W. D. MOUNT.

AUTOMATIC DRAIN FOR COMPRESSORS.

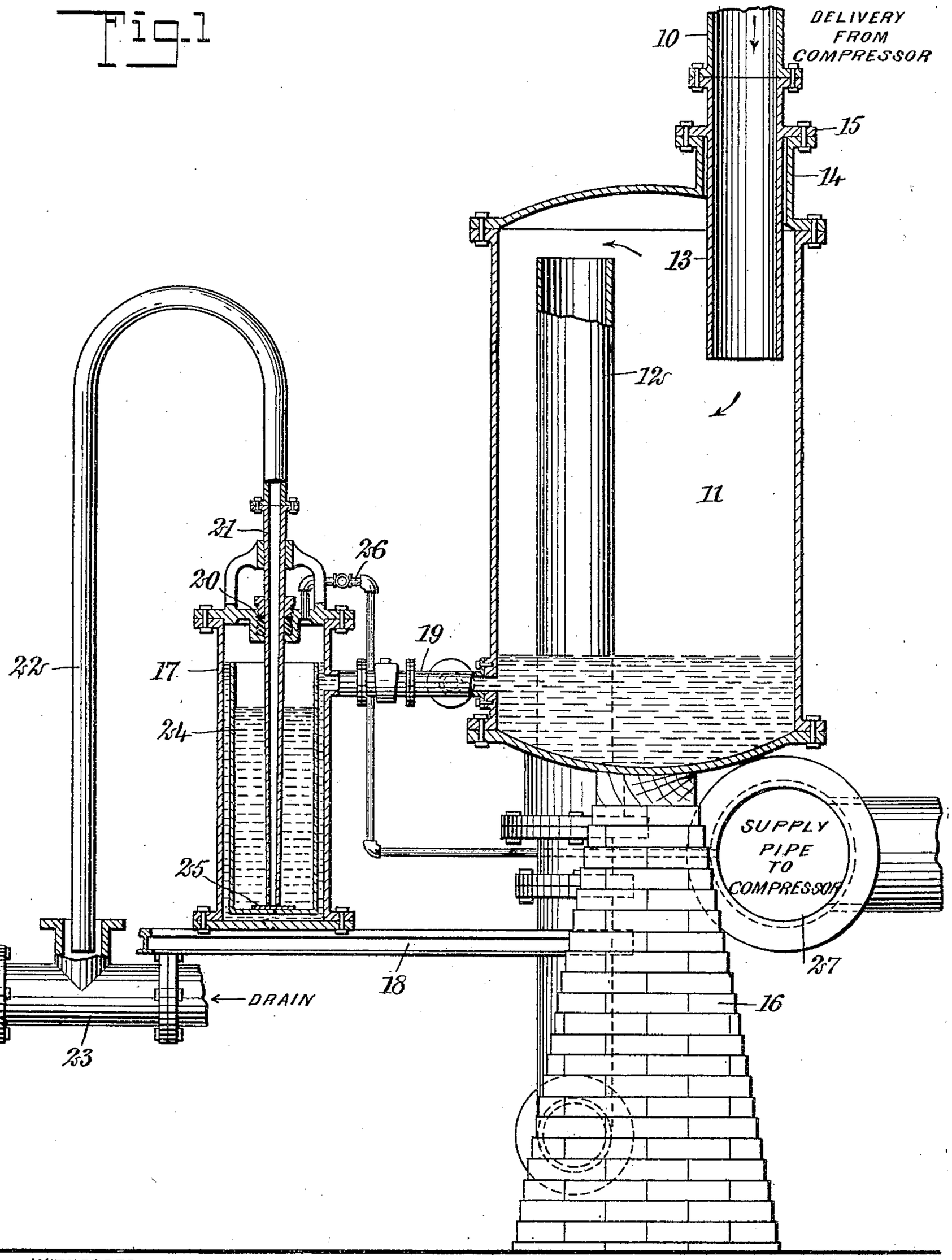
APPLICATION FILED NOV. 27, 1908.

925,438.

Patented June 15, 1909.

2 SHEETS—SHEET 1.

Fig. 1



WITNESSES

J. A. Brophy

C. H. Fairbanks

INVENTOR

William D. Mount

BY Munn & Co

ATTORNEYS

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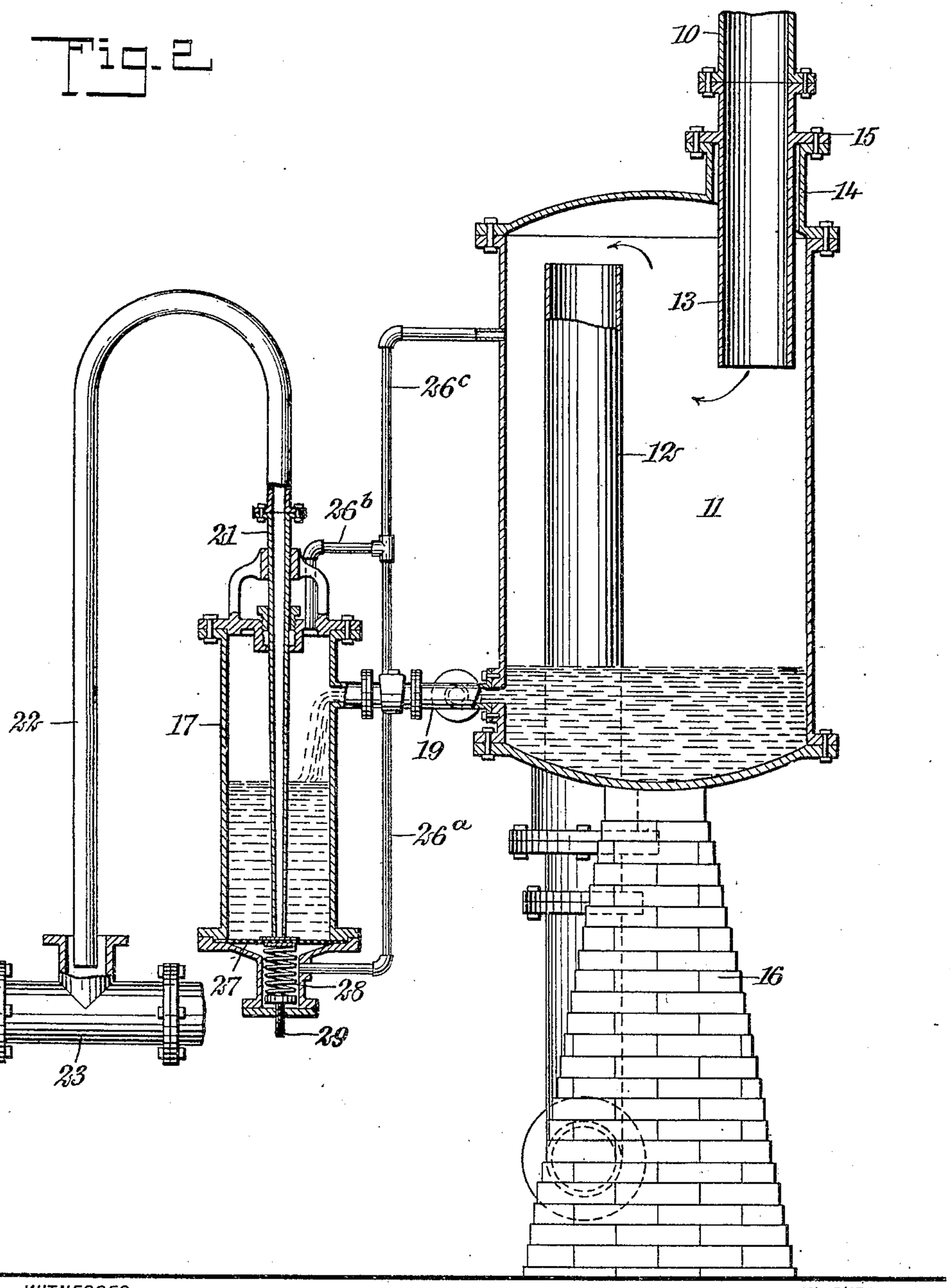
2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

WILLIAM D. MOUNT, OF SALTVILLE, VIRGINIA, ASSIGNOR TO THE MATHIESON ALKALI WORKS, OF SALTVILLE, VIRGINIA.

AUTOMATIC DRAIN FOR COMPRESSORS.

No. 925,438. Specification of Letters Patent. Patented June 15, 1909.

Application filed November 27, 1908. Serial No. 464,562.

To all whom it may concern:

Be it known that I, WILLIAM D. MOUNT, a citizen of the United States, and a resident of Saltville, in the county of Smyth and State of Virginia, have invented a new and Improved Automatic Drain for Compressors, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in gas compression apparatus, and relates more particularly to means for separating water or other liquid from the compressed gas after the latter leaves the compressor.

In certain types of gas compressors, it is common practice to inject water either into the compressor or into the discharge pipe therefrom, in order to reduce the temperature of the compressed gas and remove the heat of compression. My improved apparatus is designed to automatically separate this water from the gas after it has performed the desired object, and to automatically withdraw the water from the separating chamber, maintain a substantially constant water level in the latter, and prevent the loss of any gas withdrawn from the separating chamber in solution in the water.

It is, of course, evident that my improved apparatus may be used for separating any other liquid from the gas, but it is especially adapted to accomplish the object above set forth.

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, and in which—

Figure 1 is a side elevation of an apparatus constructed in accordance with my invention, a portion of said apparatus being shown in section; and Fig. 2 is a view similar to Fig. 1, but showing a slightly modified form.

My improved apparatus may be used in connection with any type of gas-compressing mechanism, and as the details of the latter do not involve my invention they are not illustrated in the accompanying drawings.

The gas is delivered from the compressor through a conduit 10 to the main liquid-separating chamber 11, in which the liquid separates from the gas and collects at the bottom, while the gas escapes through a conduit 12 to a storage chamber or to any other point at which it is desired to use the same. The delivery pipe 10 may be connected to the upper portion of the chamber 11 in any suitable manner, to effect a gas-tight joint, but, as illustrated, said pipe is bolted to a pipe 13 extending through a collar 14 integral with the top of the chamber, and the pipe 13 is provided with an outwardly-extending flange 15 intermediate its ends and bolted to the outer end of the collar 14. The pipe 13 terminates within the chamber adjacent the upper end thereof and below the upper end of the pipe 12, which extends out through the bottom of the chamber. The connections for the pipe 12 and the bottom of the chamber 11 may be substantially the same as those illustrated at the top of the chamber. The chamber may be supported in any suitable manner, as, for instance, upon a column or base 16; and at one side of the liquid-separating chamber, I support a second chamber 17 for receiving the liquid from the chamber 11, controlling the outflow of said liquid, separating the gas from the liquid and returning said gas to the system. This chamber 17 is illustrated as being supported on a beam or bar 18, extending outwardly from the base 16, and is connected adjacent its upper end by a pipe 19 leading from the lower portion of the chamber 11. The pipe 19 enters the chamber 11 below the normal liquid line therein and serves to deliver liquid from the liquid-separating chamber 11 to the gas-separating and liquid-returning chamber 17.

Extending through a packing 20 in the top of the chamber 17, is a pipe 21, the lower end of which is disposed adjacent to but spaced from the bottom of the chamber 17. This pipe at its upper and outer end, may be connected by any suitable conduit 22 to the sewer pipe or waste pipe 23.

Within the chamber 17 is a float 24 in the form of a cylindrical vessel having an open top and having the inner surface of the closed lower end provided with a gasket 25 for engagement with the lower open end of the liquid outlet pipe 21. The chamber 17 is closed air-tight, save for the pipes connected to the same, so that there will be no loss of gas or liquid from said chamber. Connected to the top of the chamber is a gas pipe 26, through which gas may be drawn off from the top of the chamber 17, to maintain the pressure therein substantially below the pressure in the chamber 11. As the liquid enters the chamber 17 through the pipe 19, it gives up all gas which was dissolved therein by the

higher pressure and this gas may be conveyed by the pipe 26 to the main supply pipe 27 leading to the compressor. Thus the pressure in the chamber 17 will be maintained comparatively low, and in case the gas is of value, none of it will be permitted to go to waste.

In the operation of the form shown in Fig. 1, the gas and liquid under high pressure, come from the compressor through the pipe 10; the liquid is separated from the gas in the chamber 11, and the gas is conveyed through the pipe 12 to the storage chamber. The liquid collecting in the lower portion of the chamber 11 flows through the pipe 19 to the chamber 17 outside of the float 24, until a sufficient quantity of liquid has entered said chamber to raise the float and close the end of the pipe 21 as illustrated in the drawing. A further accumulation of liquid in the chamber 17 will eventually cause an overflow into the float 24 and the liquid will continue to rise in the float 24 until the buoyancy of the float is overcome and the float settles to the bottom to open the valve at the lower end of the pipe 21. The liquid then flows out through the siphon until the liquid level within the float is lowered to such an extent that the float will again rise and close the valve. The end of the pipe 21 is so far beneath the level of the liquid that there is no possibility of gas blowing off through the pipe 21, and the liquid will remain in the chamber 17 outside of the float at approximately the level of the upper edge of the float. The edge of the float is above the pipe 19, so that at no time will the liquid level in the chamber 11 descend sufficiently low to permit the direct escape of gas from the chamber 11 to the chamber 17, but even should such gas escape, it would merely flow through the pipe 26 back to the suction pipe along with the gas escaping from the liquid in the chamber 17.

In the specific form illustrated in Fig. 2, I have illustrated a slightly different form of controlling means for the lower end of the pipe 21, and a slightly different disposition of the gas from the chamber 17. Instead of employing a float within the chamber 17, I employ a diaphragm 27 adapted to move vertically to control the lower end of the pipe 21. The diaphragm is normally held in position against the end of the pipe, to close the latter by a coil spring 28, the tension of which may be readily varied by an adjusting screw 29. The space beneath the diaphragm is closed substantially air-tight and is connected by a branch pipe 26^a to a pipe 26^b leading to the upper end of the chamber 17. The two pipes 26^a and 26^b are connected by a pipe 26^c with the chamber 11. In the operation of this form, the liquid flows from the chamber 11 to the chamber 17 until it has accumulated in the latter to such an extent that the weight of said liquid will counterbalance the spring 28, and the diaphragm will be depressed to uncover the end of the pipe 21 and the liquid may escape through the siphon. As soon as sufficient liquid has escaped to permit the spring 28 to lift the remaining liquid, the valve will be closed. The branch pipes 26^a and 26^b permit the same pressure to exist above the liquid as exists below the diaphragm, so that the weight of the liquid alone will control the opening and closing of the inlet to the pipe 21. Any gas which separates from the liquid in the chamber 17 will be returned to the chamber 11 through the conduit 26^c.

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

1. A gas compression system, including a liquid separating chamber, through which the gas passes under high pressure, a second chamber receiving liquid from the first-mentioned chamber, a tube for withdrawing liquid from said second-mentioned chamber and delivering said liquid at atmospheric pressure, a movable member within the second-mentioned chamber and constituting a closure for said tube and movable to open said tube upon the accumulation of a predetermined quantity of liquid within said second-mentioned chamber, and a conduit leading from said second-mentioned chamber and normally open to return to the system, gas separated from the liquid in said second-mentioned chamber.

2. A gas compression system including a liquid-separating chamber, a second chamber receiving liquid from the first-mentioned chamber, a siphon tube for withdrawing liquid from said second-mentioned chamber, a diaphragm within the second-mentioned chamber and constituting a closure for the lower end of said siphon tube, a spring for raising said diaphragm and closing said tube when the amount of liquid within said second-mentioned chamber decreases below a predetermined amount, and a conduit establishing open communication between said chambers above their liquid levels for returning the gas from the second-mentioned chamber to the first-mentioned chamber.

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

WILLIAM D. MOUNT.

Witnesses:
J. F. WATSON,
W. W. RUBLE.