No. 701,433. Patented June 3, 1902.

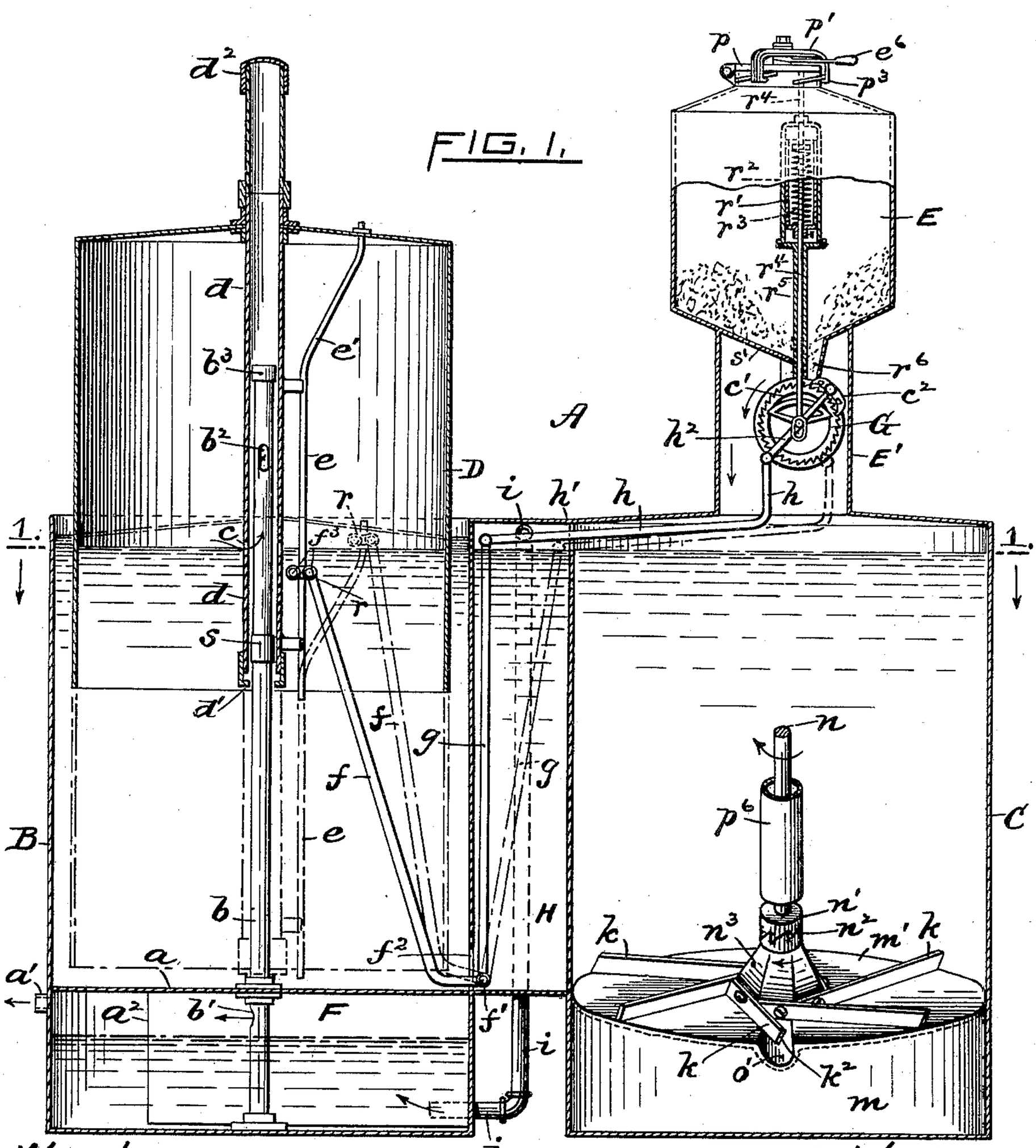
J. W. WEEKS.

ACETYLENE GAS GENERATOR.

(Application filed May 2, 1901.)

(No Model.) 4 Sheets—Sheet 1.

FIG. 1.



WITNESSES.

Charles P. Hannigan

S. C. Harris

INVENTOR.

John W. Weeks.

By Geo. H. Remington & Co.

Attys.

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(No Model.) 4 Sheets—Sheet 2.

FIG. 2.

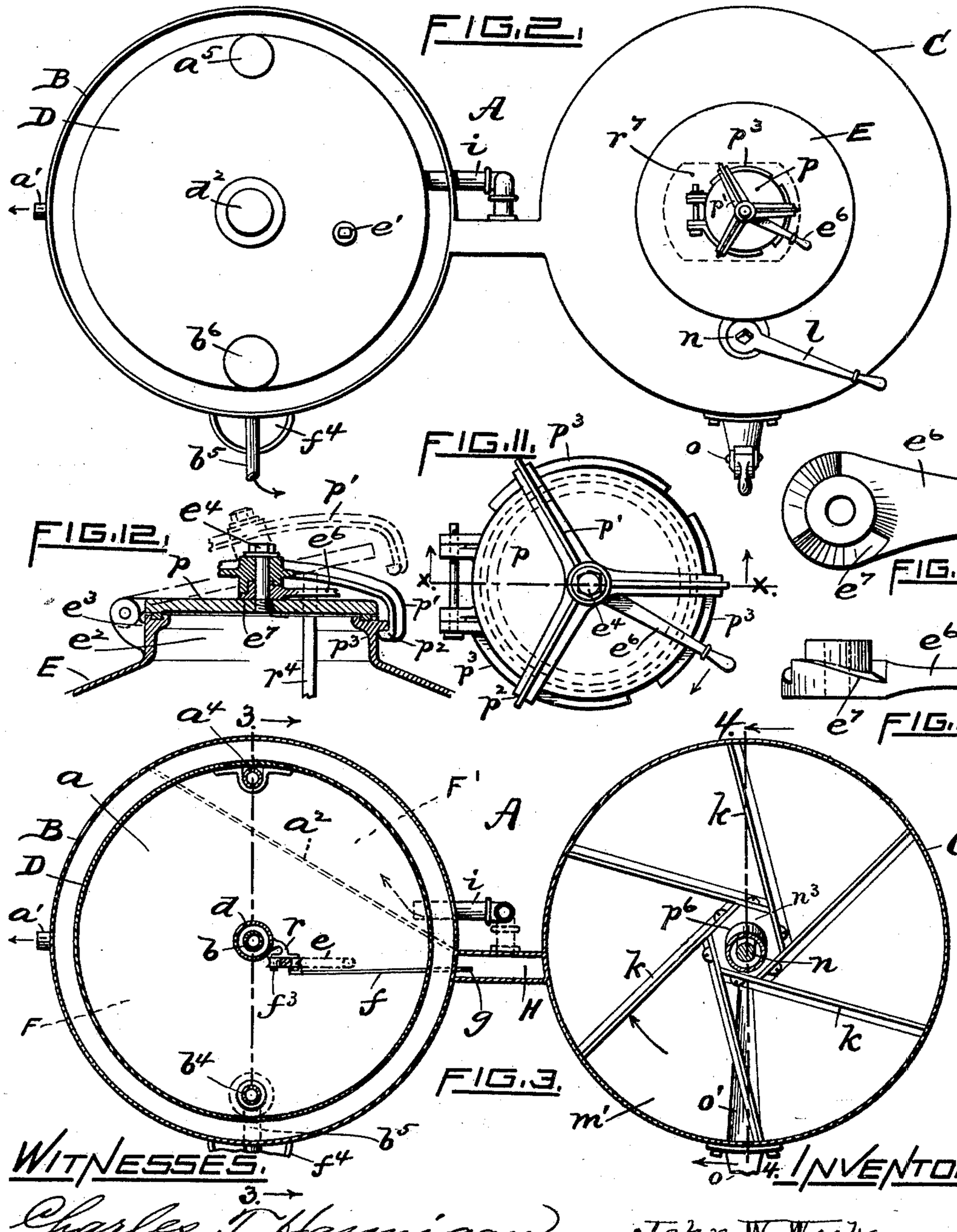

FIG. 11.

FIG. 12.

FIG. 19.

FIG. 13.

FIG. 3.

WITNESSES.

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FIG. 8.

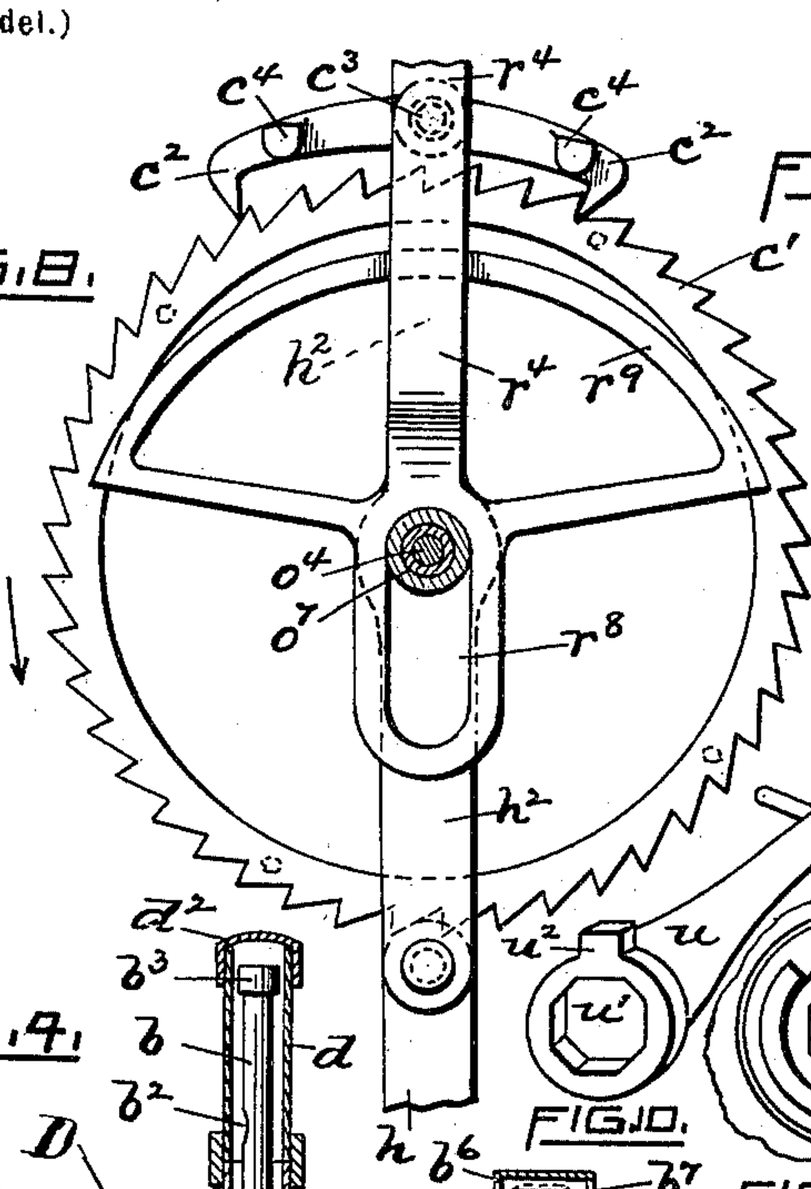

FIG. 6.

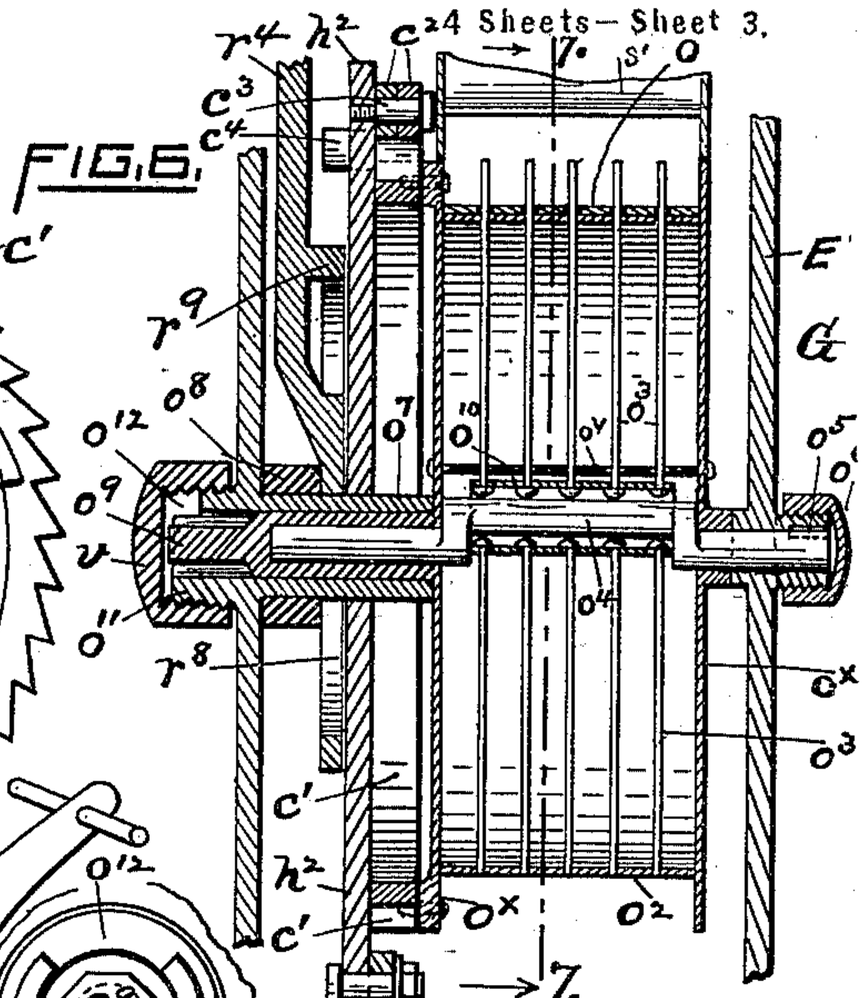

FIG. 4.

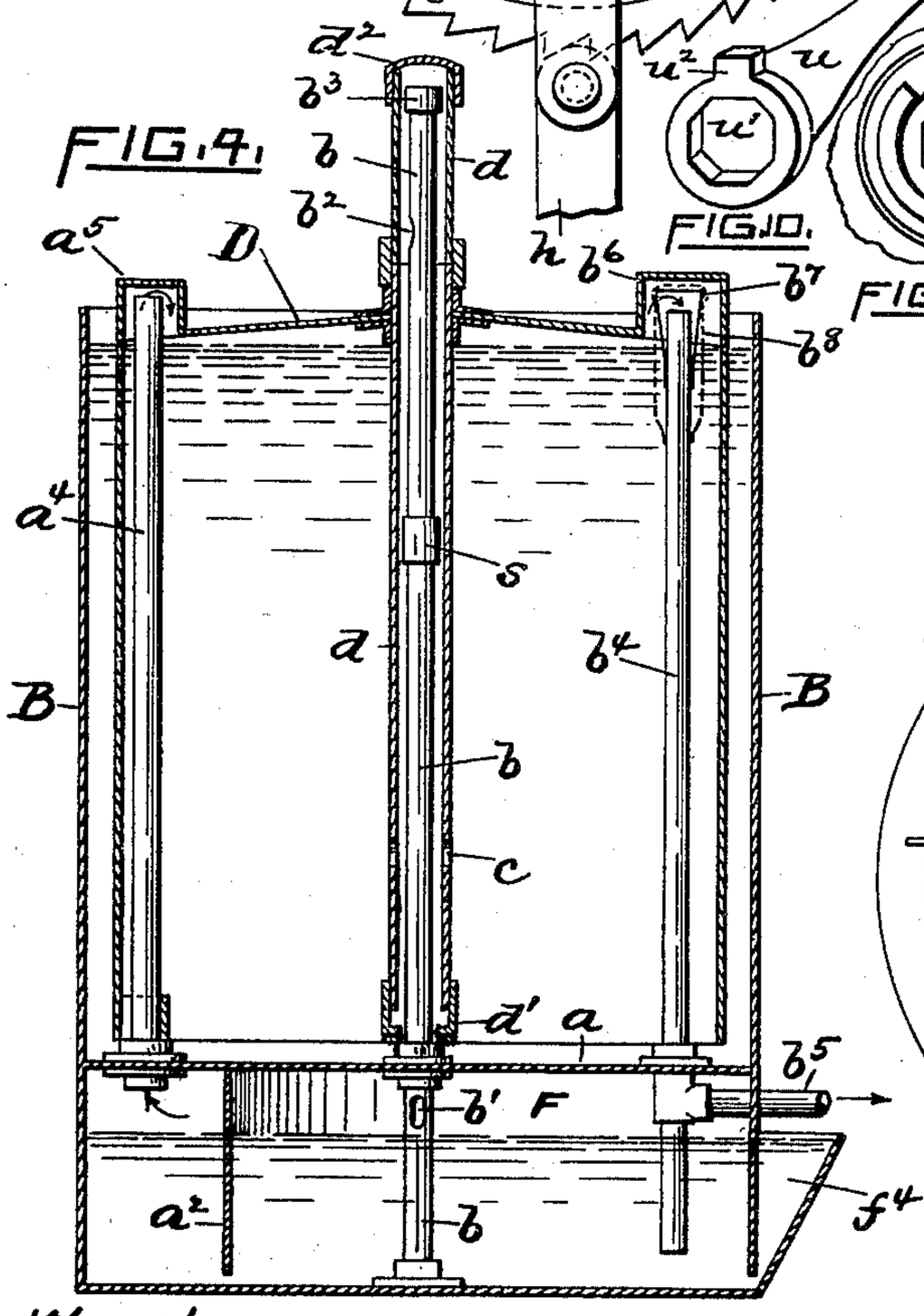

FIG. 10.

FIG. 9.

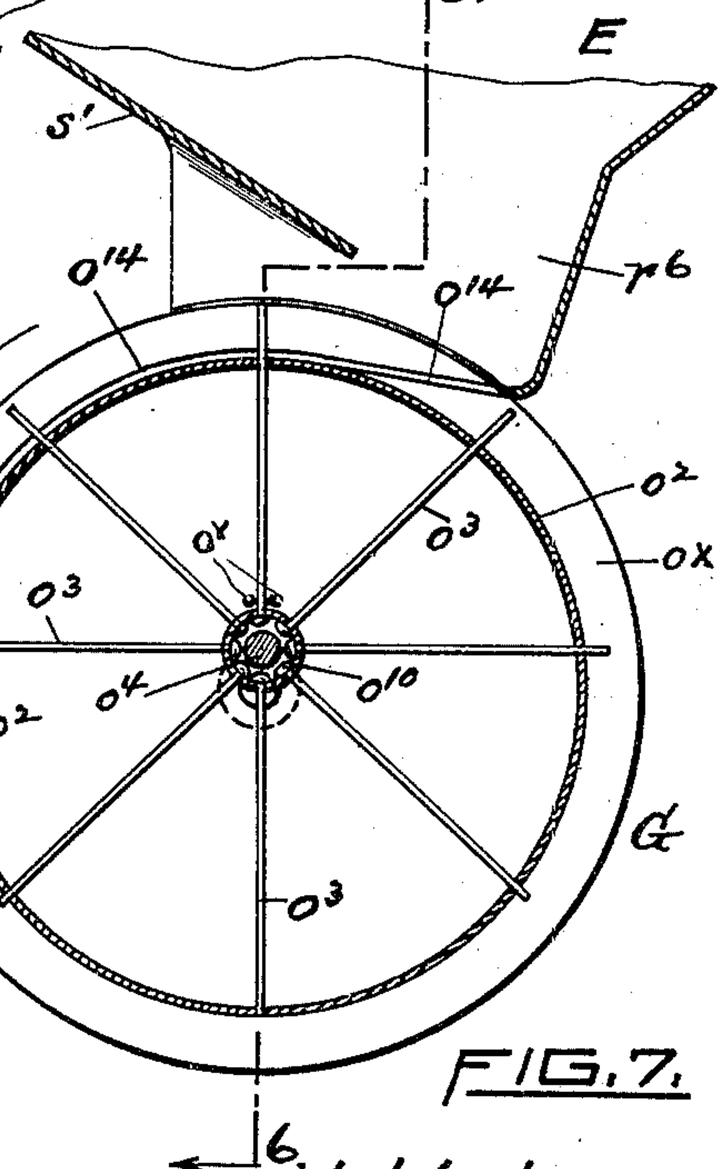

FIG. 7.

WITNESSES.

Charles T. Hannigan.

S. C. Harris

INVENTOR.

John W. Weeks.

By Geo. H. Remington & Co.

Attys

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J. W. WEEKS.

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(No Model.) 4 Sheets—Sheet 4.

FIG. 5.

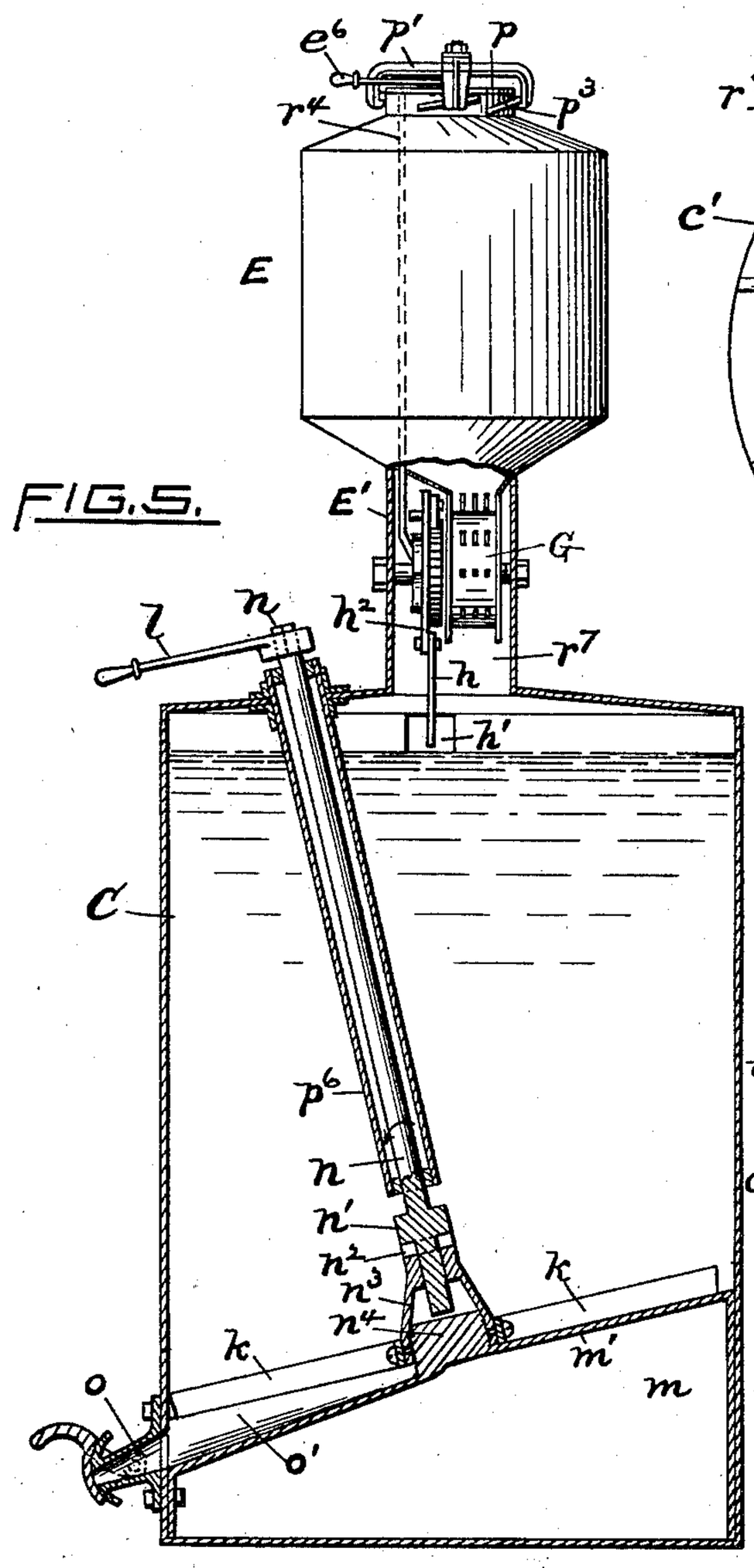

FIG. 15.

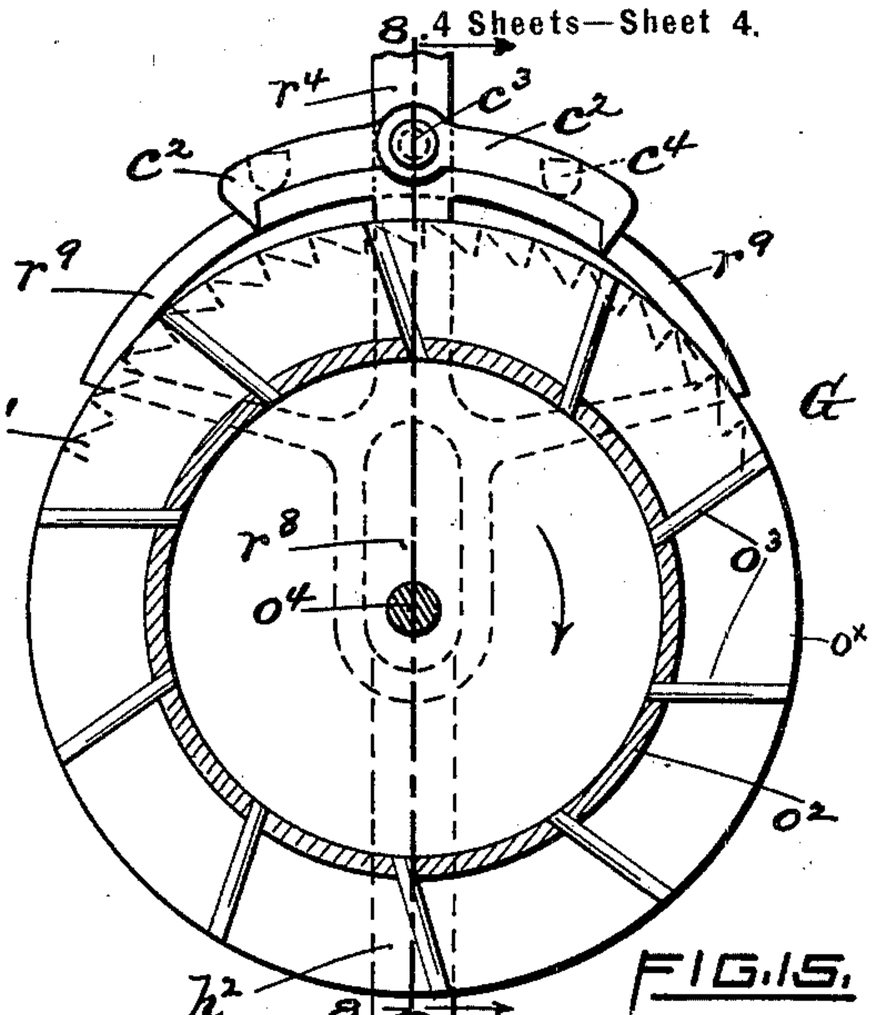

FIG. 16.

WITNESSES.

Charles T. Hannigan.

S. C. Harris

INVENTOR.

John W. Weeks

by Geo. H. Remington & Co.

Attys.

UNITED STATES PATENT OFFICE.

JOHN W. WEEKS, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE UNIVERSAL ACETYLENE COMPANY, OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF RHODE ISLAND.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 701,433, dated June 3, 1902.

Application filed May 2, 1901. Serial No. 58,443. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. WEEKS, a citizen of the United States of America, and a resident of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Acetylene-Gas Generators, of which the following is a specification.

My invention relates to certain novel improvements in apparatus or machines for generating acetylene gas and of the type in which the dry carbid is fed automatically and intermittingly, as required, into the generator located below the carbid holder or reservoir.

The invention consists in a device for feeding the carbid from the holder by the action of the descending gasometer, the arrangement being such that the discharge-orifice of the holder cannot become clogged, nor can it be accidentally opened while the holder is being charged with carbid, even though the generator be producing gas at the time.

It also consists in an improved construction of the machine whereby the generator and gasometer tanks may be simultaneously filled with fresh water and the carbid maintained in its normal or dry state at all times.

In the accompanying four sheets of drawings, Figure 1 is a longitudinal central sectional view of my improved acetylene-gas-generating apparatus complete as provided with a gas-generating tank and a tank connected therewith containing the gasometer, &c., as in use. Fig. 2 is a plan view of the same. Fig. 3 is a horizontal sectional view taken on line 1 1 of Fig. 1. Fig. 4 is a transverse central sectional view of the gasometer, its tank, &c., taken on line 3 3 of Fig. 3, showing the gasometer in its lowest or normal position. Fig. 5 is a sectional view of the gas-generating tank, &c., taken on line 4 4 of Fig. 3 and also showing the carbid-holder and the feeding mechanism. Fig. 6 is a transverse sectional view of the feeding device, enlarged, taken on line 6 6 of Fig. 7. Fig. 7 is a cross-section taken on line 7 7 of Fig. 6. Fig. 8 is a front elevation of portions of the feeding mechanism, the front part of the frame or housing being omitted. Fig. 9 is an end view, enlarged, of the feed-wheel shaft and its bearing. Fig. 10 is a perspective view of a key or wrench adapted to engage said shaft. Fig. 11 is a plan view of the novel top or cover through which the reservoir is charged with carbid. Fig. 12 is a cross-sectional view of the same taken on line $x\,x$ of Fig. 11. Fig. 13 is a partial side view of the auxiliary locking lever or wrench by means of which the cover is securely clamped and sealed to the holder. Fig. 14 is a top view of it. Fig. 15 is a cross-sectional view taken on line 5 5 of Fig. 16, showing a modification of the carbid-feeding mechanism; and Fig. 16 is a transverse section taken on line 8 8 of Fig. 15.

The following is a detailed description of my improved acetylene-gas-generating apparatus A and the manner of its operation.

The closed water-holding gas-generating tank C and the gasometer-holding tank B are united by a hollow or chambered water-tight connection H, having as drawn a rectangular shape, the two tanks being in continuously open communication by means of the opening f^2 in the lower side of tank B and the opening h' in the upper adjacent side of tank C, the bottom of said opening h' being practically the normal level of the water in the two tanks, all as clearly shown in Fig. 1.

The lower portion of the gas-generating tank C is provided interiorly with a cylindrical member m, having its top surface m' arranged at an angle therewith, the lower side having a radial depression or trough o' therein registering with a gate or valved outlet o. (See Figs. 1, 3, and 5.) It is through this gate that the residue or slaked carbid is discharged, as will be described later.

The carbid-holder E is supported by the hollow neck or connection E′, secured to and opening into the top of the tank C. The carbid-feeding mechanism is located in said hollow connection and is substantially as follows:

Referring to Figs. 6, 7, and 8, it will be seen, Fig. 6, that a stationary crank-shaft o^4 is mounted in the side walls of the extension E′, the shaft being prevented from turning by means of a key o^5, the corresponding end of the shaft being protected by a cap o^6.

Revolubly mounted on the plain portion of said shaft are the two circular disks or ends o^x of the feed-wheel G, said ends being united by the cylindrical rim o^2. The front or left end of the wheel has a comparatively long hub, its outer portion o^9 being reduced in thickness and adapted to receive the end u' of the socket-wrench u, Fig. 10. This end of the shaft is protected by a cap v, screwed to the corresponding side of the wall. By means of this construction it is obvious that the feed-wheel may be partly rotated by hand or independently of the driving mechanism when desired—that is to say, the hub o^{11} has a portion thereof cut away at o^{12}, (see Figs. 6 and 9,) while the said wrench u has an exterior lug u^2 thereon, Fig. 10, arranged in such manner that upon placing the wrench upon the end portion o^9 of the wheel the latter may be turned an angular distance equal, say, to one-eighth of a revolution.

The crank or eccentric portion of the shaft o^4 is provided with a loosely-turning sleeve o^{10}, in which are mounted eight series of radially-arranged endwise-movable fingers o^3 of uniform length, the inner ends being enlarged to form heads, as clearly shown in Figs. 6 and 7. These fingers extend through the wheel-rim o^2, the arrangement being such that upon revolving the wheel each series of fingers is successively and gradually projected through the rim. In order that the said sleeve o^{10} shall move concurrently with the wheel-rim, I may use two guide-pins o^v, secured to and extending through the two ends o^x and bearing against the corresponding row of pins, as shown.

The hopper or carbid-holder E has its lower portion reduced to form a contracted passage r^6, having an inclined partition s' therein. The lower edges of the two lateral sides of the holder are formed so as to register with and be concentric to the periphery of said ends o^x of the feed-wheel. (See Figs. 6 and 7.) The base or bottom member o^{14} of the stationary holder E is bent to conform to the surface or curvature of the wheel-rim and is further provided with a series of slits or narrow longitudinal openings located in the path of the fingers o^3, whereby the wheel in revolving causes the fingers to travel in said slits.

The means employed for mechanically and intermittingly rotating the feed-wheel are as follows: To the front side of the wheel is secured a ratchet or toothed rim c', having an arm h^2 arranged in front thereof and mounted to swing freely on the hub o^7 of the wheel-bearing. To the lower end of this arm is jointed the bent link or connection h, in turn jointed to the vertical lever g, mounted to vibrate in the chambered portion H. At the upper end of arm h^2 is fixed a horizontal pin c^3, having mounted thereon the two oppositely-arranged self-dropping pawls c^2, adapted to engage the teeth of said ratchet-wheel. Each pawl has a short lug c^4 projecting in front therefrom. As thus arranged it is obvious that upon swinging the arm h^2 in the proper direction the driving-pawl will force the wheel around in the arrow direction, Fig. 8, a distance corresponding to the angular movement of the lever g. (See also Fig. 1.) The feed-wheel remains stationary while the pawls, &c., are swung back to the normal position by the action of lever g. One of the pawls acts as a check or lock to prevent the feed-wheel from turning rearwardly.

Within the carbid-holder E is mounted a vertically-arranged stationary tube r^5, through which freely passes the rod r^4. The latter extends downwardly in front of the arm h^2, its lower portion having a slotted opening r^8, through which the bearing o^7 passes and forms a guide therefor. To the rear side of this rod r^4 is fixed a quadrant r^9, adapted when elevated to contact with said lugs c^4 of the pawls and swing them out of engagement with the teeth of the wheel or ratchet c'. The upper end of rod r^4 bears against the under side of the hinged cover p of the carbid-holder. Said rod is provided with a helical spring r^3, bearing against a vertically-adjustable member r', inclosing the spring, the member r' in turn being inclosed in the enlarged chambered portion r^2, through which the rod passes. (See Fig. 1.) As thus constructed it will be seen that the parts are protected from the carbid, the spring acting to force the rod r^4 and its quadrant upwardly whenever the cover is lifted. By this means the feed-wheel remains stationary while the holder is being charged with carbid or even though the gasometer should be depressed by taking gas therefrom or for any other cause.

The open tank B, in which the gasometer D is mounted and sealed, is as drawn substantially the same diameter and height as the other tank, C, and has a water-tight bottom or horizontal partition a near its lower end, thereby forming a space or gas-washing chamber F beneath, as shown in Figs. 1 and 4. Secured to the bottom of said chamber is an upright tube b, the same extending through the partition a and above the top of tank B. Its upper end may be left open or closed by a cap b^3, as shown. Near the top of the tube is formed an inlet-opening b^2, the same being in direct communication with an exit-opening b', formed in the tube at a point just below the partition a.

The lower part of tank B is provided with an exterior projection or nozzle f^4, open at the top and in direct communication with said chamber F, the latter being filled with water to a point substantially level with the top of said nozzle, but below the opening b'. Within the chamber F is located a downwardly-extending vertical partition a^2, (see also dotted lines, Fig. 3,) thereby producing a smaller chamber F', so arranged that the water circulates freely in both. A continuously-open blow-off pipe a' extends through the wall and is located above the water-lever in the gas-washing chamber F, thereby allowing any

gas flowing from the pipe-opening b' to escape freely and directly into the atmosphere, thus rendering the generator absolutely safe against excessive volume and pressure of gas.

The gas-holder or gasometer D has a central tube d secured thereto, the same extending through and above the top wall of the gasometer and is surmounted by a cap d^2. To the lower end of the tube is secured a collar or coupling member d', having an inwardly-formed flange adapted to engage a collar or enlargement s of the said tube b. As thus constructed the tubes b and d form a lateral support and telescopic guide for the vertically-movable gasometer, the collar s serving as a stop for limiting its upward movement, while the member d' limits the gasometer's movement in the opposite direction. (See broken lines in Fig. 1.) At a suitable predetermined point the tube d has an opening c formed therein, the location of said opening being arranged so that in the event of the gasometer rising to its limit said opening will then be above the water-level in the tank and permit the gas to escape freely into the atmosphere via said passages c, b^2, b, and b' into the chamber F and from the latter via opening a' into the outer air, all as clearly shown in Fig. 1.

In the lower portion of the hollow connection H, uniting the tanks C and B, is fulcrumed at f' a bent lever f, said lever passing through the adjacent opening f^2 into the tank B and upwardly therein at an angle, its upper end being provided with a pair of freely-turning small guide-wheels f^3, between which passes a rod e, suitably secured to and supported by the tube d, the upper portion e' of the rod being bent at an angle and fastened to the top of the gasometer D. A lever g, also fulcrumed at f', extends upwardly in the chamber H and is arranged to vibrate in unison with the lever f, as indicated by broken lines in Fig. 1. A connection h is jointed to the upper end of lever g, the same extending horizontally through an opening h', formed in the wall of the tank C, and is attached to and forms a part of the carbid-feeding device before described. From the foregoing it is apparent that the feeding mechanism is inactive or normally stationary, while the major part of the gasometer's vertical movements simply causes the straight portion of the rod e to pass freely between the concave faces of the guide-wheels f^3; but at the instant the gasometer in its descent brings the bent part e' into engagement with the lever and until it falls to its limit or stop the lever will be correspondingly forced away from the center of the gasometer or outwardly, thereby at the same time imparting an endwise movement to the connection h and actuating the feed-wheel G to discharge carbid into the gas-generating tank C. The gasometer in rising from said low position gradually returns the levers, &c., to the normal or stationary position to be again actuated by the gasometer in its next descent.

The top end of the carbid-holder E has a charging-opening e^2 therein, provided with a hinged cover p. To the center of said cover is secured a pin or bolt e^4, on which is fitted a swinging three-arm clamp or spider p', the outer end of each arm having a projection or hook p^2 on its under side arranged to engage a cam-shaped lip or lug p^3. (See Figs. 11 and 12.) Interposed between the cover and spider is located a swinging handle e^6, forming an auxiliary clamping device. In this arrangement the bottom face of the member p' at its hub is provided with one or more inclined or cam-shaped lugs, forming the counterpart of and in engagement with similar lugs e^7, formed on the upper side of the member e^6. (See Figs. 13 and 14.) After closing the cover and clamping it down by means of the spider p' the handle e^6 of the auxiliary clamping member is swung axially, its wedge action operating to rigidly secure the parts together and producing an air-tight joint.

In Figs. 1, 3, and 5 is represented a device for removing the residue or slaked carbid from the generator. The bottom m' of the latter is formed at an angle to its longitudinal axis and having a radial trough o' and discharge-outlet o. (See Fig. 5.) A series of thin scraper-blades k are secured to a central head n^3, turning freely on a stationary hub n^4 of the base m'. The upper end of said head is provided with clutch-teeth n^2, arranged to be engaged by a clutch member n', having similar teeth, said teeth being adapted to rotate the scraper when turned in the proper direction, as shown in Fig. 1. The clutch n' is secured to or integral with the shaft n, extending upwardly through the top of the generator and at right angles to the plane of the base m' and is surmounted by an operating-lever l. A stationary pipe p^6, through which the shaft passes, forms a bearing therefor, while at the same time permitting the shaft to move endwise in case it is turned in a contrary direction. The scraper-blades k are arranged tangentially, whereby when in use they are adapted to force the residue outwardly or toward the periphery of the generator, each pocket or space between the blades discharging its contents successively into the trough o' and open gate o.

The manner of operation of my improved acetylene-gas-generating apparatus A is substantially as follows, assuming first, however, that the several parts of the machine are in the normal position, substantially as shown in Fig. 1, and having the holder E charged with carbid, the tanks C B and chambers F F′ being filled with the desired quantity of water, and having the gasometer D in the act of rising by the gas being generated in tank C, the feed-wheel G meanwhile being stationary: The gas passes from the top of the generator-chamber through opening h'

into the open pipe i, communicating with the hollow connection H above the water-line, then downwardly, and is discharged into the water of chamber F′, thus washing the gas. From said chamber the gas passes upwardly therefrom through pipe a^4 into the gas-holder or gasometer D, the same gradually rising in tank B by reason of the inflowing gas. The vertical service-pipe b^4, located in tank B, is open at both ends. Its upper end extends above the water-level and is protected by a suitable screen or strainer b^8, supported by a framework b^7. The lower end of said pipe extends through the partition a and is immersed in the water in the washing-chamber F. At a point above this water-level the pipe b^4 is provided with a branch or outlet pipe b^5, to which connection may be made for conducting the gas from the gasometer to the burners or place of use, as desired. Now in case an excess quantity or pressure of gas should force the gasometer upwardly to its limit or stop s the open passage c will thereby become exposed, at which instant the gas will escape into the outer air via openings b^2, b, b', and a', as hereinbefore stated. In case there be a back pressure or excess pressure in the service-pipes b^4 b^5 the gas in such event freely escapes from the bottom end of pipe b^4 and rising through the water in chamber F flows off into the atmosphere via outlet a'. Whenever the quantity and pressure of gas are sufficiently reduced in the gasometer, the latter in its descent will cause the inclined portion e' of rod e to engage the end of lever f and force the latter outwardly, (see dotted-line position, Fig. 1,) said action at the same time vibrating lever g and through its connection h rotating the feed-wheel G, say, one-eighth of a revolution. This wheel movement causes the upper set of fingers o^3 to enter the slots formed in the bottom o^{14} of the neck of the carbid-holder and to force a corresponding quantity or charge of carbid from the base of the holder and discharge it into the water below, where it is instantly converted into acetylene gas and flows from the generator C via openings h', &c., into the gasometer, as just described. The upward movement of the gasometer next returns the feed mechanism to the normal position, the feed-wheel itself meanwhile remaining stationary. The foregoing operation is continuously and automatically repeated as long as the supply of carbid is maintained in the holder and the gas is being consumed. If no gas is being used, the gasometer will remain practically stationary while the escape or blow-off opening c is under water, assuming, of course, that the gasometer has not descended sufficiently to cause the feed mechanism to be again acted upon. I may further add that the feed-wheel as arranged revolves in one direction only, its movement being intermittent and in unison with the vertical movements of the gasometer or, rather, that part of it which causes the bent portion e' of rod e to contact with the lever f, &c. When in action, the fingers o^3 of the feed-wheel are forced gradually up through the base o^{14} of the carbid-holder, thereby disturbing or agitating the mass of carbid resting thereon and forcing out through the opening below the partition s' a charge of carbid, which is carried downwardly along the said base and falls therefrom into the water of the tank C. The amount of carbid forming a charge may be varied by changing the number of series of fingers in the feed-wheel or by changing the distance the fingers project through the wheel's rim.

In order to relieve the feed-wheel from the weight of the carbid contained in the holder E, and thus reduce to a minimum the working friction or force required to rotate the wheel, I employ the said slotted stationary base o^{14}, forming the bottom of the throat, through which the carbid is discharged from the holder. The base member as drawn (see Fig. 7) is interposed between the holder proper and the feed-wheel. The same extends forward and is bent to the contour of the wheel's rim and lies adjacent thereto, although preferably not in actual contact therewith. Thus it is clear that only the small movable fingers o^3 of the wheel are brought into direct engagement with the carbid, the surface of the wheel itself at the same time being shielded or protected by the interposed base, as before stated. It is obvious that the device is not so well adapted for carbid having a granular or powdered form as it is for carbid consisting of medium and small-sized pieces.

It will be seen, referring to chamber F in Figs. 1 and 4, that the space below the lower edge of partition a^2, as well as that of the opening through the wall contiguous to the nozzle f^4, is somewhat less than the distance from the base of the chamber up to the lower end of the service-pipe b^4. Therefore any gas overflowing from said pipe will rise through the water and escape through the open outlet a' into the atmosphere. Gas flowing from the gas-inlet pipe i into the water of the washing-chamber F′ will, however, rise through the water in said chamber and pass upwardly to the gasometer via pipe a^4 without waste.

The water-levels in tanks B and C and the bottom chambers F F′ may be practically maintained by simply introducing a suitable hose in the open space formed between the adjacent walls of the gasometer and its tank and supplying water therefrom until it flows from the chamber of the hollow connection H into the upper open end of the pipe i and thence downwardly through said pipe into the chamber F′, the supply being continued until it overflows the nozzle f^4, at which instant it will be apparent that the water has risen to the desired levels. This arrangement forms a safe and sure guide or indicator. The water in the tanks, &c., may thus be re-

newed at any time without inconvenience, the construction being such that whenever the water overflows the nozzle or lip f^4 the attendant knows that the several water-holding tanks, &c., are properly filled.

In Figs. 5, 15, and 16 I have represented a slightly-modified construction of the feed-wheel G. The manner of mounting and actuating it is, however, substantially the same as before described. In the modified form the several series of fingers o^3 are fixed to the rim o^2 of the wheel, the latter turning on a straight shaft o^4, as clearly shown in said Figs. 15 and 16.

Among the advantages possessed by my improved acetylene-gas generator A, I would state that it embodies all the conditions required by the National Board of Fire Underwriters. The machine is almost wholly automatic in its several functions. It is belived to be absolutely safe. It can be charged with carbid without danger while it is in operation. It can be easily and quickly cleaned at any time. The parts are readily accessible. The residue can be thoroughly loosened and drawn off without stopping the machine. It is impossible for the carbid to drop into the generator except as it is intermittingly fed from the holder by the action of the gasometer, and in view of all the advantages above referred to the machine can be produced at a comparatively small cost.

While I have to some extent described the construction and manner of operation of the combined telescoping guide, stop, and blow-off formed by the tubes b and d, the closure device for the carbid-holder E, and the scraper mechanism for removing the residue from the bottom of the tank C, I do not claim the same herewith, as they will form the subjects of other applications for Letters Patent to be filed by me in the United States Patent Office.

I claim as my invention and desire to secure by United States Letters Patent—

1. In an acetylene-gas generator, the combination of a water-tank; a carbid-feeder located at the top of the water-tank; a gasometer, an interposed hollow water-tight connecting member uniting the water-tank with the tank of the gasometer, said member having an opening at the upper part into the water-tank and an opening at the lower part into the tank of the gasometer, a bent lever pivoted in proximity to said lower opening of said member and having one arm operated by the gasometer, the lever having its other arm extending upwardly through said connecting member, and means connected with the free end of said latter arm for operating said carbid-feeder.

2. In an acetylene-gas generator, the combination of a water-tank, a carbid-feeder located at the top of the water-tank, a gasometer, an interposed connecting member uniting the water-tank with the gasometer-tank, said member having an opening at the upper part into the water-tank and an opening at the lower part into the tank of the gasometer, a bent lever pivoted in proximity to said lower opening and having one arm extending upwardly in the gasometer, an inclined rod in the gasometer arranged to engage said arm and thereby move the lever on the movement of the gasometer, the other arm of the bent lever extending upwardly through the connecting member, and a rod connecting the end of said latter arm with the carbid-feeder.

3. In an acetylene-gas generator, the combination of a water-tank, a carbid-feeder located at the top of the water-tank, a gasometer, an interposed connecting member uniting the water-tank with the gasometer-tank, said member having an opening at its upper part into the water-tank and an opening at its lower part into the tank of the gasometer, a gas-washing chamber located in the base of the gasometer, a pipe communicating with said connecting vessel just below the top of said water-tank and just above the normal water-line, said pipe communicating with the gas-washing chamber near its bottom, and an exterior outlet or overflow communicating with said gas-washing chamber for limiting the height of water in the latter.

4. In an acetylene-gas generator, the combination with the gasometer and gas-generating tanks, B, C, respectively, and gas-washing chambers located below the tank E, of the interposed hollow water-tight connection H uniting said tanks and communicating therewith by means of suitable openings, the opening in tank c being at the normal water line or level, a gas-pipe i leading from the upper end of said connection H and discharging into the said gas-washing chamber and an exterior outlet overflow-nozzle communicating with said gas-washing chamber thus limiting the height of water in the latter, substantially as described.

5. In an acetylene-gas generator, the combination of a suitably-mounted carbid holder or reservoir having a slitted bottom member supporting the carbid, a revoluble feed-wheel having its rim provided with projecting pins or fingers arranged to enter upwardly through and travel along said slits so as to discharge a quantity of the carbid from the holder, and means substantially as described for intermittingly rotating the feed-wheel.

6. In an acetylene-gas generator, the combination of a suitable stationary crank-shaft or eccentric and the feed-wheel G, the latter having a revoluble inner sleeve mounted on the crank portion of the shaft and a series of radially-movable fingers held in said sleeve and extending through the rim of the wheel, arranged whereby upon rotating the wheel the outer portion of the fingers will be successively and gradually projected beyond the rim and then retracted, substantially as described.

7. In an acetylene-gas generator, the combination of the revolubly-mounted carbid-

feeding wheel G, provided with peripherally-arranged fingers and a ratchet or toothed member, a swinging arm carrying self-dropping pawls arranged to engage the said toothed member, a vertically-movable gasometer, and mechanism connected with said swinging arm and gasometer, whereby the latter is adapted to actuate the feed-wheel, substantially as described.

8. In an acetylene-gas generator, the combination with the carbid-holder and the feed-wheel, revolubly mounted below the throat of said holder, provided with a series of independent fingers or agitators, of a slotted base member for supporting the carbid and forming the bottom of the throat and at the same time also forming a shield for the upper portion of the wheel, in that the latter is not in direct contact with the carbid, and means actuated on rotation of the wheel for gradually passing said fingers upwardly through the slotted portion of the base to engage the carbid and discharge it from the throat of the holder, substantially as described.

Signed at Providence, Rhode Island, this 5th day of April, 1901.

JOHN W. WEEKS.

Witnesses:
GEO. H. REMINGTON,
JOHN T. HENTHORN.