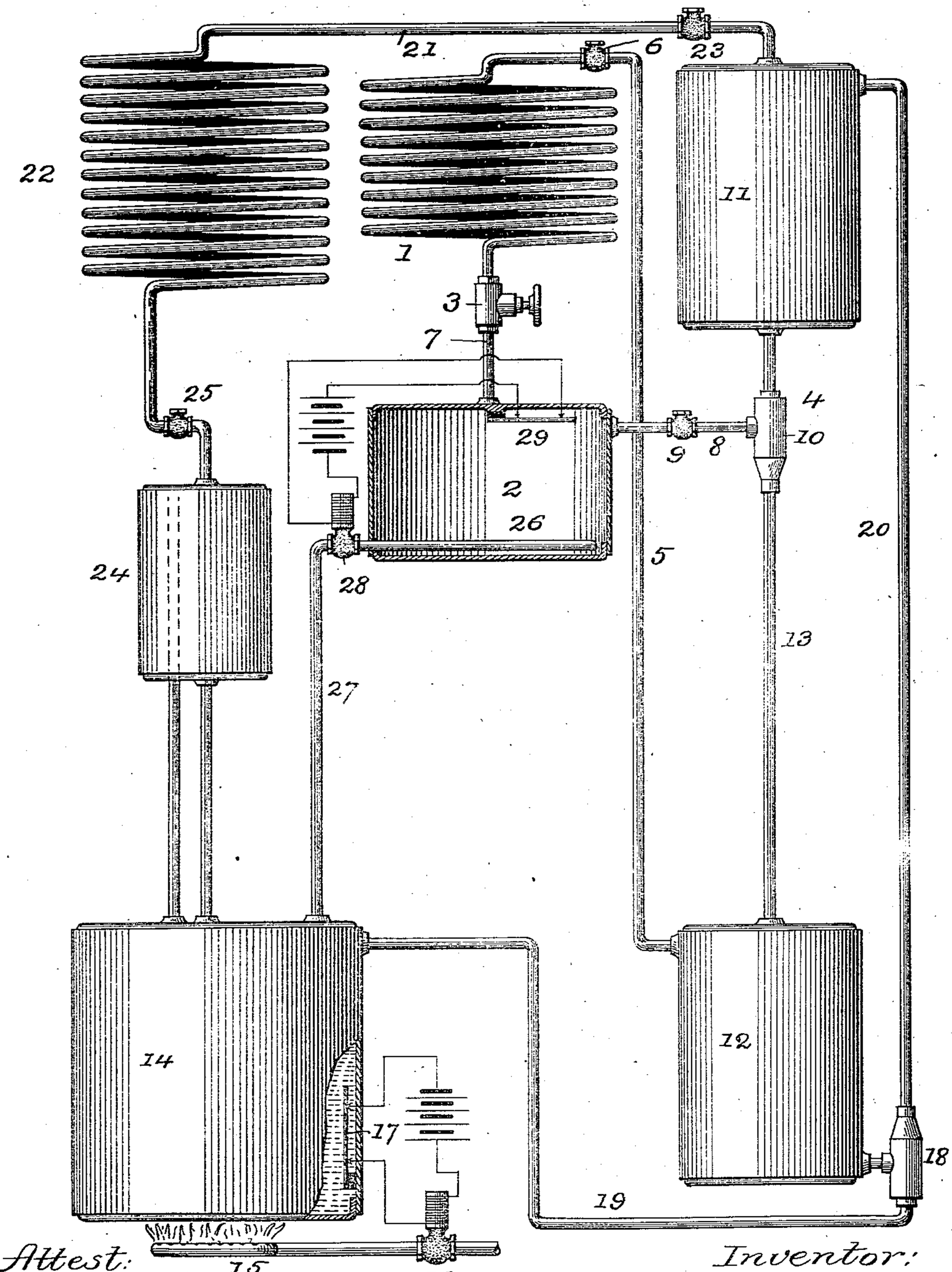
No. 677,845. Patented July 2, 1901.

C. J. COLEMAN.

REFRIGERATION SYSTEM.

(No Model.)



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UNITED STATES PATENT OFFICE.

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REFRIGERATION SYSTEM.

SPECIFICATION forming part of Letters Patent No. 677,845, dated July 2, 1901.

Application filed January 12, 1900. Serial No. 1,199. (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.

The present invention relates to certain improvements in the type of refrigeration systems which constitute the subject-matter of my prior application for Letters Patent, Serial No. 733,689, filed October 19, 1899, and in which the refrigerant medium is positively transferred from the expansion or cooling chamber into the condensing or storage chamber to attain a continued and automatic operation of the system.

The object of the present improvement is to provide a simple and efficient refrigeration apparatus in which the different operations of the system are carried on in succeeding cycles and automatically controlled to maintain a predetermined temperature in the cooling-chamber, all 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, partly in section, of an apparatus embodying the present improvements.

Referring to the drawing, as in my aforesaid application for Letters Patent, 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 pumping-engine or injector 4 is connected to the storage-chamber by a pipe connection 5, provided with a check-valve 6 to prevent a return flow of the refrigerant from the storage-chamber. The storage-chamber is in turn connected to the cooling-chamber 2 by a pipe connection 7, in which is the expansion-valve 3, heretofore described, and the cooling-chamber is in turn connected to the inlet end of the compression apparatus by the return-pipe connection 8, provided with a check-valve 9 to prevent a back flow of the refrigerant into the cooling-chamber.

The system illustrated in the drawing involves the use of the same fluid medium in common in both the refrigerating or cooling portion and in the thermally-actuated portion of the system and comprises the following arrangement of parts:

10 is an injector or jet-pump receiving its supply of actuating fluid, preferably mercury, from an elevated tank 11, its inlet or suction end being connected by pipe connection 8 with the cooling-chamber 2 and adapted to exhaust the expanded refrigerant medium therefrom.

12 is a closed receiving tank or chamber, into which the eduction-pipe 13 of the pump or injector 10 discharges the motive liquid, leaving the refrigerant medium in the upper portion of such chamber in a compressed condition and from whence it passes through pipe connection 5 into the storage-chamber 1 for reuse.

14 is a thermal-pressure generator provided with a gaseous-fuel supply-pipe and burner 15, the supply of fuel-gas thereto being regulated and controlled, as in my aforesaid prior application, by an electromagnetic controlling-valve 16 and a thermostat 17, located under the influence of the generator 14 and adapted to open or close the electromotive circuit of the operating-electromagnet of the valve 16 to regulate the supply of fuel-gas in accordance with the variations of temperature within the generator.

18 is an injector or other similar type of pumping-engine receiving its supply of actuating gaseous pressure from the thermal generator 14 through pipe connection 19, its inlet or suction end being connected with the lower end of the receiving-tank 12 and adapted to lift the motive-power fluid of the main injector or pump 10 from the tank 12, through pipe connection 20, into the elevated supply-tank 11, the motive gaseous-pressure fluid collecting in the upper end of the chamber 11 and passing from thence through the connecting-pipe 21 into the auxiliary storage-chamber 22 to be liquefied.

23 is a check-valve in the pipe connection 21 to prevent a back flow from the auxiliary chamber 22.

24 is an elevated tank having pipe connection with the auxiliary storage-chamber and the thermal generator 14 and constituting a stand-pipe to receive the condensed liquid from such chamber and return the same to the thermal generator in an automatic manner and by any suitable automatic means, as fully set forth in my aforesaid prior application.

25 is a check-valve in the pipe connection between the auxiliary storage-chamber and the tank 24 to prevent a return flow from such tank into the auxiliary storage-chamber.

The present improvement involves the operation of a refrigeration system and apparatus so as to maintain a maximum and continuous cooling effect and in connection therewith to provide means for regulating the temperature of the cooling-chamber by an automatically-controlled admission of a heated fluid or gaseous medium or by radiation, the object being to provide a very simple and durable apparatus in which are but very few complex parts liable to become deranged in continued use. In the construction shown in the drawing as illustrative of this part of the present invention, 26 is a radiator-coil arranged within the cooling-chamber 2 and having communication with the thermal generator 14 by pipe connection 27.

28 is an electromagnetic controlling-valve in the pipe connection 27, and 29 is a thermostat located under the influence of the cooling-chamber 2 and adapted to open or close the electromotive circuit of the operating-electromagnet of the valve 28 to automatically regulate the admission of heated fluid into the interior of the cooling-chamber to preserve a uniform and predetermined degree of temperature in such cooling-chamber.

In the operation of the present apparatus the expanded refrigerant medium is drawn from the expansion-chamber 2 by the injector 10 and compressed into the upper part of the receiving or separating chamber 12, from which it passes through pipe connection 5 to the storage-chamber 1 to be again expanded in the expansion-chamber 2 in the continued operation of the apparatus.

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

1. In a refrigeration system of the class herein described, and in which the admission of the expanding fluid to the cooling-chamber is substantially uniform and continuous, the combination with the storage-chamber and the cooling-chamber, of means for admitting thermal agency to the cooling-chamber without interruption in the admission of the cooling fluid to such chamber, substantially as set forth.

2. In a refrigeration system of the class herein described, and in which the admission of the expanding fluid to the cooling-chamber is substantially uniform and continuous, the combination with the storage-chamber and the cooling-chamber, of means for admitting thermal agency to the cooling-chamber without interruption in the admission of the cooling fluid to such chamber, and means connected with the cooling-chamber for automatically controlling the admission of such thermal agency, substantially as set forth.

3. In a refrigeration system in which the cooling effect operates continuously, the combination with the storage-chamber and the cooling-chamber, of means for admitting thermal agency to the cooling-chamber, the same comprising a heating-coil arranged in the lower portion of the cooling-chamber, substantially as set forth.

4. In a refrigeration system in which the cooling effect operates continuously, the combination with the storage-chamber and the cooling-chamber, of means for admitting thermal agency to the cooling-chamber the same comprising a heating-coil arranged in the lower portion of the cooling-chamber, and means connected to the cooling-chamber for automatically controlling the admission of such thermal agency, substantially as set forth.

5. In a refrigeration system of the class herein described and in which the admission of the expanding fluid to the cooling-chamber is substantially uniform and continuous, the combination with the storage-chamber and the cooling-chamber, of an injector arranged intermediate of said chambers, means for admitting a thermal agency to the cooling-chamber, and means for automatically controlling the admission of such thermal agency, substantially as set forth.

6. In a refrigeration system of the class herein described and in which the admission of the expanding fluid to the cooling-chamber is substantially uniform and continuous, the combination with the storage-chamber and the cooling-chamber, of an injector arranged intermediate of said chambers, means for admitting a thermal agency to the cooling-chamber, and means connected with the cooling-chamber for automatically controlling the admission of such thermal agency, substantially as set forth.

7. In a refrigeration system of the class herein described and in which the admission of the expanding fluid to the cooling-chamber is substantially uniform and continuous, the combination with the storage-chamber and the cooling-chamber, of an injector arranged intermediate of said chambers, means for admitting a thermal agency to the cooling-chamber, the same comprising a heating-coil arranged in the lower portion of the cooling-chamber, and means for automatically controlling the admission of such thermal agency, substantially as set forth.

8. In a refrigeration system of the class herein described and in which the admission

of the expanding fluid to the cooling-chamber is substantially uniform and continuous, the combination with the storage-chamber and the cooling-chamber, of an injector arranged intermediate of said chambers, means for admitting a thermal agency to the cooling-chamber the same comprising a heating-coil arranged in the lower portion of the cooling-chamber, and means connected with the cooling-chamber for automatically controlling the admission of such thermal agency, substantially as set forth.

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

CLYDE J. COLEMAN.

Witnesses:
ROBERT BURNS,
M. H. HOLMES.