No. 614,438. Patented Nov. 22, 1898.

L. S. BUFFINGTON.

ACETYLENE GAS LAMP.

(Application filed Oct. 23, 1896.)

(No Model.)

Fig. 1.

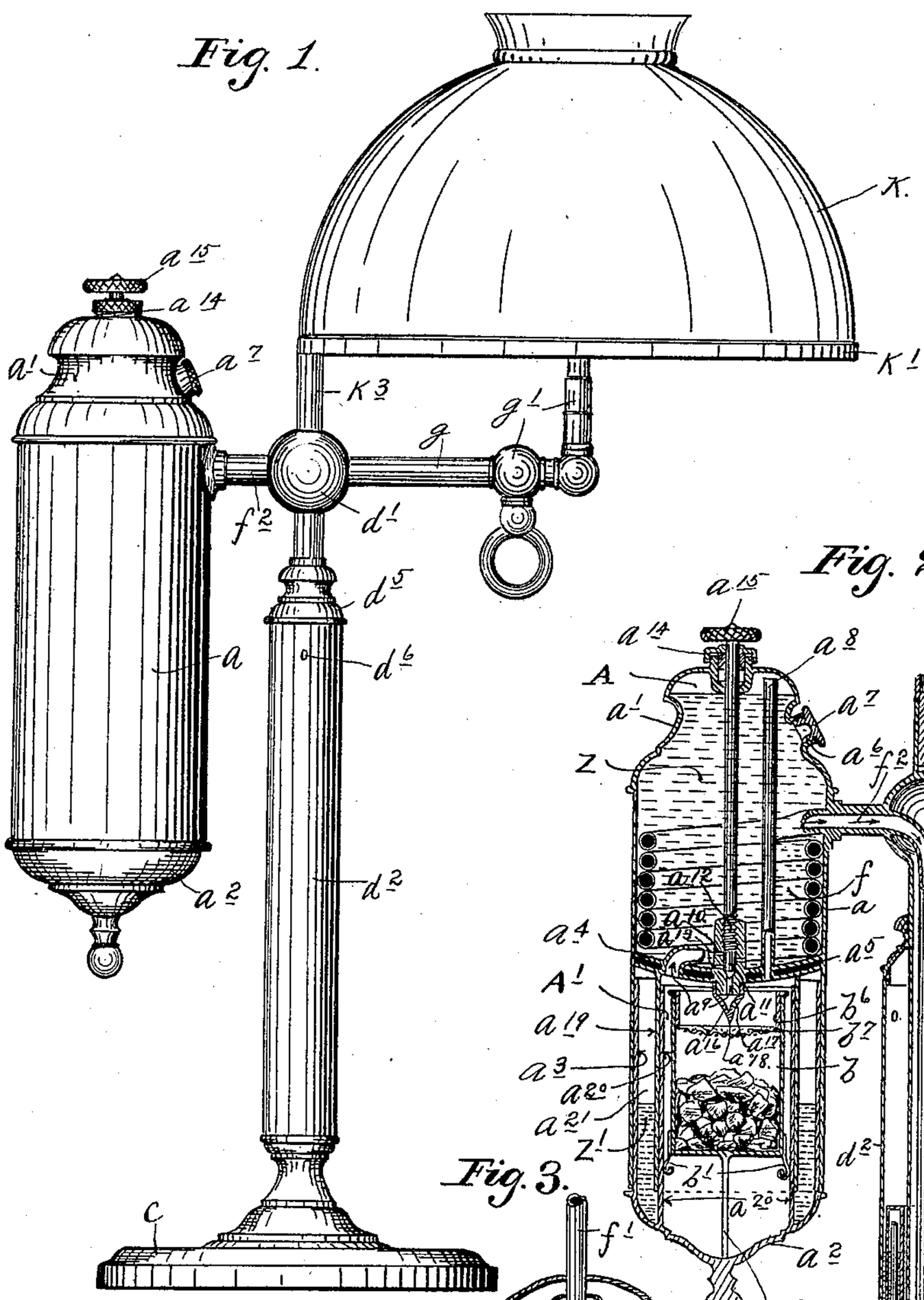


Fig. 2.

Fig. 3.

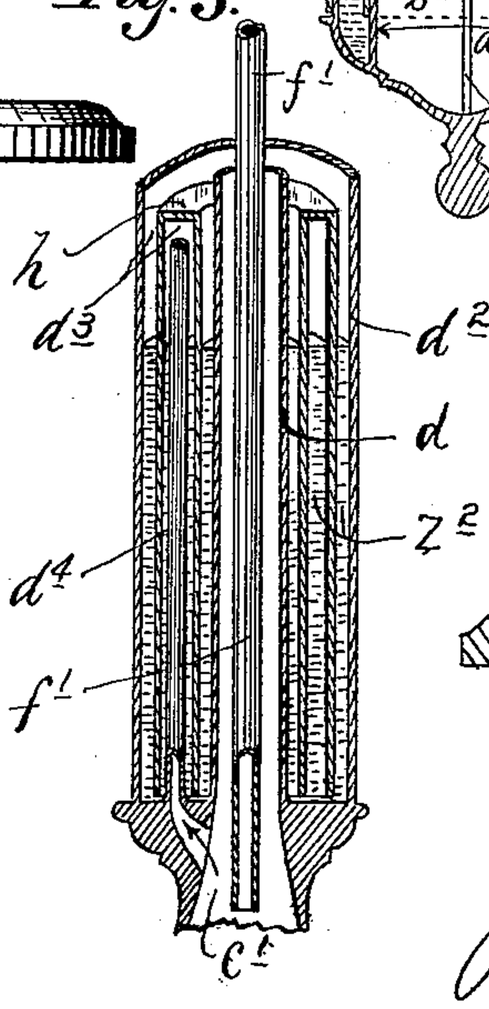
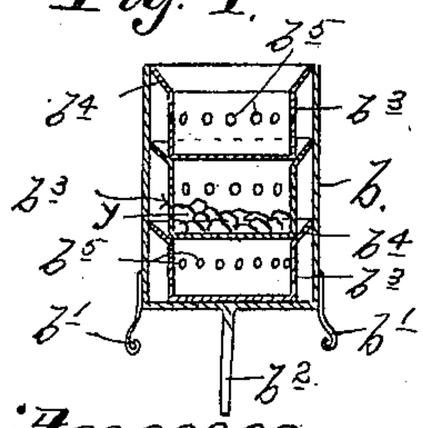


Fig. 4.



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ACETYLENE-GAS LAMP.

SPECIFICATION forming part of Letters Patent No. 614,438, dated November 22, 1898.

Application filed October 23, 1896. Serial No. 609,817. (No model.)

To all whom it may concern:

Be it known that I, LEROY S. BUFFINGTON, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Acetylene-Gas Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention has for its especial object to provide an improved acetylene-gas lamp.

To this end my invention consists in the novel devices and combinations of devices hereinafter described, and defined in the claims.

Certain of the features of construction disclosed in my present invention are also illustrated in a companion application, filed of even date herewith, Serial No. 609,816, entitled "Acetylene-gas lamp," and certain features are also, from a broad point of view, illustrated in my prior application, Serial No. 605,383, filed September 10, 1896, entitled "Apparatus for generating acetylene gas."

My present invention is illustrated in the accompanying drawings, wherein like letters refer to like parts throughout the several views.

Figure 1 is a view in side elevation of the preferred form of my invention, shown as constructed on the general design of what is usually termed a "student's" lamp. Fig. 2 is a view principally in central vertical section, with some parts broken away and others shown in full, showing the internal construction of the lamp. Fig. 3 is an enlarged view in sectional perspective, showing a portion of the lamp-standard, involving what I term a "governor" or "compensating gasometer;" and Fig. 4 is a detail view in central vertical section, showing one of the carbid-holders used in connection with the lamp removed from working position.

Referring first to the parts which constitute the generator, a indicates a vertically-disposed cylinder the upper end of which is closed by means of a fixed cap a' and the lower end of which is closed by means of a removable bottom section a^2. This removable bottom section a^2 is provided with an upwardly-extending cylindrical portion a^3, which telescopes with sufficient frictional engagement to hold the bottom in working position under normal gas-pressures with the inside of the lower end of the said cylinder a. This cylinder a is divided into two chambers or receptacles A A′ by means of a dividing-partition a^4. As shown, the partition a^4 is formed with a lining of asbestos a^5 or other suitable material which is a non-conductor of heat.

The upper chamber or receptacle A is to be filled with water, as indicated at z, and this may be accomplished through a nipple a^6, provided with a removable plug a^7.

a^8 indicates a vertically-disposed gas-conveying pipe, the lower end of which opens from the chamber A′ and the upper end of which terminates in a chamber A above the highest level of the column of water z.

Opening downward through the center of the partition a^4 is a passage a^9, formed in a valve-seat a^{10}. This passage a^9 is adapted to be opened and closed by means of a needle-valve a^{11}, the stem of which has screw-threaded engagement a^{12} with the valve-seat a^{10}. The valve-seat a^{10} is provided with a series of capillary passages a^{13}, which are located one above the other, so as to give in the aggregate a greater or less amount of opening to the valve-passage a^9 according to the distance to which the valve a^{11} is raised. The upper end of the stem of the needle-valve works through a stuffing-box a^{14} in the cylinder-cap a', and is provided with a knurled head a^{15}, by means of which the valve may be manipulated. Just below the passage a^9 the partition or head a^4 is provided with an inverted conical nipple a^{16}, that is provided with a series of very small perforations or capillary passages a^{17} and terminates in a depending needle-point a^{18}. From the bottom of the head or partition a^4 depends another cylindrical section a^{19}. This cylindrical section a^{19} is of substantially the same length as that portion of the cylinder a which depends below the partition a^4, but is considerably less in diameter. The removable bottom section a^2 is also provided with a cylindrical section a^{20}, which rises therefrom concentric to the cylindrical portion a^3, but spaced apart

inward therefrom, so as to form an annular well a^{21}, adapted to contain a sealing liquid z'. The cylindrical portion a^{20} is adapted to telescope with frictional engagement with the interior of the depending cylindrical portion a^{19}, and when the parts are put together the said annular portion a^{19} will be submerged in the column of water z', and a gas-tight seal will be thereby formed between said cylindrical portions a^{19} and a^{20}.

Two forms of carbid-holders are shown in the accompanying drawings. In the form shown in Fig. 2, b indicates a cylinder which is closed at its bottom and is provided with spring-retaining feet b', which, as shown, project below the bottom of the holder and tend to spring outward. The cylindrical portion b is slightly less in diameter than the cylindrical portion a^{20} of the removable bottom section a^2, and is adapted to be placed in working position, as shown in Fig. 2 of the drawings, while the bottom section is removed by forcing the same telescopically downward into the cylindrical portion a^{20}, in which position the feet b' hold the same from lateral movement, while its downward movement is limited by a depending finger b^2, secured to the bottom of said portion b. As shown, the removable bottom section a^2 a^3 a^{19} is drawn downward out of working position by taking hold of a suitable knob or finger-piece depending from the bottom of said portion a^2. In the construction shown in Fig. 4 the interior of the carbid-holder or the carbid-holder proper is made up of a series or stack of holder-sections b^3, which are set loosely one on top of the other. Each holder-section b^3 is formed with an open upper end, which is provided with an outwardly-flaring annular flange b^4. Again, each holder-section b^3 is provided about half-way up their sides with a series of perforations b^5, which run substantially in a horizontal plane around the periphery of the same. In preparing this carbid-holder for work each holder-section b^3 should be about half-filled with carbid bodies y.

In the carbid-holder shown in Fig. 2 the stacked sections are dispensed with, and the upper end of the cylindrical portion b is provided with a removable cover b^6, the transverse portion b^7 of which is formed by reticulate or wire cloth.

The base c of the lamp-standard is recessed to form a drying-chamber c'. As shown, the bottom of the drying-chamber c' is closed by means of a removable screw-threaded plug c^2, which carries a carbid-holder c^3, that is open at its upper end and is adapted to contain a small amount of carbid y'. Rigidly secured to the base c, with its lower end open to the drying-chamber c', is a vertically-disposed tube d, which terminates at its upper end in a hollow ball or sphere d'. d^2 indicates another and considerably-larger tube, which is placed concentrically around the tube d, so as to form an annular chamber d^3. This annular chamber d^3 is adapted to contain a body of sealing liquid z^2, and is completely shut off from the drying-chamber c', as well as from the gas-conveying connections, except through a small vertically-disposed tube d^4, the lower end of which is open to said drying-chamber c' and the upper end of which opens into the annular chamber d^3 above the level of the sealing liquid z^2. The upper end of the exterior tube d^2 is closed by means of a loose sliding cap d^5, mounted for sliding movement on the tube d; but the upper end of said tube d^2 is perforated, as shown at d^6, to permit atmospheric pressure within the chamber d^3.

Gas is conveyed from the generating-chamber A' through a pipe $f\,f'\,f^2$, which is wound in the form of a coil f at its receiving end, which coil is located in the water-containing compartment A and is submerged in the water z. The receiving end of the coil f opens to the compartment A' through the partition a^4 a^5, and the delivery-section f' is passed centrally through the vertical tube d, and its lower end terminates in the drying-chamber c' in position to discharge the condensed liquid products onto the carbid y' in the carbid-holder c^3. From the drying-chamber c' the gas will pass upward through the annular chamber formed between the inside of the tube d and the outside of the pipe-section f' to the bulb d'. From the bulb d' the gas passes through a short pipe-section g to an ordinary gas-burner g'. It will be noted that the section f^2 of the gas-pipe $f\,f'\,f^2$ serves to support the generator-cylinder a from the bulb or sphere d', and hence this section f^2 is shown as somewhat thickened, as compared with the rest of the pipe.

In connection with the device so far described I employ what may be termed a "governor" or "compensating gasometer," the purpose of which is to keep the pressure of the gas practically constant regardless of sudden variations in the speed of generation of the gas. As already set forth, I use in my present invention a valve for controlling the flow of water from the water-compartment onto the carbid in the generating-chamber, which valve is adapted to be operated and set by hand. In many generators, and particularly in the form of gas-lamp herein disclosed, a hand-operated valve gives better results than one which is operated automatically, as in the ordinary forms of generators. However, with this hand-set valve the flow of the water onto the carbid will be somewhat irregular and uneven, and hence it becomes very essential to provide a device which will prevent the sudden increase or decrease in the speed at which the gas is generated from producing material variations in the gas-pressure and the resulting variations in the intensity of the burning flame. The device which I have shown for this purpose is in the form of a double-walled gasometer-section h, which is formed with a central opening run-

ning completely through the same and has the lower end of the annular chamber formed between the walls of the same left open. This gasometer h is placed in working position within the tube d^2 and around the tube d, with its lower end submerged in the liquid z^2 and with the tube d^4 working in the annular chamber of the same. The gasometer h is properly weighted, so as to give the desired pressure on the gas. A small amount of gas will always be contained in the governor or gasometer h; but the gas in traveling from the generator to the burner does not pass through this gasometer, but passes directly from the drying-chamber c' into the pipe d. If, however, a sudden overgeneration of gas takes place, the excess will find its way into the gasometer through the pipe d^4 and will cause the gasometer to rise; but this rise of the gasometer does not materially vary its pressure on the confined gas. Again, if the average speed of generation is not kept up for a short interval the governor or gasometer will gradually lower. In this way all flickering or perceptible variation in the intensity of the flame are avoided. It will, however, be understood that the needle-valve a^{11} should be properly adjusted, so as to give the desired average feed.

As shown, an ordinary shade k is held in position by means of a shade-support k', which in turn is held in place by means of a finger k^2, depending therefrom and working in a keeper k^3, formed on the upper portion of the ball or bulb d'.

The action of the lamp when lighted is substantially as follows: The parts of the generator being charged with water and carbid, as already indicated, and the valve a^{11} being opened, so as to open the valve-passage a^9 and one or more of the capillary passages a^{13}, water will be permitted to flow from the water-compartment A onto the carbid. As the water passes through the passage a^9 it will be discharged into the interior of the nipple a^{16} and will run through the perforations a^{17} and be discharged in very small drops from the needle-point a^{18}. The generating action being thus started the gas will flow through the pipe $f\ f'\ f^2$, drying-chamber c', tube d, ball d', and pipe-section g to the burner g'.

As is well-known to persons familiar with this art, acetylene gas as it comes from the generator always contains more or less gummy and other foreign impurities, as well as small quantities of vaporized water. These foreign impurities will in a short time clog and choke the burners, so as to render the same useless without cleaning, and, further, these foreign impurities in the gas decrease its illuminating efficiency and often produce a smoky flame. However, in my apparatus above described these foreign impurities are removed from the gas before it reaches the burner, and hence the above-noted objections are obviated. As the gas passes from the generating-chamber through the condensing-coil f it will be cooled, and most of the foreign liquid impurities carried thereby will be precipitated and will run back into the generating-chamber. As the gas passes on it will, however, be further cooled and the foreign substances which are precipitated within the pipe-section f' will fall directly onto the carbid-bodies y' in the carbid-holder c^3. The water which has been condensed in the pipe-section f' and discharged onto the carbid y' will cause a very slight and slow generation of acetylene gas, while the other substances which are precipitated onto these carbid-bodies will be taken up and held by the lime products. In this manner the gas is rendered as near perfectly pure as may be desired for practical purposes. The pipe a^8 permits the pressure in the generating chamber or receptacle A′ and in the water-receptacle A to equalize, and hence all of the liquid which is contained in the compartment A may be used up in the generating action without refilling the water-compartment with water. It will also be noted that in this construction the annular compartment which is formed between the cylindrical portion a^3 and a^{19} of the removable generator bottom is not in communication with the interior of the generating-compartment, and hence the liquid z' acts simply as a seal.

As already indicated, the removable cup-like bottom section a^2 is frictionally held in working position under sufficient tension to prevent it from being forced from position under normal or ordinary gas-pressures from within. However, under abnormal or very high gas-pressures from within, such as may be caused by accidental or overgenerations of gas, this cup-like bottom section a^2 would be forced from working position, thus rendering explosions impossible. It will also be noted that the lamp-standard supports the generator in such position that the cup-like bottom section a^2 may be readily removed.

Noting in detail the action of the form of carbid-holder illustrated in Fig. 4, it will be seen that the carbid contained in the different holder-sections b^3 will be used up in succession. This action will take place as follows: Water will first be dripped onto the carbid contained in the uppermost holder-section b^3, and this will continue until the contents thereof are completely decomposed, and then the water will commence to overflow through the perforations b^5. The water overflowing and running through the perforations b^5 of the uppermost holder-section will run down the sides of the holder until it is caught by the annular flange b^4 of the next lower holder-section b^3, and the joint between this annular flange b^4 and the bottom of the holder-section which rests thereon being essentially loose and more or less open the water will then run freely into the next lower carbid-holder—that is, into the carbid-holder second from the top. This action will be repeated until the carbid of each holder has been used up. The holder-

sections b^3 should be filled not much more than half full of carbid, so as to give room for expansion of the lime products. Of course instead of dropping the water first onto the upper holder-section and allowing the same to work downward the water might be dropped into the holder-section b and allowed to work its way step by step upward through the holder-sections.

It will be understood, of course, that various alterations in the details of construction above set forth may be made without departing from the spirit of my invention. For instance, certain of the features of construction above set forth might be embodied in an apparatus of much larger proportions, adapted for use in supplying gas in the ordinary manner.

It will also be understood that the device may be used to control the production of any gas which may be formed by the contact of any liquid gas-producer with any solid gas-producer or other gas-producing substance, and hence such terms as "water-containing compartment" and "carbid-holder" are not intended as limitations on the use of the device, but are used simply for the purposes of brevity and clearness.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. The combination with a support, of a generating-receptacle having an open lower end and a telescopically-removable bottom section frictionally held in working position and removable by excessive internal gas-pressure, substantially as described.

2. The combination with a generating-receptacle provided with an open-ended cylindrical section, of a telescopically-removable cap or cup-like section frictionally held in working position on said open-ended cylindrical section and removable by excessive internal gas-pressure, substantially as described.

3. In a generator, the combination with a relatively-fixed water-containing receptacle having a valved passage in its bottom and provided with a depending open-ended section, of a downwardly-removable bottom section telescoping with said depending section, and a carbid-holder carried by and removable with said bottom section, substantially as described.

4. In a generator, the combination with a water-containing receptacle having a valved passage in its bottom and provided with a pair of concentric cylindrical sections depending therefrom, of the removable bottom provided with a pair of concentric cylindrical sections forming an annular well and adapted to telescope with the cylindrical portions of said water-receptacle, and a carbid-holder working telescopically within the small cylindrical section of said removable bottom, substantially as described.

5. In a lamp, the combination with a lamp standard or support, of a generator and a burner supported by said standard, and gas-conveying connections between said generator and said burner, involving an expansible or yielding governor or compensating gasometer located in said lamp-standard and subject to the pressure of the generated gas, substantially as described.

6. The combination with a pair of generator-receptacles in communication with each other through a valved passage, of a gas-burner, the lamp-standard formed with the annular liquid-containing chamber d^3, gas-conveying connections between one of said generator-receptacles, involving the concentric pipe-sections f' and d, the double-walled governor or gasometer h seated in said annular chamber d^3, and the branched pipe d^4 opening from the gas-conveying connections into the chamber of said gasometer h, substantially as described.

7. In a gas-lamp, the combination with a pair of generator-receptacles in communication with each other through a hand-operated valve device, of a gas-burner, the lamp-standard formed with the drying-chamber c' and annular water-containing chamber d^3, the gas-conveying connections between the uppermost generator-receptacle and said burner, involving the pipe-sections f' and d, the double-walled governor or gasometer h seated in said annular chamber d^3, and the branch pipe d^4 opening from the gas-conveying connections into the chamber of said gasometer h, substantially as described.

8. The combination with a generating-receptacle, of a removable carbid-holder, involving the exterior section b, and the stack or holder sections b^3 having the flanged upper ends b^4 and provided with perforations b^5 located above their bottoms and running substantially in a horizontal plane, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LEROY S. BUFFINGTON.

Witnesses:
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