No. 626,363. Patented June 6, 1899.

T. A. BRYAN.

ACETYLENE GAS GENERATOR.

(Application filed Oct. 21, 1898.)

(No Model.) 2 Sheets—Sheet 1.

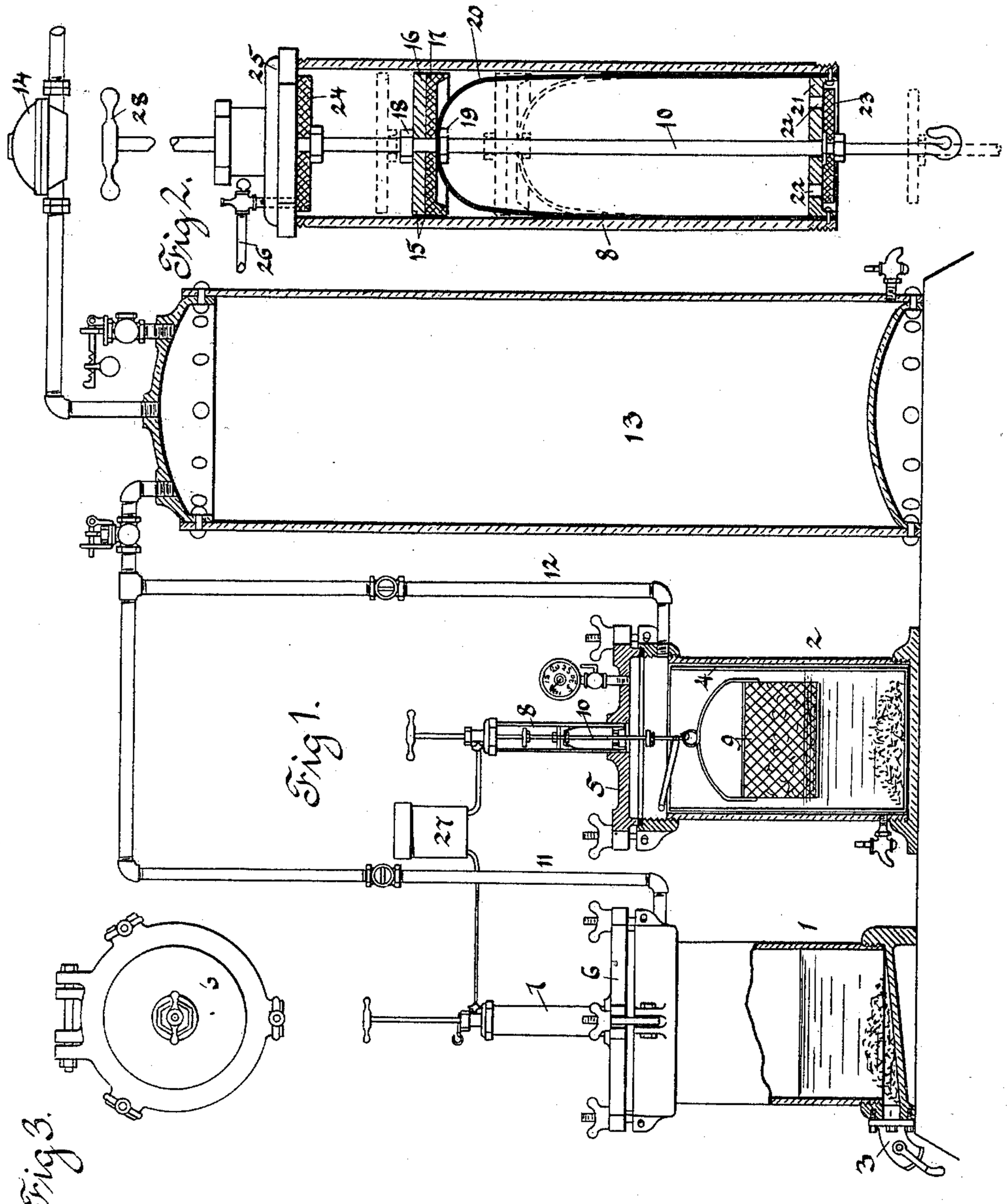

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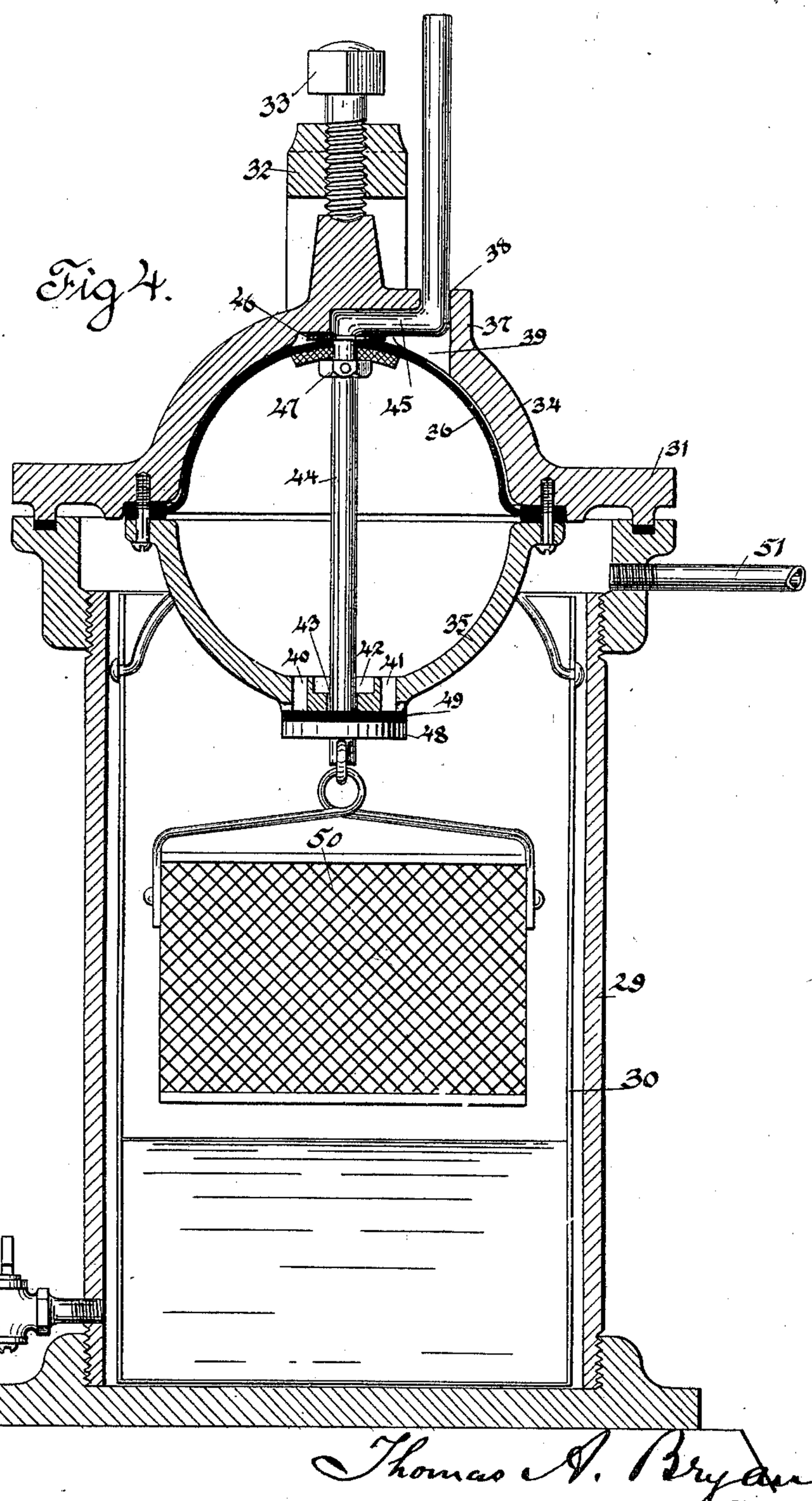
Fig 4.



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UNITED STATES PATENT OFFICE.

THOMAS A. BRYAN, OF BALTIMORE, MARYLAND.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 626,363, dated June 6, 1899.

Application filed October 21, 1898. Serial No. 694,196. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. BRYAN, a citizen of the United States of America, and a resident of Baltimore, Maryland, have invented certain new and useful Improvements in Cylinders for Acetylene-Gas Generators, of which the following is a specification.

My invention relates to acetylene-gas generators, and particularly to such as are adapted for use on railroad-trains and other moving vehicles.

My device consists of what is known as the "dip" type of machines, in which the carbid is contained in a perforated basket and is dipped from time to time into a vessel containing water and then withdrawn. In a previous application I have described and claimed the general combination of the device shown in the drawings in this case.

In an application heretofore filed I have described an acetylene-gas generator, which consists of a closed receptacle containing water with a cylinder mounted upon it, having a piston in the cylinder, and the carbid-carrying device suspended from the piston, so that the carbid-carrying device would be reciprocated by the motion of the piston under the influence of a change in gas-pressure, descending by gravity and being raised by a sufficient increase of pressure. This structure has been found to have objections—first, because it is difficult to make it gas-tight, and, secondly, because the friction resulting from a gas-tight packing of the piston makes the device too stiff in action for satisfactory work.

In order to avoid the difficulties with this device, I have devised the apparatus shown in this application, which consists in one case of a piston loose within the cylinder, so as not to generate any friction, and a gas-tight sack secured to it and to the mouth of the cylinder, which will be expanded as the pressure increases and will relax and permit the piston to descend under the influence of gravity as the pressure decreases. Should the flexible sack burst, the piston is provided with a flexible expansive flange which, under the influence of gas-pressure, will make contact with the sides of the cylinder, but in doing so will at once give rise to the undesirable friction.

In the drawings of this case I have also shown another form of device constructed on the same principle as the one just mentioned and which would be controlled by the generic claims made in this application. It consists of a generator wholly closed, so as to be gas-tight, provided with a hole in the top and a flexible diaphragm secured by a gas-tight joint over that hole. From the center of the diaphragm is suspended the carbid-basket. The increase of gas-pressure within the generator will raise the flexible diaphragm and lift the basket out of the water, while the reduction of the gas-pressure will permit the diaphragm to collapse, and by gravitation the basket will fall and dip. The special form of structure shown in Fig. 4 has advantages in operation in that it supports the diaphragm when at its extreme limit of motion, both up and down.

In the drawings, Figure 1 is a vertical elevation, partly in section, of my acetylene-gas generator. Fig. 2 is a vertical section of the improved form of cylinder construction. Fig. 3 is a plan view of the top of the generator. Fig. 4 is a vertical section of a preferred form of structure embodying my invention.

Referring to the drawings, Figs. 1, 2, and 3, 1 and 2 are generators consisting of cylinders of the same or different construction. In generator 1 the water is contained within the cylinder 1 and the carbid refuse (oxid of calcium) falls to the bottom of the cylinder and is removed with the surplus water by a sluice-valve 3. In generator 2 the form is slightly different. 4 is a water-can contained in the generator and holding water and receiving the refuse of the carbid and adapted to be lifted out of the cylinder 2 and emptied. 5 and 6 are removable covers, a plan view of which is shown in Fig. 3, which are bolted to the top of the cylinder and provided with gas-tight joints. 7 and 8 are the cylinders on the top of the generators. 9 is a basket containing carbid, suspended from the piston-rod 10 of the cylinder 8, 7 being of the identical construction. 11 and 12 are gas-pipes leading from the generator to a high-pressure storage-tank 13, and 14 is a pressure-reduction valve by which the high pressure of the receiving-tank 13 is reduced and delivered to a burner at any desired pressure.

Referring now to Fig. 2, which is an en-

larged view of cylinder 8, 15 is a piston mounted upon the rod 10, which consists of two parts. 16 is a metal plate perforated in the center and through which the rod 10 passes. 17 is a cup-shaped disk of rubber, of the same size as the disk 16 and also centrally perforated and slipped upon the rod 10. 18 and 19 are nuts screwed upon the rod 10 and which when screwed together form the piston 15, consisting of the plate 16 and the rubber cup 17. This piston is slightly smaller in diameter than the cylinder, and in consequence of the fact that the piston-rod is guided at both ends will reciprocate within the cylinder without contact with its walls unless gas-pressure be applied to its under surface. The downwardly-projecting edges of the cup 17 are made comparatively thin and flexible, so that they may be forced outward against the walls of the cylinder when a suitable pressure is applied below. 20 is an elastic sack perforated at its apex for the passage of the rod 10 and secured against the under side of the piston 15 by the nut 19, the joint formed thereby being a gas-tight joint. The lower or open end of the sack 20 is secured into the lower end of the cylinder by means of the cylinder-head 21, which is riveted or otherwise secured into the end of the cylinder. This cylinder-head 21 is perforated at 22 22. 23 is a rubber disk, also secured to the piston-rod by suitable nuts and covering the perforations 22 22 when the piston is up. 24 is another disk, also secured to the piston-rod 10 and making contact with the interior of the top cylinder-head 25. 26 is a vent through the top of the cylinder-head 25, connected with a chamber 27, which preferably contains acetylene gas. The purpose of this vent in the top is to admit gas in the upper portion of the cylinder and prevent any suction upon the piston when it descends.

The operation of my device is as follows: When the piston-rod 10, carrying the basket 9, is thrust by the handle 28 upon its upper end and plunged into the water contained in the bucket 4, gas will be generated, which will rise in the upper part of the generator 6, pass through the openings 22 22 into the cylinder-head 21, expand the elastic sack 20, push up the piston 15 until disks 23 and 24 reach the cylinder-heads, and when that occurs the basket 9 will have been lifted clear of the water. Should the pressure of the gas become so great as to rupture the elastic sack, or should it become ruptured from any cause, the cup-shaped piston, of rubber, is designed to expand under the pressure below against the walls of the cylinder and operate the device. While the friction generated by this action will be greater than is desired, still the device will continue operative and can be used until the elastic sack can be restored.

It will be observed that if the inverted elastic cup which forms a part of the piston is made with a long flexible lip it may be used without the elastic sack, for the reason that when the gas-pressure rises to a high point within the cylinder it will expand the lip against the walls of the cylinder, and increased friction due to this contact will not interfere with the satisfactory operation of the machine, because the pressure, being much greater than the friction, will overcome it. The point at which the friction is injurious is upon the descent of the piston under the influence of gravity when the gas-pressure is reduced. When, therefore, the pressure of the gases in the generator has become less in consequence of the consumption of the gas, the elastic cup will contract and leave the walls of the cylinder, remove the friction which was the result of the contact of the cup with the walls, and permit the piston to descend with a minimum of friction.

Referring now to Fig. 4, 29 is the generator, and 30 a contained water tank or bucket. 31 is a cover for the generator, which rests upon the gasket and when pressure is applied forms a gas-tight closure for it. 32 is a yoke fastening the top of the cover, and 33 a screw passing through the yoke and bearing upon the top of the cover, so as to exert suitable pressure upon its gasket. The yoke equalizes the pressure upon the gasket and maintains a tight joint thereon. The center of the cover 31 is made hemispherical in form, which hemispherical portion is numbered 34. To the interior of the cover is secured a hemispherical cup 35, which, together with the hemispherical portion of the cover 34, constitutes a complete sphere. 36 is a diaphragm secured between the cup 35 and the interior of the cover 34 by means of suitable screws and gasket-joint, so as to make a gas-tight connection. The diaphragm 36 is cup-shaped and of the same size and form as the hemispherical portion of the cover 34 and the cup 35, so that in its elevated position (shown in Fig. 4) it will coincide with the interior of the hemispherical portion 34 and when in its extreme depressed position it will coincide with the hemisphere 35. The hemispherical portion of the cover 34 is provided with a boss 37 on one side of the center and a hole 38 through it. 39 is a recess on the interior of the hemispherical portion 34. 40 and 41 are two perforations in the bottom of the cup 35, and 42 is a recess in the center of the bottom of the cup 35. In the center of this recess is an aperture 43. 44 is a rod which passes through the hole 43 and having an elbow 45 passing through the diaphragm 36 and the hole 38 in the boss 37. This rod is provided for the purpose of avoiding the yoke 32. The diaphragm 36 at the point at which the rod 44 passes through it is secured to the rod by a gas-tight joint by means of a washer or nut 46 and the nut 47. On the lower end of the rod 44 is a solid disk 48 and above that a rubber disk 49 of diameter sufficient to cover the two holes 40 and 41 when in its most elevated position. Disk

48 49 is not a valve in the true sense that it closes the apertures 40 and 41 wholly when up. It does not close them wholly, but serves primarily as a deflector to protect the interior of the diaphragm-chamber from the excessive heat of the carbid in the basket. The apertures 40 and 41 remain partially open always, so that the pressure of the gas on the interior of the diaphragm-chamber and that in the generator may be substantially the same. The deflector 48, however, makes it possible to maintain a considerably lower temperature in the diaphragm-chamber than in the generator. The same is true of the structure shown in Fig. 2, where the deflector or valve is marked 23. When the carbid is first dipped into the water, the gas is generated in the presence of an excess of water, and the temperature is consequently low. When the carbid is withdrawn from the water, the gas generated is given off as a result of the action of a limited quantity of water upon an excess of carbid, with a consequent increase of temperature. The purpose of the deflectors 23 and 48 in the two forms of apparatus is to retard the circulation of gas from the generator to the diaphragm-chamber, and thus keep down the temperature in the diaphragm-chamber. From the lower end of the rod 44 is suspended a carbid-basket 50. 51 is a gas-pipe rod from the generator. The operation of this device is practically the same as that of the other one just described, except that there is but one flexible device from which the basket is suspended. That is preferably made of rubber and cup-shaped in form, conforming to the interior surface of the hemispheres against which it will rest when in its two extreme positions. There are no joints in this device. Everything is sealed tight. The structure is simple and durable and the influence of the acetylene gas upon rubber is believed to be beneficial rather than prejudicial. The life of the apparatus therefore should be long.

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

1. In a gas-generator, the combination of a generating-chamber constructed to contain water, provided upon its top with a dome approximately hemispherical, and having upon the interior of the dome a flexible hemispherical diaphragm or section, corresponding in form with the interior of the dome, by which it will be supported throughout its entire surface when under gas-pressure, and a carbid-carrying device suspended from the flexible section or diaphragm, which by the decrease of gas-pressure within the generator will permit the carbid-receptacle by its weight to dip into the water and generate gas, and which as the gas-pressure increases will be expanded and lift the carbid-receptacle out of the water and stop the generation of gas.

2. In an acetylene-gas generator the combination, of a generating-chamber constructed to contain water with a spherical chamber mounted upon it and in communication with it, a flexible hemispherical diaphragm secured transversely of the spherical chamber, and conforming in shape with the interior of the spherical chamber when in its two extreme positions up and down, and a carbid-receptacle suspended from the diaphragm, substantially as described.

3. In an acetylene-gas generator the combination, of a gas-generating chamber constructed to contain water, a spherical chamber mounted upon it and in communication with it, a flexible hemispherical diaphragm secured transversely of the spherical chamber and conforming in shape with the interior of the spherical chamber when in either of its two extreme positions up or down, and a carbid-receptacle suspended from the diaphragm and a valve mounted upon the suspensory-rod of the carbid-receptacle which is adapted to close the communication between the generator and the chamber when the diaphragm is at its position of extreme elevation.

4. In an acetylene-gas generator, the combination of a gas-generating chamber constructed to contain water, having a cylinder mounted upon it and in communication with it, a cup-shaped piston constructed of flexible material in the cylinder and fitting tightly enough therein to be expanded as the pressure in the cylinder increases, and a piston-rod passing through the top of the cylinder and extending below the piston, and a carbid-receptacle suspended over the lower end of the piston-rod, substantially as described.

5. In an acetylene-gas generator, the combination of a gas-generating chamber constructed to contain water, having a cylinder mounted upon it, and in communication with it, a cup-shaped piston constructed of flexible material in the cylinder, and fitting tightly enough therein to be expanded, as the pressure in the cylinder increases, and a piston-rod passing through the top of the cylinder and extending below the piston and a carbid-receptacle suspended over the lower end of the piston-rod, and a flexible sack secured at its lower end to the lower end of the cylinder and at its bottom end to the piston, the piston-rod passing through its center, substantially as described.

Signed by me, at Baltimore, Maryland, this 17th day of October, 1898.

THOMAS A. BRYAN.

Witnesses:
CHARLES HUMPHREY BOONE,
GEORGE KENT.