No. 669,140. Patented Mar. 5, 1901.

W. KNAPP.

PRODUCTION OF COMPRESSED GAS.

(Application filed Sept. 7, 1899.)

(No Model.)

Fig. 2.

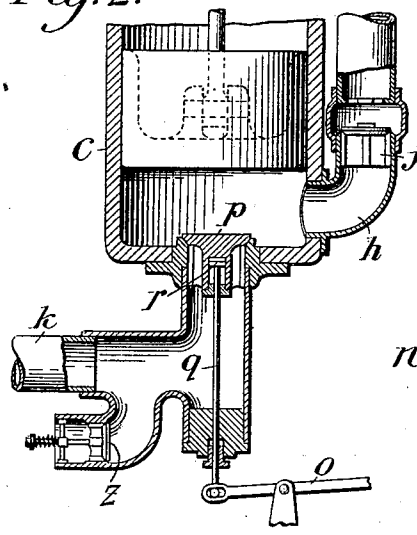


Fig. 1.

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UNITED STATES PATENT OFFICE.

WENZL KNAPP, OF HAMBURG, GERMANY.

PRODUCTION OF COMPRESSED GAS.

SPECIFICATION forming part of Letters Patent No. 669,140, dated March 5, 1901.

Application filed September 7, 1899. Serial No. 729,688. (No model.)

To all whom it may concern:

Be it known that I, WENZL KNAPP, a citizen of the German Empire, and a resident of Peterstrasse 46, Hamburg, Germany, have invented certain new and useful Improvements in the Production of Compressed Gas, of which the following is a specification.

This invention relates to an apparatus be which illuminating-gas that may be mixed with atmospheric air is pressed by a suitably power into a vessel filled with a suitable liquid. The pressure upon the gas is determined at pleasure by the height of the liquid column within the vessel. This pressure is to remain always constant during the withdrawal of the gas, and herein is to be found the essence of the invention. To maintain this even pressure, an automatic pressure-regulator is employed which automatically cuts off the supply of gas when the desired pressure is reached; but at the moment the pressure is reduced gas is supplied until the desired pressure is again reëstablished.

The apparatus consists of a vessel divided by a partition into two compartments, the upper compartment communicating with the lower one by means of a tube that reaches nearly to the bottom of the latter. The lower compartment serves for holding a suitable liquid.

In the accompanying drawings, Figure 1 is an elevation, partly in section, of my improved apparatus. Fig. 2 is an enlarged section of the suction and pressure pump.

The apparatus consists of a vessel *a* and a pump *c*, that may be actuated by a hot-air motor *b*. The vessel *a* (shown in cross-section) is divided by a partition-wall *d* into two compartments *e* and *f*, the upper one of which, *e*, is connected with the lower by means of a pipe *g*, extending downward from the partition-wall *d* nearly to the bottom of the lower compartment *f*. This latter is filled with glycerin or some other suitable liquid, which when at rest will attain the same level in the pipe *g*. Above the level of the liquid in this compartment is situated the inlet-pipe *h* for the admission of the gas, while the outlet-pipe *i* for drawing off the gas is at about the same level as *h*. In the present case the gas is drawn out of the pipe *k* and forced into pipe *h*, having back-pressure valve *j*, by means of the pump *c*, which is driven, for example, by a hot-air motor *b*.

In consequence of the uninterrupted admission of gas into the compartment *f* the liquid therein is forced to ascend through the pipe *g* into the upper compartment *e* of the vessel *a*, where it rises in proportion to the increasing volume of gas in compartment *f*. When the liquid is almost entirely forced out of compartment *f*, and the compartment *e* is therefore almost filled with the liquid, the pump *c* is automatically stopped by means of a lever *m*, connected with a ball-float *l*, which lever lifts the suction-valve *p* from its seat by rod *n*, lever *o*, and a lifting-rod *q*, connected to the valve. This arrangement is shown on an enlarged scale in Fig. 2 of the accompanying drawings.

The valve-cone *p* is provided with a central cylindrical bore, in which is guided the head *r* of the lifting-rod *q*. If the ball *l* is lifted by the liquid, the lifting-rod *q*, and with it the valve-cone *p*, is raised, so that the valve is held entirely open and the pump *c* runs empty. Consequently the back-pressure valve *j* within pipe *h* will prevent any further admission of gas to the vessel *a*. The gas contained in the pump is alternately pressed back and sucked within feed-pipe *k*. Thus the pump acts further, but without being able to press the gas into the compartment *f*, because the pressure of the gas contained in the latter firmly holds the valve *j* upon its seat. At the moment, however, when the volume of gas has decreased and the float *l* again descends the rod *q* is drawn down by the raising of rod *n*, so that the valve *p* again begins to act, and the gas consumed is at once replaced. Thus as soon as compressed gas has been drawn off an equal quantity of press-gas is generated, so that the pressure imparted remains always the same. An overproduction is therefore prevented by the automatically-acting pressure-regulator.

Should the pressure-regulator accidentally fail to act, a further automatic device actuated by the overflowing liquid is provided, which closes the suction-pipe of the pump. To this end the said suction-pipe is provided with a cock *s*, the plug of which is connected to a double lever *t*, a weight *u* suspended from one arm of which keeps the cock open. The

other arm supports a carrier v, containing a hose x, attached to the overflow-pipe w. This hose is coiled upon the carrier and passes thence downward into an accumulator y, adapted to receive the liquid overflowing from compartment e of vessel a. This device acts in such a manner that when the hose is empty the cock s is kept open by means of the weight u; but when the hose is full its overweight will turn and close the cock, so that the pump does not draw any more gas or forward it to the compartment f of the vessel a.

A valve z, loaded by means of a spring or the like, Fig. 2, may be inserted in the suction-pipe k for drawing in air and adapted to be adjusted according to the particular proportions of the mixture desired.

What I claim is—

1. An apparatus for producing compressed gas having a constant pressure, composed of a vessel containing a liquid and divided into two compartments, the upper compartment communicating with the lower compartment by a pipe reaching to near the bottom of the latter, a pump for forcing the gas into the lower compartment and thereby the liquid into the upper compartment, and a pressure-regulator in the upper compartment which is connected to the pump to automatically cut off the gas when the desired pressure is obtained and readmit the gas when the pressure is reduced, substantially as specified.

2. An apparatus for producing compressed gas, composed of a vessel divided into two compartments and containing a liquid, a pipe extending from the upper into the lower compartment, a gas-supply pipe entering the lower compartment, a gas-pump having a suction-valve, a float in the upper compartment, and means connected to said float for lifting said valve when the float is raised, substantially as specified.

3. An apparatus for producing compressed gas, composed of a vessel divided into two compartments and containing a liquid, a pipe extending from the upper into the lower compartment, a gas-supply pipe entering the lower compartment, a valve in the gas-supply pipe, a weighted lever connected to the valve-cock, a hose carried by the lever, and an overflow-pipe in the upper compartment that communicates with said hose, substantially as specified.

Signed by me at Hamburg, Germany, this 27th day of July, 1899.

WENZL KNAPP.

Witnesses:
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