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I. CARLIER.

COMPRESSOR.

APPLICATION FILED FEB. 4, 1903.

NO MODEL.

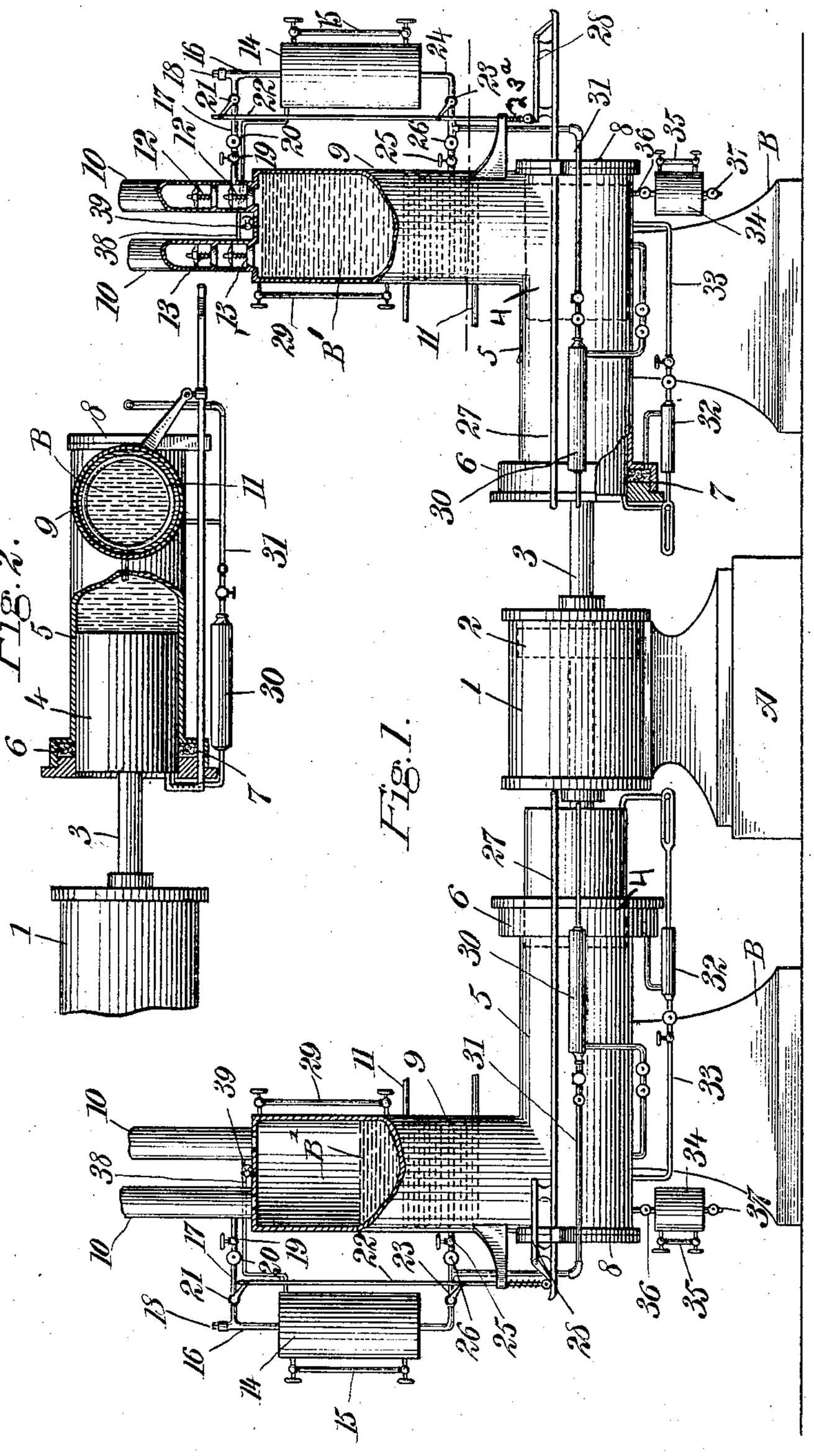

Fig. 1.



Fig. 2.

WITNESSES:

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No. 766,017. Patented July 26, 1904.

# UNITED STATES PATENT OFFICE.

IVAN CARLIER, OF DENVER, COLORADO.

## COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 766,017, dated July 26, 1904.

Application filed February 4, 1903. Serial No. 141,806. (No model.)

*To all whom it may concern:*

Be it known that I, IVAN CARLIER, a citizen of the United States, and a resident of Denver, in the county of Arapahoe and State of Colorado, have invented new and useful Improvements in Compressors, of which the following is a full, clear, and exact description.

This invention relates to certain novel and useful improvements in compressors, and has particular application to a device of this character for compressing air through the agency of a liquid or fluid.

One of the principal objects of the present invention is to construct a compressor which shall be exceedingly simple in its construction, positive in its operation, and capable of withstanding a maximum amount of wear and tear.

A further object of the invention is to provide a mechanism or apparatus in which the compression of the air is affected by a fluid or liquid—such as water, mercury, oil, or the like—thus obviating the necessity of lubricating the compressor-cylinders, which lubrication would be imperative if the ordinary pistons were employed.

With these and other objects of a similar nature in view the invention consists in the construction, combination, and arrangement of parts as is described in this specification, delineated in the accompanying drawings, and set forth in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a side elevation of an apparatus embodying my improvements, the cylinders or compression-chambers being shown broken away; and Fig. 2 is a top plan view of one of the compression-chambers, such chamber being broken away to show the plunger working therein.

Referring now to the accompanying drawings in detail, A designates a base or support of any suitable character having mounted thereon a steam-cylinder 1, within which cylinder reciprocates a piston-head 2, (shown in dotted lines,) said head being mounted upon a rod 3, which rod passes or extends entirely through the cylinder, the piston-head being mounted approximately centrally thereof, and a plunger 4 is mounted at each end of said rod. In the present instance I have shown a double compressor operated from a single steam-cylinder, and it is to be understood that both the compression-chambers and their adjuncts—such as the gearing, valves, piping, and the like—are counterparts, and the description herein following is applicable to both.

The plunger 4, hereinbefore referred to, is attached to the end of the rod 3 and is adapted to reciprocate in the horizontal portion 5 of the compression-cylinder in accordance with the direction of movement of the piston-head 2. This portion 5 is provided at its front end with the ordinary stuffing-box 6 and the packing 7, and at its opposite or rear end is mounted a flange 8, which can be readily removed to take out the plunger, if necessary.

Communicating with the horizontal member 5 and extending vertically upward therefrom is the section 9 of the compression-chamber, having communicating therewith at its top portion two upwardly-extending tubes 10 10. As will be evident from the drawings, these sections or compression-chamber members 5 and 9 are intended to receive the compressing fluid B′, which may be of any suitable character—such as mercury, oil, water, or the like—and approximately centrally of the vertical section of the chamber is arranged a coil or coils of pipes, as shown at 11, such pipe having a fluid circulating therethrough for the purpose of cooling the liquid in the chamber; but it is to be understood that, if desired, instead of employing the coil a water-jacket may be provided or may be used in addition thereto.

Within the vertical members 10 10 are arranged the spring-tensioned valves 12 12 and 13 13, which are slightly spaced apart, the valves 13 being oppositely arranged to the valves 12—that is to say, while the valves 12 are opened by the air being compressed by the liquid in the vertical cylinder the valves 13 13 are closed, and when the latter valves are drawn inward and opened by suction to

admit air into the cylinder when the liquid is following the piston and descending in said chamber the valves 12 will close.

Mounted adjacent to the vertical member 9 is a supplemental liquid-receiver 14, which is provided with an ordinary glass sight-gage 15, and at its upper or top portion this receiving-tank 14 is connected with the outlet-tube 10 through the medium of a vertical pipe 16 and a horizontal pipe 17, which latter communicates with the discharge member 10 at a point between the two valves 12 12. The vertical member 16 is provided with a cap 18, which may be removed for the purpose of pouring liquid into the receiver, which liquid will enter the vertical chamber, as will be hereinafter described. The horizontal pipe 17 is provided with valves 19 and 20 and has a cut-off valve 21, connected with a rod 22, said rod at a point near its lower end having connection with a similar valve 23, arranged within a pipe 24, which extends from the bottom of the receiving-tank and communicates with the vertical chamber 9 at a point near the lower end thereof, said pipe 24 also having cut-off valves 25 and 26. The rod 22, which is connected, as before described, with the two valves 21 and 23, is actuated by the reciprocation of the plunger in the horizontal cylinder 5, said plunger contacting with and operating a horizontally-disposed rod 27, having at its end a slide 28, which slide is adapted to move beneath and elevate the rod 22, consequently opening the valves 21 and 23, said valves being closed again by the rod being pulled downward through spring $23^a$ when the slide passes from beneath the same on the return movement of the plunger.

From the construction thus far described it will be seen that when the plunger moves forward the liquid will be forced upward in the vertical chamber 9, and the air compressed thereby will force outward the valves 12 12 and pass through the discharge 10. Should the liquid move too far in the cylinder, so as to pass the first valve, it will flow through the horizontal pipe 17, down through the pipe 16, (the valve 21 being open,) and into the receiver 14, and from thence through the pipe 24 into the compression-chamber again. At the side of the vertical compression-chamber 9 is also arranged a glass sight-tube 29 to indicate the amount of liquid in the compression-chamber. Arranged alongside of the horizontal portion 5 of the compression-chamber is a pump 30, which is connected, through the medium of a pipe 31, with the pipe 24, leading from the reservoir into the vertical chamber, this pump being operated simultaneously with the piston and being employed to force back into the compressor the liquid which may go through the discharge-valves 12 12 and from thence into the receiver. A second pump 32 is connected with the stuffing-box 6 and is also operated by the movement of the plunger 4, it being intended that said pump will force back through the pipe 33 any liquid which will leak from the horizontal cylinder through the stuffing-box. At the lowermost portion of the compressor is arranged a supplemental tank 34, having an indicating-tube 35 and a pipe 36, connecting the tank with the compressor, this tank being designed to receive any water that may be expressed from the air.

In order to support the compressor apparatus, any suitable base may be employed, such as shown at B. When employing ammonia-gas or a similar element—for instance, when the device is used as an ice-making machine—I preferably connect the suction-tube 10 with the tank 14 through the medium of a pipe 38, which will return to said tank any liquid which may possibly be forced past the valve and escape into said suction-tube from the compressor-chamber 9. I also place a suitable air cock or valve 39 at the top of the tank between the tubes 10 10.

It will be observed that I have provided an apparatus which is extremely compact and will be found very desirable in connection with ice-machines or the like, as it occupies but very little space, and the parts thereof are so arranged and are so comparatively few that there is little liability of the same being damaged or getting out of order.

While I have shown and herein described one particular embodiment of my invention, it is of course to be understood that I do not limit myself to the precise details shown herein, as there may be modifications and variations in some respects without departing from the spirit of the invention or sacrificing any of the numerous advantages thereof. For instance, while I have herein shown and described a steam-engine employed as the motive power any suitable engine or agency may be used.

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

1. In a compressor, the combination of a motor and a fluid-chamber, a plunger moving in said chamber adapted to be reciprocated by the motor, a tube for the admission of air to the fluid-chamber, a second tube for the escape of air compressed in said chamber by the fluid, valves in said tubes, a coil arranged in the fluid-chamber and adapted to have a liquid circulating therethrough for cooling the fluid in the chamber, a supplemental fluid-receiving tank arranged adjacent to the chamber, pipes connecting the said supplemental tank with the air-discharge tube and with the fluid-chamber, valves in said pipe, and means, including a rod, movable vertically at predetermined times for controlling said valves, substantially as set forth.

2. In a compressor, the combination of a

motor and a fluid-chamber, a plunger moving in said chamber adapted to be reciprocated by said motor, a tube for the admission of air to the fluid-chamber, a second tube for the escape of air compressed in said chamber by the fluid, spring-tensioned valves in said tubes, a supplemental fluid-receiving tank arranged adjacent to the fluid-chamber, pipes connecting said tank with the fluid-chamber and with the compressed-air outlet, valves in said pipes, and means, including a vertically-movable rod and a slide operated at predetermined times and contacting with said rod, for actuating said valves, substantially as set forth.

3. The combination of an engine, a compression or fluid chamber, a plunger operated from the engine and movable in said chamber, a valve-controlled air-inlet and a valve-controlled outlet for said chamber, a supplemental fluid-receiving tank arranged adjacent to the fluid-chamber, pipes connecting the tank with the chamber and with the air-outlet, valves in said pipes, a spring-tensioned rod connected with said valves, a slide actuated by the movement of the plunger for controlling the valve-rod, and opening and closing the valves at predetermined periods, a stuffing-boxes for the fluid-chamber, and a pump connected with the stuffing-box of the fluid-chamber and with the chamber for returning to the latter any fluid escaping through such stuffing-box, substantially as set forth.

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

IVAN CARLIER.

Witnesses:
JOHN J. HATTONY,
FRED T. NEWTON.