No. 666,042. Patented Jan. 15, 1901.

J. W. WEEKS & H. C. EARLE.

ACETYLENE GAS GENERATOR.

(No Model.) (Application filed Sept. 15, 1900.)

FIG. 7.

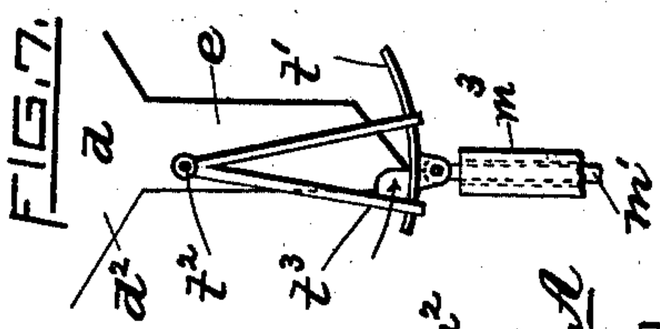

FIG. 8.

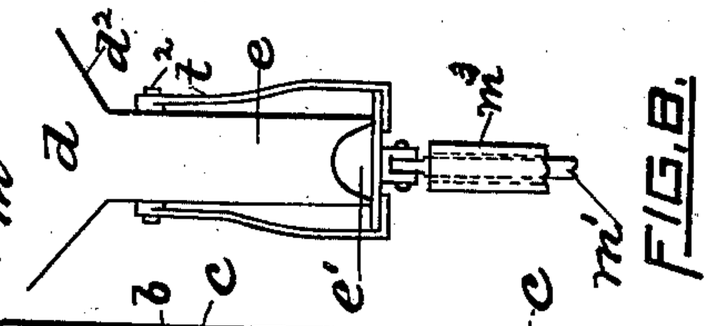

FIG. 4.

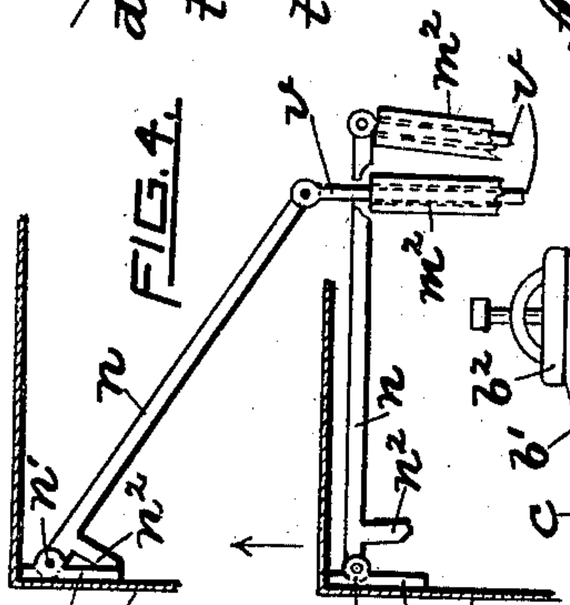

FIG. 2.

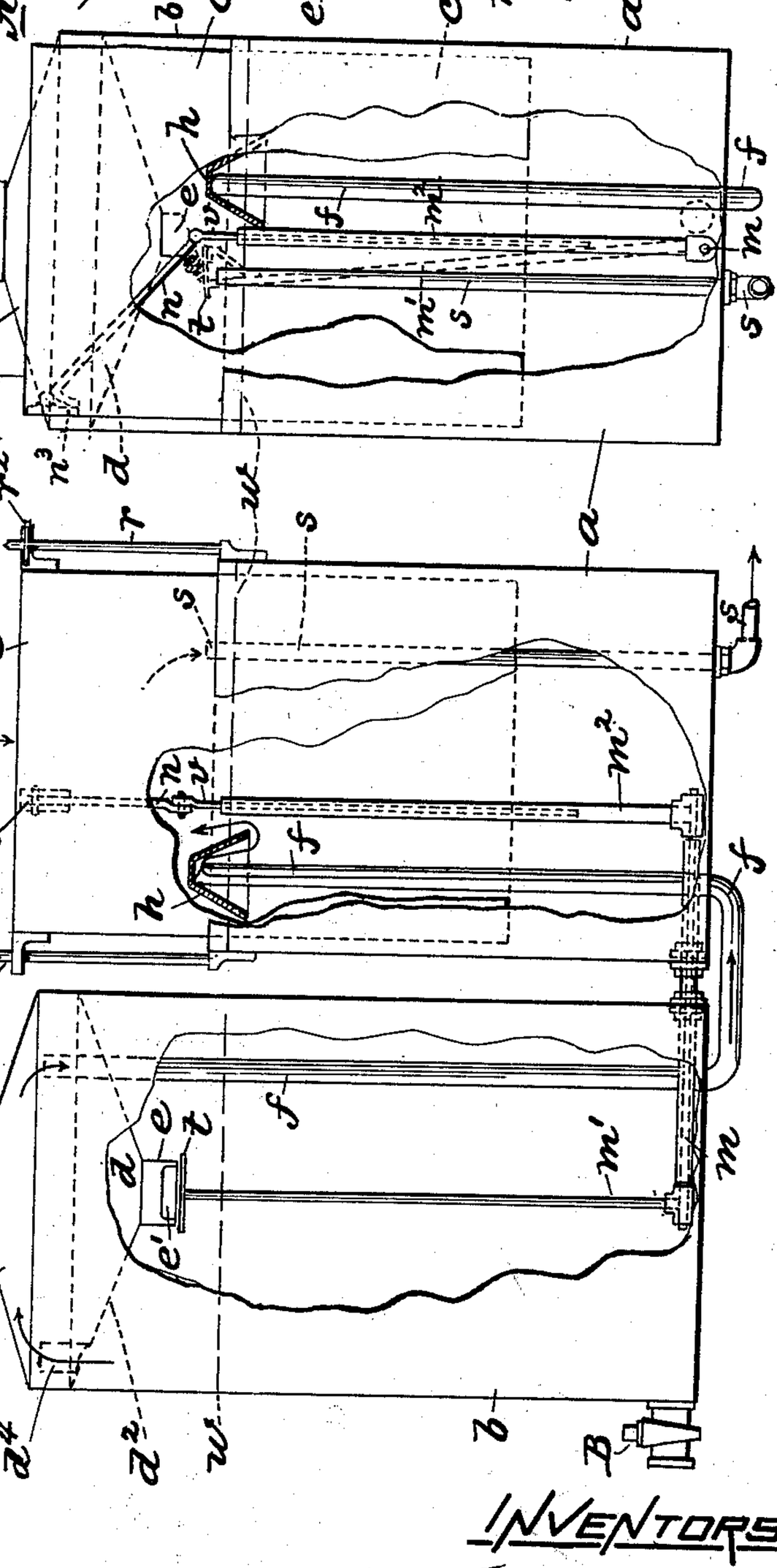

FIG. 3.

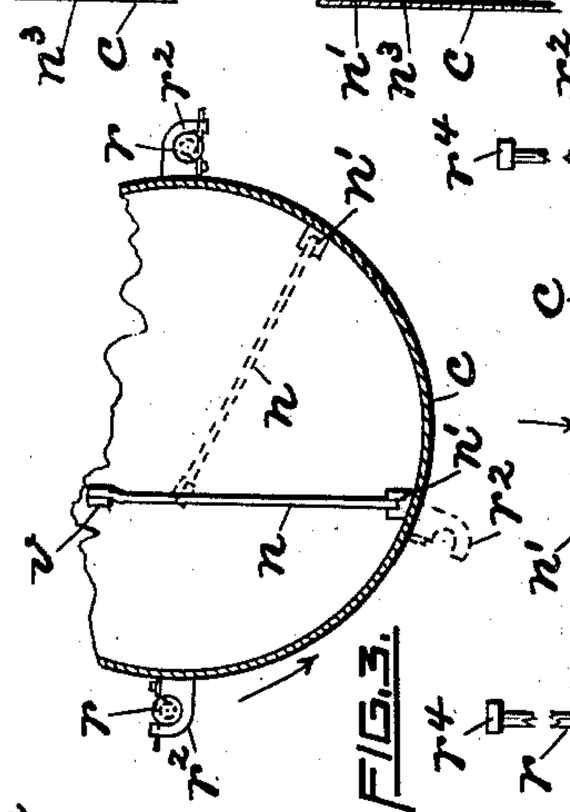

FIG. 6.

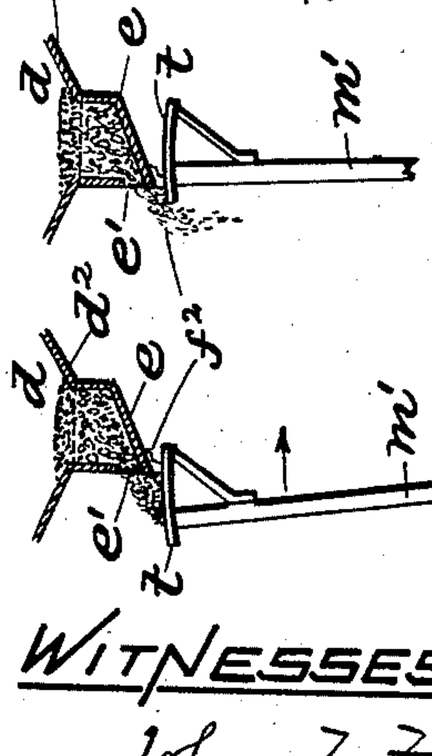

FIG. 5.

FIG. 1.

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UNITED STATES PATENT OFFICE.

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ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 666,042, dated January 15, 1901.

Application filed September 15, 1900. Serial No. 30,111. (No model.)

To all whom it may concern:

Be it known that we, JOHN W. WEEKS and HENRY C. EARLE, citizens of the United States of America, and residents of the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in Acetylene-Gas Generators, of which the following is a specification.

Our invention relates to improvements in machines or apparatus for generating acetylene gas—that is, gas produced from calcium carbid. Our present invention relates more especially, however, to new and improved means for automatically "feeding" the carbid from a suitable receiver or hopper and discharging it therefrom into a tank of water located below the hopper.

The object of our invention is to provide apparatus of the class forming the subject of this application with simple, efficient, and comparatively inexpensive means for producing acetylene gas, the apparatus being wholly self-contained and occupying a minimum of space, the action of the machine being automatic and controlled by the vertical movements of the gasometer or gas-holder, which in turn is influenced by the volume of gas consumed or taken from the holder. The gas thus generated is thoroughly washed and filtered, so that the light produced is very uniform in color and burns with a greater degree of brilliancy and steadiness. Moreover, the passages of the service-pipes and burners are kept free and unobstructed by reason of the absence of "dust" or fine particles of the carbid usually present in generators of this class.

Another advantage possessed by our apparatus is that the element of danger is practically eliminated. The receiver or hopper can be easily and readily opened at any time and recharged with carbid even while the gas-jets are burning, and this, too, without any visible change in the light itself and without loss of gas.

In our gas-generating apparatus we prefer to employ two slightly-separated independent water-holding tanks, the top of one being provided with a reservoir or hopper containing the carbid in a finely-broken or comminuted state, access to the hopper being had through an opening in the top protected by a removably-sealed cover. The other tank carries the usual inverted buoyant gas-holder, gas being taken from the latter via a stationary service-pipe whose open end extends above the surface of the water. Within the gas-holder and directly jointed thereto is an arm or lever connected telescopically with another arm secured to a suitably-mounted shaft extending into the other tank and carrying at its end a corresponding upwardly-extending arm. This latter arm is surmounted by a table or platform located directly below the continuously-open discharging-outlet of the hopper. As thus constructed it will be apparent that the movements of the gas-holder within fixed limits impart an angular movement to the arms or levers secured to the rocker-shaft. When the gas-holder rises, due to the generation of gas, the table is carried forward to its normal position or limit, where it remains stationary to receive the charge of carbid, which flows or runs from the hopper until the "angle of repose" is attained. Now whenever the consumption of gas causes the holder to fall below a predetermined point it operates to swing or vibrate the rock-shaft arm, thereby retracting the table and, as it were, scraping off the charge of carbid resting thereon, which upon falling into the water is quickly converted into gas. The latter then rises through the water and passes through a suitable opening into the top of the hopper and thence downward through a pipe leading therefrom into the other tank. The pressure of the gas generated then operates to force the holder upwardly, thereby returning the table to its normal position, where another charge of carbid gradually deposits itself automatically upon it, as before stated. By reason of the telescopic connection jointed to the holder any further upward movement of the latter will not in any way actuate the table.

In the accompanying sheet of drawings, Figure 1 is a front side elevation of our improved acetylene-gas-generating apparatus complete, a portion of each water-tank being broken away. Fig. 2 is a corresponding end elevation viewed from the right of Fig. 1. In these two views the relation of the several parts represent the gas-holder in its downward movement immediately preceding the

discharge of the carbid from the table into the water below. Fig. 3 is a plan or top view of the gas-holder with the end removed. Fig. 4 is a partial vertical sectional view of the holder, showing the two positions of the connection through which the rocker-shaft is actuated. Fig. 5 is a side view, in partial section, showing the normal position of the table. Fig. 6 is a similar view showing the table retracted to its limit and discharging the carbid therefrom. Fig. 7 is a side view showing a modification of the hopper-opening and the movable table, and Fig. 8 is a front view of the same.

The following is a more detailed description of our improved acetylene-gas-generating apparatus.

The mechanism or plant as a whole is indicated by A. The two water-holding tanks *a* and *b* are, as drawn, independent of each other. The water-level *w* is preferably kept uniform in each. The tank *a* is open at the top and forms a seal for the usual inverted gas-holder *c*, the latter being open at the bottom and closed at the top. The stationary rods *r*, secured to the tank, serve as guides for the holder, the latter having guide-bearings r^2, through which the rods extend, stops r^4 being employed to limit the upward movement of the holder. The other tank *b* is somewhat longer or higher than tank *a* and is closed at the top. Within the same at a suitable distance above the water-level is fixed a reservoir or hopper *d*, adapted to receive the main charge of carbid employed in generating the gas. The lower side or bottom d^2 of the hopper is beveled and terminates at the center in the spout or neck *e* in open communication therewith. One side or face of the neck has a suitably-shaped opening *e'* formed in its wall, through which the subcharges of carbid freely flow or escape onto the table beneath. The shape and size of this opening or slit should vary according to the degree of fineness of the carbid used and the quantity to be discharged into the water whenever the gasometer falls to its limit. The top *b'* of tank *b* has a suitable opening at the center closed by an air-tight cover b^2. It is through this opening that the hopper is filled or charged with carbid, the latter being crushed or broken to a uniform size. In cases where the carbid used is comparatively coarse we prefer to employ the table mechanism and the form of hopper opening *e'* shown in Figs. 7 and 8.

The mechanism for automatically feeding the carbid from the hopper into the tank *b*, where it is converted into acetylene gas, is substantially as follows:

To the upper inner portion of the gas-holder *c* is pivoted at *n'* an arm or connection *n*, having its free end jointed to a downwardly-extending rod *v*, loosely mounted in a tubular arm or lever m^2, secured to one end of a suitably-mounted horizontal rocker-shaft *m*, extending through the walls of tank *a* into tank *b*, as clearly shown. As thus constructed it is evident that when the holder *c* rises from its low position it will, through the medium of said parts *n v*, swing the tubular arm m^2 inwardly or to a vertical or nearly vertical position, at which instant the short arm or lug n^2, formed on the under side of connection *n*, engages a fixed stop n^3, thereby preventing further angular movement of the arm *n*. (See Fig. 2 and upper part of Fig. 4.) In case the continued generation of gas forces the holder *c* higher or even to its limit the rod *v* then simply slides upwardly in the socketed arm m^2, the length of the rod being such, of course, that it cannot be wholly withdrawn while in use. To the opposite end of the said rocker-shaft *m* is secured the upwardly-extending arm or lever *m'*, terminating in the table or platform *t*, located directly below the discharge-opening *e'* of the carbid-holder *d*. The normal position of the table is represented in Figs. 2 and 5.

In order to recharge the hopper at any time with carbid, we prefer first to rotate the gasometer *c* axially about forty-five degrees. (See dotted lines, Fig. 3.) This results in forcing the table *t* outwardly to its normal position, so that upon removing the cover b^2 the desired quantity of carbid can be readily placed in the hopper, the said table meanwhile preventing the carbid which runs through the outlet-passage *e'* from falling into the water below. After thus charging the hopper the cover is replaced and secured, followed by rotating the holder *c* back to the normal position, thereby at the same time imparting angular movement to the shaft *m* and its levers and swinging the table *t* to the position shown in Fig. 6, thus discharging the subcharge of carbid from the table into the water, where it is immediately converted into gas.

It will be seen, referring to Fig. 3, that the inner or free end of the connection *n* is arranged eccentrically to the center of the gasometer. Thus it will be evident that the act of rotating the latter in the arrow direction—say forty-five degrees—retracts the connection from the full-line position to the one indicated by dotted lines, the result being substantially the same as that produced automatically by the gasometer in its vertical movements.

Figs. 7 and 8 represent a modification of the table and the manner of supporting the same. In this case the table *t'* is pivoted at t^2 to the hopper, the arms t^3 permitting the table to swing within fixed limits. To the under side of the table is jointed a downwardly-extending rod *m'*, which in turn is adapted to move freely in the tubular arm m^3, its lower end to be secured to the rocker-shaft *m* substantially the same as in the arrangement of the parts *v* and m^2, mounted in the gas seal or tank *a*, before described. As thus constructed any depression or settlement of the hopper will not

affect the relation of the outlet-passage e' to the table. We prefer to interpose a piece of yielding material or substance, as felt, f^2 between the adjacent surfaces of the hopper-neck e and table, as indicated in Figs. 5 and 6. By means of this arrangement the carbid is brushed or scraped off the moving table more effectively and with less friction.

In our gas-generating apparatus we prefer to use a continuously-open discharge-aperture e' in the hopper rather than one provided with a valve or gate arranged to open and close the aperture at each discharge of the carbid into the water. Obviously the form and size of the said aperture are made to correspond with the degree of fineness and quantity of carbid to be discharged from the hopper, at the same time taking into consideration the frequency of the discharges.

The operation of our improved acetylene-gas-generating apparatus may be described as follows: Assuming first that the several parts of the generator be constructed and in the normal position, the hopper d filled with carbid, and the water-level in the two tanks a and b being, say, at w, now the action of the gasometer c in falling operates through the medium of said connection and lever members n, v, m^2, m, and m' to automatically retract or withdraw the table t from the position shown in Fig. 5 to that represented in Fig. 6, thereby forcibly discharging into the water below the amount of carbid resting upon the table. The carbid is instantly converted into gas, which, rising through the water in tank b, passes via short pipe d^4 into the carbid holder or hopper d and thence downwardly into pipe f, which extends into tank a and upwardly above the water-line. (See arrows, Fig. 1.) Surmounting the open end of the pipe f is a tilting hood h, its lower edge being sealed by immersion in the water of the tank. The gas is thus rewashed before entering the gasometer c, since it must pass beneath the hood. (See arrow.) The volume and pressure of gas thus generated quickly elevate the gasometer, so that when the latter rises to a predetermined point, or as indicated in upper portion of Fig. 4, the movement will have carried the table t back to its original or normal position, Fig. 5, there to remain until the holder in its downward movement again retracts the table. While the latter is still in such normal position the carbid flows out freely upon its surface through the continuously-open passage e' until it becomes clogged, as it were, at which instant the movement of the carbid ceases, the sides of the small pile of carbid then resting upon the table, forming what may be termed the "angle of repose." The gas is taken from the holder c via the service-pipe s, as common. A large gate or cock B is located at the bottom of tank b, through which the slaked carbid or residue may be withdrawn.

In case it becomes necessary or desirable to recharge the reservoir or hopper d with carbid the same can be readily effected by swinging the gasometer axially about forty-five degrees, as before stated, or to the position indicated by dotted lines, Fig. 3. In such event gas contained in the gasometer cannot escape through inlet-pipe f into the atmosphere, because the hood h, partly immersed in the water of tank a, forms a seal therefor.

What we claim as our invention, and desire to secure by United States Letters Patent, is—

1. In an acetylene-gas generator, the combination of a closed water-tank b, a carbid-reservoir d mounted above and forming the top of said tank, a continuously-open port or passage formed in the base of said reservoir, a movable table or platform located immediately below the port so as to receive the carbid discharged from the reservoir, a water-tank a, a buoyant gas-holder c mounted in and sealed by the water in said tank a, and mechanism constructed and arranged substantially as described and connected with said gas-holder and table, whereby the holder c in its downward movement operates to discharge the carbid from the table.

2. In an acetylene-gas generator, the combination with a suitably-mounted carbid-holder having a continuously-open aperture therein through which the carbid is discharged automatically or by gravity, and a movable table adapted to receive the carbid as it issues from said aperture, of a floating gasometer for the gas generated and a mounted rocker-shaft and links or arms connected with said table and gasometer, whereby the vertical movements of the latter automatically actuate and control the discharge of the carbid from the table into the water below, substantially as described.

3. In an acetylene-gas generator, the combination of a suitably-mounted rocker-shaft having an arm m' secured thereto surmounted by a table or platform adapted to receive thereon charges of carbid, a floating gasometer capable of vertical movement, a connection n pivoted thereto, and a telescoping connection uniting said rocker-shaft and connection n, substantially as described.

4. In an acetylene-gas generator, the combination of a rocker-shaft having a table-carrying arm at one end and a tubular arm at the other, a floating gasometer, a connection jointed to the gasometer, a stop for limiting the downward angular movement of said connection, and a rod jointed to the outer or free end of the connection and slidably fitted into said tubular arm, thus forming a telescopic connection, whereby the initial upward movement of the gasometer vibrates the rocker-shaft until arrested by said stop, while further upward movement of the gasometer extends said telescopic connection without imparting additional movement to the rocker-shaft.

5. In an acetylene-gas generator, the com-

bination with a suitably-mounted rocker-shaft and connection, of a floating gasometer and a link *n* jointed thereto and to said connection, and having the inner or free end of the link extending beyond the center of the gasometer and being eccentric thereto, substantially as hereinbefore described and for the purpose set forth.

Signed by us at Providence, Rhode Island, this 12th day of September, A. D. 1900.

JOHN W. WEEKS.
HENRY C. EARLE.

Witnesses:
GEO. H. REMINGTON,
GEORGE H. TAFT.