Dec. 14, 1926. **1,610,600**

E. S. BRYANT

COMPRESSOR

Filed Dec. 15, 1924 3 Sheets-Sheet 1

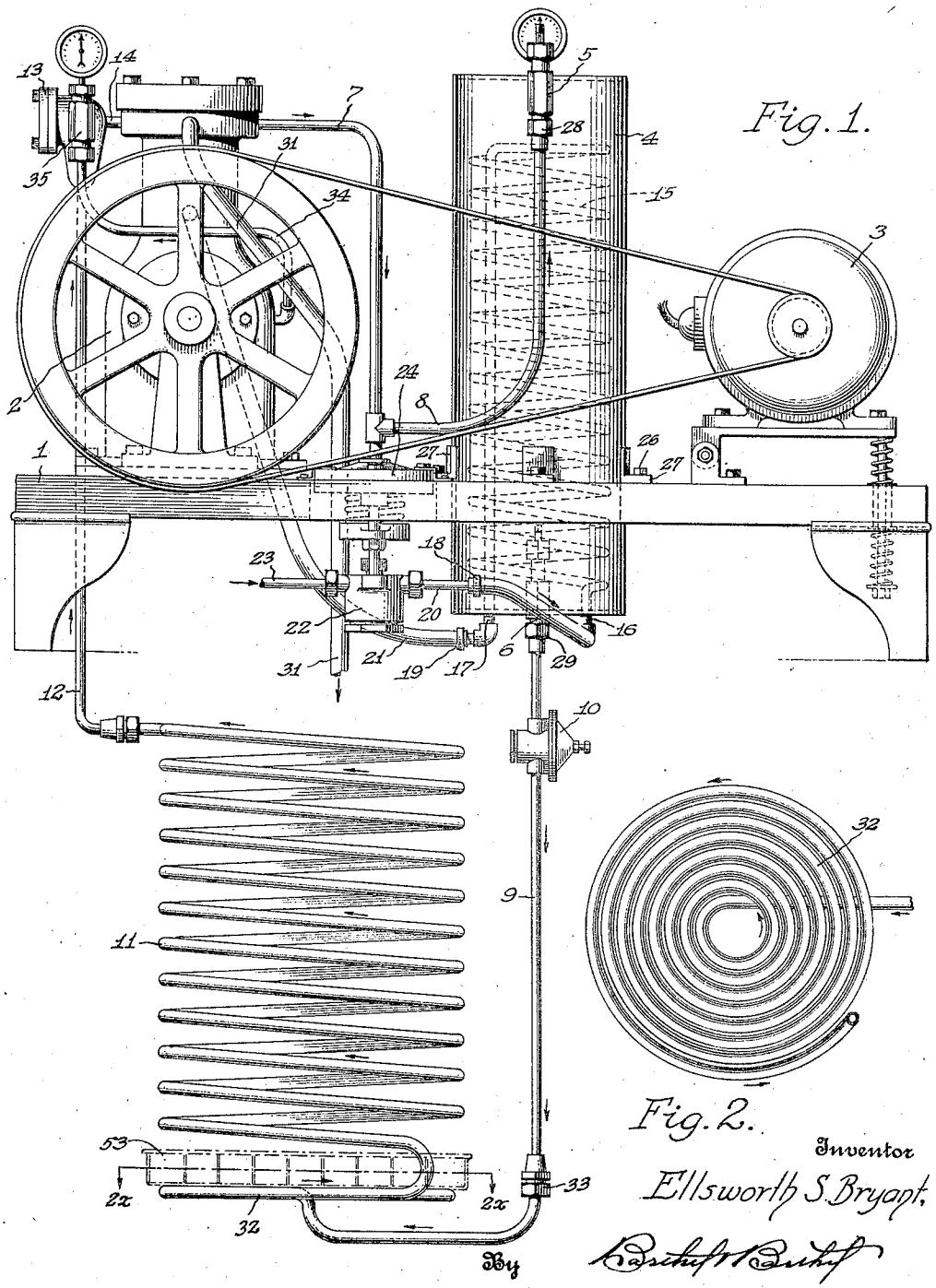


Fig. 1.

Fig. 2.

Inventor

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COMPRESSOR

Filed Dec. 15, 1924 3 Sheets-Sheet 2

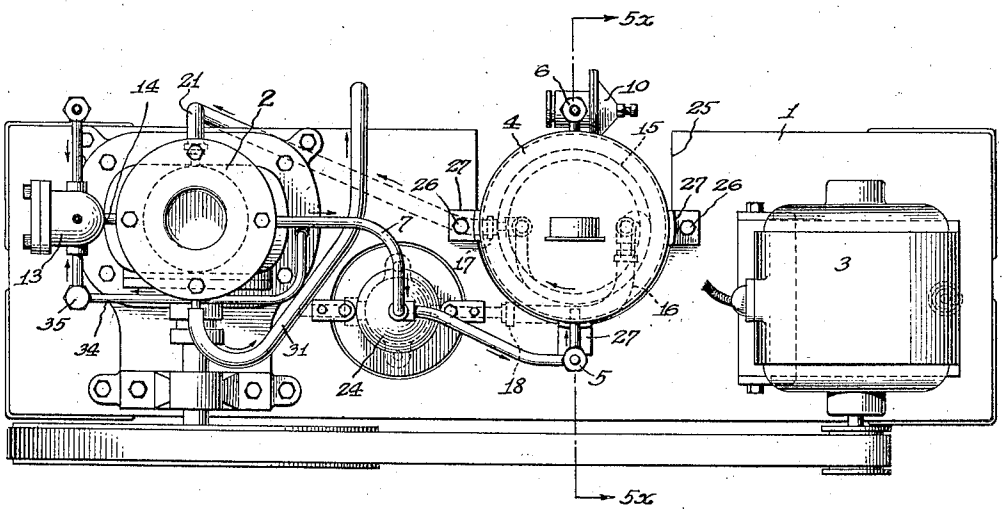


Fig. 3.

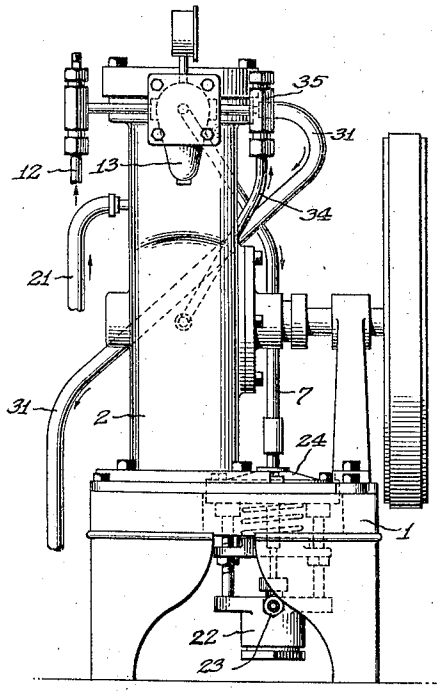


Fig. 4.

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Dec. 14, 1926. **1,610,600**

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COMPRESSOR

Filed Dec. 15, 1924 3 Sheets-Sheet 3

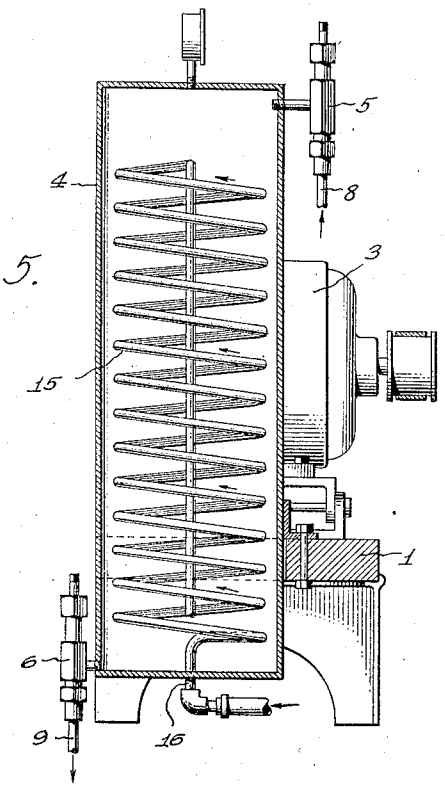


Fig. 5.

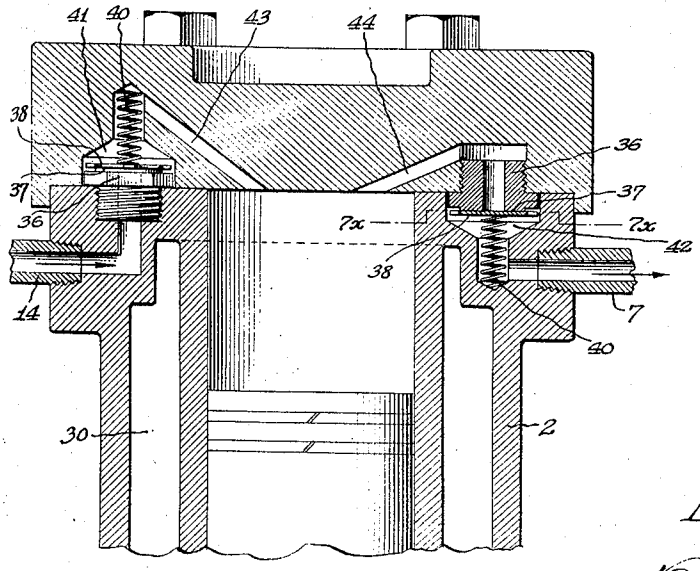


Fig. 6.

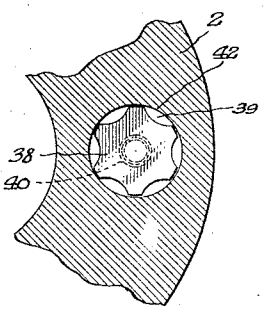


Fig. 7.

Inventor

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Patented Dec. 14, 1926. 1,610,600

UNITED STATES PATENT OFFICE.

ELLSWORTH S. BRYANT, OF DETROIT, MICHIGAN, ASSIGNOR TO BRYANT PATTERN AND MANUFACTURING COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

COMPRESSOR.

Application filed December 15, 1924. Serial No. 755,966.

This invention relates to portable refrigerating plants employing the compression process of refrigeration, and more particularly to those adapted for household use where cheapness, compactness and ready facility of replacement of parts are desirable.

One of the objects of the said invention is to provide a simple and readily detachable assembly of the refrigerant container in such a machine whereby the said container may be easily removed and replaced without interference with the other mechanisms of the machine.

A further object is to provide a special form of valve for the compressor which is particularly applicable for controlling the passage of refrigerant gases through the compressor and is simple, cheap and positive in its operation.

A still further object is to provide a novel form of expansion coil having a base through which the cooling agent passes, and upon which vessels or articles to be cooled may be placed; and a still further object is to effect the returning of gas which may leak past the piston to the crank case of the compressor back to the cylinder thereof.

Other objects subsidiary to or resulting from the aforesaid objects, or from the construction or operation of the invention as it may be carried into effect, will become apparent as the said invention is hereinafter further disclosed.

In carrying the said invention into effect, I may provide in a refrigerating machine a motor driven compressor, a refrigerant container or receiver, receiving discharge from said compressor and provided with a water cooling device, and an expansion coil connected to said receiver through a pressure reducing valve and to said compressor.

The inlet and outlet valves of the compressor are in the form of stemless valve disks housed in the cylinder or cylinder head casting in which springs are also housed, closing the said disks against the faces of bushings inserted into the opposed cylinder or cylinder head casting as the case may be, and the inlet of the said compressor is further provided with an auxiliary check valve through which gases which may have leaked into the crank case of the compressor are drawn into the cylinder thereof and thereby returned to the gas circulatory system.

The expansion coil is in the form of a base comprising a spirally wound coil, the outermost convolution of which is extended upwardly into a helical coil having a diameter approximating that of the said outer convolution of the said base whereby the greater area of the said base is not subjected to drip from the helical portion of the said coil, and lends itself to use as a cooling table for receptacles or articles which may be placed thereon. The said receiver is connected with the several pipes leading thereto and therefrom by means of a readily detachable coupling, and is removable from such support as may be provided therefor, whereby it may be readily removed and replaced.

All of which is more particularly described and ascertained hereinafter, by way of example, having reference to the accompanying drawing, wherein—

Figure 1 is an elevation of a refrigerating machine embodying the said invention;

Figure 2 is a section of the expansion coil taken on the line 2ˣ—2ˣ, Figure 1;

Figure 3 is a plan of the said machine, the expansion coil being omitted;

Figure 4 is an end elevation of the same;

Figure 5 is a transverse section through the machine taken on the line 5ˣ—5ˣ, Figure 3;

Figure 6 is a fragmentary sectional view of the cylinder of the compressor illustrating the valve mechanism; and

Figure 7 is a transverse section of the same taken on the line 7ˣ—7ˣ, Figure 6.

Similar characters of reference indicate similar parts in the several figures of the drawing.

Mounted upon a support 1 is a compressor 2 driven by a motor 3, and also mounted upon the said support is a tank or receiver 4 which is provided with inlet and outlet connections 5 and 6 respectively, the said

compressor communicating with the said inlet connection through the pipes 7 and 8. The outlet connection 6 of the receiver is coupled to a pipe 9 which is interrupted by a reducing valve 10, and is in turn coupled to an expansion coil generally numbered 11, and a pipe 12 connects the exhaust end of the said expansion coil with a receiver 13 from which extends the inlet pipe 14 of the compressor, completing the gas circulatory system.

Within the said tank 4 is a cooling coil 15, the inlet 16 and outlet 17 of which extend through the bottom of the said tank and are coupled at 18 and 19 to the pipes 20 and 21. The pipe 20 leads from a shut off valve 22 with which a water connection 23 communicates, and which valve is controlled by a pressure-sensitive diaphragm device 24, which may be of any of the well known types, connected with the pipe line 7, 8.

The said tank enters a recess 25 in the support 1, and is secured in position by bolts 26 passing through ear pieces 27. Dismantling of the tank from the machine may be quickly effected by the removal of the said bolts 26 and the uncoupling of couplings 18, 19, 28 and 29 as will be apparent; and it will be seen that the connections 5 and 6 are in the form of shut-off valves so that the uncoupling of the tank may be effected even though the tank may be filled with gas.

The pipe 21 enters the water jacket 30 of the compressor so that the water discharged from the cooling coil of the said tank is further utilized for the cooling of the compressor and is eventually discharged therefrom through the pipe 31.

The expansion coil 11 is indicated as having a base 32 which is of flat spiral form, the body of the said expansion coil extending upwardly in helical form from the outer convolution of the said base so that the convolutions of the said body are approximately superposed over the outer convolution of the said base and the inner convolution of the said base is connected by the coupling 33 to the pipe 9. Thus the said base is in the form of a tray which may be utilized for the support of water receptacles 53 or any other articles which it may be desired to place thereon, and any drip from the helical coils will not fall upon the inner parts of the said tray so that it may be used for the reception of food stuffs which may, if so desired, extend upwardly within the helical coil. Furthermore, with this arrangement the articles to be cooled are placed directly upon the base of the coil so that the cooling thereof may be very rapidly effected and efficiently maintained.

The gas from the expansion coil passes through the pipe 12 and receiver 13 to the cylinder of the compressor, and to take care of any leakage of the gas past the piston of the compressor, I have provided a pipe 34 which leads from the crank case through a check valve 35 to the said receiver 13, so that any gas which may have so escaped into the crank case may reenter the cylinder through the said check valve.

An important feature of the said invention resides in the valves controlling passage of gases to and from the cylinder of the compressor. It will be seen that each of these valves comprises a bushing 36 having a ground and hardened seat 37 upon which rests a valve disk 38, which is stemless, being simply in the form of a flat plate, the edge of which is notched at 39 to permit the passage of gas therearound when the valve is open, and 40 is the spring which yieldably retains the said valve upon its seat.

For the accommodation of the seat end of the bushing the valve disk and its spring, the casting into which these parts extend, is suitably bored to form a housing as at 41 in the case of the inlet valve and 42 in the case of the exhaust valve, so that the said valves are contained within the castings forming the upper part of the cylinder and are quite close to the bore of the cylinder. Consequently, the inlet and exhaust passages 43 and 44 are comparatively short and as in this case the piston of the compressor rises almost into contact with the head of the cylinder, the exhausting of the compressor on the discharge stroke of the piston is always complete and great efficiency is thereby secured, there being very little gas pocketed in the compressor immediately prior to the inlet stroke.

It will be observed that the nature and application of the said valves is extremely simple and successfully avoids a complicity of fixtures or attachments to the cylinder, the said valve being simply housed at the junction between the cylinder walls of the cylinder head.

The apparatus described has been found in actual practice to give excellent results in refrigeration, and to be capable of easy interchangeability of parts so that for household use and small refrigerating plants it meets the many requirements of such devices and may be constructed at a cost compatible with its use in small household installations.

This invention may be developed within the scope of the following claims, without departing from the essential features of the said invention, and it is desired that the specification and drawing be read as merely illustrative and not in a limiting sense, except as necessitated by the prior art.

What I claim is:—

1. In a compressor, a cylinder casting, a cylinder head casting, inlet and outlet valves, each of said valves comprising a bushing, a disk and a spring, said bushing

being accommodated in one of said castings and said disk and spring in the other of said castings.

2. In a compressor, a ported cylinder casting, a ported cylinder head casting, a bushing threaded into one of said castings and extending into a recess in the other of said castings with which its port communicates, a disk valve in said recess seating on said bushing, and a spring also in said recess yieldingly retaining said disk valve seated.

In testimony whereof I affix my signature.

ELLSWORTH S. BRYANT.