No. 677,152. Patented June 25, 1901.

C. W. BECK.

ACETYLENE GAS GENERATING LAMP.

(Application filed Aug. 2, 1897.)

(No Model.)

FIG. 1.

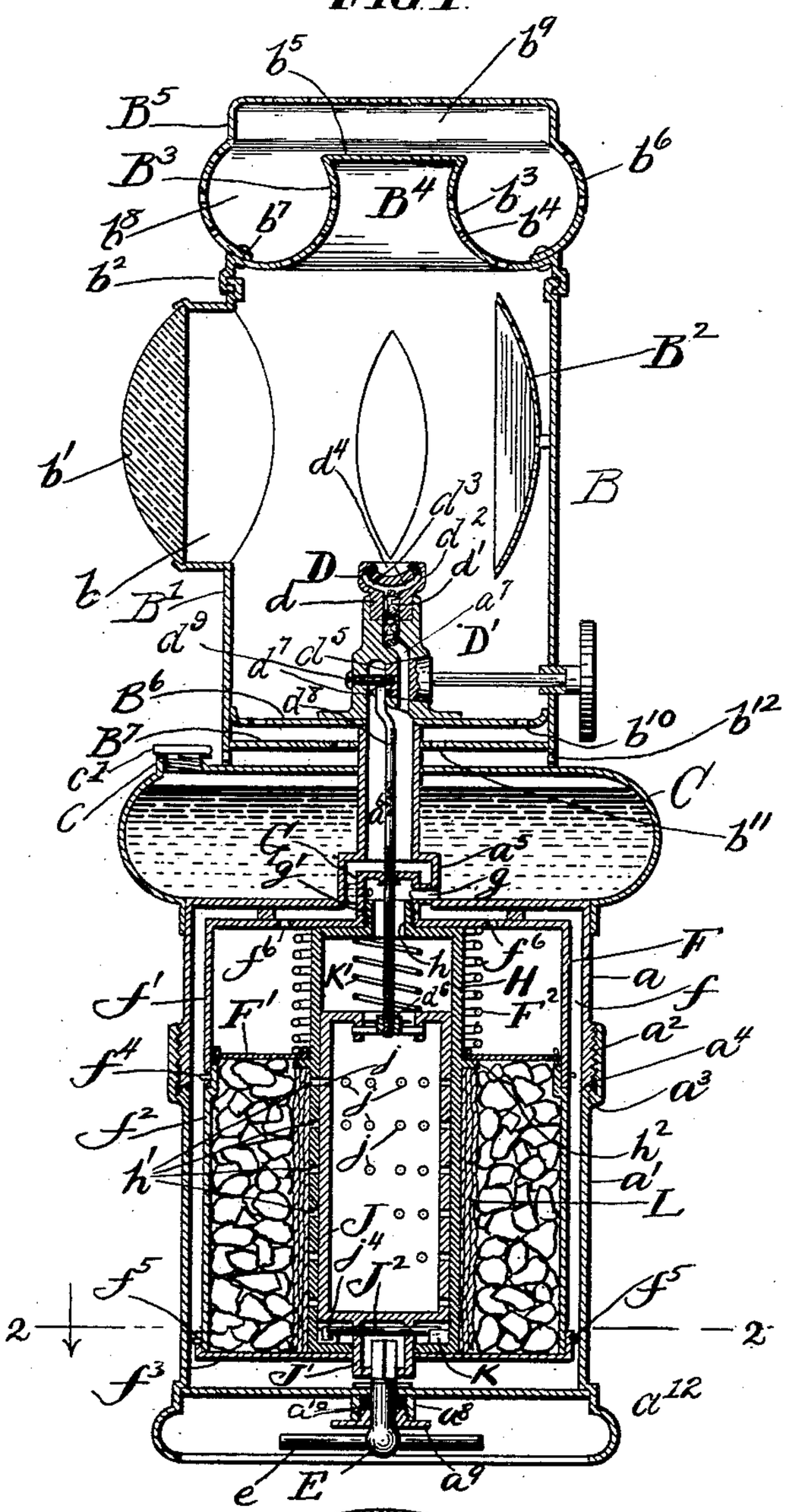
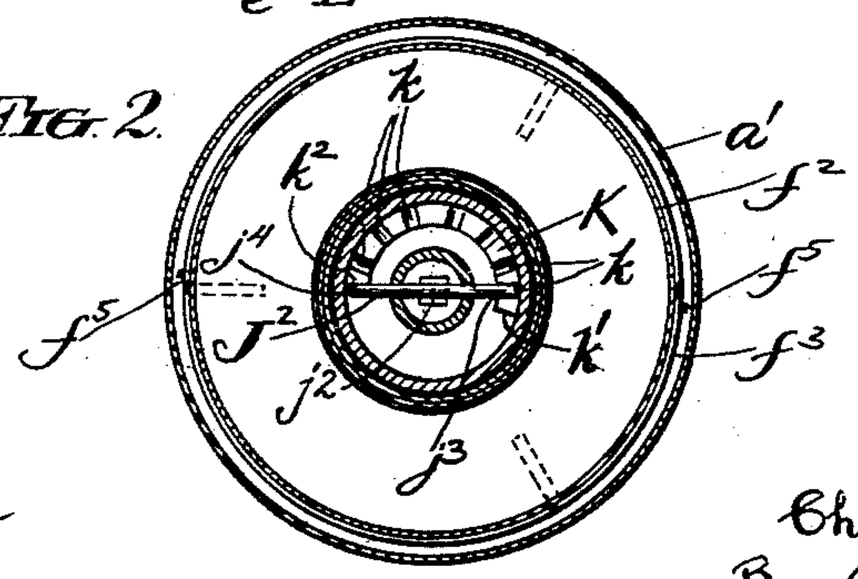


FIG. 2.



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UNITED STATES PATENT OFFICE.

CHARLES W. BECK, OF CHICAGO, ILLINOIS.

ACETYLENE-GAS-GENERATING LAMP.

SPECIFICATION forming part of Letters Patent No. 677,152, dated June 25, 1901.

Application filed August 2, 1897. Serial No. 646,718. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. BECK, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Lamps for Generating and Burning Acetylene Gas, of which the following is a specification.

This invention relates to improvements in lamps for generating and burning acetylene gas of that type wherein the gas is consumed directly or practically as fast as generated as distinguished from lamps or generators provided with a gasometer or storage vessel in which the gas is passed previously to its transmission to the burner.

The invention refers principally to portable lamps, although certain features of the invention are capable of embodiment in stationary generators, and the particular type chosen to illustrate a practical embodiment of the invention is a bicycle-lamp.

A principal object of the invention is to provide an improved means for maintaining an adequate and properly-regulated supply of liquid to the carbid, it being understood that the rate of generation of gas is directly proportional to such supply.

Other objects of the invention are to provide improvements in the details of construction whereby the carbid will be kept in a compact body and the moist and slaked or exhausted carbid thereby prevented from intermingling with the active carbid, while at the same time provision is made for the increase in bulk incident to the slaking of the material, to so arrange the parts that the carbid will be kept in a receptacle by itself and both the dust of the dry carbid and the sludge or slake residue of the exhausted carbid effectually prevented from getting into the operative parts of the lamp, to provide means whereby the regulation of the lamp may be effected and known in the dark as well as in the daytime and whereby the amount of liquid supplied may be instantly changed or regulated to suit the different conditions of the atmosphere, of the weather, or different qualities of carbid used, and to so improve the construction and arrangement of the parts generally as to produce a more efficient, reliable, and convenient lamp.

The invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims, and the same will be readily understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is an axial vertical sectional view taken on a diameter passing through the center of the lens of the headlight. Fig. 2 is a horizontal sectional view taken on line 2 2 of Fig. 1 and looking downwardly.

Referring to said drawings, A designates as a whole the generator, B the headlight, attached to and supported above the generator, and C the liquid-reservoir, mounted upon the upper end of the generator and between the latter and the headlight.

First describing the generator in detail, $a\,a'$ respectively designate the top and bottom members of a two-part outer cylindric or can-shaped body constituting a gas-tight receptacle within which the gas is generated. Said parts are united at a point intermediate the height of the body by means of a screw-threaded joint a^2, the upper member being to this end externally screw-threaded at its lower end and the upper end of the lower member slightly enlarged annularly, so as to telescope over said upper member, and internally screw-threaded to receive the latter. In order to insure a gas-tight joint, the lower member is provided at the angle formed at the junction of the annularly-enlarged portion with the main body with an upstanding circumferentially complete knife-edge a^3, which fits within a corresponding V-shaped groove a^4, formed in the lower edge of the upper member.

The generator-body is provided at its top, centrally thereof, with a cylindric extension a^5, which is in turn provided at its center with a tubular extension or pipe a^6, with which is engaged a suitable gas jet or burner nozzle D. The particular burner-tip shown herein is of peculiar construction, and consists of a stem portion d, provided with a single axial bore d' and arranged to fit at its lower end tightly within a suitable socket formed in the upper end of the pipe a^6 and having an enlarged head portion d^2, which is provided with two diametrically opposite di-

vergent or branching ducts or passages d^3, which communicate with the main central duct d' and are turned inwardly at their extreme exit ends, so as to direct the jets issuing therefrom obliquely upward and toward each other. The result of this construction is that the two jets impinge against each other and form a single jet broader and of greater volume than would be the case were a single opening of the same capacity as the two outlets combined used. In order to afford abundant access of air to the base of the jets, the tip is hollowed out or made somewhat concave between the jet-openings, as indicated clearly at d^4. The interior of the tip is preferably filled with a packing of porous filtering material d', which serves not only to filter and to a certain extent dehydrate the gas, but also aids materially in preventing the lamp from being extinguished by jars or jolts. The lower member of the generator-body is also provided centrally of its end wall a^7 with a nipple a^8, which is internally threaded and closed by means of a screw-cap a^9, provided with an enlarged head suitably milled at its periphery for engagement with the fingers for manipulating the cap. Both the screw-cap a^9 and the end wall are centrally apertured for the reception of an operating-shank E, provided at its outer end with a handle or finger-bar e and adapted to operate the regulating mechanism of the lamp, as will be hereinafter more fully described, and in order to form a gas-tight joint around said shank an impervious packing a^{10} is arranged within the nipple, between the screw-cap and opposing end wall, as indicated clearly in the drawings.

Preferably the lamp-body will be provided at its lower end with an annular depending flange a^{12}, which extends low enough to protect the operating device E and forms a base upon which the lamp may stand firmly.

Next describing the carbid-holder proper, the latter constitutes a separate and independent receptacle, (designated as a whole by F,) of the same general form, but of slightly-smaller dimensions than the outer receptacle, and within which latter said carbid-receptacle is so arranged as to provide a surrounding space or air-jacket f, extending upon all sides thereof. The said carbid-receptacle consists of upper and lower members f' f^2, respectively, conveniently and in the present instance arranged to separate at a point approximately horizontally opposite the line of separation of the outer casing, and a removable lower end cap f^3. As an efficient and desirable construction the form of connection between the upper and lower members and also between the lower member and the end cap is that of a "bayonet-joint," as indicated at f^4 and f^5, respectively.

In use the lower part of the carbid-receptacle will preferably be filled to a point level with the upper edge thereof, as will be hereinafter more fully described.

Next describing the means whereby the liquid is conveyed and distributed to the body of carbid contained in the carbid-receptacle in such manner as to produce a substantially uniform generation of gas, G designates a hollow cap forming an extension of the upper member f' of the carbid-holder, arranged centrally within the cylindric extension a^5 and provided near its upper end with one or more radial horizontally-extending inlet-pipes g, which communicate with the reservoir C. The reservoir is desirably and as shown provided with spherical sides and made of relatively large diameter and correspondingly shallow in depth, so as to reduce the height of the lamp as a whole to a minimum. A suitable filling-aperture c is provided, which is closed by a screw-cap c'. The lower end of said cap G is internally screw-threaded, as indicated at g', and connected therewith by means of a nipple h is a cylindric distributing-chamber H, arranged to depend centrally within the carbid-receptacle. In order to regulate the escape of liquid received by the distributing-chamber from the reservoir, said chamber is provided with a plurality of series of outlet-apertures h', placed at suitable intervals apart throughout the height of that portion of the distributing-chamber which extends within the lower part or section of the carbid-receptacle proper, and with said outlets is arranged to coöperate a valve-sleeve J, which fits accurately within the distributing-chamber and is adapted to be rotated therein. The valve-sleeve J is provided with a series of outlet-apertures j, so arranged that when the valve-sleeve is in one certain position a single outlet j will be brought into communication with the uppermost one of the series of outlets h' in the distributing-chamber. When the valve-sleeve is rotated a step farther, a second outlet-aperture of the valve-sleeve will be brought into communication with the uppermost outlet of the distributing-chamber, and at the same time another outlet-aperture directly beneath will be brought into communication with the next lower outlet of the distributing-chamber, and upon the next step in the movement of the valve-sleeve three outlet-apertures of the latter will be brought into communication with the corresponding outlets of the distributing-chamber, and so on in a gradually-increasing series until the distributing-chamber is placed in communication with the carbid-chamber throughout the full height of the body of carbid. In order that the valve-sleeve may be rotated step by step the exact distance required to bring its outlets into register with the outlets of the distributing-chamber, and in order also that this step-by-step movement may be made perceptible to the operator through the sense of feeling, so that the regulation may be accomplished in the dark, means are provided as follows: At its lower end the valve-sleeve J is provided with a tubular projection J' of re-

duced diameter and arranged concentrically with the axis of the sleeve, which projection extends through suitable apertures formed in the end walls of the distributing-chamber and the end-closing cap of the carbid-chamber, respectively. The lower end of the tubular projection J′ is closed by an end wall j', which is provided with a polygonal-shaped aperture j^2, adapted to receive the correspondingly-shaped inner end of the operating-shank E, whereby the valve-sleeve may be positively rotated. In the lower end of the distributing-chamber and interposed between the end wall of the latter and the superjacent wall of the valve-sleeve is arranged a semicircular upwardly-facing ratchet K, provided with a series of ratchet-notches k, corresponding to the several vertical series of outlet-apertures of the valve-sleeve.

J^2 designates a ratchet-bar arranged to extend diametrically through the tubular projection J′, one end j^3 of said ratchet-bar being arranged to engage the semicircular ratchet, while the opposite end j^4 is turned at right angles downwardly and is adapted to act as a stop to contact with the ends k' and k^2 of the ratchet, and thereby limit the rotation of the valve-sleeve in each direction.

K′ indicates a spiral expansion-spring interposed between the upper end of the valve-sleeve and the opposing end wall of the distributing-chamber, by which means the valve-sleeve and ratchet-bar carried thereby are held in contact with the semicircular ratchet, and in order that the ratchet-bar may be forced out of the ratchet-notches and the valve-sleeve rotated in either direction by the application of sufficient torsional force upon the operating-shank the said ratchet-bar is made round upon its lower side at that end which engages the ratchet-notches, and the latter are also of semicircular form. It will of course be understood that when the valve-sleeve is rotated to one extreme of movement the outlet-apertures of the sleeve will be brought into such relation to those of the distributing-chamber as to completely shut off communication between the distributing-chamber and the carbid-receptacle. In order that the distribution of the liquid may be rendered more perfect and also to prevent access of carbid to the outlet-apertures of the distributing-chamber and valve-sleeve, that part of the distributing-chamber which extends within the body of carbid is provided with a covering L, of absorbent material—such, for instance, as a sheet of felt or winding of linen, yarn, or the like.

In order to provide for the increase in bulk incident to the slaking of the carbid and at the same time to hold the carbid compactly together, a movable diaphragm or follower F′ is arranged to slide in the upper part of the carbid-holder and is normally forced downward into bearing with the body of the carbid by means of a coiled expansion-spring F^2, interposed between said follower and the opposing upper end wall of the carbid-holder. In order to limit the downward movement of the follower, the distributing-chamber is provided with an external annular flange h^2, against which the follower is adapted to rest when forced downward to its lowermost limit or when the lower part of the carbid-receptacle is removed for emptying or recharging the same.

It is to be understood that the follower does not form a gas-tight partition between the upper and lower parts of the carbid-holder, nor is the carbid-holder proper intended to be gas-tight. From the upper part of the carbid-holder the gas passes upwardly through outlet-apertures f^6 into the extension a^5 of the generator, and thence through the pipe a^6, with which the jet-nozzle communicates, as hereinbefore described.

Means are provided whereby the gas may be shut off from the burner and simultaneously therewith the valve-sleeve so moved as to cut off the supply of liquid to the carbid, thereby interrupting the generation of gas, said means being constructed and arranged as follows: The upper end portion of the pipe a^5 is formed from solid metal and is provided with a relatively small gas-passage a^7, which extends axially through the upper portion thereof, but is deflected to one side at the lower portion of said part, as indicated clearly in the drawings. Within said lower portion is seated a transversely-arranged rotary valve plug or cock D′, said cock being so arranged as to intersect the gas-passage and being itself provided with a transverse gas-passage, which is adapted to register with the gas-passage of the pipe when in one position and to cut off said passage when the cock is rotated in the usual manner. The said valve-plug extends only partly through the body of the pipe a^6 and is provided with a truncated end d^5, which terminates within the pipe a^6. The truncated end of the valve-plug carries an eccentrically-arranged wrist-pin d^7, with which is connected a rod or stem d^8, which extends downwardly through a closely-fitting passage formed in the cap G of the generator and has swiveling connection d^6 at its lower end with the valve-sleeve J. The arrangement of the wrist-pin of the valve-plug with relation to the gas-passage through the latter is such that when the valve-plug is rotated to cut off the gas-passage the valve-sleeve will be lifted bodily, thus carrying its several outlet-apertures out of register with the outlet-apertures of the distributing-chamber. At the same time as long as the valve-plug remains open the valve-sleeve may, by reason of the swiveling connection, be rotated freely to regulate or cut off the supply of liquid. In order to hold the valve-plug firmly to its seat, a screw d^9 is inserted through the wall of the pipe a^6 and threaded into the end of said plug, axially thereof, as indicated clearly in Fig. 1.

Next describing the headlight or flame-

chamber, the latter is shown in the present instance as consisting of a main cylindric body B′, provided with the usual circular lens-opening *b*, within which is fitted a plano-convex lens *b*′. At a point diametrically opposite said lens a concave reflector B^2 is suitably mounted within the chamber. The upper end of said cylindric body is closed by means of a hood of novel construction, comprising an inner cap B^3, the outer rim b^2 of which telescopes over and is suitably connected with the upper end of the cylindric body, while the central portion thereof has the form of a contracted upward extension B^4, having concave outer sides b^3 of foraminated construction or provided with a plurality of outlet-apertures b^4 and a closed top b^5. Over this inner cap B^3 is secured a second outer cap B^5, the lower part of the rim of which is swelled outwardly, as indicated at b^6, and united at its extreme lower margin b^7 to the inner cap, the space intervening between the inner and outer cap having the form of an annular chamber b^8, open at its upper side and communicating with a cylindric space b^9. Both the outwardly-swelled sides of the outer cap and the flat top portion of the latter are provided with outlet-apertures or are of foraminated construction, so as to afford exit of the products of combustion. The hood thus formed is not only extremely economical and simple in construction, but serves to effectually baffle air-currents and prevent their reaching the flame, while at the same time the inner cap, separated from the outer cap by the body of air or gas, prevents the outside of the hood from becoming extremely hot and dangerous to handle.

In order to afford sufficient access of air to the burner through the base of the headlight and at the same time to baffle air-currents, the lower part of the headlight is provided with a plurality of diaphragms B^6 B^7, which are provided with annular series of inlet-apertures b^{10} b^{11}, offset or arranged out of line with each other. Ingress of air to the lower part of the headlight, beneath the lowermost baffle-plate, is provided by means of a circumferential series of inlet-apertures b^{12}.

In using the lamp thus described the operator will first remove the lower part of the generator proper, the shank of the valve-operating device being withdrawn from engagement with the tubular extension of the valve-sleeve and removed, together with the said lower member. The lower end cap of the carbid-receptacle will next be disengaged and removed, the lamp inverted, and the lower chamber of the carbid-receptacle, or that portion thereof below the movable follower, filled with carbid around the wick-covered distributing-chamber until it is level full, the said follower forming the bottom of the receptacle while the lamp is thus in inverted position. The end cap of the carbid-holder and the lower part of the generator-body will then be replaced successively, it being noted that the engaging end of the valve-sleeve-operating device will automatically enter the tubular extension of the valve-sleeve, so as to close all outlets of the distributing-chamber. The liquid-reservoir will now be opened and filled and the cap returned to place, whereupon the lamp will be ready for use and may be brought into operation by simply turning the valve-operating handle one step, waiting a moment for the generation of gas to begin, and then lighting the burner. The regulation of the size of the flame may be accomplished in the manner hereinbefore fully described, and it is to be noted that the rate of generation may be augmented or decreased almost instantly at any time during the operation of the lamp by simply turning the valve-operating handle a step in one direction or the other, as required, and that this regulation may be accomplished with as great certainty and readiness in the dark as in daylight, because of the yielding spring-pressed-ratchet construction which enables the operator to distinctly feel when the sleeve has been rotated from one notch to the next. As the carbid slakes it expands or increases in bulk to a considerable extent, and this expansion is provided for by the movable spring-pressed follower. At the same time the follower serves to hold the carbid in compact form and prevents the latter from being shaken up in such manner as to intermingle the moist carbid with that which is dry. This is a feature of especial importance, because it has been found that in practice the shaking up and intermingling of the moist and dry carbid is followed by a sudden and greatly increased generation of gas, which not only increases the flame beyond the capacity of the headlight, but may even result in an explosion of the lamp.

Owing to the expansion of the carbid in slaking, the residue has a decided tendency to pack or become caked within the carbid-receptacle, so that it is more or less difficult to remove the same. This is especially true when the exhausted residue is allowed to remain in the lamp for a considerable period of time after the lamp has been used, in which event it becomes caked into a relatively hard and solid mass. It is one of the principal objects of the peculiar construction of the carbid-holder described herein to provide ready means for loosening and removing the residue when it has thus become caked. When the holder is thus filled with residue which will not readily fall out when the lower end cap is removed, the lower end part of the holder may be separated from the upper part, whereupon access may be had to both ends of the mass. The withdrawal of the distributing-chamber from the mass will of course leave a central cored-out opening, so that by rapping the sides of the cylindric holder the mass will be broken up and fall out readily.

I claim as my invention—

1. In a lamp for generating and burning

acetylene gas, the combination of a carbid-receptacle adapted to confine the carbid and the residue provided at one side with a substantially imperforate movable wall or follower, a spring arranged to hold said movable part in yielding contact with the body of carbid and means for feeding water to the carbid.

2. In a lamp for generating and burning acetylene gas, the combination of a receptacle for the carbid, a substantially imperforate movable diaphragm arranged to fit and move within a part of said receptacle of uniform cross-sectional form and adapted to rest upon and confine the body of carbid and residue within the receptacle, and a spring arranged to act upon said diaphragm to hold it in yielding contact with the body of carbid and residue.

3. In a lamp for generating and burning acetylene gas, the combination of a carbid-receptacle constructed to open or separate midway of its height, a movable diaphragm arranged within one of said parts and held adjacent to the mouth thereof or point of connection with the other member, whereby when the said other member is filled and the two parts assembled together the diaphragm will rest in contact with the body of carbid, and a spring arranged to hold the diaphragm in yielding contact with the body of carbid.

4. In a lamp for generating and burning acetylene gas, the combination of a carbid-receptacle and a cylindric distributing-chamber arranged concentrically with the carbid-receptacle, a rotatable valve-sleeve arranged to control the flow of liquid from the distributing-chamber to the carbid, a ratchet arranged to act upon one end of said valve-sleeve and a spring arranged to hold the valve-sleeve in yielding engagement with the ratchet, an operating-shank engaged with and extending in axial alinement with said rotatable sleeve, one end of said shank being and extending out through the wall of the generator and provided with means for operating it, and an external source of liquid-supply communicating with the distributing-chamber.

5. In a lamp for generating and burning acetylene gas, the combination with a headlight, and a generator-body supported beneath the same and embracing two members constructed to separate at a point intermediate of the height of the generator-body, an inner carbid-holder of smaller dimensions than the generator and so secured within the latter as to provide an enveloping insulating-space between the outer and inner parts, said carbid-holder being also constructed to separate at a point intermediate of its height, a removable end closure for the lower end of the carbid-holder of substantially the full cross-sectional area of the latter, a distributing-chamber arranged to extend vertically within the carbid-holder, centrally thereof, and provided with perforated side wall, a valve-sleeve arranged to fit within said distributing-chamber and provided with outlet-apertures adapted to be brought into register with those of the distributing-chamber, a ratchet arranged to control the position of said valve-sleeve, means extending without the generator for operating said valve-sleeve, a movable spring-pressed, follower arranged within one end of the carbid-receptacle and adapted to hold the body of carbid together with a yielding pressure, and an external source of liquid-supply communicating with the distributing-chamber.

6. In a lamp for generating and burning acetylene gas, the combination with a burner, and a generator-body supported beneath the same and embracing two members constructed to separate at a point intermediate of the height of the generator-body, of an inner carbid-holder of smaller dimensions than the generator and so secured within the latter as to provide an enveloping insulating-space between the outer and inner parts, said carbid-holder being also constructed to separate at a point intermediate of its height.

7. In an acetylene-generator, a carbid-chamber, a liquid-distributing chamber located within the carbid-chamber, a supply-reservoir in open communication with the distributing-chamber, one or more distributing-openings in said distributing-chamber and means for regulating the discharge of liquid therethrough.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two subscribing witnesses, this 26th day of July, A. D. 1897.

CHARLES W. BECK.

Witnesses:
HENRY W. CARTER,
A. H. GRAVES.