

No. 682,407.

Patented Sept. 10, 1901.

W. A. FEURT & H. H. MARTIN.  
ACETYLENE GAS GENERATING APPARATUS.

(Application filed July 28, 1900.)

(No Model.)

3 Sheets—Sheet 1.

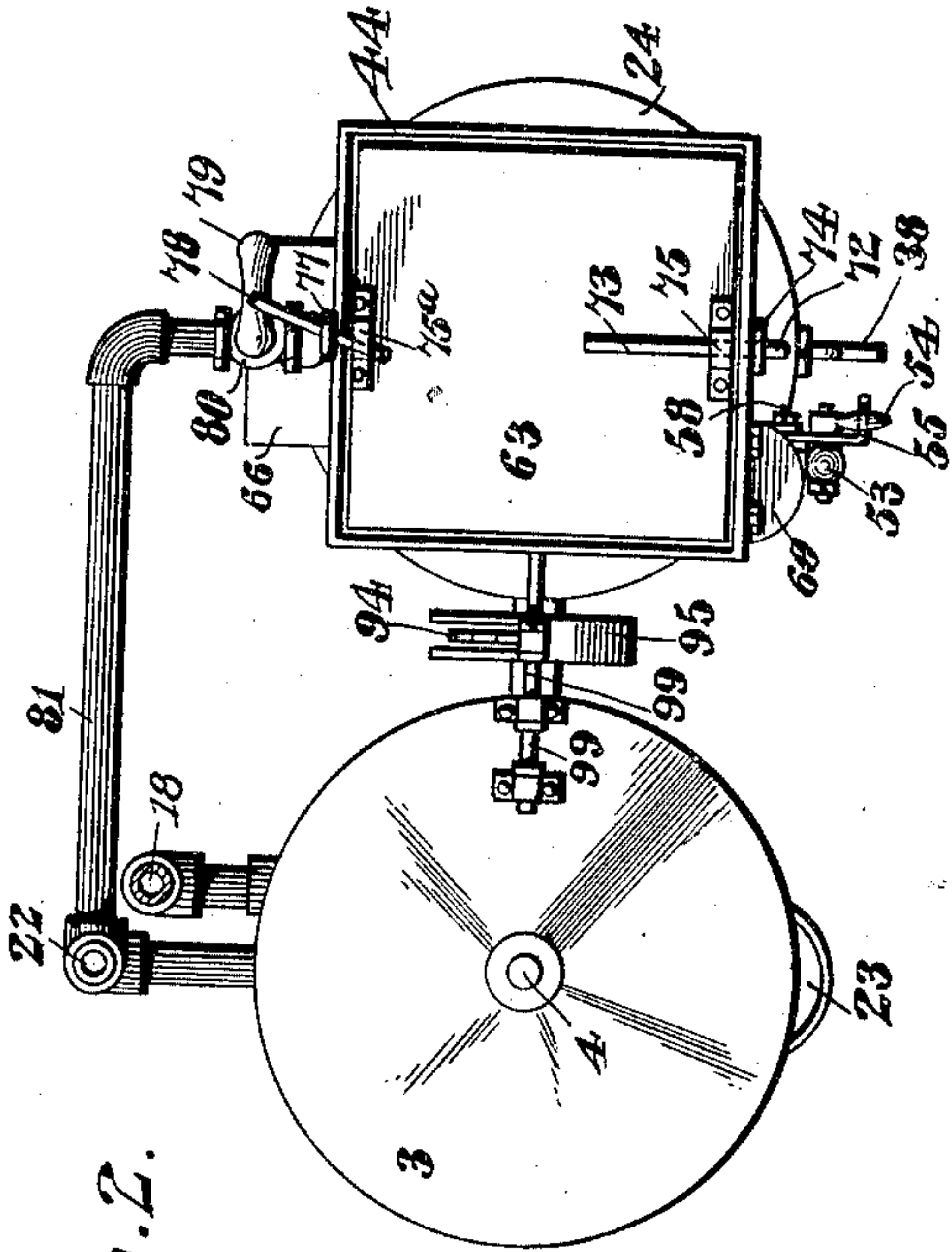


Fig. 2.

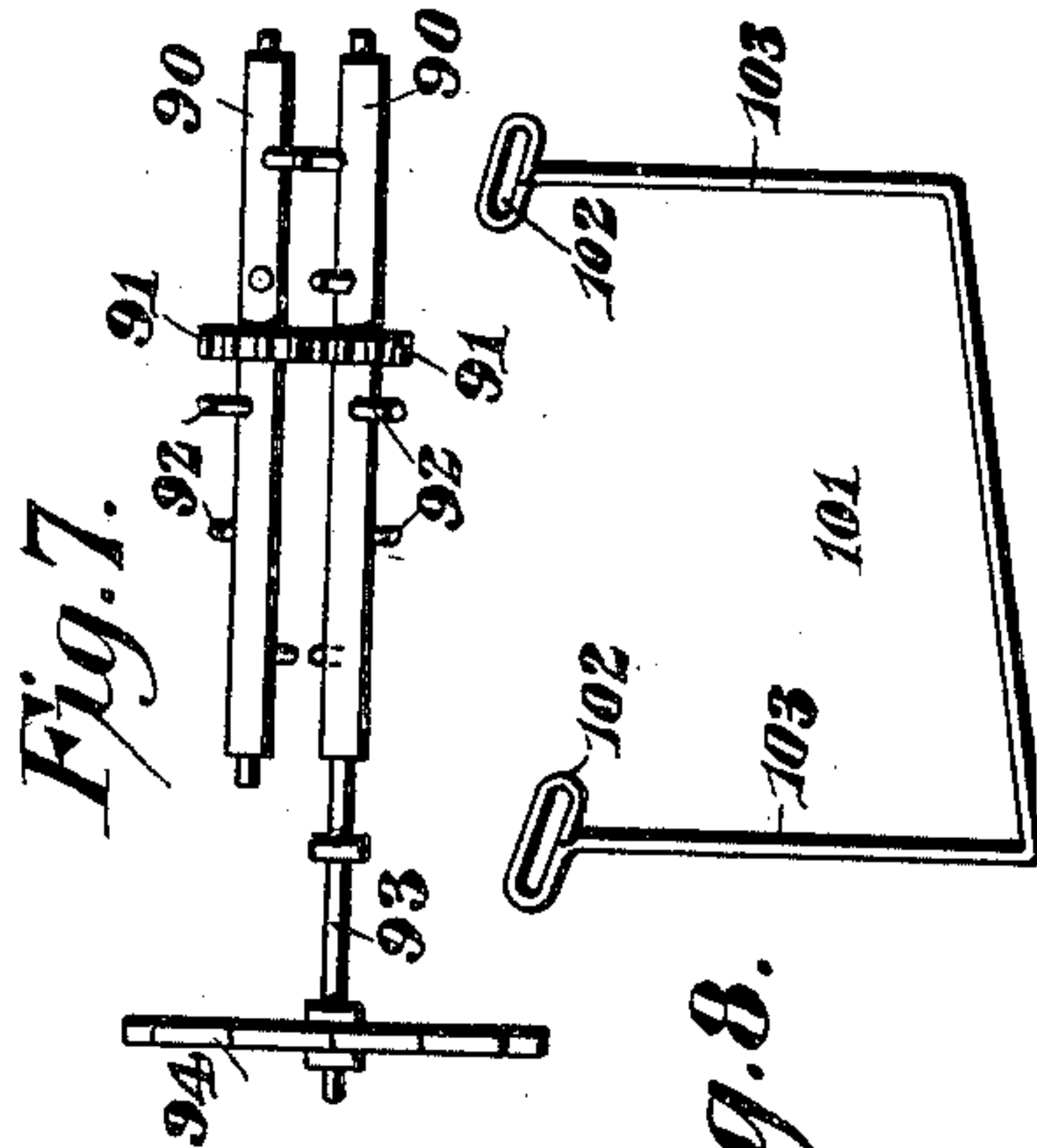


Fig. 7.

Fig. 8.

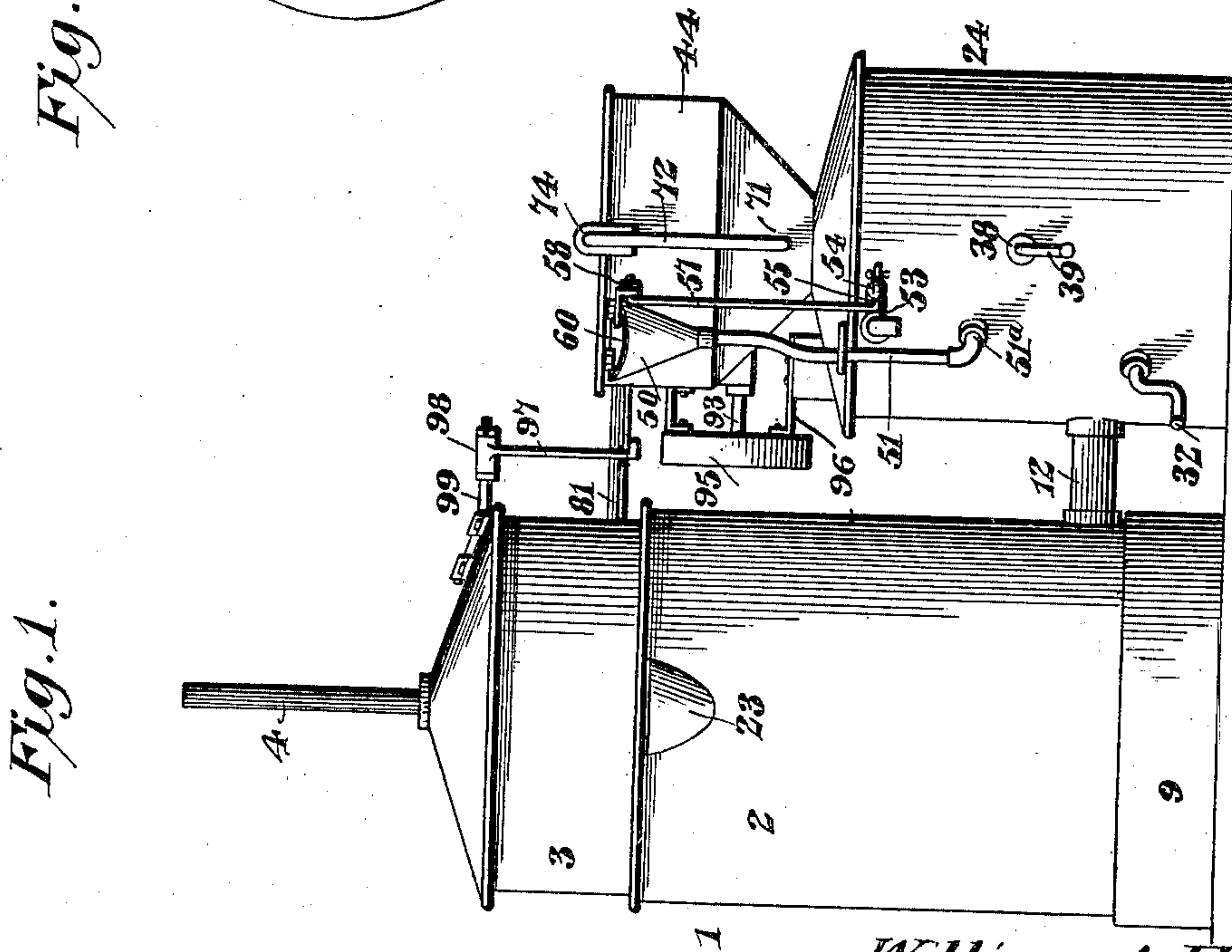


Fig. 1.

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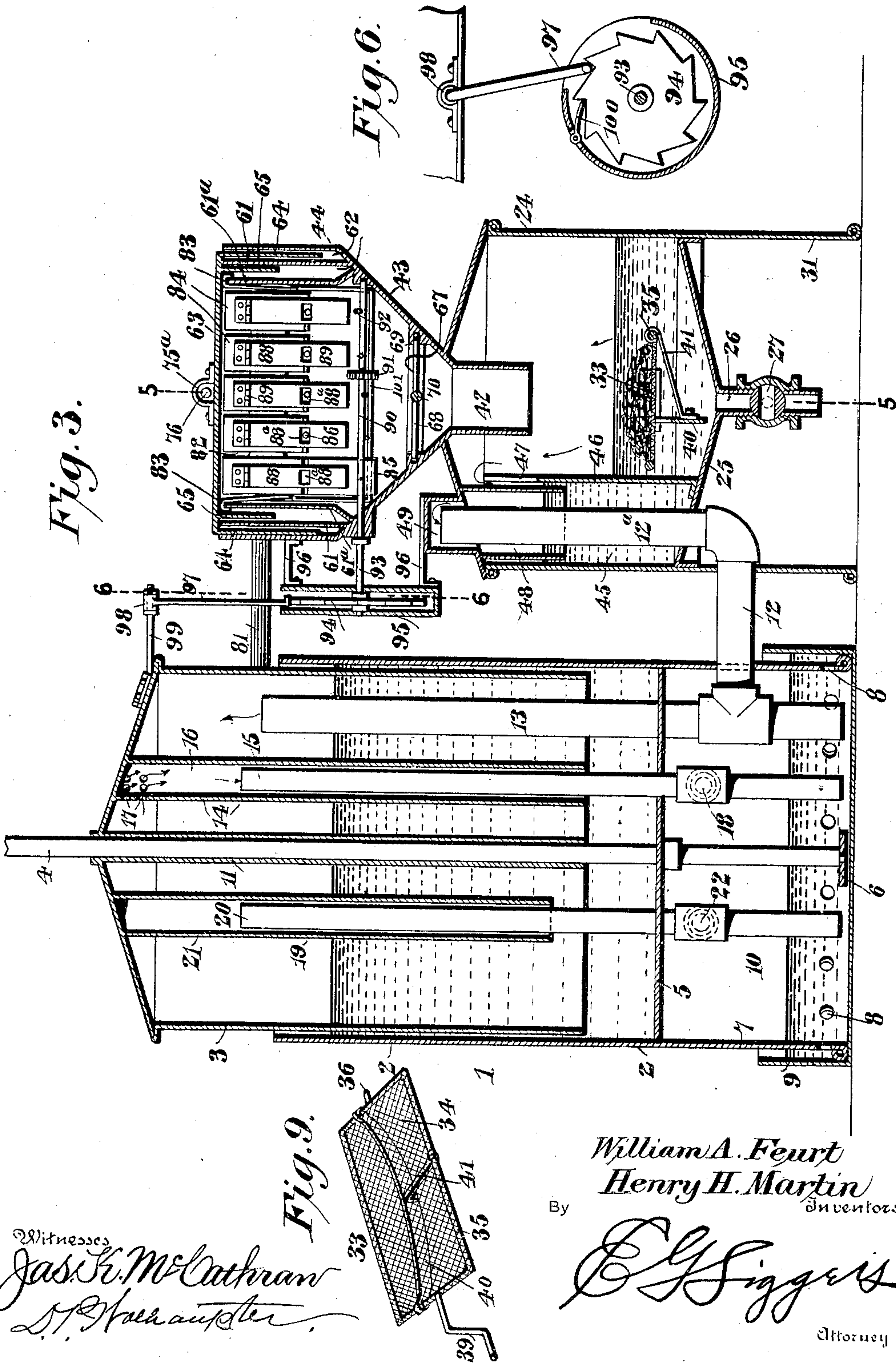
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ACETYLENE GAS GENERATING APPARATUS.

(Application filed July 26, 1900.)

(No Model.)

3 Sheets—Sheet 2.



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3 Sheets—Sheet 3.

Fig. 5.

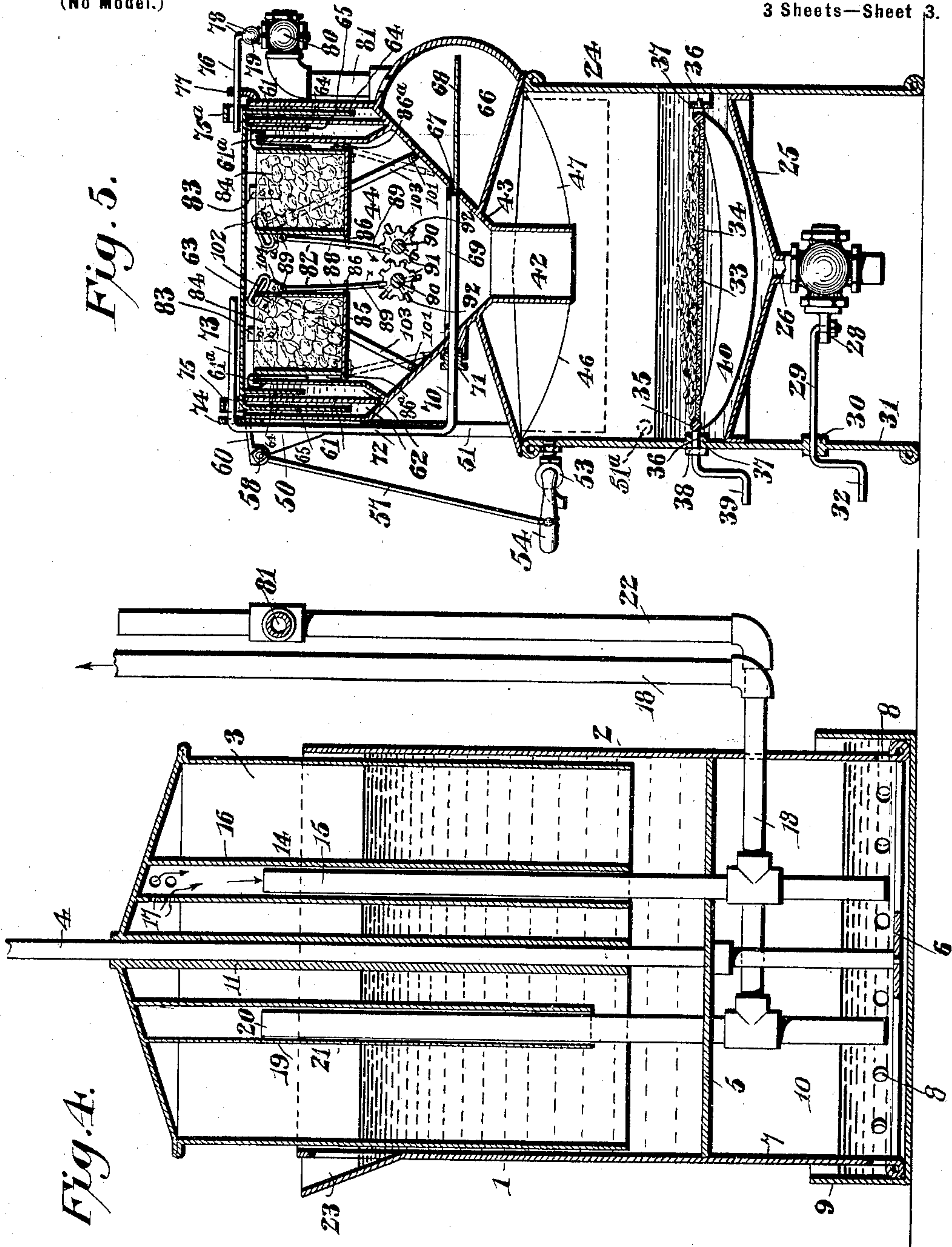


Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## ACETYLENE-GAS-GENERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 682,407, dated September 10, 1901.

Application filed July 26, 1900. Serial No. 24,940. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM A. FEURT and HENRY H. MARTIN, citizens of the United States, residing at Maryville, in the county of Nodaway and State of Missouri, have invented a new and useful Gas-Generating Apparatus, of which the following is a specification.

This invention relates to gas apparatus, and has special reference to improved means for the production of acetylene gas.

To this end the invention contemplates a novel construction of apparatus entirely automatic in its action both in the production of gas and in the feeding of fresh charges of the carbide to replace that consumed or disintegrated by the action of the water. In the accomplishment of this object the invention has in view the provision of an apparatus all of the parts of which are thoroughly sealed against the escape of gas as well as against the ingress of air, and which is also provided with means for obviating damage by explosion or otherwise upon an abnormal or over production of gas.

While the foregoing objects are sought for in the carrying out of the invention, still a special object is to provide a novel and reliable form of feeding mechanism associated with a plurality of individual carbide-holding cells to provide for successively and automatically feeding successive charges of the calcium carbide into the water and to provide for controlling this feeding mechanism solely through the movement of the gas-bell of the gasometer, according to the quantity of gas therein, thus making the feed of the carbide proportionate to the amount of gas produced and consumed.

A further object of the invention is to provide improved means for holding the charges of carbide independently of the generating vessel or chamber, whereby the carbide holder or hopper may be replenished without escape of gas from the apparatus and without affecting the parts within the generating vessel or chamber. In this connection a further object is to provide a novel form of closure or seal for the carbide-holding hopper to ob-

violate displacement thereof, while at the same time preventing escape of gas during the operation of the apparatus.

With these and other objects in view, which will more readily appear to those skilled in the art as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

The essential features of the invention, which provide for carrying out the special objects thereof, are necessarily susceptible to a variety of modifications without departing from the spirit or scope of the invention; but the preferred embodiment of the improvements is shown in the accompanying drawings, in which—

Figure 1 is a side elevation of an acetylene-gas apparatus embodying the improvements contemplated by the present invention and showing the gas-bell in an elevated position, in which position the feeding of the carbide is suspended. Fig. 2 is a top plan view of the apparatus. Fig. 3 is a vertical sectional view of the complete apparatus, including the gasometer and the generator. Fig. 4 is a vertical sectional view of the gasometer, showing more clearly the pipe connections associated therewith. Fig. 5 is a vertical sectional view of the generator, the section being taken on the line 5 5 of Fig. 3. Fig. 6 is a detail view of a portion of the feeding mechanism on the line 6 6 of Fig. 3, showing more plainly the mounting of the ratchet-disk for said mechanism and the relation thereof to the actuating-pawl carried by the gas-bell of the gasometer. Fig. 7 is a detail plan view of the releasing-shafts of the feeding mechanism, which cooperate with the pivotal latches of the individual carbide-cells. Fig. 8 is a detail in perspective of the resetting device or pawl associated with the carbide-cells of each battery. Fig. 9 is a detail in perspective of the rocking carbide-grate.

Like numerals of reference designate corresponding parts in the several figures of the drawings.

The complete apparatus includes as a part



thereof a gasometer or gas-holder 1, essentially consisting of an upright water-tank 2 and a vertically-movable gas-bell 3, inverted therein and having its lower open end immersed in the liquid of the water-tank to constitute an effective seal against the escape of gas. In carrying out the present invention the gasometer is preferably fitted with a central fixed guide-rod 4, which extends centrally and longitudinally throughout the entire height of the gasometer to provide a guiding-support for the gas-bell in the vertical play thereof. The said central guide-rod 4 preferably extends through the main bottom 5 of the water-tank 2 and is fitted at its lower extremity in a transverse brace 6, arranged within and secured to opposite sides of the pendent base-rim 7, projecting below the plane of the main bottom 5 of the water-tank. The said pendent base-rim 7 of the water-tank 2 is preferably provided at or near its lower edge with a plurality of circulating-openings 8 for the water placed within the receiving-pan 9, within which the lower end of the water-tank is preferably seated. The said receiving-pan 9 is of a slightly-greater diameter than the pendent base-rim of the water-tank received therein and is adapted to be supplied with water to provide for maintaining the level of water within the chamber 10, confined within the said rim 7, said chamber 10 having projecting therein the lower ends of a series of pipes, hereinafter referred to. The said central guide-rod 4, which is fitted at its lower end to the transverse brace 6 at the extreme bottom of the gasometer, slidably receives thereon an elongated bearing-sleeve 11, joined at its upper end to the top of the gas-bell and depending centrally within the bell the full length thereof to provide a long sleeved bearing therefor to firmly steady it in the vertical play of the same, while also remaining immersed in the liquid of the water-tank to be sealed therein and prevent the escape of gas therethrough.

The gasometer or gas-holder 1 receives its supply of gas from the generator, hereinafter described, through the gas-pipe 12 of the generator. This discharge-pipe 12 of the generator is extended through the pendent base-rim 7 of the water-tank and is coupled to a vertically-disposed gas-induction pipe 13, which induction-pipe extends through the main bottom 5 of the water-tank and has the lower end thereof sealed in the water within the bottom chamber 10 of the water-tank, while the upper end of the said gas-induction pipe 13 extends above the level of the liquid in the water-tank 2, so as to discharge the gas into the gas-bell 3, and to provide for carrying off the gas from the chamber of the gas-bell there is associated with the latter a telescopic eduction-pipe 14, consisting of fixed and movable pipe-sections 15 and 16, respectively. The fixed section 15 of the telescopic eduction-pipe 14 is fitted in the bottom of the water-tank and like the induction-

pipe 13 has the lower end thereof sealed in the water of the bottom chamber 10 and its upper end extended above the level of the liquid in the tank 2, but over which upper end telescopes the movable larger section 16 of the eduction-pipe 14. The said movable pipe-section 16 is joined by any suitable means at its upper end to the top of the vertically-movable gas-bell and is provided at or near its upper end with a plurality of gas-ports 17, through which the gas enters from the bell 3 and passes into the pipe-section 16, and thence into the fixed section 15. The said movable section 16 of the eduction-pipe preferably extends the full height or length of the bell 3, so as to be always submerged in the liquid of the water-tank to thereby prevent escape of gas excepting through the ports 17, and the lower fixed section 15 of the eduction-pipe has connected thereto the service-pipe 18, extending through the bottom or base-rim 7 of the water-tank and leading to the point of use. Besides the gas induction and eduction pipes the gasometer or gas-holder is also fitted with a telescopic blow-off safety-pipe 19, consisting of the fixed and movable pipe-sections 20 and 21. The fixed pipe-section 20 of the lower pipe is arranged similarly to the pipe 13 and the fixed section 15 of the eduction-pipe—that is, being fitted in the main bottom 5 of the gasometer and having its lower end sealed in the liquid in the bottom chamber 10 and its upper end normally extended above the level of the liquid in the water-tank 2. The movable section 21 of the blow-off pipe is joined at its upper end to the top of the gas-bell and loosely works over the fixed pipe-section 20. The said movable pipe-section 21 is also of a sufficient length to be always immersed or sealed within the liquid of the water-tank 2 under normal conditions, so that normally when the apparatus is working properly there is no escape of gas through the said pipe 19; but in the event of an abnormal amount of gas being generated and filling the gas-bell 3 the latter will be forced upward to an extreme position, thereby carrying the lower end of the movable pipe-section 21 above the level of the liquid in the gasometer, and thus permitting the excess or surplus gas to escape into the fixed pipe-section 20, and from thence into the exterior vent-pipe 22, which is in communication with the outer atmosphere and is extended through the base-rim 7 of the water-tank and coupled to the lower end portion of the fixed pipe-section 20, as plainly shown in Fig. 4 of the drawings.

The necessary supply of water is maintained in the tank 2 of the gasometer by introducing the same through the lateral filling-funnel 23, provided upon the water-tank 2, at one side thereof and at or near its upper end, as shown in Fig. 4 of the drawings, and at this point it may be noted that by reason of having the lower ends of the pipes 13, 15, and 20 of the gasometer extended into the open bottom



thereof such pipes may be readily cleaned or repaired by simply lifting the gasometer above the receiving-pan 9. A further advantage of this construction resides in the fact that any products of condensation forming within any of the said pipes will drop there-through into the pan 9, which may be cleaned from time to time.

The generator is arranged wholly exterior to the gasometer or gas-holder 1 and is designated in its entirety by the reference-number 24. This generator essentially comprises an air and water tight generating vessel or chamber, preferably provided with a conical or dished bottom 25, to the apex of which is fitted a drain-pipe 26, provided with a draw-off cock 27, the turning stem of which cock has suitably coupled thereto, as at 28, the inner end of a short operating-shaft 29, extending through a bearing 30 in one side of the base-rim 31 of the generating vessel and provided exterior to the latter with a crank-handle 32, which provides simple and efficient means for manipulating the cock 27 from the exterior of the generator, as may be plainly seen from Fig. 5 of the drawings. The said base-rim 31 of the generating vessel 24 projects a material distance below the conical or dished bottom 25 thereof and serves as a supporting-stand for holding the generating vessel in the properly-elevated position above the floor of the base upon which it rests.

The generating vessel or chamber 24 of the generator is designed to hold a sufficient quantity of water to provide for the generation of gas from the calcium carbide, and to provide for the proper support of the carbide within the vessel 24, while at the same time providing for the convenient disposal of the spent carbide, there is employed a carbide-grate 33. This grate essentially consists of a screen or foraminous platform 34, fitted within the rocking frame 35 and of a less width than that of the vessel, so as to be completely surrounded by water about its sides, as well as above and below the same, thus insuring an active attacking of the carbide at all points above the grate. The said rocking frame 35 is preferably of a rectangular formation and is provided at the opposite ends thereof with pivot-pintles 36, mounted in bearings 37, provided at diametrically opposite sides of the generating vessel, and one of which pivot-pintles 36 is extended through a stuffing-box 38 upon the side of the vessel and carries at its outer end an operating-crank 39, which can be swung back and forth to provide for the oscillating or rocking movement of the grate whenever this is necessary. The said rocking grate 33 is supported within the generating vessel 24, in a plane directly above the conical or dished bottom 25 thereof, and to provide for the proper discharging or cleaning out of the spent carbide there is associated with the rocking grate 33 a scraper-blade 40. The scraper-blade 40 is of an arched formation to conform as nearly as possible to the

dish of the bottom 25 of the generating vessel and extends well into said bottom in close proximity thereto to provide for loosening up any accumulations of material beneath the grate, besides providing for working the same into the pipe 26, through which spent carbide and other sediment are drawn off from time to time. The said scraper-blade 40 is disposed longitudinally beneath the rocking grate and is rigidly joined at its ends to the end bars of the frame 35, and to provide for rigidly joining the scraper-blade to the grate there is preferably employed a brace 41, fastened at one end to one side of the scraper-blade and at its other end to one side of the rocking frame.

The rocking carbide-grate 33 is arranged in the vertical plane of the feed-spout 42, which projects centrally and inwardly within the generating vessel, at the top thereof, and is located at the apex of the contracted bottom 43 of the carbide-holding hopper 44, surmounting the generating vessel 24 and rigidly joined thereto in any suitable manner. The elements associated with the carbide-holding hopper 44 will be hereinafter more fully described; but it may be noted at this point that the charge of carbide which is released from the hopper falls through the feed-spout 42 and is deposited directly on the carbide-grate 33, which, being immersed in the water within the generating vessel provides means for holding the carbide while it is attacked by the water and gas evolved. The supply of water within the main generating-chamber of the vessel 24 is provided for through the medium of a separate water-chamber 45, which is formed at one side of the vessel by a transverse partition 46, arising from the bottom thereof, but terminating short of the top of the vessel 24 to permit of both gas and air passing thereover, as may be plainly seen from Fig. 3 of the drawings. The said partition 46, which closes in the separate water-chamber 45, is preferably provided at its upper end with a depression 47 to insure the ready overflow of water from the chamber 45 into the main compartment or chamber of the vessel 24, and the upper open end of the separate water-chamber 45, which is always in communication with the main compartment of the vessel 24, is adapted to receive therein a pendent seal-hood 48, the lower end of which is submerged in the water within the chamber 45, and thereby constitutes an effective seal to prevent the return of gas from the gasometer when in the act of cleaning the generator, besides at the same time forming an effective purifying-chamber for the manufactured gas before it passes into the discharge-pipe 12, leading to the suction-pipe 13 of the gasometer. At this point it will be observed that the said gas-discharge pipe 12 for the generator has a vertical arm 12<sup>a</sup> extending upward through the water-chamber 45 and also through the seal-hood 48, depending from the top of the



vessel 24. The extreme upper end of the arm 12<sup>a</sup> of the gas-discharge pipe terminates within an offset gas-pocket 49, projecting from the top of the generating vessel 24 in the vertical plane of and in communication with the pendent seal-hood 48. By reason of this construction it will be observed that the gas which is evolved from the chemical within the main compartment of the vessel 24 passes over the top edge of the partition 46 and displacing the comparatively small amount of water between this partition and the wall of the hood 48 bubbles through the water at the bottom of the seal-hood 48 and enters the gas-pocket 49, from which it passes into the gas-discharge pipe 12 and is delivered thereby into the gasometer in the manner already explained. The said seal-hood 48 is necessarily of a somewhat less width than the water-chamber 45, into which it projects to admit of the operation just described.

The replenishing of the separate water-chamber 45, and consequently of the main compartment of the generating vessel 24, is accomplished through a filling-funnel 50, arranged upon the exterior of the carbid-hopper 44 and in communication with a water-supply pipe 51. This water-supply pipe 51 leads from the apex or bottom of the filling-funnel 50 to a point upon the side of the generator vessel 24, as indicated at 51<sup>a</sup>. At this point the said water-supply pipe 51 communicates with the interior of the separate water-chamber 45, so that when water is introduced into the funnel 50 it passes through the pipe 51 and enters the chamber 45, from which it overflows into the main compartment of the vessel 24, within which is located the carbid-supporting grate. When the water-chamber and the main compartment of the generating vessel are being resupplied with water in the manner described, it is necessary to provide for the venting of the generating vessel by placing the same in communication with the outer air. This is provided for by a vent-cock 53, fitted to the generating vessel at one side thereof and contiguous to the upper end of the same. The said vent-cock 53 has an operating-handle 54 fitted to the stem thereof, and in carrying out the present invention this operating-handle of the vent-cock has pivotally connected thereto, as at 55, the lower end of a link 57, the upper end of which link has a pivotal connection, as at 58, with the hinged lid or cover 60 for the open end of the filling-funnel 50. When the hinged lid or cover 60 for the filling-funnel is closed, the link 57 serves to also hold the vent-cock 53 in a closed position; but when the said lid or cover 60 is raised to admit of the introduction of water into the funnel 50 this movement provides for the simultaneous opening of the cock 53, thus insuring a proper setting of the parts for resupplying water to the generating vessel. At this point it will also be observed that with the vent-cock 53 open the same will

gage or indicate the maximum amount of water-level within the generating vessel.

One of the important features in connection with the carbid-holding hopper 44, which surmounts the generating vessel 24, is the closure for said hopper, and to provide for carrying out this part of the invention the hopper 44 is provided, within the open top portion thereof, with a plurality of interior annular walls 61 61<sup>a</sup>, which are arranged in spaced relation to leave intervening annular water pockets or wells 62, open at the top and closed at the bottom by reason of the fact that the interior annular walls 61 61<sup>a</sup> are preferably joined at their lower edges to and arise from the contracted bottom 43 of the hopper, contiguous to the main rim or body thereof. Preferably a pair of the interior walls 61 61<sup>a</sup> are employed, and these walls are disposed in substantially parallel relation to the main rim of the hopper, so as to accommodate in the pockets or wells 62 therebetween a sufficient quantity of water to provide an effective gas and air tight water seal for the removable cover 63. This cover 63 is of the same general configuration as the body of the carbid-holding hopper 44 and is provided with a plurality of pendent rim-flanges 64 and 65, arranged in spaced relation one within the other and preferably of different widths, the innermost rim-flange 65 being the smaller one and being designed to extend inside of the innermost water pocket or well 62, while the other wider flange 64, which, in effect, constitutes the main rim of the cover, extends into the outermost water pocket or well 62, nearly the full depth of said pocket, to provide an effective seal for the cover. Both of the rim-flanges 64 and 65 are immersed in the water of the pockets or cells into which they project, thus providing a double water seal for the cover, which renders the carbid-holder thoroughly air and gas tight.

To provide for the effective holding of the cover 63 in its closed position over the open top of the hopper 44, there is associated with the latter an air-chamber 66, preferably offset from one side of the hopper between the same and the top of the generating vessel 24, as plainly shown in Fig. 5 of the drawings, and this laterally-offset air-chamber 66 is in communication with the interior of the hopper 44 through the opening or port 67, which opening or port also accommodates for sliding movement therein the cut-off gate 68. This cut-off gate 68 is mounted to slide horizontally in the guideway 69, provided within the hopper-body immediately above the plane of the feed-spout 42, and has connected thereto the inner end of an operating-rod 70, sliding through a stuffing-box 71, provided at one side of the hopper-body 44, and provided at its outer end with an angled guard-arm 72, arranged in an upright position and having its horizontal portion 73 at the upper end thereof working through a perforated guide-



ear 74 at the upper edge of the hopper-body and adapted to be projected through the retaining-keeper 75, provided on the upper side of the removable cover 63. The said cover 5 is provided with a similar keeper 75<sup>a</sup> diametrically opposite the keeper 75, which is adapted to receive the guard-bolt 76, working through the guide-ear 77, provided at the upper edge of the hopper-body and pivotally 10 connected at one end, as at 78, to the operating-handle 79 of an air-controlling cock 80, fitted in an air-relief pipe 81, connected at one end with the laterally-offset air-chamber 66 of the hopper and at its other end with the 15 vent-pipe 22 of the gasometer, which vent-pipe is in communication with the outer air.

When the removable cover 63 is off of the hopper, the guard-bolt 76 must necessarily be retracted out of the way, and consequently 20 the air-controlling valve 80 is opened. Likewise the horizontal portion 73 of the guard-arm 72 must also be withdrawn out of the retaining-keepers 75, in which position the cut-off gate 68 is drawn across the bottom 25 portion of the carbid-holding hopper, so as to cut off communication with the generating vessel through the feed-spout 42. With the parts thus arranged the hopper may be resupplied and the parts associated there- 30 with readjusted without interfering with the generating vessel and without escape of gas from such vessel. When the cover is replaced, the rim-flanges 64 and 65 thereof are introduced into the water pockets or wells 35 62, and as it is pressed down into place the surplus air within said water pockets or wells, as well as the surplus air within the hopper-body itself, will be forced out through the opening or port 67 into the air-chamber 66, 40 and thence through the relief-pipe 81 into the vent-pipe 22, thus providing for the rarification of the air within the carbid-hopper. After the cover has been thus positioned the operating-handle 79 of the cock 80 is turned 45 so as to close the cock and simultaneously project the bolt 76 through the retaining-keeper 75<sup>a</sup> on the cover. The closing of the cock 80 cuts off communication between the outer air and the interior of the carbid-holding hopper 44, and thereby provides for as- 50 sisting in securing the cover 63 by the rarification of the air within the hopper, and it is only when the valve 80 is reopened to re-establish communication between the interior of the hopper and the outer air that the 55 cover 63 can be readily removed without interference from the holding tendency or suction occasioned by the rarification of the air within the hopper.

60 When the cover of the hopper is positioned in the manner described, the operating-rod 70 is moved inward to carry the cut-off gate 68 back into the air-chamber 66, thus opening up communication through the feed-spout 65 42 with the generating vessel. This movement of the operating-rod 70 simultaneously carries the horizontal portion of the guard-

arm 72 through the retaining-keepers 75 on the cover. It will thus be seen that the cover cannot possibly be removed until the gate 68 70 is closed and the air-controlling valve 80 opened.

To provide for the automatic feeding of successive charges of calcium carbid from the hopper through the feed-spout 42 into the 75 generating vessel 24, there are removably arranged within the top portion of the hopper 44 opposite batteries 82 of carbid-holding cells. Each battery 82 of carbid-holding cells is independent of the other and independ- 80 ently supported and removable, and to provide for the detachable support of the batteries 82 each of the same is provided at suitable points at the upper edge thereof with a plurality of hanger-hooks 83, adapted 85 to detachably engage over the top edge of the innermost interior annular wall 61<sup>a</sup> of the hopper, said wall therefore acting in the capacity of an interior supporting-flange for detachably sustaining the batteries 82 in posi- 90 tion. The said batteries 82 of carbid-cells are arranged upon diametrically opposite sides of the interior wall 61<sup>a</sup>, and each of said batteries consists of a plurality of individual cells 84 of a sufficient size to hold a 95 suitable supply of carbid for a single charge and preferably of a rectangular formation. The cells of each battery are coupled or joined together in any suitable way, so as to be removable and replaceable as an entirety, and 100 each individual cell 84 is open at the upper and lower end thereof and is adapted to have its lower end covered and uncovered by a hinged bottom 85. The said hinged bottom 85 has a hinge connection 86<sup>a</sup> at one end 105 thereof upon the lower edge of the cell-body and at its free end or edge is provided with a projecting catch-pin 86, adapted to engage in the keeper-opening 88<sup>a</sup> of a pivotal trip-latch plate 88, hinged at its upper edge, 110 as at 89<sup>a</sup>, to one side of the cell and provided with a deflected tongue 89 at its lower free end below the keeper-opening 88<sup>a</sup>. With respect to the said hinged bottom and the trip-latch plate 88 all of the cells of both batteries 115 are constructed alike, and normally when the cells are charged with the carbid the hinged bottoms 85 are closed and held in such position by the trip-latches 88, as may be plainly seen from Fig. 5 of the drawings. 120

To provide for the automatic tripping or releasing of the hinged bottoms of the individual carbid-cells 84, there is utilized a feed mechanism which includes a pair of releas- 125 ing-shafts 90, arranged in parallel relation and journaled in suitable bearings within the carbid-hopper below the plane of the batteries 82. The shafts 90 are geared together by the gearing 91 for movement in unison and are 130 each provided with a series of projecting tap-pet-pins 92, arranged in spiral order to provide for the successive release of the hinged bottoms of the cells in each battery. One of the shafts 90 is associated with one of the



batteries of cells, and the tappet-pins 92 of such shaft are arranged in such relation as to successively engage the lower free ends of the trip-latches of successive cells, so that the cells will be emptied one after the other automatically during the operation of the apparatus. One of the releasing-shafts 90 has a shaft extension 93 at one end which projects exterior to the carbid-hopper and carries upon its outer end a ratchet feed-wheel 94, which is preferably incased within a circular guard-casing 95, supported by means of suitable brackets or equivalent supports 96 at one side of the generator. The said guard-casing 95 is open at the top to receive therein the lower end of a pivotal actuating-pawl 97, which is pivotally hung at its upper end, as at 98, from the supporting-arm 99, secured to and carried by the top of the gas-bell 3. To prevent backward movement of the ratchet feed-wheel 94, there is associated with the same a check-pawl 100, pivotally mounted on the guard-casing 95, as plainly illustrated in Fig. 6 of the drawings. When a sufficient quantity of gas has been evolved to elevate the bell 3 of the gasometer, the actuating-pawl 97 of the feeding mechanism is raised out of operative relation to the ratchet-wheel 94; but as the supply of gas becomes depleted in the gasometer the bell 3 lowers and causes the pawl 97 to engage one tooth of the wheel 94, and thereby transmit motion to the releasing-shafts 90. The turning of the releasing-shafts 90 causes a tappet-pin to engage the lower free end of a trip-latch 88, so as to swing the same outward from engagement with the catch-pin of the hinged bottom 85 associated therewith, thus releasing the said bottom and permitting it to swing downwardly, so as to discharge the contents of the cell into the hopper and through the feed-spout 42 onto the carbid-grate 33 within the generating vessel. After the opening of the hinged bottoms of all of the cells such bottoms may be reclosed and reengaged with their trip-latches without removing the batteries from the hopper. To provide for this, there is associated with each battery of cells a resetting device 101, preferably in the form of a U-shaped bail having handles 102 at the terminals of its side arms 103. The resetting device or bail 101 for each battery of cells has the side arms 103 thereof slidably mounted in the guides 104, fitted within the hopper-body at opposite inner sides thereof, while the yoke portion of the bail extends between the bottoms of all of the cells of the battery. The resetting device or bail for each battery is preferably disposed obliquely or at an inclination, and when all of the hinged bottoms have been released the same will lie within the bail directly over the cross-bar thereof. It is therefore simply necessary to grasp the terminal handles 102 and lift the bail upwardly to provide for swinging the free ends of the bottoms against the tongues or free ends of the trip-latches, so that the

catch-pins 86 will become reengaged with the keepers or keeper-openings of said latches. Of course, should it be preferred, the hinged bottoms of the cells may be readjusted after removing the batteries from the hopper.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described apparatus will be readily apparent to those skilled in the art without further description, and it will be understood that various changes in the form, proportion, and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a gas apparatus, a generating vessel having an inlet for carbid at the top, and a bottom drain connection, a grate having a pivotal support interposed between the inlet for the carbid and the drain connection, said grate carrying a scraper having a sweep across and at one side of the drain connection, and means for rocking the grate.

2. In a gas apparatus, a generating vessel provided with a drain connection at the bottom, a carbid-grate mounted within the vessel, a single scraper-blade carried by the grate at the under side thereof, said blade extending longitudinally of the grate and having a sweep across and at one side of the plane of the drain connection, and means for rocking said grate with its scraper-blade.

3. In a gas apparatus, the generating vessel having a dished bottom provided with a drain connection, a carbid-grate pivotally mounted within the vessel, a scraper-blade affixed to the grate at the under side thereof and extending longitudinally of the same, said blade conforming to the dish of the bottom and having a sweep across and at one side of the plane of said drain connection, and means for rocking said grate with its attached scraper-blade.

4. In a gas apparatus, a generating vessel having a main compartment, a separate water-chamber, and a gas-chamber at the top of the water-chamber, the latter being arranged to permit of the overflow of water therefrom into the main compartment, and a water-supply for the generating vessel having communication with the said water-chamber, substantially as set forth.

5. In a gas apparatus, a generating vessel having a main compartment and a separate water-chamber partitioned therefrom, said water-chamber being arranged to permit of the overflow of water therefrom into the main compartment of the vessel, a gas-discharge pipe, and a water-supply in communication with said separate water-chamber, substantially as set forth.

6. In a gas apparatus, a generating vessel having a main compartment and a separate water-chamber partitioned therefrom, a gas-chamber provided within the top portion of



said water-chamber, and sealed from the main compartment of the vessel, a gas-discharge pipe extending into said gas-chamber, and means for supplying water to the water-chamber and causing its overflow into the main compartment of the generating vessel, substantially as set forth.

7. In a gas apparatus, a generating vessel having a main compartment, a separate water-chamber partitioned therefrom and in communication therewith, and a sealed gas-chamber formed by a pendent hood projecting from the top of the generating vessel into the said separate water-chamber, a gas-discharge pipe leading into the gas-chamber formed by said hood, and means for supplying water to the water-chamber and causing the overflow thereof into the main compartment of the generating vessel, substantially as set forth.

8. In a gas apparatus, a generating vessel having a main compartment and a water-chamber partitioned therefrom and in communication therewith, a gas-pocket offset from the top of the generating vessel, a hood pendent from said top and projecting into the said separate water-chamber, a gas-discharge pipe extending through the water-chamber into the said gas-pocket, and means for supplying water to said separate water-chamber and also to the main compartment of the vessel, substantially as set forth.

9. In a gas apparatus, a generating vessel having a main compartment and a separate water-chamber arranged to overflow into the main compartment, a gas-discharge pipe, a suitably-arranged filling-funnel having a water-supply pipe connection with said separate water-chamber, a lid or cover for said funnel, an air-vent cock fitted to the generating vessel and having an operating stem or handle, and a link connection between said handle or stem and the lid or cover to provide for the synchronous movement of these parts, substantially as set forth.

10. In a gas apparatus, a generating vessel having a main compartment, and a separate water-chamber arranged to permit of the overflow of water therefrom into the main compartment, a suitably-arranged filling-receptacle having a water-supply pipe connection with the separate water-chamber, a lid or cover for said receptacle, an air-vent cock fitted to the vessel and in communication with the main compartment thereof, and means for synchronously operating the cock and said lid or cover.

11. In a gas apparatus, a generating vessel having a main compartment and a water-chamber arranged to permit of the overflow of water therefrom into the main compartment, a filling-funnel having a water-supply pipe connection with the water-chamber, a lid or cover for said funnel, an air-vent cock fitted to the generating vessel and in communication with the main compartment thereof, and an operating-handle for said cock

having an operative connection with the lid or cover to synchronously move the same with the cock.

12. In a gas apparatus, the combination with the generating vessel, of a carbid-holding hopper in communication with said vessel, a cover having a sealed connection with the hopper-body, air-exhaust and cut-off means coöperating with the hopper, independently of and below the cover, to assist in holding the latter in place and to facilitate its removal and a cut-off arranged to control communication between the hopper and the vessel, substantially as set forth.

13. In a gas apparatus, the combination with the generating vessel, of a carbid-holding hopper in communication with said vessel, an imperforate cover having a sealed connection with the hopper-body, means, independent of the cover, for controlling communication between the outer air and the interior of the hopper below the cover, to assist in holding the latter in place and to facilitate its removal and a cut-off arranged to control communication between the hopper and the vessel, substantially as set forth.

14. In a gas apparatus, a generator having a carbid-holding hopper, an imperforate removable cover having a plurality of sealed connections with the hopper, means, independent of the cover, for controlling communication between the outer air and the interior of the hopper below the cover to assist in holding the latter in place and to facilitate its removal and a cut-off arranged to control communication between the hopper and the vessel.

15. In a gas apparatus, a generator having a carbid-holding hopper open at the top, a removable cover having a sealed connection with the hopper, an air-chamber in communication with the interior of the hopper, and a valved air-relief pipe in communication with said air-chamber, substantially as set forth.

16. In a gas apparatus, a generator having a carbid-holding hopper open at the top, a removable cover for the hopper having a retaining-keeper, an air-chamber in communication with the interior of the hopper, an air-relief pipe in communication with the air-chamber, an air-controlling valve arranged in said pipe and having an operating-handle, and a guard-bolt connected with said operating-handle and adapted to engage and disengage said keeper, substantially as set forth.

17. In a gas apparatus, a generator having a carbid-holding hopper, a removable cover for the hopper, an air-relief pipe in communication with the interior of the hopper below its cover, a valve arranged in said pipe and having an operating-handle carrying a guard adapted to engage with the cover, and a cut-off gate for the hopper carrying a guard-arm also adapted to engage with the cover, substantially as set forth.

18. In a gas apparatus, a generator having a generating vessel and a hopper in commu-



nication with said vessel, an offset air-chamber in communication with the hopper and having a relief-pipe connection, a removable cover for the hopper, a sliding cut-off gate 5 arranged to work within the hopper and also arranged to be projected into the said air-chamber, and an operating-rod connected with said gate and having a guard-arm adapted to work over the cover, substantially as set 10 forth.

19. In a gas apparatus, a generator having a carbid-holding receptacle, separate batteries of individual cells located within the receptacle, each cell having an independent hinged 15 bottom and a latch for holding the same in operative position, journals located within the receptacle, shafts mounted in the journals and arranged respectively contiguous to each battery, said shafts having means for successively operating the latches of the cells and 20 being geared together within the receptacle for simultaneous rotation, one of the shafts being located wholly within the receptacle, and the other having one end projecting

through the same, and operating means engaging the exposed portion of said shaft to rotate the same. 25

20. In a gas apparatus, a generator having a carbid-holder, a battery of individual carbid-cells mounted within the hopper, each cell 30 having a downwardly-swinging hinged bottom, and a latch for holding said bottom in closed position, and a resetting device consisting of a single U-shaped bail slidably mounted within the hopper-body with its 35 cross-bar extending across and beneath the entire series of cells, whereby the cross-bar of the bail when raised will operate to simultaneously lift all of the hinged bottoms.

In testimony that we claim the foregoing 40 as our own we have hereto affixed our signatures in the presence of two witnesses.

WILLIAM A. FEURT.  
HENRY H. MARTIN.

Witnesses:

F. A. CUMMINS,  
IRA K. ALDERMAN.