No. 831,894. PATENTED SEPT. 25, 1906.

A. ROSENBERG.

APPARATUS FOR GENERATING ACETYLENE GAS.

APPLICATION FILED FEB. 13, 1905.

3 SHEETS—SHEET 1.

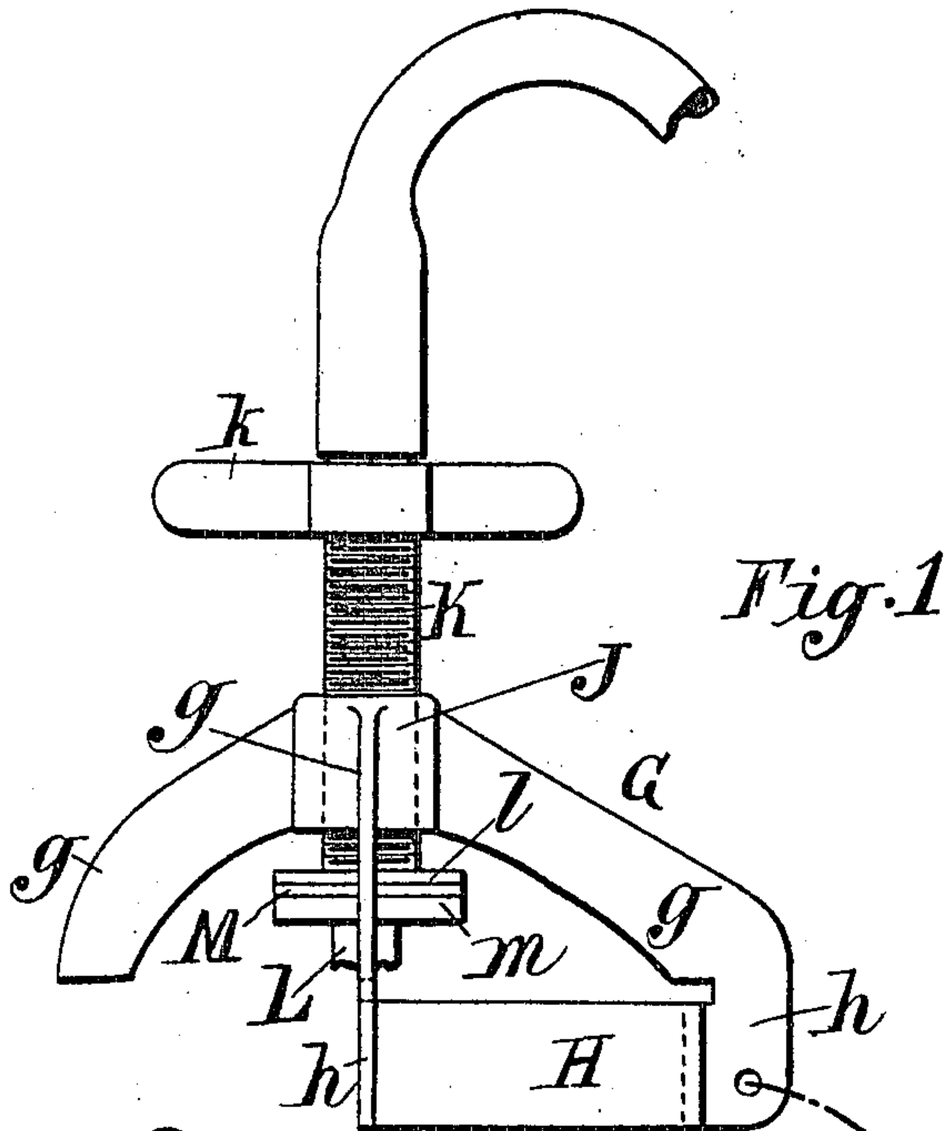
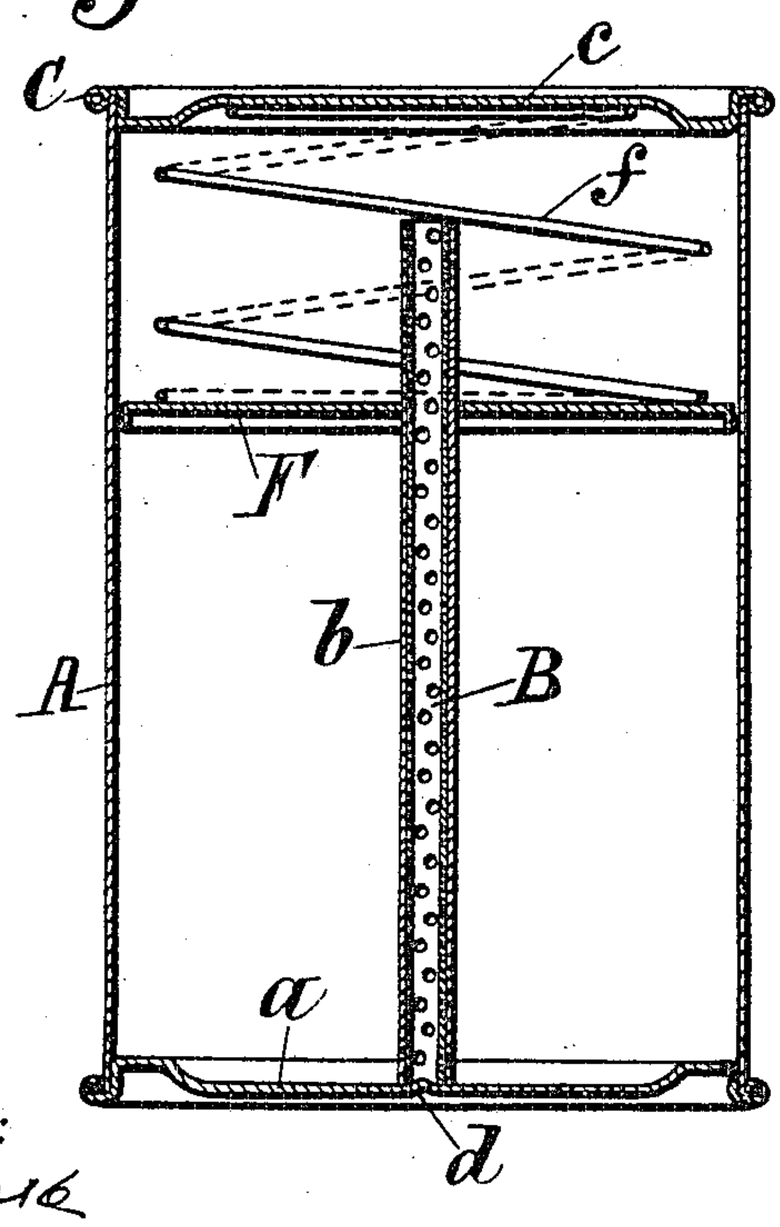


Fig. 1

Fig. 2.



Witnesses:
C. E. Holsick
A. H. Davis

Inventor
Augustus Rosenberg
By Munn & Co.
Attorneys

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3 SHEETS—SHEET 2.

Fig. 3.

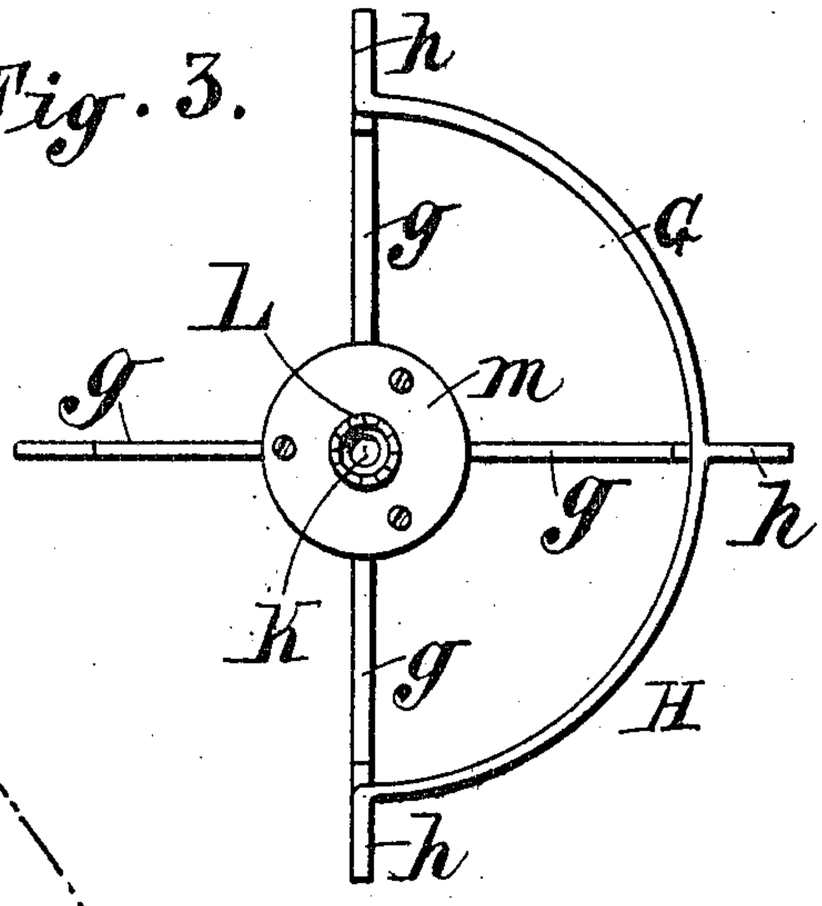
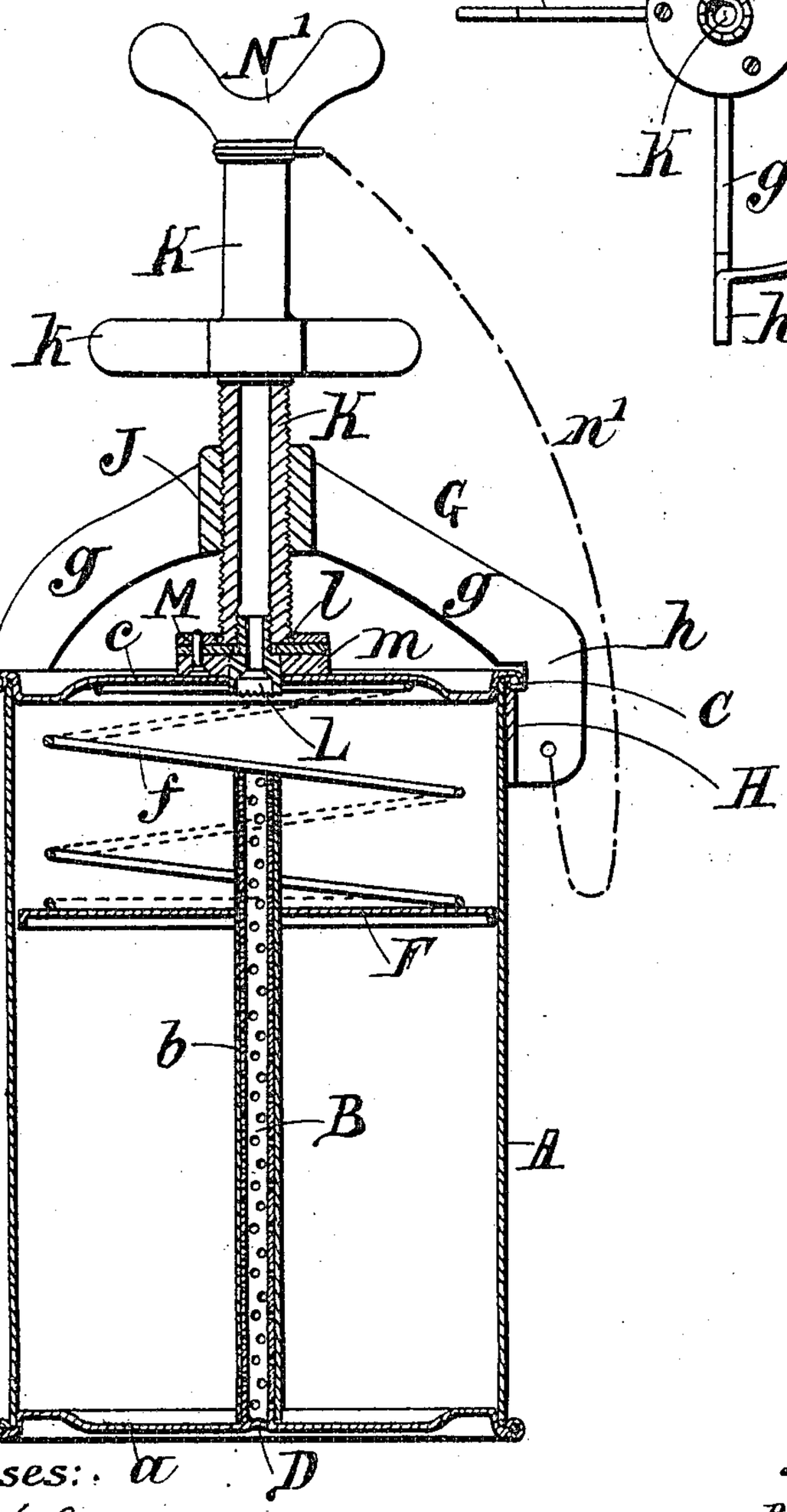


Fig. 4.



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Augustus Rosenburg
By Munn & Co
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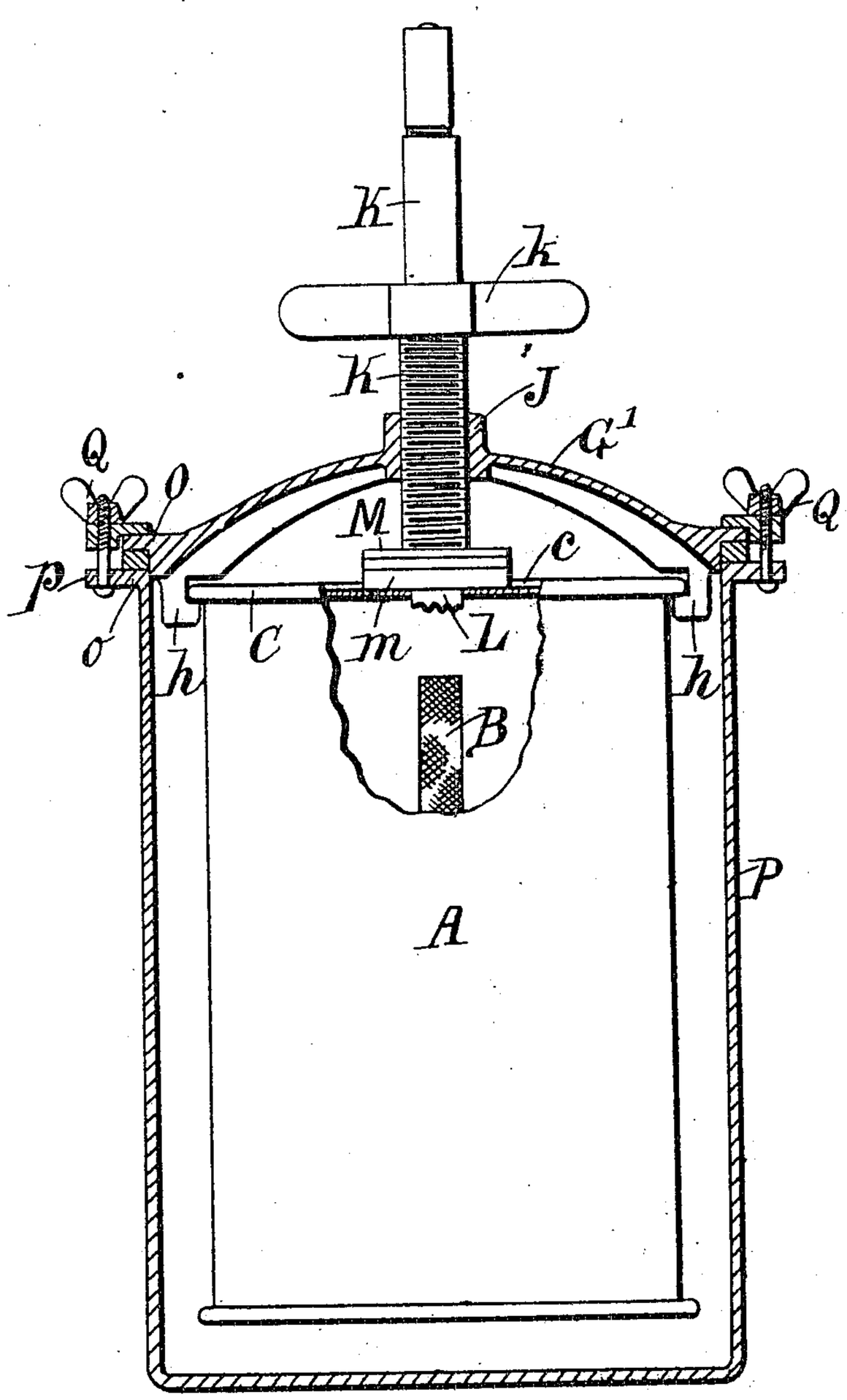
3 SHEETS—SHEET 3.

Fig. 5.



Witnesses:
C. E. Holsig
A. H. Davis

Inventor
Augustus Rosenberg
By Munn & Co.
Attorneys

UNITED STATES PATENT OFFICE.

AUGUSTUS ROSENBERG, OF LONDON, ENGLAND.

APPARATUS FOR GENERATING ACETYLENE GAS.

No. 831,894. Specification of Letters Patent. Patented Sept. 25, 1906.

Application filed February 13, 1905. Serial No. 245,404.

To all whom it may concern:

Be it known that I, AUGUSTUS ROSENBERG, engineer, a subject of the King of Great Britain, residing at 259 High Holborn, London, England, have invented certain new and useful Improvements in and Connected with Apparatus for the Generation of Acetylene and other Gas, of which the following is a specification.

This invention relates to apparatus employed in the production of gases by the reaction occurring progressively between a solid and a liquid reagent which are permitted to gradually come into contact with one another; and the invention has for its object to provide a vessel which will not only serve for the transport and storage of the solid reagent, but also (in combination with a tubular attachment of special construction, which forms the subject of another application for Letters Patent, Serial No. 276,057, filed August 28, 1905) as a generator for the gas when the vessel is immersed in the liquid reagent, so that the necessity of employing a separate generating apparatus may be obviated.

The apparatus which is illustrated in the accompanying drawings will for convenience be described with reference to the production of acetylene gas from calcium carbid.

Figure 1 is a longitudinal section of the vessel, and Fig. 2 is a side elevation of the tubular attachment which forms the subject of the other application aforesaid. Fig. 3 is an inverted plan view of the tubular attachment. Fig. 4 is a longitudinal section of the vessel and attachment in combination, and Fig. 5 is a similar view showing the apparatus as combined with a container for the water. The apparatus alone is shown, the solid and liquid reagents being omitted.

The same letters of reference denote like parts in all the figures.

The combined storage vessel and generator consists of a closed canister A, made of tinplate (or other material which will permit of the canister being sealed against the entrance of air or moisture) and provided with a perforated tube B integral with and rising centrally from the bottom *a* and terminating a short distance from the top *c* of the canister.

The tube B may contain a wick or some material possessing the necessary capillarity, but in lieu thereof is preferably surrounded by a sleeve or wrapping *b* of a fabric adapted to give passage to the water. The tube B might itself be formed of some material such as stiff but porous paper, in which case the sleeve or wick might be dispensed with.

The canister is provided with a peripheral ledge or flange C, surrounding its upper part and formed, preferably, by a beading spun or stamped up around the edge of the top plate *c* and serving or assisting to secure the top plate to the body A of the canister by soldering. The solid reagent (which is not shown in the drawings) is packed within the canister A around the tube B, space being left, if necessary, for such increase in bulk of the contents of the canister as may result from the reaction. In such case there may be provided a follower adapted to confine the contents of the canister to the lower portion of the latter, and thus prevent the material from movement during transport. This follower would consist of a diaphragm F, fitting easily within the canister and apertured to give passage to the tube B, and a spiral spring *f*, confined between the diaphragm F and the top *c* of the canister, so as to press the diaphragm constantly toward the bottom *a*, between which and the diaphragm F the material is packed. As the material in the canister expands in consequence of the reaction taking place the spring *f* yields and allows the diaphragm F to rise.

The tubular attachment comprises a yoke G, which may be in the form of an open or spider frame having, say, four radial arms *g*, whose outer ends are adapted to rest upon the top *c* of the canister or upon the beading C, the hooked or notched extensions *h* of so many of the arms *g* (three in the example illustrated) as are comprised in one half the circumference of the yoke being adapted to engage beneath said beading, so that the yoke can be applied in position upon the canister by a simple movement perpendicular to the axis of the latter.

The arms *g* radiate from a central boss J, having a screw-threaded aperture, which when the yoke G is in position on the canister is in axial alinement with the latter, the arms being arched, so as to leave a convenient space between the boss J and the top *c* of the canister. Through this screw-threaded aperture works an externally screw-threaded tube K, which is provided toward its outer end with cross-arms *k* for rotating the tube and at its inner extremity with a piercer or cutter L, adapted to establish communication between the interior of the canis-

ter and the tube K and formed, preferably, of a ring of crown-teeth surrounding the open lower end of the tube, which also carries above the cutter a rotatable flange M, faced with a washer *m*, of rubber or other suitable compressible jointing material.

When the tubular attachment is to be applied to the canister, the yoke G is placed in position so that the hooked extremities *h* of its arms *g* engage beneath the flange or beading C, and on the tube K being rotated, so as to cause the cutter L to bear upon the top *c* of the canister, the under side of the hooks or notches *h* are first drawn up tightly against the under side of the beading C, the pressure thus exerted upon which may be distributed by means of a band H, connecting the hooks *h* and extending around the corresponding half of the circumference of the yoke, so as to bear continuously on the beading. By now further rotating the tube K the cutter L will be likewise both rotated and advanced, so as to cut a circular hole in the top plate *c* of the canister, and by the continued advance of the tube the flange M will ultimately force the washer *m* into contact with said top plate, and thus form a gas-tight and water-tight joint between the tube K and the canister.

The screw-thread on the tube K is of slow pitch to enable the cutting operation to be effected with ease, and the flange M is preferably made to engage somewhat loosely with a shoulder, as at *l*, on the tube, so as to be free to accommodate itself to any irregularity of the surface of the top plate *c* of the canister.

Prior to the employment of the canister for generating the gas that end of the tube B which is attached to the bottom *a* of the canister remains closed by the latter; but when the gas is to be generated entrance is afforded to the liquid (wherein the canister is then immersed) by means of a small pin-hole, which is pierced through the bottom of the canster within the area of the tube B, as shown at D in Fig. 4. For enabling this to be done I provide on a screw-plug N, which serves for closing the outer end of the tube K when it is desired to stop the generation of gas, a short and sharp steel needle-point *n*, so that the plug constitutes a puncturing-tool. The screw-plug N is provided with a handle or wings N′, whereby to turn it, and is permanently attached to the yoke G by means of a chain, as at *n*′.

In operation, the yoke G having been engaged with the canister, the tube K is rotated, so as to cut a hole in the top of the latter and joint the tube K to the top plate *c* around the hole. The pin-hole D is then pierced in the bottom *a* of the canister, and the latter is immersed in the liquid reagent (water in the case supposed) contained in any convenient vessel. The liquid thereupon enters the canister through the hole D, and passing up the tube B and through its porous walls attacks the solid reagent from beneath, the gas evolved passing into the upper part of the canister and escaping by way of the tube K. The latter may have a flexible tube connected to its upper end for leading the gas to any point required, or a burner may be fitted directly to the top of the tube K, which may also (if desired) be fitted with a stop-cock for regulating the flow of the gas.

The generator acts on the well-known principle of the "diving-bell" type of acetylene-generator, a balance being maintained under ordinary conditions of working between the head of liquid outside the canister and the pressure of gas inside the latter, while any excess in the rate of production of the gas as compared with the consumption will result in an accumulation of pressure within the canister and (by reason of the consequent lowering of the level of the liquid therein) a proportionate diminution in the rate at which the gas is generated, so that in the event of a certain degree of pressure being attained the liquid will be entirely expelled through the pin-hole D, and the generation of gas will cease, the pin-hole D acting as a safety-valve and obviating all risk of explosion. A similar diminution and ultimate cessation in the gas production will occur if the passage of the tube K be closed—as, for instance, by the plug N or the stop-cock already referred to. By thus closing the tube K when the canister is lifted out of the liquid any balance of material remaining within the canister will be kept ready for subsequent use in consequence of the pressure of gas in the canister, causing any remaining free moisture to be driven out through the pin-hole.

The canister provided with the tubular attachment may be used in combination with a vessel for the liquid reagent, as shown in Fig. 5, so as to form therewith a self-contained apparatus. In such case the yoke instead of being in the form of an open spider-frame would consist of a closed dome G′, having hooked lugs *h* on its under side adapted to engage beneath the beading C of the canister A, as before, and provided beyond the radius of said lugs with a lip or flange O, faced with a rubber washer *o*, so as to be adapted to make joint with a corresponding flange or lip *p*, surrounding the mouth of the liquid-container P, to which the flange O may be secured by screw-clamps Q. With such an arrangement it is obviously necessary that sufficient interspace be provided between the canister A and the vessel P to hold the entire quantity of the liquid reagent if (owing to possible accumulation of pressure within the canister, as before described) so much of the

liquid as had gained access to the interior of the canister should be expelled through the pin-hole D. Such a self-contained combination as illustrated in Fig. 5 would in the case of acetylene form a very compact and convenient generator for the gas, well adapted to be used for such purposes as the supply of gas for motor-car lamps, domestic lighting, and the like, the top of the pipe K being either provided with a burner, as indicated, so that the apparatus constitutes a lamp, or being connected by a flexible tube to the burner of a lamp or lantern placed at a distance from the generator.

The canisters being of little value when empty may be thrown away after their contents have been exhausted, while the tubular attachment may be used for an indefinite number of canisters in succession.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. A charging vessel for containing carbid, said vessel being provided with a foraminous tube secured to the bottom thereof and extending to a point adjacent to the top, said bottom being adapted to be punctured within the space covered by the tube, whereby to admit water to the carbid, a tube for delivering the evolved gas, means for clamping the tube against the vessel, and manually-operated means in connection with the tube whereby to perforate the top of the charging vessel.

2. A charging vessel for containing carbid, said vessel being provided with a foraminous tube secured to the bottom thereof, and with an external circumferential bead or flange, said bottom being adapted to be punctured within the space covered by the tube whereby to admit water to the carbid, a tube for delivering the evolved gas, means engaging the flange or bead for securing the tube to the charging vessel and means within the tube whereby to perforate the top of said vessel.

3. A charging vessel for containing carbid, comprising a vessel provided with a foraminous tube arising from the bottom and extending to approximately the top thereof, said bottom being adapted to be punctured within the area of said tube, an attachment for carrying away the gas generated, and comprising a clamp for engaging the vessel, and a tube for receiving the gas, and manually-operated means in connection with the tube whereby to perforate the top of the charging vessel, the top of the clamp being provided with a screw-threaded aperture for the passage of the tube, substantially as described.

AUGUSTUS ROSENBERG.

Witnesses:
H. D. JAMESON,
F. L. RAND.