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G. G. SMITH.

DEPURATOR FOR GAS.

APPLICATION FILED DEC. 17, 1900

Fig. 1.

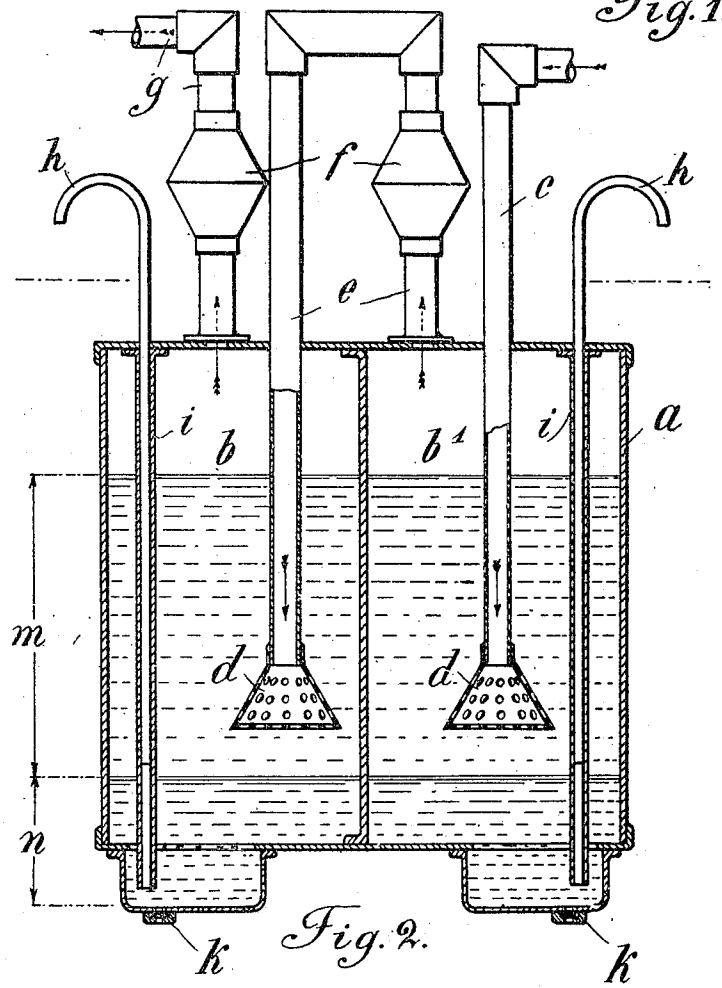
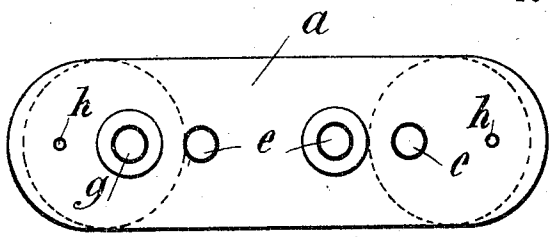


Fig. 2.



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UNITED STATES PATENT OFFICE.

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DEPURATOR FOR GAS.

No. 824,956. Specification of Letters Patent. Patented July 3, 1906.

Application filed December 17, 1900. Serial No. 40,127.

To all whom it may concern:

Be it known that I, GEORGE GREGORY SMITH, a citizen of the United States of America, residing at Villa Bel Riposo, San Domenico, Florence, Italy, have invented new and useful Improvements in Depurators for Acetylene and other Gases, of which the following is a description.

The present invention consists of an improved automatic depurator for acetylene and other gases; and its object is to provide means for purifying and drying the gas. This is attained by passing the gas coming from the generator once or several times through liquid vaseline, which will extract all the water and a great many other impurities from the same.

The invention also comprises means for preventing the vaseline from bubbling over into the pipe leading to the gasometer and means for regulating the pressure in the depurator so that the water extracted from the gas will be automatically discharged from the said depurator. Means are also furnished for distributing the gas through the vaseline in finely-divided streams or jets.

In order to render the present specification easily intelligible, reference is had to the accompanying drawings, in which similar letters of reference denote similar parts throughout both views.

Figure 1 is a sectional elevation through one form of embodying the invention, and Fig. 2 is a plan of the same.

The depurator consists of the housing *a*, of a suitable material, which is divided into two or more chambers *b b'*. A pipe *c*, coming from the gas-generator, dips into the fluid vaseline in the chamber *b'* and is provided at its lower end with a rose *d*, which serves to distribute the gas in finely-divided streams into the vaseline. The gas then rises through the vaseline into pipe *e*, by means of which it passes to the second chamber *b*. The pipe *e* dips into the second chamber below the level of the vaseline therein and is also provided with a rose *d* for the purpose hereinbefore set forth. In chamber *b* the gas again rises though the vaseline into the pipe *g*, whence it passes to the gasometer.

In connection with some gases—such, for instance, as acetylene—when the gas is being generated the vaseline is agitated (the gas generation being very energetic) to such an extent that at first an emulsion, or rather a temporary emulsion, is formed, and this causes bubbles of vaseline to rise in the chambers. These bubbles pass upon the outlet-pipes and finally flow into the dip leading to the gasometer. Here they accumulate and finally form a vaseline seal in the said dip, which prevents the passage of the gas and form a source of danger. In order to prevent the vaseline-bubbles formed by the emulsion from passing into the outlet-pipes, these latter are expanded or enlarged, as at *f*, and such enlargements have the effect of causing the bubbles rising to gradually expand therein until they burst and the vaseline contained in the same flows back into the depurator. The enlargements *f* might be of any desired form; but it has been found advantageous to employ the double-cone form, as illustrated, since this form seems to cause the bubbles to burst more quickly than any other form as far as hitherto ascertained.

Since acetylene when newly generated contains a considerable quantity of water and vaseline possesses the quality or property of extracting practically all the water from the same, a quantity of water would soon be deposited underneath the vaseline which would cause a total displacement of the latter in a very short time were not means provided for automatically eliminating the superfluous water, so as to retain the position of the vaseline at substantially the same level throughout.

In the operation of this device several elements and forces are to be reckoned with—to wit, a permanent body of liquid vaseline, gas of constantly-varying pressure passing into and rising through and remaining for a short period above the body of vaseline, water charged with impurities constantly accumulating above the body of vaseline and raising it up and causing it to encroach upon the gas-space, atmospheric pressure, and a column of liquid exposed to atmospheric pressure. The influence of each of these elements is exerted within a closed chamber. The column of water is contained within an open stand-pipe communicating with the exterior of the chamber, and such column, plus the atmospheric pressure, is capable of withstanding the pressure of the gas upon the liquids within the chamber, accentuated by the accumulation of water, only up to a

certain point, and then the stand-pipe will permit the escape of a sufficient quantity of surplus water to enable the atmospherically-pressed column to again resist the physical conditions existing within the chamber, and at the moment of cessation of the discharge from the stand-pipe the column of liquid, plus the atmospheric pressure, balances the existing condition of the combination of forces within the chamber. The discharge of water is caused by the condition of forces within the chamber overbalancing such column. The action is automatic, and since the accumulation of water reduces the gas-space upon rise of gas-pressure after a certain dimunition of gas-space the surplus water, and only the surplus, will be ejected through the stand-pipe. This action will go on, provided no unusual accident happens to the machine, year after year.

The stand-pipe is made adjustable so that the height of the column of liquid may be adjusted, to the end that the amount of pressure within the chamber which will be necessary to overbalance the column may be predetermined, and upon the rise of pressure above such predetermined point the chamber will automatically discharge the water through the stand-pipe and the stand-pipe will, through its contained column of liquid, automatically stop the discharge upon the restoration of the balance to which it has been adjusted. This is effected by means of telescopically-adjustable water-pipes *h h*, one for each chamber, which pipes are shown as having bent upper ends. These pipes are guided in the stationary pipes *i i*, advantageously mounted underneath the cover of the depurator and extending down far enough to dip into the water below the vaseline, as illustrated. The object in mounting the pipes *h h* telescopically is to enable them to be adjusted by being raised or lowered to keep the water-level beneath the vaseline at a certain predetermined height irrespective of the pressure in the depurator. Thus if the pressure is very high in the depurator the pipe *h* should be correspondingly raised to increase the height of the column, and if it is low the pipe may be lowered, as will be readily understood. As illustrated, *m* represents the vaseline layer, and *n* the water below the same, and the pipes *h* should be adjusted so that their ends dip into the water—*i. e.*, care must be taken by examining the discharge of the said pipes *h* that no vaseline is discharged and wasted through the same.

The pipes *h* may be withdrawn from the tubes *i*, through which tubes the vaseline may be poured into the same, and outlets *k k* are provided at the bottoms of the said chambers for drawing off the water and removing other impurities as may be necessary.

Although two chambers have been described, it will be obvious that only one, or more than two, might be employed without departing from the spirit of the invention.

The use of liquid vaseline is of particular importance in connection more especially with acetylene. Vaseline has the property not only of drying, but also of purifying acetylene gas. Experiments have shown that it extracts a great many of the phosphoric, as also all benzine, alcohol and the naphthalene and some of the sulfurous impurities from the same. It also eliminates practically all the water, thus producing a well-dried gas.

I claim as my invention—

1. A depurator embodying a closed chamber, a permanent body of precipitating depurant, and adjustable automatic hydrostatic means capable of purging the chamber of precipitate.

2. A depurator of the class specified comprising a series of chambers; a well in the lower portion of each chamber; a permanent body of liquid vaseline within each chamber; a gas-feed pipe opening below the normal surface level of the vaseline in the first chamber; a similar pipe leading from the gas-space of one chamber to below the normal surface of the vaseline in the next chamber; an enlargement in each of the pipes for expanding and breaking bubbles or film carried by the gas; and a discharge-pipe emanating from each well.

3. A depurator of the class specified comprising a series of chambers; a well in the lower portion of each chamber; a permanent body of liquid vaseline within each chamber; a gas-feed pipe opening below the normal surface level of the vaseline in the first chamber; a similar pipe leading from the gas-space of one chamber to below the normal surface of the vaseline in the next chamber; an enlargement in each of the pipes for expanding and breaking bubbles or film carried by the gas; and a discharge-pipe, in communication with each well, containing a column of water and capable of adjusting the height of the same.

4. In a device of the character specified, the combination of a chamber adapted to hold a depurant, a gas-inlet pipe entering said chamber and having its opening below the normal surface level of the depurant and effective to pass liquid-laden gas into the depurant, means to discharge the liquid from the chamber and comprising a stand-pipe having its opening near the bottom of said chamber, and means for adjusting the height of the discharge end of said stand-pipe relatively to the opening thereof, a gas-outlet from the chamber, and a bubble-breaking enlargement therein having the form of two truncated cones set base to base.

5. A depurator comprising a chamber, a well in the lower portion thereof, a perma-

nent body of liquid vaseline within the chamber, a gas-feed pipe opening below the normal surface level of the vaseline, a gas-pipe leading from the gas-space of such chamber, an enlargement in such pipe for expanding and breaking bubbles or film carried by the gas, and a discharge-pipe in communication with the wall adapted to contain a column of water, and means for adjusting the height of the discharge end of said pipe.

In witness whereof I have hereunto set my hand in presence of two witnesses.

GEORGE GREGORY SMITH.

Witnesses:

SPIRITO BERNARD,

EUGENIA CECCHINI.