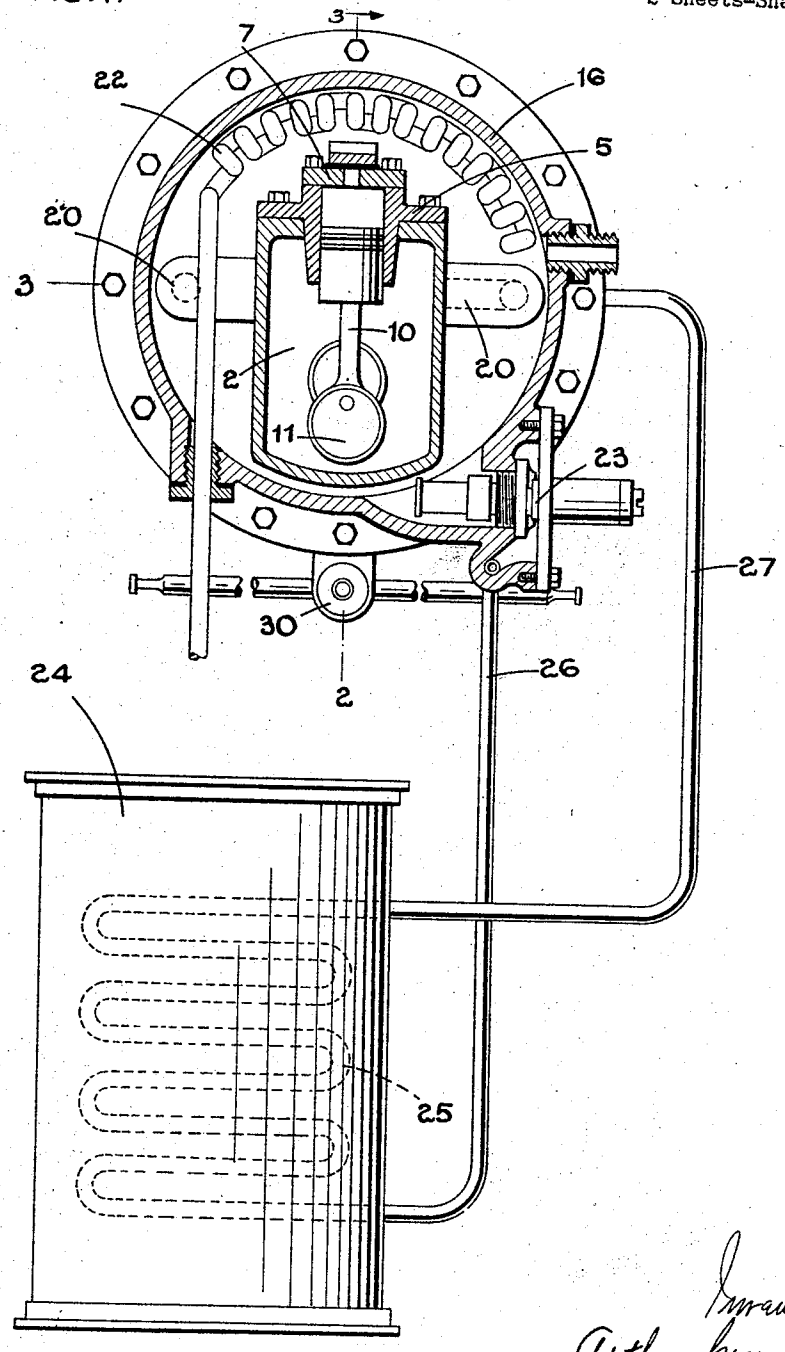
July 12, 1927. 1,635,615

A. GREEN

PUMP FOR REFRIGERATING APPARATUS

Filed May 26, 1925 2 Sheets-Sheet 1

FIG. 1.



Inventor
Arthur Green
By B. Singer, Atty.

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A. GREEN

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FIG. 2.

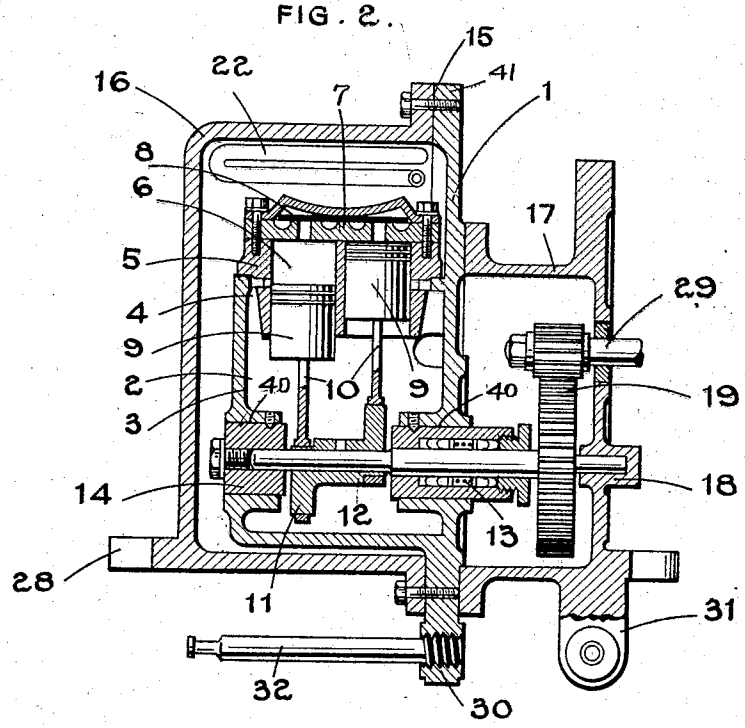
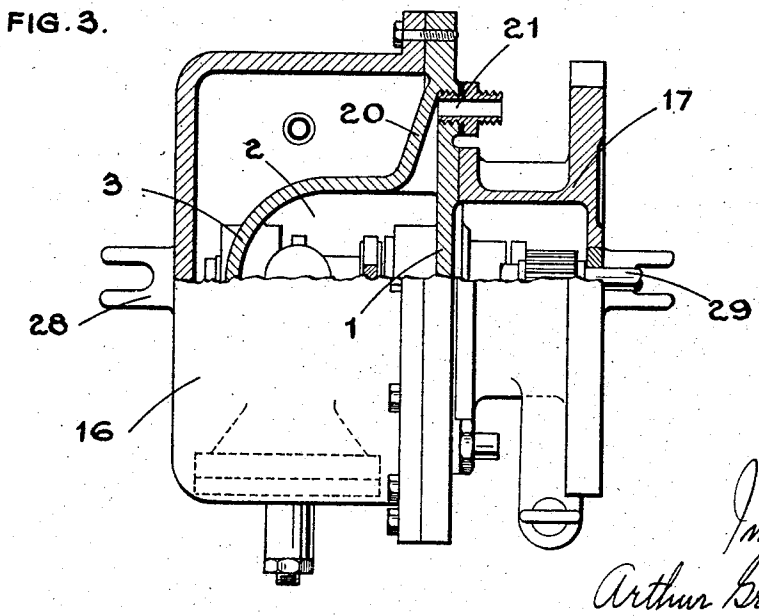


FIG. 3.



Inventor
Arthur Green
By- B. Singer, Atty.

Patented July 12, 1927. 1,635,615

UNITED STATES PATENT OFFICE.

ARTHUR GREEN, OF COVENTRY, ENGLAND.

PUMP FOR REFRIGERATING APPARATUS.

Application filed May 26, 1925, Serial No. 33,027, and in Great Britain September 22, 1924.

This invention relates to refrigerating apparatus and refers more particularly to that kind of apparatus wherein a working fluid is evaporated from its liquid state in an evaporating coil or equivalent low pressure unit, from which the evaporated fluid passes to the chamber of a compressor in which the eccentric shaft, crank shaft, or equivalent driven spindle is mounted, the evaporated fluid being compressed by the compressor and discharged to a chamber or reservoir forming a high pressure unit and associated with cooling means for condensing the fluid, the condensed fluid being then again released to the low pressure unit by way of a suitable valve for pre-evaporation.

The present invention has for its object to provide a generally improved apparatus which will be more convenient in general use, can be easily and cheaply manufactured, and at the same time has its parts arranged in an accessible manner so that the apparatus can be easily inspected and maintained in order.

The primary object of the present invention is to provide an improved arrangement and construction of the castings or elements forming the compressor unit, the high pressure unit or reservoir for compressed fluid, and the parts associated with the transmission of power for driving the compressor. A particular object of the invention is to reduce the size of these castings or members as far as possible and to provide for their compact assembly so that the whole device will occupy a minimum of space compatible with the necessary enclosed spaces for the production of a machine having the required refrigerating powers. A further particular object of the present invention is to render these castings or members of the simplest possible form and to avoid the formation of jacketed members or members having double walls, so that the production of the castings is facilitated and consequently the cost of manufacture reduced. A further particular object of the invention is also to reduce the number of separate castings or members and also to reduce the joints or connections required to be made between these members, and thereby saving labour both in the machining of the joining faces and in the assembly of the parts, and also rendering the leakage or escaping of the fluid a less likely occurrence.

A particular feature attained by the present invention for effecting these objects is to provide the low pressure or eccentric chamber of the compressor on one side of a plate or disc like formation which projects to form a peripheral flange engaged by a single integral cover; which cover serves as a reservoir for compressed fluid and at the same time encloses the low pressure chamber, a cylinder block and a valved cylinder head, so that these members and the joints between them are not exposed to the external atmosphere.

A further feature attained by the present invention is to enable the eccentric chamber of the compressor to be formed in one piece so that the usual joint between the major portion and an inspection door, or between two halves, is obviated, this feature being attained by mounting a cylinder block in the major opening formed in the chamber and by mounting the bearings of the driven spindle in openings which extend completely through the walls of the chamber. Further features in connection with the compressor construction are to provide a straight driving spindle having a separately formed eccentric member for securing thereon, to mount a cylinder block in the opening in the eccentric chamber in a manner so that it can be readily detached therefrom without the necessity for undoing any inlet connections for providing for the inflow of low pressure fluid, and also to provide a gear casing which is secured directly to the flange or plate on which the cover member is secured, only on the opposite side thereof, so that the apparatus is rendered as compact as possible, and at the same time to arrange that said gear casing encloses the bearing and stuffing box through which the driven spindle passes externally to the eccentric chamber, and thereby tends to confine any traces of working fluid which might escape by way of the stuffing box.

Referring to the drawings:—

Figure 1 is a vertical section of a refrigerating apparatus constructed according to my invention.

Figure 2 is a longitudinal vertical section on the line 2—2 in Figure 1.

Figure 3 is a section taken on the line 3—3 in Figure 1.

In the construction illustrated by the accompanying drawings, I form by casting integrally as a single piece a disc or plate 1 having on one side a hollow body 2 adapted

to form the low pressure or pumping chamber. The disc or plate 1 may be of substantially circular form, while that portion of the casting or member 2 which forms the pumping chamber may be of U shape in cross section, (as shown clearly in Figure 1), the axis of the cylindrical part of this portion being more or less vertical and at right angles to the centre line of the disc or plate.

One end of the pump chamber portion 2 is closed by an integral wall 3, while the upper end has a major opening 4 for receiving a separate member or cylinder-block 5 which embodies the pump cylinder or cylinders 6. One end of the cylinder block 5 is provided with a cylinder head 7 having delivery openings from the cylinders controlled by a flat flexible valve member 8 which is clamped in position against the cylinder head at points intermediately of the delivery openings by a securing member, this securing member and the cylinder head 7 being secured to the cylinder block 5 by common bolts.

The cylinder block 5 is provided, in known manner, with openings for establishing communication between the cylinder and the low pressure chamber when the respective pistons are at the bottom of their strokes.

The pistons 9 are driven by connecting rods 10 receiving motion from eccentrics or cams 11 formed as a separate member and mounted on a straight shaft 12 passing through a stuffing box 13 in the aforementioned disc or plate, and also having a bearing 14 in the opposite wall of the pump chamber. The gland or stuffing box 13 in the disc or plate 1 may be constructed in accordance with my co-pending application and both the stuffing box 13 and the bearing 14 are located in minor openings 40 extending through the plate 1 and the wall 3, so that they can be placed in position from the outside of the chamber.

The disc or plate 1 projects beyond the sides of the pump chamber to form an integral external flange 41 which is provided with a facing 15 upon the same side as that where the pump chamber is situated. The facing 15 extends around the pump chamber, and receives one end of an enclosing hollow body 16 which forms the condensing chamber, and encloses the pump chamber, the cylinder block and the cylinder head.

This outer hollow body 16 may be provided with a suitable union into which working fluid may be fed as required, the said union being closed by a plug during normal working.

The hollow outer body which constitutes the condenser chamber is preferably of circular form in cross section, and one of the advantages gained thereby is that the power of the pump may be increased if required without altering the exterior diameter of this chamber. If it is desired to increase the power of the pump, two groups of pump cylinders may be used instead of a single group, as has been described, the groups of cylinders in such an arrangement being disposed similarly to the cylinders of a V engine.

Upon the opposite side of the disc or plate 1 from that where the pump and condenser chambers are situated, I provide a housing 17, the outer wall of which contains a third bearing 18 for the shaft which drives the pump pistons. This housing serves to accommodate a reduction gearing 19 by which power is transmitted from a shaft 29, and also to enclose the stuffing box 13.

The pump chamber portion may be cast with a pair of lateral hollow extensions 20 leading to openings 21 through the plate or disc 1, which openings are exterior to the bearing housing and form inlets for the working fluid or for gauges.

In the condenser chamber I may provide suitable condenser coils 22 which convey cooling water, the ends of which coils pass out through the walls of said chamber.

In another suitable part of the condenser chamber I may provide one or more reducing valves such as 23 constructed substantially as described in my prior British specification No. 4,078 of 1924.

Apparatus constructed in accordance with the present invention may be used in conjunction with the apparatus described in my prior British specifications Nos. 3,837 of 1924 and 206,944.

Disposed below the condenser cooler casing is a brine tank 24 containing an evaporator coil 25 which is connected with the condenser cooler casing and pump by means of pipes 26 and 27 respectively.

The lower end of the condenser cooler casing and gear case may be provided with slotted feet 28 for its attachment to a suitable base board. In addition, the disc 1 may be provided with an integral lug 30 and the housing 17 may be provided with an integral lug 31. The lugs 30 and 31 may carry suspension rods such as 32.

The shaft 29 is driven by an electric motor or other suitable power supply.

What I claim then is:—

1. A compressor unit comprising in combination a chamber for receiving low pressure fluid formed as a single integral casting, an integral external flange formed on one side of said chamber, a facing on said external flange, a one-piece cover engaging said facing and completely enclosing the chamber with the exception of one wall thereof, said one external wall forming together with the flange a disc like plate, said chamber having a pair of minor openings extending through opposite walls thereof, bearings in said through openings which are each capable of

being placed in position from the exterior of the chamber, one of said bearings being disposed in the external wall and incorporating a stuffing box, the other of said bearings being disposed in an internal wall, a driving shaft mounted in said bearings and projecting externally of the chamber by way of the stuffing box, a cylinder block detachably mounted in a major opening in an internal wall of the chamber, a detachable head on the cylinder block providing a valved outlet from each cylinder into the interior of the cover, a piston in each cylinder operatively connected with the driving shaft, and controlling an inlet port connecting the cylinder with the chamber, and an inlet in the external wall of the chamber for permitting the inflow of fluid.

2. A compressor unit comprising in combination, a chamber for receiving low pressure fluid formed as a single integral casting, an integral external flange formed on one side of said chamber, a facing on said external flange, a one-piece cover engaging said facing and completely enclosing the chamber with the exception of one wall thereof, said one external wall forming together with the flange a disc like plate, said chamber having a pair of minor openings extending through opposite walls thereof, bearings in said through openings which are each capable of being placed in position from the exterior of the chamber, one of said bearings being disposed in the external wall and incorporating a stuffing box, the other of said bearings being disposed in an internal wall, a driving shaft mounted in said bearings and projecting externally of the chamber by way of the stuffing box, a cylinder block detachably mounted in a major opening in an internal wall of the chamber, a detachable head on the cylinder block providing a valved outlet from each cylinder into the interior of the cover, a piston in each cylinder operatively connected with the driving shaft and controlling an inlet port connecting the cylinder with the chamber, a casing formed from a single integral casting engaging a facing on the external wall of the chamber and providing a bearing for the extremity of the projecting part of the driving spindle, a motor shaft extending into the casing, reduction gearing within the casing and connecting the motor shaft with the driving shaft, said casing enclosing the part of the disc like plate in which the bearing and stuffing box are mounted, two pipe connections disposed one on either side of the casing and mounted in openings in portions of the external wall of the chamber which are not covered by the casing, and two hollow lateral extensions formed on the chamber for registering with said two openings in said external wall, whereby two pipe connections provide for the inflow of low pressure fluid and for the mounting of a pressure gauge.

In witness whereof I affix my signature.

ARTHUR GREEN.