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H. AMRHEIN, EXECUTOR OF H. IDEN, DEC'D.

ACETYLENE GAS LAMP.

APPLICATION FILED JAN. 29, 1910.

1,149,522.

Patented Aug. 10, 1915.

2 SHEETS—SHEET 1.

Fig. 3.

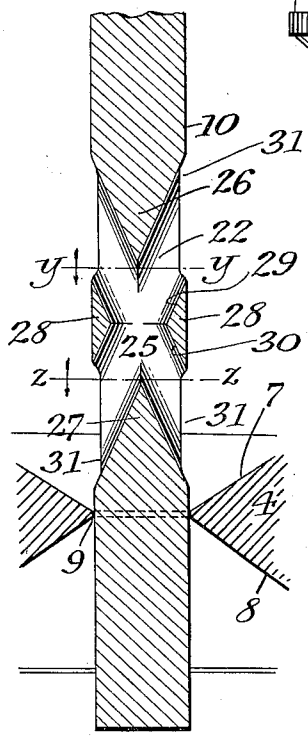


Fig. 1.

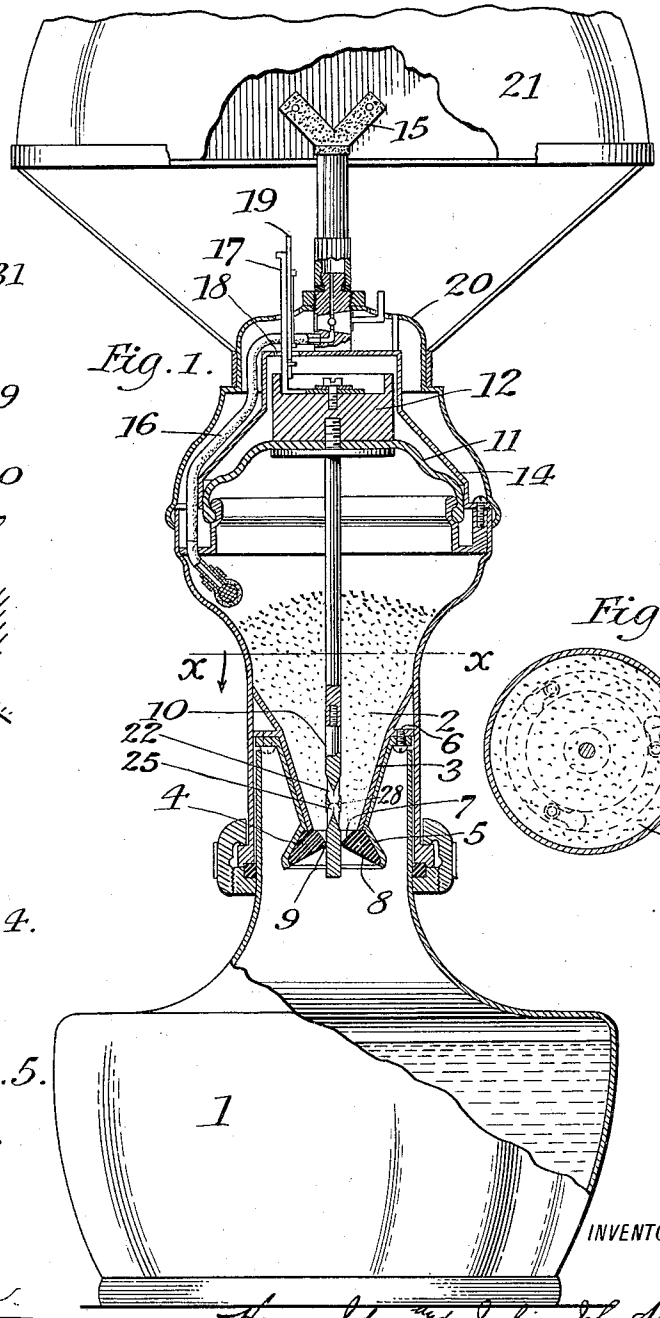


Fig. 2.

Fig. 4.

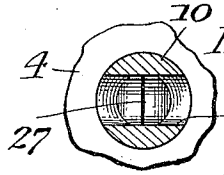
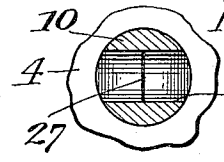


Fig. 5.



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2 SHEETS—SHEET 2.

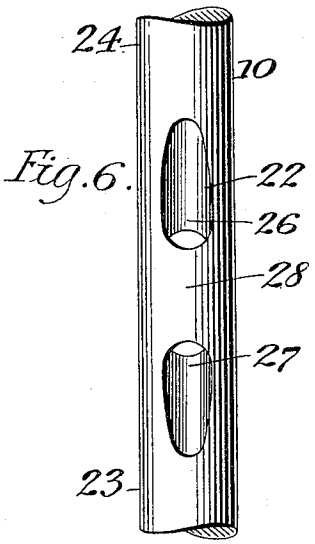


Fig. 6.

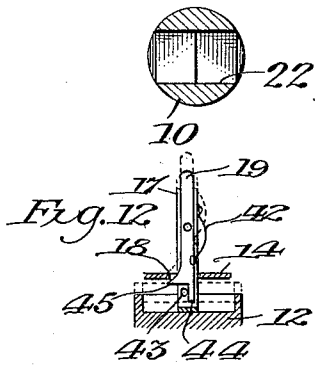


Fig. 8.

Fig. 12.

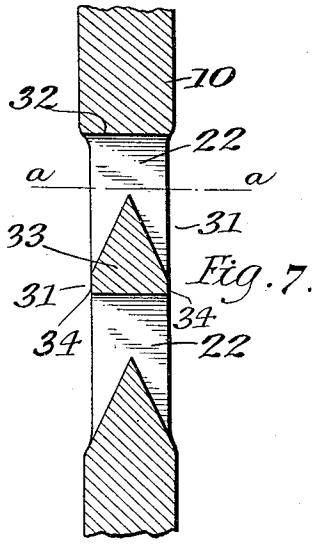


Fig. 7.

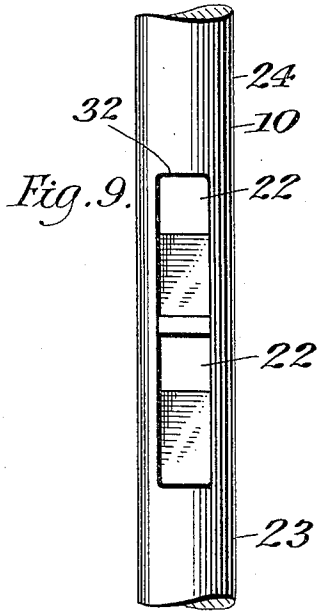


Fig. 9.

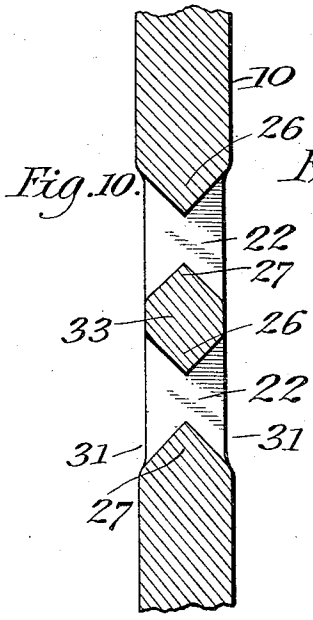


Fig. 10.

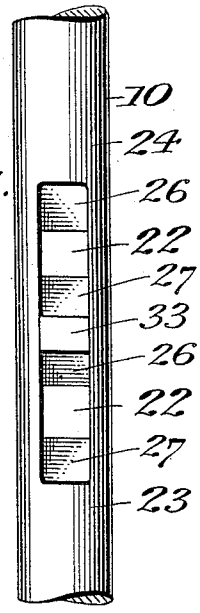


Fig. 11.

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UNITED STATES PATENT OFFICE.

HENRY IDEN AND JULIUS JOHN SUCKERT, OF NEW YORK, N. Y.; HENRY AMRHEIN, EXECUTOR OF SAID IDEN, DECEASED; ASSIGNORS TO VAN GLECKLAND CO. INC., A CORPORATION OF NEW YORK.

ACETYLENE-GAS LAMP.

1,149,522. Specification of Letters Patent. Patented Aug. 10, 1915.

Application filed January 29, 1910. Serial No. 540,849.

To all whom it may concern:

Be it known that we, HENRY IDEN and JULIUS JOHN SUCKERT, both citizens of the United States, and residents of New York, in the county and State of New York, have invented certain new and useful Improvements in Acetylene-Gas Lamps, of which the following is a specification.

This invention relates to acetylene gas lamps, and it has particular relation to that class of lamps which comprise a composite structure adapted for the generation and burning of acetylene gas and in which granulated or pulverulent cabid is fed to a body of water in a generating chamber in successive small quantities at such frequent intervals and in such manner that the generation of gas is maintained for continuous use and the feed of carbid is automatically controlled by the pressure of the gas generated.

In acetylene generating and burning lamp devices of the class above mentioned, the gas is consumed directly or practically as fast as generated, as distinguished from lamps or generators which are provided with gasometers or storage compartments adapted to hold a considerable body of gas, whereby the conditions of a small body of gas and comparatively low gas-pressure are obtained and the device is rendered safe and convenient in use, requires no special skill on the part of the operator, and in its composite entirety is particularly adapted for service as a portable or table lamp for domestic or analogous purposes.

The specific type of lamp of the class above mentioned, for which our improvements are especially adapted, usually comprises a water-holder constituting a gas-generating chamber, above which is arranged a carbid-holder constituting a chamber to which the gas passes from the generating chamber and from which the gas passes to a suitable burner, the communication between the gas-generating chamber and the carbid-holder being through the carbid feed-passage only. Said passage is formed by a flexible valve-ring through which works a feed-plunger in frictional contact with the inner edge of the ring, the plunger being carried by a flexible diaphragm mounted at the upper portion of the carbid-holder and operating to reciprocate the plunger by the upward movement of the diaphragm caused by the gas-pressure and by the downward movement of the diaphragm caused by suitable forcing means when the gas-pressure lessens. The feed-plunger is provided with a reduced portion, whereby the carbid is fed to the gas-generating chamber on the downward movement of the plunger through the feed-passage, and the circumferential structural relation of the plunger to the valve-ring is such that on its upward movement the plunger will close the feed-passage against the carbid. The construction is such that the generated gas passes to the carbid-holder at the feed-passage.

Lamps of the structural type above set forth have heretofore usually been irregular and uncertain in operation, owing to the indefinite and variable quantities of carbid fed to the generating chamber, by reason of the imperfect structural characteristics of the plunger, thus causing a fluctuating and irregular gas supply which precludes uniform operation, and such constructions have also been irregular in operation by reason of liability to clogging either by the lodging of the carbid on the plunger or the slaking and adhering of the carbid to the plunger or feed-passage in such manner as to impair or interrupt the feeding operation.

Our invention is designed to overcome the above-noted objections, and other disadvantages experienced in the type of carbid feed-mechanisms above referred to, and it has for its object to provide improved means for feeding the carbid and an improved construction whereby a uniform and regular operation will be secured, the carbid will be fed in regulated quantities according to the desired rate of generation and the conditions of generation required, clogging will be obviated, and the conflux of gas-generating elements will be so controlled that the rate of generation will be automatically maintained substantially uniform with the rate of consumption.

A further object of our invention is to provide an improved feed-mechanism which will be adapted for effective and positive operation under a very low gas-pressure, thus enhancing the safety and convenience

of its use under the most desirable conditions and requirements in small portable or table lamps, and which will possess advantages in point of simplicity, economy in manufacture and use, effectiveness and general efficiency.

In the drawings, we have illustrated a lamp of the general type to which our present invention especially relates, and Figure 1 is a vertical sectional view of an acetylene gas lamp having our invention. Fig. 2 is a horizontal sectional view, on the line *x*—*x*, Fig. 1. Fig. 3 is a detail vertical sectional view, on an enlarged scale, of the feed-portion of the plunger and the feed-passage. Fig. 4 is a detail horizontal sectional view, taken on the line *y*—*y*, Fig. 3. Fig. 5 is a detail horizontal sectional view, taken on the line *z*—*z*, Fig. 3. Fig. 6 is a detail side view, on an enlarged scale, of the construction of the feed-portion of the plunger shown in Fig. 3. Fig. 7 is a detail vertical sectional view, on an enlarged scale, illustrating a modification in the construction of the feed-portion of the plunger. Fig. 8 is a detail horizontal sectional view, taken on the line *a*—*a*, Fig. 7. Fig. 9 is a detail side view, on an enlarged scale, of the construction shown in Fig. 7. Fig. 10 is a detail vertical sectional view, on an enlarged scale, illustrating a modification in the construction shown in Fig. 7. Fig. 11 is a detail side view, on an enlarged scale, of the construction shown in Fig. 10. Fig. 12 is a detail side view, partly in section, of the locking mechanism which operates to lock the diaphragm against its flexing action and thus retain the feed-plunger in fixed position against feed of the carbid.

Corresponding parts in all the figures are denoted by the same reference characters.

Our present invention and improvements relate to the type of feed-plunger which is transversely perforated to form a through passage or space for carrying the carbid in the feed operation, as shown in the co-pending application for patent filed by Henry Iden on January 29, 1910, Serial No. 540,847, and our co-pending application for patent filed on January 29, 1910, Serial No. 540,848, to which applications reference may be had for a more detail explanation of the general characteristics and advantages of this type of perforated plunger, and our present improvements involve specific features of construction in such type of perforated plunger.

Referring to the drawings, 1 designates the water-holder, which constitutes the generating chamber and base of the lamp, 2 designates the carbid-holder, which constitutes a chamber to which the gas passes from the generating chamber and is provided with a convergent or inclined bottom, 3, directed toward a feed-passage existing between the generating chamber and the carbid-holder. Said inclined bottom assures the downward passage of the body of carbid in the holder 2, and the only communication between the generating chamber and carbid-holder is through said feed-passage. The carbid-holder is mounted above the generating chamber and is preferably detachably connected therewith, to enable separation and convenient filling. The feed-passage is constituted by a flexible valve-ring 4, preferably formed of rubber and carried by a holder, as at 5, detachably connected with the bottom portion of the carbid-holder, for instance by a bayonet joint, as at 6. The valve-ring has a concentrically inclined or concaved top surface, 7, and a concentrically inclined or concaved bottom surface, 8, the latter being preferably of deep concavity and substantial transverse area for the purpose of more effectively preventing the adhering of slaked carbid on said surface, and said top and bottom surfaces converge to a thin blunt inner edge, as at 9, which enhances flexibility at the feed-passage and reduces the area of frictional contact with the feed-plunger. 10 designates the feed-plunger, which reciprocally operates within the valve-ring and is preferably constituted by a rod having a cylindrical contour corresponding to the feed-opening of the valve-ring and frictionally bearing with relation to the inner edge thereof. At the top of the carbid-holder is mounted a flexible diaphragm, 11, preferably formed of rubber and adapted to be expanded upwardly by the pressure of the gas which passes from the generating chamber 1 through the feed-passage to the carbid-holder. Means are provided for depressing said diaphragm as the gas-pressure lessens, which means preferably consists of a top-weight, as at 12, to which the diaphragm is connected. The feed-plunger is suitably connected to said diaphragm and depends therefrom, so that it is reciprocated by the flexible action of the diaphragm. A cover, 14, is mounted at the top of the carbid-holder 2, over the diaphragm, and carries a suitable gas-burner, 15, to which the gas is fed by a tube, 16, extending from the carbid-holder.

Means are provided to lock the diaphragm against its flexing action and thus retain the feed-plunger in fixed position against feed of the carbid, which means preferably comprise an arm, 17, extending upwardly from the weight 12 and through an opening, 18, in the cover 14 and carrying a stop adapted to bear upon the cover and constituted by a pivotally-mounted catch, 19. The pivoted catch 19 is controlled by a spring, 42, carried by the arm 17 and having its free end bearing against said catch at a point below its pivot, the movement of the catch under action of the spring being

limited by a pin, 43, projecting from the arm 17 and engaged by an extension or finger, 44, at the lower end of the catch. The front edge of the catch 19, at the lower portion immediately above its bottom edge and which is normally beneath the cover plate 14, is beveled downwardly and forwardly, as at 45, said beveled edge being at the side opposite from the spring 42 and extending with relation to and beneath one edge of the opening 18 in the cover 14. This construction, as just described, operates so that upon upward movement of the weight 12 and the arm 17 said beveled edge 45 will bear against the edge of the opening 18 and the catch will be operated upon its pivot against the tension of the spring 42 until said beveled edge passes above the cover plate 14, when the catch will automatically return to normal position under tension of the spring and its bottom edge beneath said beveled portion will rest upon the cover plate 14 and the catch will be sustained thereby in such elevated position in which it will operate to lock the diaphragm and plunger mechanism in corresponding elevated position. The position of parts as just described is illustrated in dotted lines in Fig. 12. This active position of the locking mechanism will be retained until the catch 19 is manually operated against its spring tension to withdraw it from its bearing upon the cover plate 14 and permit its downward passage through the opening or slot 18 to the normal position shown in full lines in Fig. 12. Thus, when it is desired to stop the generating action it is only necessary to grasp the projecting arm 17 and lift the same until the supporting-catch 19 automatically acts, whereby the diaphragm will be locked in upward position and the feed-plunger will be maintained in its position which closes the feed-passage against the carbid. The same non-generating conditions also automatically result if the gas-pressure should increase beyond the normal conditions to such a degree as will flex the diaphragm upwardly to a point enabling the automatic locking action of the catch 19, and to start the lamp in generating operation it is only necessary to operate the catch to permit the downward flexing of the diaphragm. A suitable cap-piece, 20, forms the top of the lamp-body and serves as a support for a shade, 21, or other protector around the gas-jet. In its general detail features the lamp as above described may be of any suitable or adapted construction, the main features of the type of lamp related to our present invention being a feed-passage between the generating chamber and carbid-holder, a feed-plunger reciprocating within said passage, and a member actuated by the pressure of the gas generated to cause the actuation of the feed-plunger.

In our present invention and improvements, the perforations, 22, of the feed-plunger 10, which form the through passages or spaces for carrying the carbid in the feed operation, are in their structural characteristics arranged to form a reversely-inclined bottom at the through passage or space, whereby the gravity discharge of the carbid from the through charge-chamber is facilitated and effected in a relative operation at both sides of the plunger. The feed-portion of the plunger is constituted by the perforations, and beneath the perforated portion the body of the plunger circumferentially conforms to the opening in the valve-ring 4, the contour being preferably cylindrical, as shown at 23, whereby the feed-passage is closed against the carbid when the diaphragm is expanded upwardly by the gas-pressure, and the same circumferential contour is preferably provided immediately above the perforated portion, as at 24, whereby the same closed conditions will be effected in any action of the plunger which carries the perforated carbid-feeding portion entirely beneath the feed-passage.

In the construction shown in Figs. 3 to 6, inclusive, the feed-portion of the plunger is formed by a pair of transverse reversely-inclined perforations 22, which centrally intersect each other, thus constituting an internal charge-chamber or space, as at 25, common to the pair of intersecting and inclined or diagonal perforations, said general charge-chamber or space being substantially of cross contour or X-shape in vertical section and having its inlet orifices formed by the upper terminals of the pair of perforations 22 and its outlet orifices formed by the lower terminals of said perforations, so that the feed of the carbid to the perforations and the discharge of the carbid therefrom is operatively effected at opposite sides of the plunger. The centrally-intersecting reversely-inclined perforations 22 thus form a reversely-inclined or approximately V-shaped top wall or surface, in vertical cross-section, above the common charge-chamber or space 25, as at 26, which projects downwardly with relation to the upper orifices of the respective projections 22 and facilitates the direct gravity feed of the carbid to said perforations at opposite sides of the plunger, and also form a reversely-inclined or approximately Λ-shaped bottom wall or surface, in vertical cross-section, beneath the common charge-chamber or space 25, as at 27, which projects upwardly with relation to the lower orifices of the respective perforations 22 and facilitates the direct gravity discharge of the carbid from said perforations at opposite sides of the plunger. In the construction as now described, the imperforate portions of the plunger, at each side, intermediate of

the upper and lower orifices of the pair of respective perforations 22, as at 28, form part of the side walls of the internal chamber-space 25 and have their respective top and bottom surfaces reversely inclined or beveled, as at 29 and 30, by reason of the reverse inclination and intersection of the respective perforations 22 by which said side portions 28 are formed, and the respective intersecting and reversely-inclined perforations 22 are of uniform area and extent as charge-chambers for carrying the carbid, said area including in common the internal space 25 at the cross intersection of the perforations. The construction provides corresponding conditions at diametrically-opposite sides of the plunger, each side having the inlet terminal of one of the pair of reversely-inclined intersecting perforations 22 and the outlet terminal of the other of said perforations and the intervening imperforate wall portion 28 of the plunger. At the terminals of the respective perforations 22, the plunger is preferably reduced, at points of its circumference in line with the orifices of the through passages or spaces formed by the intersecting reversely-inclined perforations, as at 31, whereby the wearing action of the open sides of the plunger, at the ends of the perforations, upon the inner edge 9 of the valve-ring 4 is obviated and the frictional contact between the plunger and valve-ring is reduced at the terminal points of the perforations while at the same time the construction preserves a frictional bearing action of the smooth imperforate circumferential portion of the plunger with relation to the inner edge of the valve-ring during the feed of the carbid. These reduced portions 31 of the circumference of the plunger also serve the office of side spaces which open up the feed-passage through the valve-ring at the feed-portion of the plunger to a degree permitting the passage of the generated gas. While we have herein illustrated one pair of reversely-inclined crossing and intersecting perforations constituting the feed-portion of the plunger, it will be understood that a plurality of such pairs of perforations arranged in series may be employed according to the conditions and circumstances of the desired feed and generation. The construction involving the reversely-inclined and crossing perforations, providing the internal charge-chamber or space 25 common to both of the perforations, produces a general charge-chamber operatively comprising the perforations opening at opposite sides of the plunger and acting to discharge the carbid from said general charge-chamber effectively and uniformly at opposite sides of the plunger by the dividing action of the reversely-inclined bottom 27.

In Figs. 7 to 9, inclusive, we have illustrated a modified construction, in which the perforations 22, constituting the through passages or spaces for carrying the carbid in the feed operation, do not extend in reversely-inclined direction and do not intersect each other as in the construction shown in Fig. 3, but are provided on a direct transverse horizontal plane and have a reversely-inclined bottom 27 substantially of the same characteristics and with the same offices and functions as above described with relation to the reversely-inclined bottom shown in Fig. 3. In this modified construction, the carbid feeds to the through transverse perforation 22 at opposite sides of the plunger and is deposited therefrom at opposite sides of the plunger by action of the reversely-inclined bottom 27, each perforation being independent in construction and operation. In the specific form of the construction now described, as illustrated in Fig. 7, we have shown the direct transverse and independent perforations 22 with a flat or straight top wall or surface, 32, and have shown two perforations in successive series, the reversely-inclined bottom 27 of the upper perforation and the flat or straight top surface 32 of the lower perforation being conjointly constituted by a dividing wall between the perforations, as at 33. It will be understood that, in this modified type of construction, a single perforation having the reversely-inclined bottom may constitute the feed-portion of the plunger, or that such perforations may be employed in series in any desired number, as may be desired according to the conditions and circumstances of the required feed and generation. The orifices of the perforations are preferably in line with the reduced portions 31 at points of the circumference of the plunger, as hereinbefore described with relation to Fig. 3, and in the present illustration we have shown a further modification related to the employment of a plurality of the independent perforations 22 in series, in which the reduced portions 31, at diametrically-opposite sides, correspond in extent to the perforated portion of the plunger and thus are in line with the terminals of all of the through passages or spaces formed by the independent transverse perforations and also in line with the dividing wall 33 intermediate of the perforations. This modified construction obviates wearing action of the open sides of the plunger at the perforated portion upon the inner edge 9 of the valve-ring 4 and preserves a frictional bearing action of the smooth imperforate side portions of the circumference of the plunger with relation to the inner edge of the valve-ring during the feed of the carbid, and also effectively opens up the feed-passage through the valve-ring throughout the feed-portion of the plunger to a degree permitting the passage of the

generated gas, and in this modified construction the extent of the reduction is preferably not sufficient to constitute side spaces which will permit the passage of the granulated or pulverulent carbid between the plunger and inner edge of the valve-ring and thus feed of the carbid in excess of the regulated quantity carried in the charge-chambers or passages of the perforations will not be permitted. It will be noted that, in this construction in which the reduced portion 31 corresponds in extent to the perforated portion of the plunger, the edge of the dividing wall 33 between a plurality of the perforations 22 terminates at a point inside the circumferential plane of the plunger, as at 34, whereby the operative service of the respective perforations in receiving and discharging the carbid is facilitated and the projection of the inner edge of the valve-ring with relation to the dividing wall between the perforations does not impair the effective operation, and if desired the edge 34 may terminate at a point a short distance from the inner plane of the reduced portion 31 substantially in the manner described in our co-pending applications for patent hereinbefore referred to.

In Figs. 10 and 11, we have shown a modification of the construction illustrated in Fig. 7, in which the perforations 22, in lieu of having a flat or straight top surface 32 as shown in Fig. 7, are provided with a reversely-inclined or approximately V-shaped top wall or surface 26, substantially in the same manner and with the same offices and functions as above described with relation to the construction shown in Fig. 3.

The advantages and operation of our invention will be readily understood by those skilled in the art to which our improvements appertain.

The transverse perforations of the plunger provide through charge-chambers or spaces having a reversely-inclined bottom, into which the carbid passes in its downward movement at opposite sides of the plunger and in which the carbid is substantially measured in regulated quantities, the area of the through chambers or spaces formed by the perforations being predetermined according to the regulated charges of carbid desired to be fed to the generating chamber, and thus the feed of the carbid in substantially regulated quantities during the operative action of the plunger under all conditions of use is effected and a regular and uniform operation of the lamp is assured. The reverse inclination of the bottom of the through chamber or space, into which the carbid is fed at opposite sides of the plunger, provides for the deposit of the carbid from the through chamber or space at opposite sides of the plunger, thus insuring a more effective and uniform operative action under the gravity status of the carbid both with relation to the body of carbid in the carbid-holder and the feed of the carbid to the generating chamber, and the improved construction also enables corresponding conditions at opposite sides of the plunger as may be desired.

The through charge-chambers for measuring and carrying the carbid also precludes liability to clogging, or the adhering of slaked carbid to or in the feed-portion of the plunger, as the feed action of the carbid is through the plunger and the perforations forming the charge-chambers or spaces are kept clear under the action of the through passage of the carbid-charges in quick succession during the operation of the lamp. The perforated feed-portion of the plunger also enables rapid and convenient cleaning, whenever desired or required, as a suitable brush or cleaning instrument can be passed directly through the perforations, it being only necessary to separate the water-holder 1 and the carbid-holder 2 and remove the detachable holder 5 carrying the valve-ring 4 when it is desired to expose the feed-portion of the plunger.

Our improved construction of plunger is adapted for a wide range of effective use under various conditions in carbid feed-mechanisms where it is desired to feed the carbid to a gas-generating chamber at opposite sides of the feed-mechanism in successive substantially regulated quantities.

We do not desire to be understood as limiting ourselves to the detail construction and arrangement of parts as herein shown and described, as it is manifest that variations and modifications therein may be resorted to, in the adaptation of our invention to varying conditions of use, without departing from the spirit and scope of our invention and improvements. We therefore reserve the right to all such variations and modifications as properly fall within the scope of our invention and the terms of the following claims.

Having thus described our invention, we claim and desire to secure by Letters Patent:

1. In carbid feed-mechanisms, a feed-plunger having a perforated portion constituting a passage for carrying the carbid and provided with a reversely-directed top.

2. In carbid feed-mechanisms, a feed-plunger having a perforated portion constituting a passage for carrying the carbid and provided with a reversely-directed bottom and a reversely-directed top.

3. In carbid feed-mechanisms, a feed-plunger having at its circumference a reduced portion at the orifice of a perforation constituting a passage for carrying the carbid and provided with a reversely-directed top.

4. In carbid feed-mechanisms, a feed-plunger having at its circumference a reduced portion at the orifice of a perforation constituting a passage for carrying the carbid and provided with a reversely-directed bottom and a reversely-directed top.

5. In carbid feed-mechanisms, a feed plunger having at opposite sides of its circumference reduced portions at the terminals of a perforation constituting a passage for carrying the carbid and provided with a reversely-directed bottom and a reversely-directed top.

6. In carbid feed-mechanisms, a feed-plunger having transverse reversely-directed perforations intersecting each other interiorly of the plunger to form an internal chamber or space in common having inlet and outlet orifices common to the reversely-directed perforations and constituting passages for carrying the carbid.

7. In carbid feed-mechanisms, a feed-plunger having a perforated portion constituting a passage for carrying the carbid and provided with a reversely-directed bottom, the terminals of the perforations being at points inside the circumferential plane of the plunger.

8. In carbid feed-mechanisms, a feed-plunger having a perforated portion constituting a passage for carrying the carbid and provided with a reversely-directed bottom, and having passages at the terminals of the perforations at opposite sides of the circumference of the plunger and exterior of and intersecting the perforations.

9. In carbid feed-mechanisms, a feed-plunger having a plurality of crossing and intersecting perforations constituting passages for carrying the carbid.

In testimony whereof we have signed our names in the presence of the subscribing witnesses.

HENRY IDEN.
JULIUS JOHN SUCKERT.

Witnesses:
JOS. REED LITTELL,
BESSIE COSTIGAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."