G. W. MILLER.

COMPRESSOR FOR REFRIGERATING APPARATUS.

APPLICATION FILED JAN. 3, 1911.

1,011,226.

Patented Dec. 12, 1911.

2 SHEETS—SHEET 1.

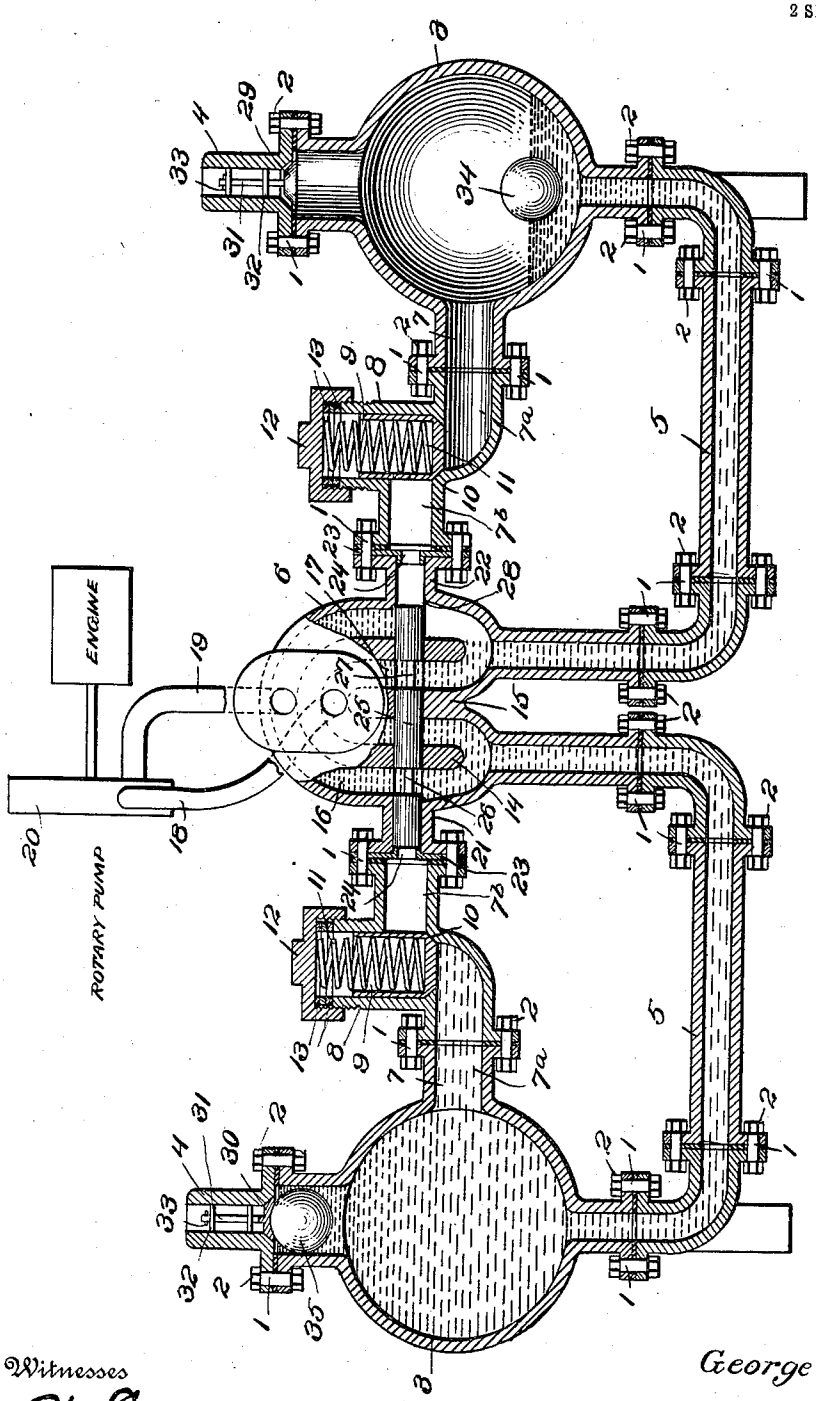

FIG. 1

Witnesses

A. Strauss

R. A. Krenkel.

Inventor

George W. Miller

By Joshua R. H. Potts.

Attorney

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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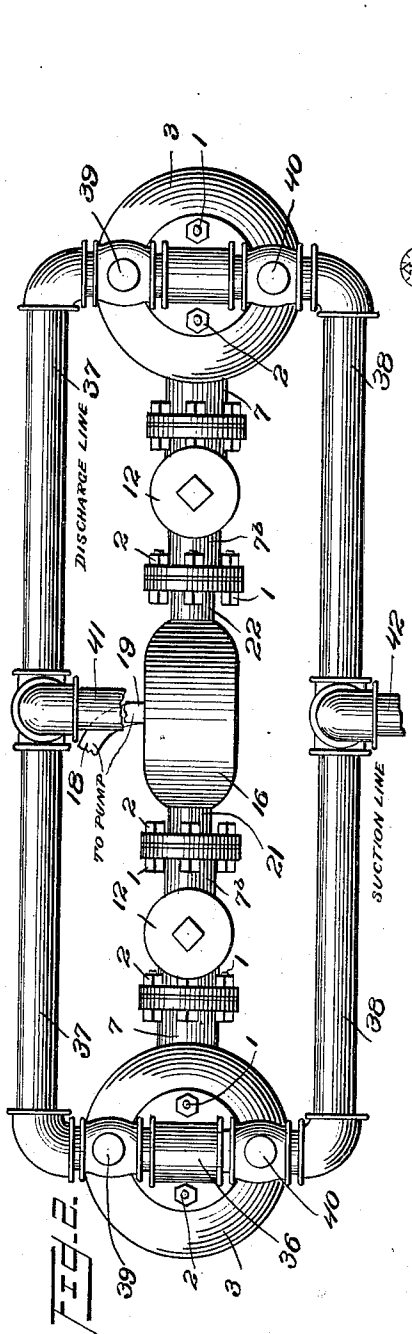

FIG. 2.

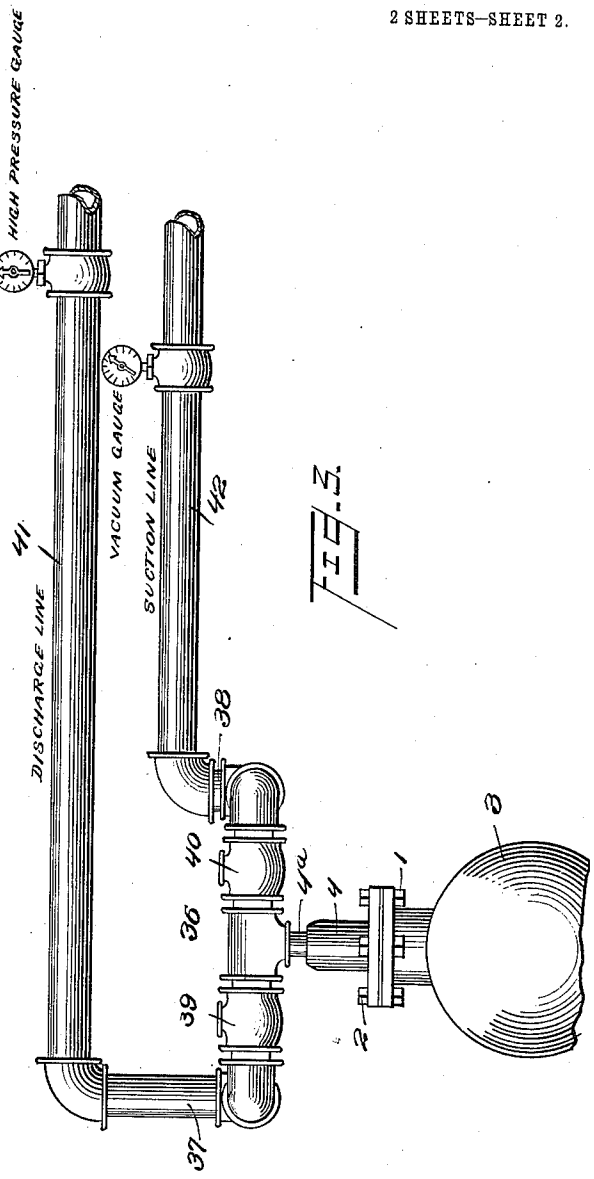

FIG. 3.

Witnesses

A. Strauss

R. S. V. Krenkel.

Inventor

George W. Miller

By Joshua R. V. Potts.

Attorney

UNITED STATES PATENT OFFICE.

GEORGE W. MILLER, OF PHILADELPHIA, PENNSYLVANIA.

COMPRESSOR FOR REFRIGERATING APPARATUS.

1,011,226. Specification of Letters Patent. Patented Dec. 12, 1911.

Application filed January 3, 1911. Serial No. 600,606.

To all whom it may concern:

Be it known that I, GEORGE W. MILLER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Compressors for Refrigerating Apparatus, of which the following is a specification.

My invention relates to improvements in compressors for refrigerating apparatus, more particularly to the pressure or vacuum creating portion of refrigerating apparatus, automatically compelling a reversal through the system and maintaining the proper vacuum or pressure.

A further object is to provide improvements of this character which rely upon a fluid plunger, such for example, as a light oil, and provide improved means for regulating the pressure of the system.

A further object is to provide an improved construction of plunger valve automatically operated by the fluid in the machine or system to reverse the flow of fluid through the system.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts, as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings: Figure 1, is a view partly in longitudinal section and partly in elevation illustrating my improved compressor. Fig. 2, is a diagrammatic plan view showing the compressor and its connection with the refrigerating system, and Fig. 3, is a view in elevation at right angles to Fig. 2.

In constructing my improved apparatus, I employ pipes and castings which are connected by bolts 1 and nuts 2 as clearly shown, forming at opposite ends spherical chambers 3 which are connected by pipes 4 with the pipes 4^a of the system. These spherical chambers 3 are connected by pipes 5 with a casting 6, which constitutes a liquid flow controlling casing, located intermediate of the chambers 3, said pipes 5 connecting the bottom of said chamber with the lower ends of the casting. Pipes 7 communicate with the intermediate portions of the chambers 3, and connect the same with the sides of casting 6, all of which parts will be more definitely hereinafter referred to and indicated by specific reference characters to the various parts of said pipes or passages to more clearly point out the operation.

The passages 7 are preferably of the peculiar shape shown, and communicate with upright valve casings 8 in which hollow check valves 9 are mounted. These check valves engage beveled seats 10 in the passages 7, entirely close said passage when seated and are normally held in closed position by means of coiled springs 11 located within the valves and bearing at their upper ends against cap nuts 12. On the upper ends of the valve casings 8, between the same and the cap nuts 12, spacing washers 13 are provided which enable the tension of the springs to be adjusted, so as to secure the exact pressure in the system by simply removing a washer or adding one, and screwing home the cap nut.

The passages 7 are divided into two distinct parts, one part 7^a between the valve 9 and the chamber 3, and the other part 7^b between the valve 9 and casting 6, it being understood that the apparatus is precisely alike at both sides, and the description of one side applies alike to both.

The casting 6 is divided by an inverted U-shaped partition 14, and a short centrally disposed partition 15 into two inverted U-shaped passages 16 and 17, which communicate at their lower ends with the pipes 5 and with each other. These passages 16 and 17 are connected by pipes 18 and 19 respectively with a pump 20 illustrated diagrammatically.

The casting 6 is provided at opposite sides with cylindrical projections 21 and 22, which are connected by bolts 1 with the portions 7^b of passages 7, and in these connections rings 23 are secured and are provided with tubular extensions 24, which project into the cylindrical portions 21 and 22, for a purpose which will now be explained.

The partitions 14 and 15 are made with circular openings of the same diameter as the internal diameter of the cylindrical pro-

jections 21 and 22, and register with said projections for the reception of a compound piston valve 25. This compound piston valve is made with two restricted portions 26 and 27, adapted to register with certain of said passages as will be hereinafter explained. The movement of said compound piston is controlled by the movement of the oil or other fluid in the apparatus, and the distance of said movement is controlled by the tubular extensions 24 on rings 23. The particular shape of the casting 6, where it joins with the projections 21 and 22, provides small openings 28 which connect the projections 21 and 22 with passage 16 at the lower portions of the valves, the communication between the upper portion of said passage 16 and the projections 21 and 22 being entirely cut off at both ends of the piston valve.

Communication between the pipes 4 and the spherical chambers 3 is controlled by means of valves 29 and 30 respectively. These valves are preferably of very light material such as aluminum, and their stems 31 are mounted in spider-like guides 32 in pipes 4, the downward movement of said valves being limited by cross pins 33 in the stems. These valves 29 and 30 have very slight movement to open and close, and they are preferably concaved as shown so as to readily receive and center ball floats 34 and 35 respectively to close the valves.

The operation of the apparatus is as follows: As shown in the drawing, the direction of flow of the oil is about ready to reverse, but we will assume that it has not quite reached that point, and will describe the direction of flow of the oil with that idea in view. The pump 20, which is continuously operating, causes a suction through the right hand pipe 5, lowering the level of oil in chamber 3. This oil is sucked up through the right hand portion of passage 17, thence through pipe 18 to the pump, and is forced back from the pump through the pipe 19, through the left hand portion of passage 16, and through the left hand pipe 5 into the left hand chamber 3, forcing the ball float 35 upward to close valve 30. This operation also sucks the oil from that portion 7^b of the right hand passage 7, through the opening 28, down the right hand portion of passage 16, and up the right hand portion of passage 17. As this direction of flow continues, the pressure in the portion 7^a of passage 7 will finally become sufficient to raise the left hand valve 9 from its seat when the oil will engage the left hand end of the compound piston valve 15, and force it to the right until it engages the tubular extension 24 at the right. The restricted portions 26 and 27 of piston valve 15 will then register with the left hand portion of passage 17, and the right hand portion of passage 16 causing an exact reversal in the flow of the oil, so that the valve 29 will be closed and valve 30 opened, creating the necessary reversal of the flow of gases in the system and maintaining the proper vacuum or pressure.

The pressure of vacuum had is regulated entirely by the strength of the springs 11, which resist the pressure of the oil against the same. It is therefore an important feature to provide means whereby the strength of these springs may be adjusted, and hence the washers 13 and screw-threaded caps 12, or some other suitable mechanism for the purpose, are very important features. It will therefore be noted that the position of the compound piston valve 15 is automatically moved by the oil, and such rapidity of the reversal dependent upon the spring pressure on the valves. The pump works continuously and the reversal is automatic and any desired pressure may be had.

By reference to Figs. 2 and 3, it will be noted the relative position of my improved compressor in connection with the refrigerating system, an ordinary system of pipes being shown, in which the pipes 4^a are connected by T-couplings 36 with branch pipes 37 and 38 respectively, having check valves 39 and 40 therein. The check valves 39 are discharge check valves, and said valves 40 are suction check valves, so that I term the pipes 37 discharge pipes, and the pipes 38 suction pipes, and these discharge and suction pipes are connected by pipes 41 and 42 respectively with the other parts of the apparatus (not shown).

Various slight changes might be made in the general form and arrangement of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the sprit and scope of the appended claims.

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

1. In an apparatus of the character described, the combination with chambers, valved communication between said chambers and a refrigerating system, of floats in said chambers adapted to close said valves, a liquid flow controlling casing having parallel U-shaped passages therein, a compound piston valve positioned across said parallel passages, passages connecting both of the U-shaped passages with the first-mentioned chambers, and other passages connecting the first-mentioned chambers with the casing in line with the ends of said piston valve.

2. In an apparatus of the character described, the combination with chambers,

valved communication between said chambers and a refrigerating system, of floats in said chambers adapted to close said valves, a liquid flow controlling casing having parallel U-shaped passages therein, a compound piston valve positioned across said parallel passages, passages connecting both of the U-shaped passages with the first-mentioned chambers, and other passages connecting the first mentioned chambers with the casing in line with the ends of said piston valve, and spring-pressed valves in said last-mentioned passages, substantially as described.

3. In an apparatus of the character described, the combination with chambers, valved communication between said chambers and a refrigerating system, of floats in said chambers adapted to close said valves, a liquid flow controlling casing having parallel U-shaped passages therein, a compound piston valve positioned across said parallel passages, passages connecting both of the U-shaped passages with the first-mentioned chambers, and other passages connecting the first-mentioned chambers with the casing in line with the ends of said piston valve, a pump, and pipes connecting said pump with said U-shaped passages respectively, substantially as described.

4. In an apparatus of the character described, the combination with chambers, valved communication between said chambers and a refrigerating system, of floats in said chambers adapted to close said valves, a liquid flow controlling casing having parallel U-shaped passages therein, a compound piston valve positioned across said parallel passages, passages connecting both of the U-shaped passages with the first-mentioned chambers, and other passages connecting the first-mentioned chambers with the casing in line with the ends of said piston valve, and spring-pressed valves in said last-mentioned passages, a pump, and pipes connecting said pump with said U-shaped passages respectively, substantially as described.

5. In an apparatus of the character described, the combination with chambers, valved communication between said chambers and a refrigerating system, of floats in said chambers adapted to close said valves, a liquid flow controlling casing having parallel U-shaped passages therein, a compound piston valve positioned across said parallel passages, passages connecting both of the U-shaped passages with the first-mentioned chambers, and other passages connecting the first-mentioned chambers with the casing in line with the ends of said piston valve, said piston valve comprising a cylinder rod having annular grooves therein of a length conforming to the width of said U-shaped passages, and adapted to register alternately with said passages when moved by the pressure of liquid against the ends of the piston, substantially as described.

6. In an apparatus of the character described, the combination with chambers, valved communication between said chambers and a refrigerating system, of floats in said chambers adapted to close said valves, a liquid flow controlling casing having parallel U-shaped passages therein, a compound piston valve positioned across said parallel passages, passages connecting both of the U-shaped passages with the first-mentioned chambers, and other passages connecting the first-mentioned chambers with the casing in line with the ends of said piston valve, and spring-pressed valves in said last-mentioned passages, said piston valve comprising a cylinder rod having annular grooves therein of a length conforming to the width of said U-shaped passages and adapted to register alternately with said passages when moved by the pressure of liquid against the ends of the piston, substantially as described.

7. In an apparatus of the character described, the combination with chambers, valved communication between said chambers and a refrigerating system, of floats in said chambers adapted to close said valves, a liquid flow controlling casing having parallel U-shaped passages therein, a compound piston valve positioned across said parallel passages, passages connecting both of the U-shaped passages with the first-mentioned chambers, and other passages connecting the first-mentioned chambers with the casing in line with the ends of said piston valve, a pump, and pipes connecting said pump with said U-shaped passages respectively, said piston valve comprising a cylinder rod, having annular grooves therein of a length conforming to the width of said U-shaped passages, and adapted to register alternately with said passages when moved by the pressure of liquid against the ends of the piston, substantially as described.

8. In an apparatus of the character described, the combination with chambers, valved communication between said chambers and a refrigerating system, of floats in said chambers adapted to close said valves, a liquid flow controlling casing having parallel U-shaped passages therein, a compound piston valve positioned across said parallel passages, passages connecting both of the U-shaped passages with the first mentioned chambers, and other passages connecting the first mentioned chambers with the casing in line with the ends of said piston valve, and spring pressed valves in said last mentioned passages, a pump, and pipes connecting said pump with said U-shaped passages respectively, said piston valve comprising a cylinder rod having annular grooves therein of

a length conforming to the width of said U-shaped passages, and adapted to register alternately with said passages when moved by the pressure of liquid against the ends of the piston, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE W. MILLER.

Witnesses:
R. H. KRENKEL,
CHAS. E. POTTS.