No. 653,171. Patented July 3, 1900.

C. J. COLEMAN.

SYSTEM OF REFRIGERATION.

(Application filed Sept. 9, 1899.)

(No Model.)

Fig. 1.

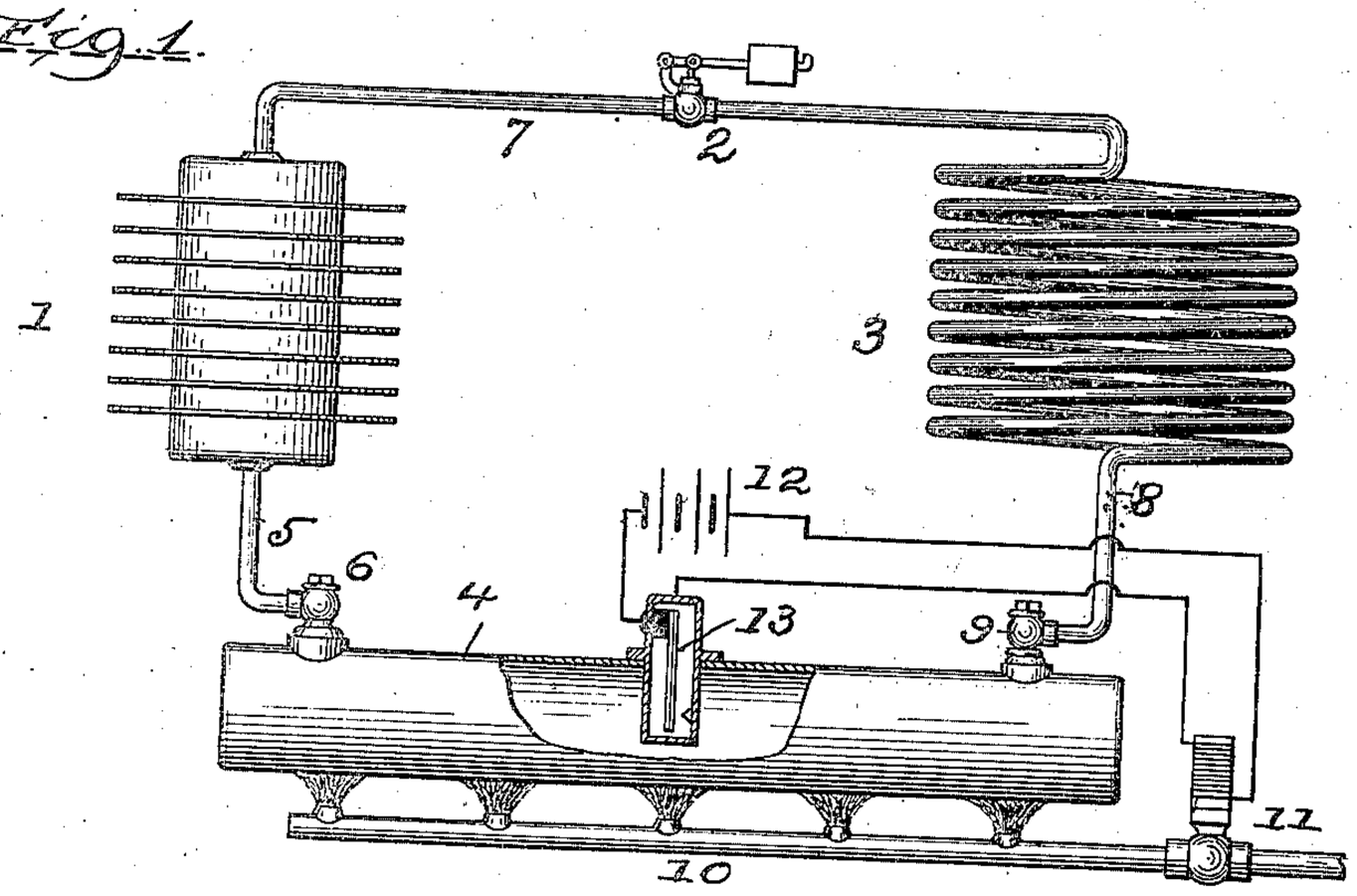
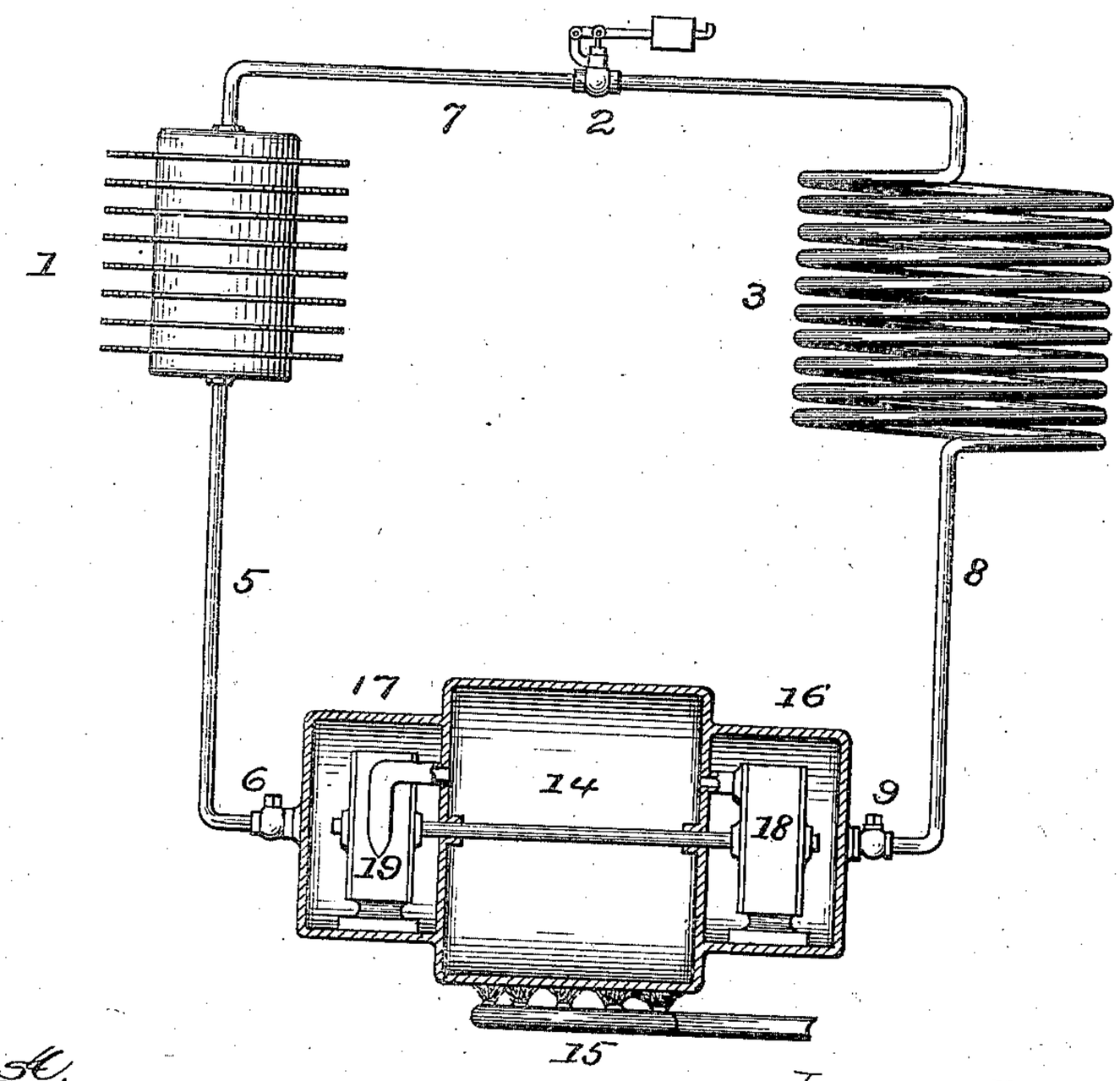


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SYSTEM OF REFRIGERATION.

SPECIFICATION forming part of Letters Patent No. 653,171, dated July 3, 1900.

Application filed September 9, 1899. Serial No. 730,006. (No model.)

To all whom it may concern:

Be it known that I, CLYDE J. COLEMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Systems of Refrigeration, (Case C;) and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

The present invention relates to that class of refrigerating systems in which the respective operations automatically follow each other in the continued cycles of operations of the system.

The present improvement has for its object to provide a simple and efficient automatic system of refrigeration in which the different cycles of operations of the system and of the refrigerant medium thereof are primarily effected in a direct manner by a thermal agency and in an automatic and in either a continuous or intermittent manner, all as will hereinafter more fully appear, and be more particularly pointed out in the claims.

In the accompanying drawings, illustrative of the present system of refrigeration, Figure 1 is an elevation, partly in section, of a refrigerating apparatus embodying the intermittent type of the present system; Fig. 2, a similar view embodying the continuous type of the present system.

Similar numerals of reference indicate like parts in both views.

Referring to the drawings, 1 represents the storage or condensing coil or chamber; 2, the expansion-valve; 3, the expansion chamber or coil in which the refrigerant medium is expanded to effect the cooling operation of the system, and 4 the compression apparatus by which the expanded refrigerant medium is taken from the expansion-chamber and forced into the condensing-chamber, from whence it is again expanded within the expansion-chamber in a closed and continuous cycle of operations.

The above-described members of a refrigerating apparatus or system are in a broad sense usual to the present type of refrigerating apparatus or system and may be of any well-known and approved construction and be connected together in any usual manner. In the accompanying drawings, illustrative of the present invention, the outlet end of the compressing apparatus 4 is connected by pipe connection 5 with the condensing-chamber 1, such pipe connection being provided with a check-valve 6 to prevent a return flow of the refrigerant medium from the condensing-chamber into the compression apparatus. The condensing-chamber 1 is connected to the expansion or cooling chamber 3 by a pipe connection 7, in which is arranged the expansion-valve 2, and the expansion-chamber is in turn connected with the inlet end of the compressing apparatus 4 by the return-pipe connection 8, provided with a check-valve 9 to prevent backflow from the compressing apparatus 4 into such expansion or cooling chamber.

The first part of the present invention involves, broadly, the provision, in a system of refrigeration, as above set forth, of a compression apparatus operated by thermal agency and adapted to force the expanded and attenuated refrigerant medium as it comes from the expansion-chamber into the condensing or storage chamber in the required state of condensation or compression for reuse in effecting a cooling operation of the expansion-chamber of the system and which compressing apparatus may be of an intermittingly or constantly acting nature. In the intermittent type of apparatus illustrated in Fig. 1 of the drawings the said compressor will comprise a closed tank or chamber having inlet and outlet openings controlled by inlet and outlet check-valves 6 and 9 and an automatically-controlled burner 10, arranged beneath such tank-chamber, and which burner has its supply of gaseous fuel controlled by an electrically-actuated valve 11, the circuit of which embraces an operating-battery 12 and a thermostatic regulator 13, located within or adjacent to the compressor-tank, all as clearly illustrated in Fig. 1. The operation of this type of the present system will be as follows: Starting with the compressor tank or chamber filled with the expanded refrigerant medium as it comes from the expansion or cooling chamber of the system, with the application of heat from the burner 10, the expansion of the contents of

the compressor-tank first closes the check-valve 9, and a further expansion of such gas, due to the continued heating effect of the burner, forces the contained refrigerant medium past the check-valve 6 into the condensing-chamber of the system, such action continuing until a predetermined temperature is attained within the compressor-tank, when the thermostat 13 acts to cut off the gaseous fuel to the burner and the source of heat beneath the compressor-tank. With a cessation of the heating effect the check-valve 6 closes to prevent a backflow from the condenser into the compressor-tank. With a gradual cooling of the contents of the compressor-tank a partial vacuum will be established therein to draw the further supply of expanded refrigerant medium from the cooling-chamber of the system until a temperature is reached at which the thermostat 13 again acts to admit a supply of gaseous fuel to the burner, when a repetition of the above-described operations takes place in recurrent cycles during a continued action of the present system.

In the constantly-acting type of apparatus illustrated in Fig. 2 of the drawings the said compressor will comprise a centrally-arranged closed heating tank or chamber 14, beneath which is arranged a suitable heater or burner 15 and auxiliary receiving side chambers 16 and 17. The chamber 16 next adjacent to the expansion-chamber of the system is connected to the return-pipe connections 8, provided with check-valve 9 to prevent backflow from the chamber 16 into the expansion-chamber 3, and such chamber 16 is provided with a pump 18 of any suitable construction, by means of which the expanded refrigerant medium is drawn from the expansion-chamber and forced into the heating-chamber 14. The chamber 17 next adjacent to the condensing-chamber 1 of the system is connected to the pipe connection 5 thereof, provided with the check-valve 6 to prevent a return flow of the refrigerant medium from the condensing-chamber into the auxiliary chamber 17, and such chamber 17 is provided with a momentum motor or turbine 19, that is adapted to be operated by the heated refrigerant medium in a gaseous and highly-compressed condition owing to the heat imparted thereto in the heating-chamber 14. From such motor the refrigerant medium passes into the auxiliary chamber 17 and thence to the condensing or storage chamber 1 of the system to be condensed ready for reuse by the cooling or expansion chamber. In this construction of the present apparatus of the present system the operating-shaft of the pump 18 has operative connection with the motor-turbine 19, so as to be operated thereby. This particular type of the present system is based upon the fact that the heat of the burner will impart a sufficient degree of compression to the medium contained in the heating-chamber to afford sufficient power to the pump to constantly introduce a fresh supply of the medium to said heating-chamber, and thus render the operation of the compressing apparatus continuous in its nature.

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

1. The herein-described system of refrigeration, the same comprising the storage of the refrigerating medium, the expansion thereof to effect a cooling action, and the return of such expanded medium to the storage-chamber by thermal agency, acting dynamically upon the gaseous refrigerant medium to transfer the same independent of chemical affinity from the expansion to the storage chamber of the system, substantially as set forth.

2. The herein-described system of refrigeration, the same comprising the storage of the refrigerating medium, the expansion thereof to effect a cooling action, and the return in a constant manner of such expanded medium to the storage chamber by thermal agency, acting dynamically upon the gaseous refrigerant medium to transfer the same independent of chemical affinity from the expansion to the storage chamber of the system, substantially as set forth.

In testimony whereof witness my hand this 4th day of September, 1899.

CLYDE J. COLEMAN.

In presence of—
ROBERT BURNS,
M. H. HOLMES.