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COMPRESSOR FOR REFRIGERATING SYSTEMS.

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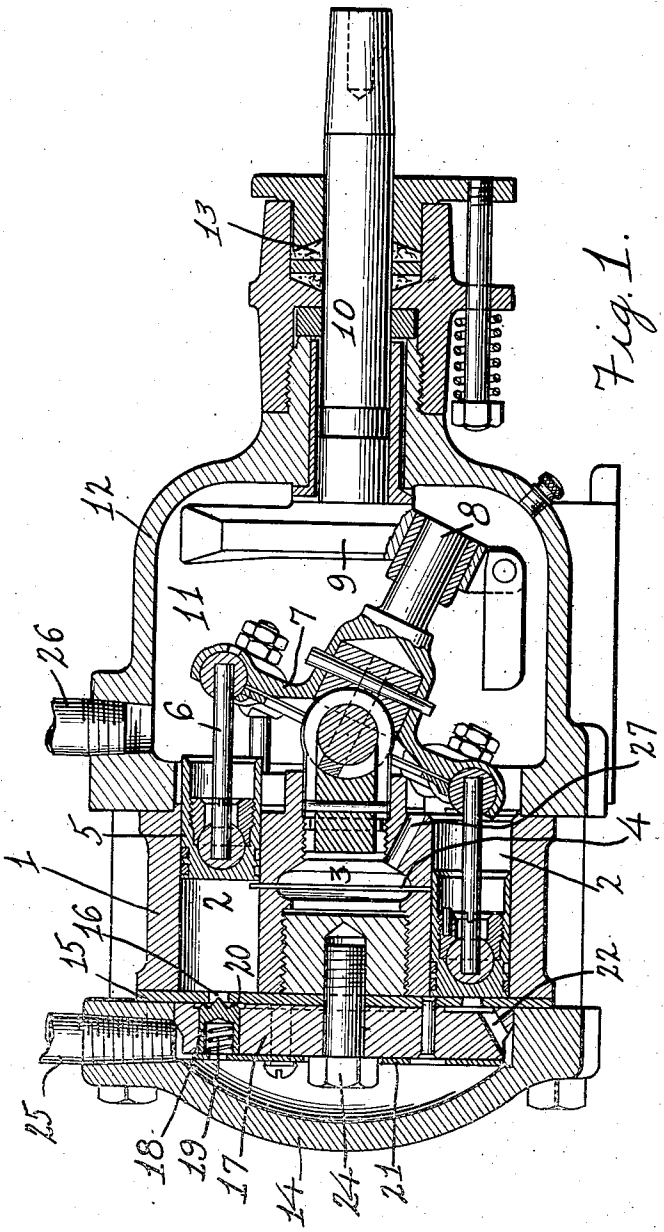



Fig. 1.

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# UNITED STATES PATENT OFFICE.

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## COMPRESSOR FOR REFRIGERATING SYSTEMS.

1,290,994. Specification of Letters Patent. Patented Jan. 14, 1919.

Application filed June 2, 1916. Serial No. 101,302.

*To all whom it may concern:*

Be it known that I, CLARENCE M. HOLLEY, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Compressors for Refrigerating Systems, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to compressors and its particular object is a compressor for use in circulating an anhydrous gas or the like through the expansion coils and return line in a refrigerating system. Another object of the invention is a compressor for receiving and discharging the circulating medium, the pump having a receiving and discharging chamber forming a part of the circulation system. Another object of the invention is a compressor forming a part of a circulation system of refrigerating apparatus as stated, adapted to receive the supply in a receiving chamber connected with the low pressure side of the system and to discharge the same to the expansion coils under uniform pressure and flow without pulsation. These objects and the several novel features of the invention are hereinafter more fully described and claimed and shown in the accompanying drawing in which—

The figure is a sectional view of a compressor embodying my invention showing the receiving and discharge chamber and their connection with the low and high pressure side of the circulation system.

The pump is preferably of that type in which a series of cylinders are arranged in a circle having pistons operating in succession therein, the arrangement being such that as one piston approaches the limit of its compression stroke a succeeding piston has begun to discharge the fluid under like pressure whereby the flow from the discharge chamber common to all the cylinders is continuous and without pulsation.

In the drawing the compressor is shown in vertical longitudinal section and consists of a circular block or casting 1 having a series of cylinders 2 arranged in a circle about a central intake chamber 3. This chamber has a slot 4 in the wall thereof leading into and common to all of the cylinders 2 and providing a port for each cylinder that is controlled by the piston 5 operating therein. The pistons are each connected by a connecting rod 6 and ball and socket joints at each end as shown with a wabble plate 7 supported by a universal joint connection centrally on the end of the cylinder block 1. The wabble plate has a stud 8 thereon connected with a crank 9 on the operating shaft 10 and the wabble plate and crank are inclosed in the chamber 11 formed by the casting 12 secured to the cylinder casting 1 in a manner to form an air tight connection therewith. The shaft 10 extends through a bearing in the end of the casting 12 and is provided with a usual packing gland 13 of such form as to prevent leakage of gas from the chamber and, likewise prevent air from passing along the surface of the shaft into the chamber 11. This shaft 10 may be rotated in any approved manner as by a gear wheel or belt not here shown, or other approved means.

To the opposite end of the cylinder is secured a recessed casting forming a discharge chamber as hereinafter stated and between this casting 14 and the end of the cylinder casting is secured the apertured plate 15 having apertures 16 individual to each cylinder 2. The casting 14 and plate 15 are secured to the cylinder casting in a manner to prevent leakage of air thereinto or of gas therebetween.

To this plate 15 is preferably secured the valve plate 17 having a series of longitudinally movable valves 18 mounted in apertures therein and each being held in position by a spring 19. These valves are each provided with a sharp circular edge 20 seating against the face of the plate 15, which is of a material somewhat softer than the valve which may thus effectually seat itself and prevent the movement of fluid from the cylinder till sufficient pressure has been produced therein to lift the valve. On the back of the valve plate 18 is a retainer plate 21 preferably of spring material having a series of arms, one for each valve tending, in conjunction with the spring 19, to hold the valve on its seat.

The valve plate has a circular groove cut in the face thereof adjacent the plate 15 and common to the entire series of valves, and

this channel or groove is open to the interior of the discharge chamber, formed by the casting 14, through channels 22, several of which are formed about the periphery of the valve plate. On the compression stroke of any piston the fluid compressed is delivered into the channel or groove and into the discharge chamber through the channels 22. The valve plate and retainer plate are retained in position on the apertured plate 15 as shown by means of the central cap screw 24 threaded into a block which in turn is threaded into the central portion of the cylinder casting 1, as shown. It is to be understood however, that the described construction of the apertured plate, the valve plate, and retainer are not material to this invention, but the described parts may be formed in any approved manner and secured in position as may be desired to perform the described functions.

To the discharge chamber is connected a pipe 25 forming part of the high pressure system which pipe, as will be readily understood connects with the cooling and expansion coils. To the other end of the coils is connected a pipe, the end 26 of which is connected with the receiving chamber 11 of the pump, which chamber is in communication with the intake chamber 3 by a passageway 27, several of which may be provided in the cylinder casting.

An anhydrous gas, as ammonia gas or other well known fluid for the purpose stated, may be circulated by this pump and by reason of the detrimental effect produced by leakage of the gas, the pump is devised to provide a closed, air tight, circulating system as heretofore stated, so that the poisonous or other gases suitable for use in a system of the character stated may be circulated.

In operation the pistons on the intake stroke open the port individual thereto formed by the slot 4 in the wall of the intake chamber. By reason of the partial vacuum produced on the intake stroke, fluid from the intake chamber will flow into the cylinder having the open port and on the succeeding down stroke of the piston, the valve 18 will lift when the pressure in the cylinder is sufficient to overcome the tension of the spring 19 and spring retaining plate 21. The fluid is thus discharged under a predetermined pressure which may be varied by varying the pressure in the discharge system, as is well known and as a succeeding piston begins to discharge fluid previous to the intake stroke of the first piston, the fluid is continuously delivered into the discharge chamber under constant pressure and without pulsation.

I am aware of other compressors in which cylinders are arranged circularly and provided with pistons operating in succession about the circle, but in such devices no provision is made to form a closed circulating system and an essential characteristic of this invention resides in the arrangement of the receiving or intake chamber communicating with the cylinders and common to all the cylinders which discharge into a common discharge chamber connected with the high pressure side of the circulating system.

Having thus briefly described my invention its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. A compressor having inclosed intake and delivery chambers at opposite ends provided with inlet and outlet conduits respectively, the compressor comprising a series of cylinders arranged in a circle, each opening into the discharge chamber and having an intake port formed in the walls thereof intermediate its length, a chamber into which all the said intake ports open, and a conduit between said chamber and the said intake.

2. A compressor comprising a casing having a receiving chamber at one end and a discharge chamber at the opposite end, a series of compressor members having cylinders arranged in a circle, pistons operating therein, a single valveless conduit leading from the intake chamber and opening into each of said cylinders providing intake ports therefor, and a valve controlled discharge port for each cylinder.

3. A compressor for closed circuit refrigerating systems comprising a casing having a receiving chamber and a discharge chamber each provided with an intake and discharge conduit, a series of compressor members having a plurality of cylinders, pistons therefor operating in succession therein, a single valveless conduit leading from the intake chamber to each of the cylinders providing intake ports therefor controlled by the pistons, and a valve controlled discharge port for each of the cylinders opening into the said discharge chamber.

In testimony whereof I sign this specification.

CLARENCE M. HOLLEY.