No. 798,275. PATENTED AUG. 29, 1905.

A. FORNANDER.

ACETYLENE GAS GENERATOR.

APPLICATION FILED DEC. 9, 1899.

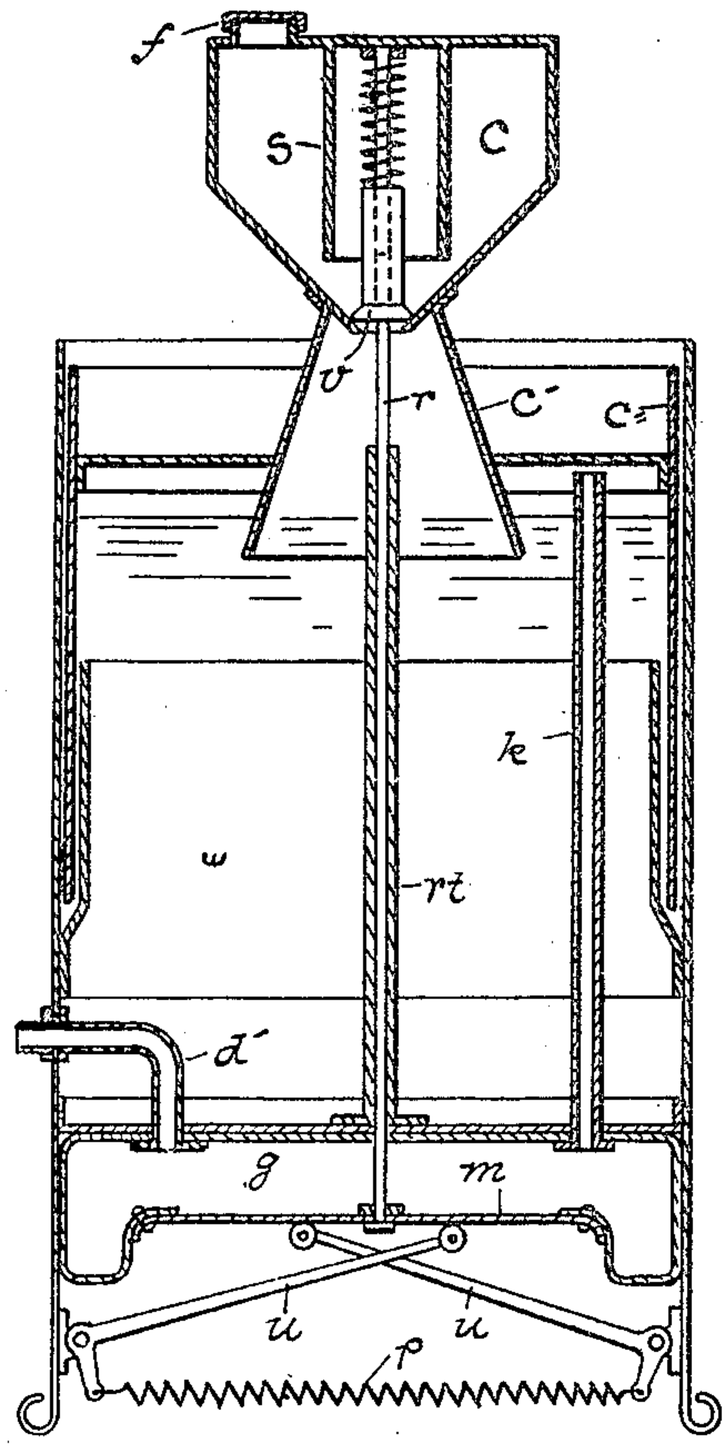

Fig. 3.

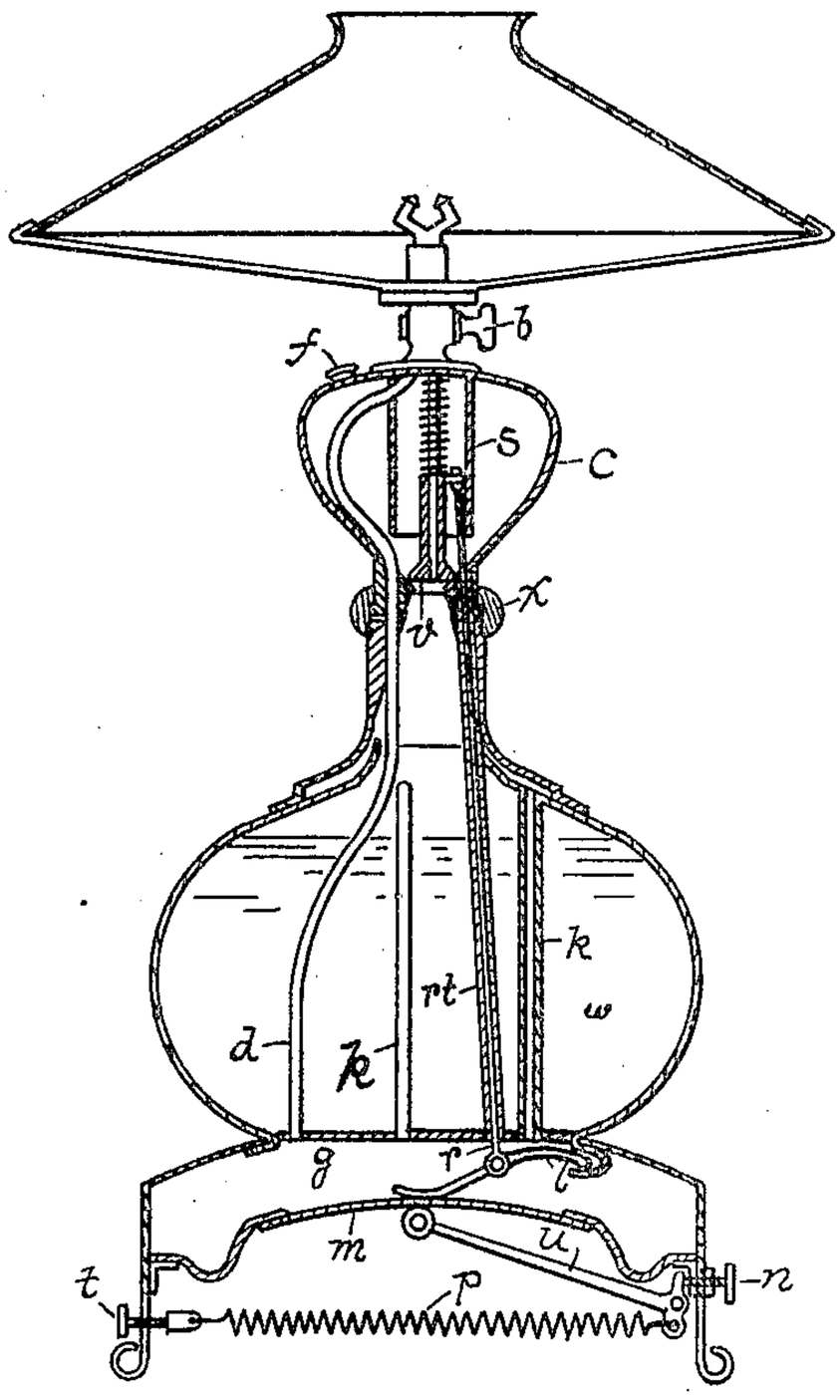

Fig. 1.

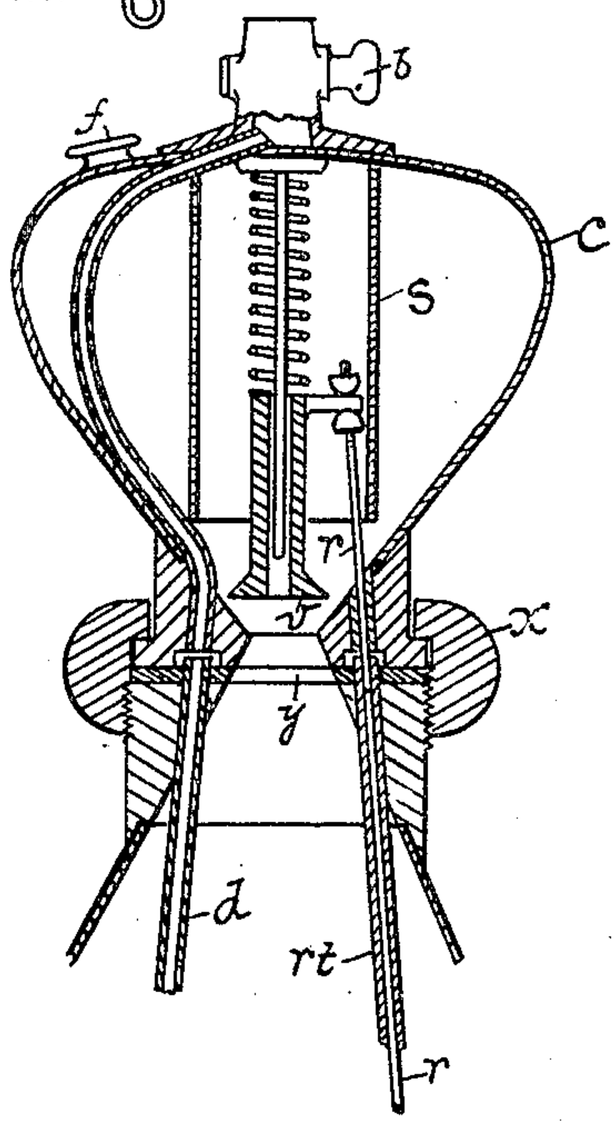

Fig. 2.

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UNITED STATES PATENT OFFICE.

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ACETYLENE-GAS GENERATOR.

No. 798,275. Specification of Letters Patent. Patented Aug. 29, 1905.

Application filed December 9, 1899. Serial No. 739,852.

To all whom it may concern:

Be it known that I, ALFRED FORNANDER, a subject of the King of Sweden and Norway, and a resident of New York city, State of New York, have invented certain new and useful Improvements in Gas-Generators, of which the following is a description, referring to the accompanying drawings.

The invention is particularly adapted to acetylene-lamps in which the gas is generated within the apparatus of the lamp, though of course the invention is not limited to these conditions.

It is also particularly adapted to portable apparatus of the type in which pulverized carbid is fed little by little, as required, to the water.

In such lamps and in such apparatus the chief difficulty has been to combine simplicity of construction and operation with certainty and constancy of operation.

The object of this invention is to overcome these difficulties and also to improve and perfect the construction and operation of the gas-generating apparatus.

A few preferable forms of the invention are shown in the accompanying drawings, wherein—

Figure 1 is a vertical central section of a lamp, omitting only features that are immaterial to the present invention. Fig. 2 is an enlarged sectional detail of parts of the same. Fig. 3 shows a modification adapted for use either with or separate from the burner or lamp proper.

Under this invention the carbid, preferably in the form of fine powder, is held in a chamber above the water-space. An opening or passage-way permits the carbid to fall into the water. A stop or valve controls the rate of feed of the carbid and may also serve to prevent the water-vapor from reaching the carbid when no gas is being drawn off. An expansible gas-holder actuated by spring-pressure or the equivalent regulates the gas-pressure for which the device is set. When the gas is drawn off, the closing of the gas-holder beyond the predetermined limit opens the carbid-valve and admits more or less carbid to the water. The carbid is kept from interfering with the valve by a support or shield above the valve which permits only a certain small amount or layer of carbid to fall down upon or around the valve. The valve is preferably of yielding material, such as rubber, so as to close securely even if some particles of the carbid lie under the edge of the valve. A spring may be added to the weight of the valve and its moving parts to assist its closing, if desirable.

In the form of the invention shown in Figs. 1 and 2 the carbid-chamber is marked *c*, the water-chamber *w*, and the gas holder or bellows *g*. The carbid-chamber is of a graceful form converging downward and may be provided with a filling-opening and cap *f*. Above it is mounted the tip holder and burner *b*, and within it is the valve or stop *v*, moving loosely on the vertical guide and preferably provided with a downwardly-pressing spring, as shown. Surrounding the spring and extending in the vicinity of the valve is a protecting-tube or carbid-support *s*, which screens these movable parts from the weight and friction of the carbid and allows only a thin layer of carbid to slip down to the valve and the opening or passage-way beneath it. Thus the valve acts at all times with equal freedom regardless of the amount of carbid in the chamber. The valve-operating rod *r* extends downward in two pieces through the rod-tube *rt*. The lower piece or section pivotally carries the small lever *l*, one end of which is slightly movable in the recess in the expansible holder or bellows *g*, while the other end rests against the movable diaphragm *m* of the bellows. The diaphragm or movable part of the bellows consists of a rubber or other annular sheet of material stretched about a rigid central disk, preferably of metal, and secured to the sides of the holder. An upwardly-pressing lever *u*, pivoted at the side of the apparatus and actuated by pressure-spring *p*, presses centrally upon the diaphragm *m* and determines the pressure of the gas in the lamp. The tension-screw *t* and nut secured to spring *p* render the tension of spring *p* adjustable at will. This arrangement of spring and lever permits a considerable movement of the diaphragm without appreciable variation in gas-pressure, a result of great importance.

In the figures it will be seen that the spring *p* is attached to the short arm of the lever *u*, so that said spring is but slightly extended or contracted by the operation of the apparatus, although the end of the long arm of the lever

u has a multiplied or extended range of movement. Diaphragm *m* may thus have an extended movement without materially varying the tension of the spring *p*, thus maintaining a substantially constant gas-pressure unaffected by large variations in spring tension.

One or more pipes *k* conduct the gas from above the water to the holder *g*, and discharge-pipe *d* carries the gas from the holder to the burner. The carbid-chamber and all the upper parts are entirely detachable from the water-chamber and lower parts of the lamp to afford ready access for cleaning out and refilling. For this purpose the carbid-chamber is provided with a strong base where it rests upon a similarly-reinforced section or ring on the water-chamber, as seen in Fig. 2. A rubber washer or packing-ring *y* is interposed, and a screw-ring *x* draws the parts together upon the packing. Rod-tube *rt* terminates at or just above the rubber washer. The lower section of the valve-rod *r* preferably terminates at about the same point. The upper section of the rod runs down through and is guided by the reinforced section of the carbid-chamber wall and rests on the end of its lower section, so as to be actuated upward by it. The discharge-tube *d* is also divided in the vicinity of the washer *y*, as shown, so that the carbid-chamber may be completely detached from the water-chamber and lower parts of the lamp.

The operation is as follows: The parts being in operative position, as shown, and gas being drawn off through pipe *d*, the lever *u* presses diaphragm *m* upward, and consequently by lever *l* and rod *r* raises valve *v*, allowing a little carbid to fall into the water. Thereupon the gas generated again expands the holder *g*, reversing the action and letting the valve *v* reseat itself. This operation continues without variation in mean pressure until all the carbid is exhausted, whereupon the diminution of pressure shows in the lamp-flame and indicates the need of recharging. The pressure of lever *u* may thereupon be relieved either by detaching spring *p* or by depressing lever *u* by means of the screw *n*. Then the ring *x* may be unscrewed and the carbid-chamber taken off, &c. The carbid can, however, be charged into the chamber by merely taking off cap *f*, if desired.

In Fig. 3 the construction differs somewhat. The carbid-chamber has a downwardly-flaring extension *c'* and a water-sealing flange *c''* instead of being secured by the screw-ring *x*. The flaring extension projects into the water and shields the end of the gas-pipe *k* from the spattering of the carbid as it drops into the water. The valve *v* rests on the end of the rod *r'*, which in turn rests directly on the diaphragm *m*. The rod-tube *rt* is therefore central and should fit closely at its upper end about the rod, so as to prevent clogging either by the powdered carbid or the froth or spatterings from the water beneath. The discharge-pipe *d'* may lead laterally from the apparatus, as shown. Two or more spring-pressed levers *u* may be used.

In both the forms of apparatus the walls immediately beneath the valve-opening diverge or flare rapidly. This is to prevent the building up of bubbles or froth from water to the valve and the consequent possible clogging of the valve.

The novel and characteristic features which distinguish this invention are as follows:

1. In a gas generator or lamp, tanks or chambers for separately holding gas-generating elements, a passage from one to another, a valve between them, an expansible and collapsible gas-chamber in communication with the gas-space in said tanks, said valve being connected with said expansible and collapsible gas-chamber in such manner that when the latter is expanded the passage from one said tank or chamber to the other is closed, a lever in engagement with said collapsible gas-chamber and adapted to move therewith, means for imparting upward movement to said lever, and a screw arranged for acting upon said lever to limit its upward movement, and to move it away from the gas-chamber to extinguish the lamp.

2. An acetylene-generator provided with a carbid-chamber and a valve for controlling the discharge of carbid therefrom to water, an expansible and collapsible gas-chamber for receiving the gas-generator, a connection engaging a movable wall of the gas-chamber and connected with the valve for operating the same, a pivoted lever engaging said movable wall, and a spring coacting with said lever and pressing it against the wall of the chamber in opposition to the pressure of the gas therein.

3. An acetylene-generator provided with a carbid-chamber and a valve for controlling the discharge of carbid therefrom to water, an expansible and collapsible gas-chamber for receiving the gas generated, a connection engaging a movable wall of the gas-chamber and connected with the valve for operating the same, a pivoted lever engaging said movable wall, and an adjustable spring coacting with said lever and pressing it against the wall of the chamber in opposition to the pressure of the gas therein.

4. An acetylene-generator provided with a carbid-chamber and a valve for controlling the discharge of carbid therefrom to water, an expansible and collapsible gas-chamber for receiving the gas generated, a connection engaging a movable wall of the gas-chamber and connected with the valve for operating the same, a pivoted lever acting against the wall of the chamber, an adjustable spring connected with said lever for imparting pressure thereto and to the chamber in opposition to the pressure of the gas, and a screw acting

upon said lever to limit its movement toward the wall of the gas-chamber and for moving said lever away from said wall in opposition to its actuating-spring.

5. An acetylene-generator having a water-chamber and a carbid-chamber detachably secured above it, each chamber provided with a gas connection and a valve-operating rod, said gas connections and rods adapted to register at the meeting point of the two chambers, and adjustable means located at the point of union for detachably securing the chambers together by a gas-tight connection.

6. In combination in an acetylene-generator, a water-chamber, a carbid-chamber detachably secured thereto, a carbid-feeding mechanism therefor, an expansible gas-holder beneath the said water-chamber, an operating-rod extending therefrom to the carbid-feeding valve and made in two pieces, an extension rising from the holder through the water-chamber and into the carbid-chamber and also in two parts, a gas connection from said holder extending upward through the water and gas chambers and also separable at their meeting point, and adjustable means for connecting the carbid and water chambers, the gas connection, and the valve-operating rod and its casing, detachably, at the point of union between the carbid and water chambers.

7. The combination with an expansible and collapsible gas-chamber, of a valve controlled thereby, a lever having unequal arms constructed to oppose the movement of the expansible and collapsible portion of the gas-chamber, and a spring controlling said lever connected to the shorter arm of the lever, whereby the tension of the spring is not substantially varied in the operation of the apparatus.

8. The combination with an expansible and collapsible gas-chamber, of a valve controlled thereby, a device for multiplying motion constructed to oppose the movement of the collapsible and expansible portion of the gas-chamber, a spring controlling said device, so arranged that its tension is not substantially varied in the operation of the apparatus, and means for controlling the tension of said spring.

Signed this 3d day of October, 1899, at New York city.

ALFRED FORNANDER.

Witnesses:

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