No. 756,221. PATENTED APR. 5, 1904.

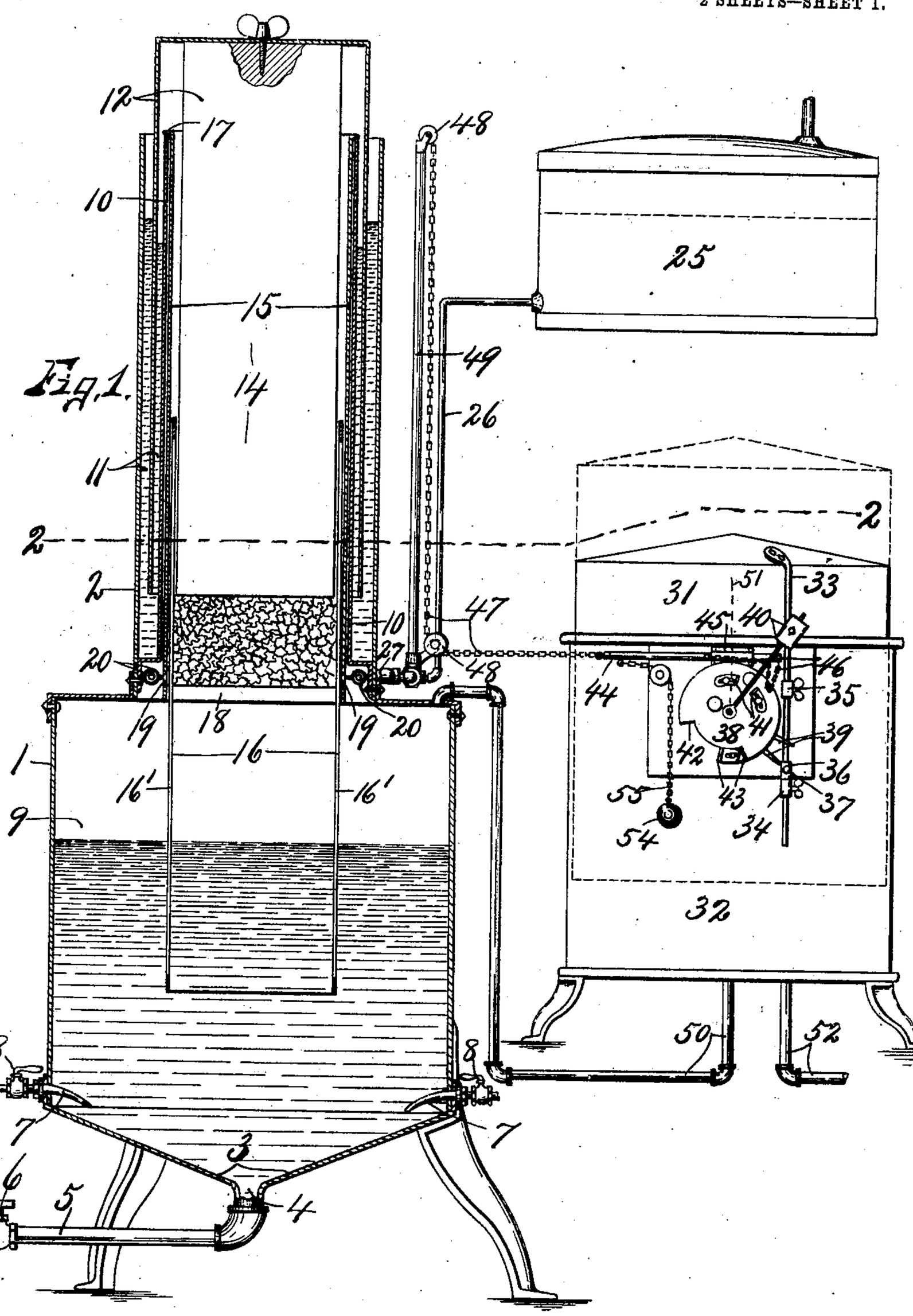
M. J. ERK.

ACETYLENE GAS GENERATOR.

APPLICATION FILED MAR. 6, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

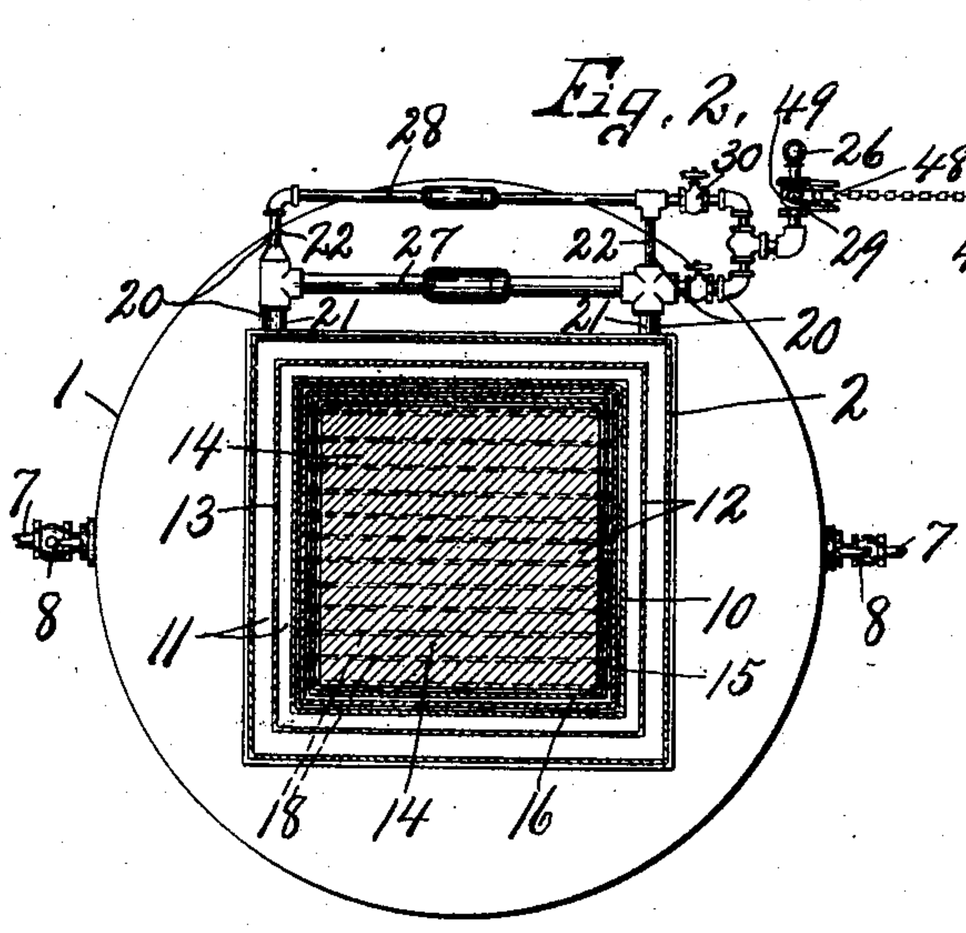


Fig. 3.

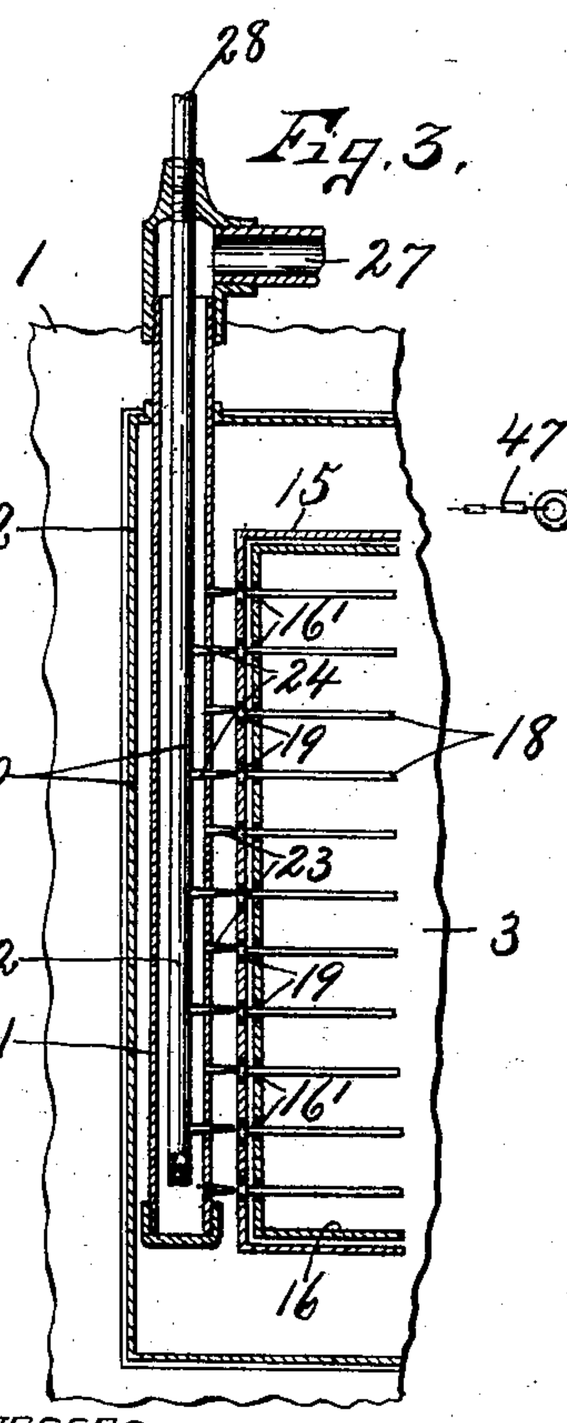


Fig. 5.

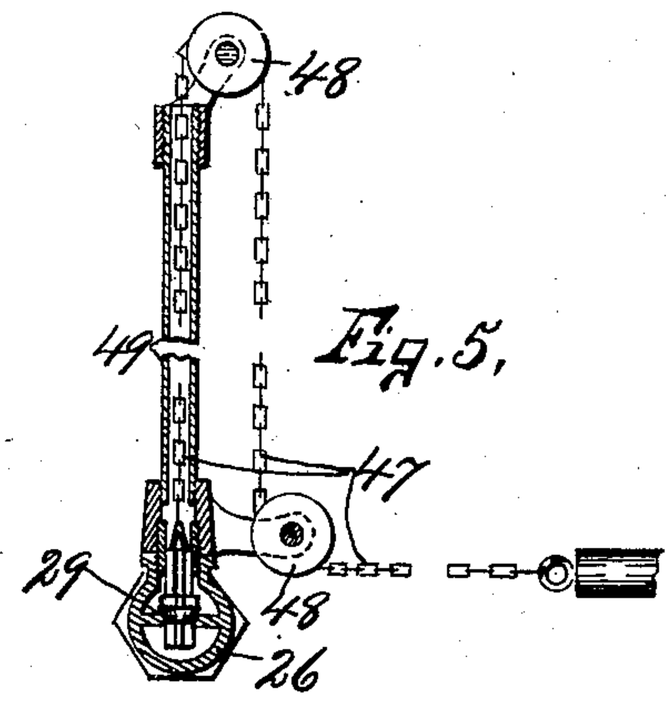
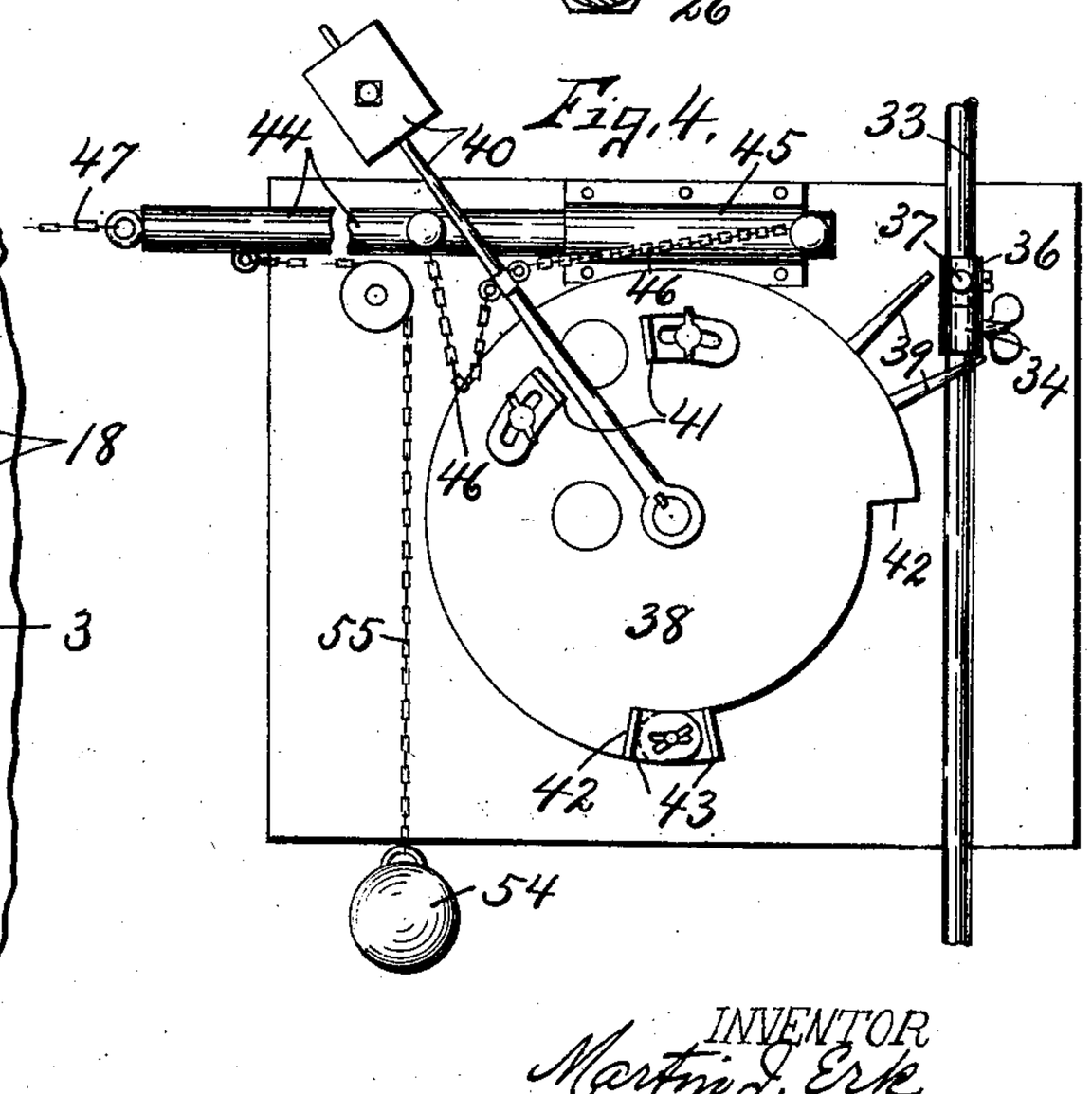


Fig. 4.



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UNITED STATES PATENT OFFICE.

MARTIN JAY ERK, OF BINGHAMTON, NEW YORK.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 756,221, dated April 5, 1904.

Application filed March 6, 1903. Serial No. 146,446. (No model.)

To all whom it may concern:

Be it known that I, MARTIN JAY ERK, of Binghamton, in the county of Broome, in the State of New York, have invented new and useful Improvements in Acetylene-Gas Generators, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to improvements in acetylene-gas generators in which the carbid is carried in a removable holder having a perforated or grate bottom and is superimposed above a subchamber adapted to receive the water and gas, the water being introduced in jets against the lower surface of the carbid for the purpose of producing gas in the upper part of the subchamber, while the sludge and water are precipitated into the base of the subchamber, a suitable water-jacket surrounding the carbid-holder to receive a vertically-movable follower and form a water seal to prevent the escape of gas except through the proper channels.

The primary object of my present invention is to locate water-supply conduits in such manner that a series of jets of water may be introduced against the lower surface of the carbid resting upon the grate-bars, so as to cut away this portion of the carbid to permit the whole body to feed downwardly gradually onto the grate, so that a fresh surface of the carbid is always presented to the jets of water. In other words, the salient feature of this part of the invention is to facilitate the feed of the carbid to the grate without liability of clogging or undue retardation in its descent.

Another object is to provide means whereby limited portions of the lower strata of carbid may be cut off in bulk and precipitated into the water in the subchamber for the purpose of generating gas in addition to that which may be generated by the action of the water directly against the carbid in the act of cutting off these limited quantities. It is common practice to collect the gas thus generated into a receiver having a movable bell, and another feature of my present invention consists in utilizing the movement of the bell for the purpose of controlling the water-supply to the carbid, and thereby controlling the production of gas.

Referring to the drawings, Figure 1 is a transverse vertical sectional view of my improved generator shown as operatively connected to a gas-receiver of the class mentioned. Fig. 2 is a horizontal sectional view taken on line 2 2, Fig. 1. Fig. 3 is an enlarged horizontal sectional view through one of the water-feed pipes and the adjacent portion of the carbid-holder, showing particularly the relation of the water-discharge nipples to the grate-bars and also showing the vertical sliding confining-walls for the sides of the carbid. Fig. 4 is an enlarged elevation of the automatic controlling mechanism for the water-supply. Fig. 5 is an enlarged detail view of the valve for controlling the water-supply.

Similar reference characters indicate corresponding parts in all the views.

In carrying out the objects of my invention I have shown an outer shell or casing comprising a cylindrical upright shell 1 and a superimposed rectangular shell 2, which is preferably square and rises from the central portion of the upper wall of the shell 1, being preferably of less cross-sectional area than the lower shell 1. This outer shell or casing is mounted upon suitable supporting legs or standards and is provided with a bottom wall 3, in the form of an inverted cone, having an opening 4 in its apex, which communicates with an outlet-conduit 5, so that the water and sludge may be drawn off when desired, said conduit being normally closed by a valve 6.

The lower end of the side walls of the shell 1 are provided with apertures in which are fitted suitable water-pipes 7, the inner ends being deflected downwardly to discharge jets of water against the inner surfaces of the bottom wall for the purpose of cleaning said wall from any accumulations when the lower section is being emptied, these pipes being provided with valves 8 for controlling the water-feed and may be connected to any desired source of water-supply.

The interior of the lower shell 1 forms a subchamber 9 beneath the shell 2 for receiving the gas and any accumulations of water

and sludge which may be precipitated in the operation of generating the gas.

The upper section 2 is open at the top and is provided with an inner supplemental wall 10, united to the lower end of the shell 2 for forming a water-jacket 11, this inner shell rising to substantially the same height as the outer shell 2, so that a quantity of water may be maintained between the walls to form a water seal, as presently described, it being understood that the upper end of the space between the walls 2 and 10 is open for receiving the water and permitting the insertion of a suitable follower 12. This follower 12 consists of an outer shell 13, open at its lower end and closed at its upper end, the lower end being immersed in the water-jacket 11, and a solid central portion 14, depending from the upper wall and extending within the inner shell 10.

Removably supported within the shell 10 is a carbid-holder consisting of an outer hollow section 15 and an inner section 16, the section 15 being suspended within the shell 10 by a flange 17, resting upon the upper end of said shell 10, the lower end of the section 15 terminating beneath the junction of the inner shell 10 with the outer shell 2 and is provided with a grate-bottom composed of separated parallel grate-bars 18, which form a portion of the upper wall of the subchamber 9. This removable section 15 is also rectangular in cross-section and fits closely within the shell 2, being adapted to be removed through the opening in the upper end of said shell when desired, and the lower ends of two of the opposite side walls are provided with a series of apertures 19, which are alined with the upper faces of the grate-bars 18 and through which water is adapted to be introduced in jets along the grate-bars and against the lower surface of the carbid which rests thereon. The means for introducing this water consists of oppositely-arranged heads 20, which are located between the lower ends of the shells 2 and 15, beneath the junction of the shell 10 with the shell 2, and extends across the outer ends of the openings 19. Each of these heads consists of outer and inner pipes or conduits 21 and 22, and each pipe or conduit is provided with a series of nipples 23 and 24, which are registered with the openings 19 and through which jets of water immerge against the lower faces of the carbid adjacent to the grate-bars, so that the portions of the carbid which rest upon the grate-bars are continually washed away in the process of producing the gas, thus removing the support for the superimposed body of carbid and permitting the same to gradually and continually gravitate onto the grate, the object of this being to prevent the congestion or clogging of the carbid and at the same time to always present a clean surface to the jets of water, which, together with the sludge, is precipitated to the bottom of the receptacle 1. In order to further facilitate the gravity-feed of the carbid onto the grate, I provide the vertically-movable inner section 16, which is also rectangular in cross-section and fits with a free sliding movement within the section 15, this inner section being provided with vertical slots 16′ for receiving the grate-bars 18 and permitting the vertical movement of said section relatively to said bars. This section 16 forms the side supporting-walls for the carbid, while the grate 18 forms the bottom supporting-wall, and it is evident that owing to the friction of the carbid with the side walls of the section 16 as the carbid is wasted away at the bottom by the water in the process of generating the gas the superimposed body, together with the section 16, gradually descends, and therefore there is no liability of the carbid becoming congested or failing to gravitate onto the grate and into the path of the jets of water. The inner solid section 14 of the follower is inserted into the upper open end of the inner section 16 and rests upon the upper surface of the carbid. This section 14 being usually weighted serves to further augment the gravity-feed of the carbid to the grate, and at the same time the outer section 13 of the follower being immersed in the water-jacket prevents any escape of gas through the upper end of the apparatus except through the channels provided therefor.

It has been previously stated that the head 20 is composed of outer and inner pipes or conduits, each of which is provided with a series of nipples. The nipples of the inner conduit extend through the adjacent side walls of the outer conduit and are disposed in alternate relation with the nipples 24, and when it is desired to generate the gas by direct contact of the jets of water with the lower surface of the carbid the nipples of each conduit are employed simultaneously; but it is sometimes desired to generate this gas by the introduction of limited quantities of carbid directly into the water in the subchamber 9, and I therefore provide means for cutting off the water-supply to one of the conduits—as, for instance, the inner conduit 22 and its corresponding nipples 23—in which instance I preferably provide the same number of nipples as are employed in the conduit 21—that is, substantially half the number shown. As previously stated, these nipples are alined with the grate-bars, and therefore when the jets of water are introduced against the lower surface of the carbid small quantities in bulk are cut away and readily precipitated into the water in the subchamber 9 to produce gas in the manner just described, a coarse grate being used in this instance.

I preferably supply the water to each of the heads 20 from a tank 25 through a single conduit 26, said conduit being connected to the branch conduits 27 and 28, the branch conduit 27 communicating with the outer sections 21

of the heads 20, and the branch conduit 28 communicates with the inner pipes 22 of said heads. The conduit 26 is provided with a valve 29, which is adapted to be operated automatically by the bell of the gas-receiver, presently described, and the branch conduit 28 is provided with a valve 30, whereby the water may be shut off from the inner pipes 22 of the heads 20 when it is desired to slice off limited portions of the carbid in bulk, as used with a coarse grate.

The means for controlling the supply of water to the heads 20 preferably consists of the movable bell 31 of a gas-receiver 32, said movable bell being provided with a depending arm 33, upon which are mounted adjustable lower and upper stops 34 and 35 and a sliding head 36, the sliding head being provided with an outwardly-projecting pin or stud 37.

Supported in proximity to the arm 33 is a rocking disk 38, having radial projecting arms 39, which are adapted to be engaged by the pin or stud 37, so that as the bell 13 is raised and lowered by the varying volumes of gas in the receiver the stops 34 and 35 operate upon the head 36 to engage the stud or pin 37 with the arms 39 to rock the disk 38 in opposite directions. Pivotally mounted upon the axis of the disk is a weighted rock-arm 40, which is actuated in opposite directions by abutments 41, provided upon the disk 38, said disk being provided with stop-shoulders 42, which coöperate with fixed stop-shoulders 43 to limit the movement of the said disk.

A sliding bar 44 is mounted in a suitable guide 45 and is connected by flexible cables 46 to the weighted arm 40, there being two of these cables connected to the opposite sides of the rock-arm, whereby the sliding bar 44 is drawn in opposite directions by the weighted arm as it moves on opposite sides of a perpendicular. This sliding bar is connected to the valve 29 by means of a cable 47, which is passed over sheaves 48 and downwardly through a stand-pipe 49, the valve being located in the base of this stand-pipe, and the upper end of the stand-pipe extends above the level of the water in the supply-tank 25, so as to prevent any overflow from the stand-pipe.

The purpose of the water-feed-controlling mechanism just described will be apparent from the description of the operation, which is as follows: Assuming that the volume of the gas in the reservoir is at its minimum and that the bell is at the lowest position, at which time the disk 38 has been operated by a pin 37 to the position seen in Fig. 1 for forcing the weighted arm 40 in the same direction, or to the right of a perpendicular, as also seen in said figure, in this position of the weighted arm the sliding bar 44 is drawn back, or to the right, and therefore the valve 29 is elevated from its seat to open the passage to permit the water to flow from the tank 25 to the distributing-heads 20 and against the lower surface of the carbid adjacent to the grate-bars. While the water is thus distributing against the carbid, gas is being generated and accumulates in the gas-holder 32, which is connected to the sub-chamber of the gas-generator by a conduit 50. As the volume of gas increases in the receiver 32 the bell is elevated, carrying the arm 33 upwardly and forcing the lower stop 34 into engagement with the head 36, thereby elevating the pin 37 against the upper radial arm 39 of the disk 38. The continued upward movement of the arm 33 therefore rocks the disk 38 from the position seen in Fig. 1, and the right-hand abutment 41 engages and rocks the weighted arm 40 to the left of the perpendicular line indicated by the numeral 51, and the weighted arm then falls to the left by gravity and continues to rock the disk until stopped by the engagement of the left-hand shoulder 42 of the disk with the adjacent shoulder 43. This tilting of the rock-arm 40 from right to left operates the bar 44 to the left through the medium of the right-hand connection 46, thus relieving the tension on the cable 47 and permitting the valve 29 to close by gravity to shut off the water-supply, and therefore to prevent the production of gas. Now when the gas is drawn off for use—as, for instance, through a conduit 52—the bell again lowers and the upper stop 35 operates against the head 36 to depress the same and to thereby rock the disk 38 to the right, or to the position seen in Fig. 1, in which case the left-hand shoulder 41 on the disk engages and rocks the weighted arm 40 to the right, which in turn actuates the sliding bar 44 and cable 47 to open the valve 29, these operations being repeated as the volume of gas within the receiver varies to raise and lower the bell 51. In order that the valve may be substantially balanced and operate easily, I provide a small weight 54, which is connected by a cable 55 to the sliding bar 44 in such manner as to partially counterbalance the weight of the valve.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An acetylene-gas generator comprising a shell adapted to receive the water and gas, a superimposed carbid-holder having bottom grate-bars and a water-feed pipe having nipples alined with the upper faces of the grate-bars for discharging jets of water against the lower surface of the carbid adjacent to and along and upon the upper faces of the grate-bars for decomposing the carbid which rests upon the grate-bars and thereby augmenting the feed of the carbid to the grate.

2. An acetylene-gas generator comprising a water-shell having a water and gas chamber, a carbid-supporting grate above said chamber, and a vertically-movable section extend-

ing above and below the grate and forming the side supporting-walls for the carbid.

3. An acetylene-gas generator comprising a water and gas holder, a superimposed carbid-holder having a bottom composed of grate-bars, and a water-supply conduit having discharge-openings alined with the upper faces of the grate-bars for cutting away the carbid resting on the bars and at the same time generating gas.

4. An acetylene-gas generator comprising a water and gas holder, a superimposed carbid-holder having a bottom composed of grate-bars, and a water-supply conduit having discharge-openings alined with the upper faces of the grate-bars for cutting away the carbid resting on the bars and at the same time generating gas, a water-jacket surrounding the carbid-holder, and a follower movable in the carbid-holder and water-jacket.

5. In an acetylene-gas generator, a shell having a subchamber for the water and gas, a superimposed carbid-holder comprising an outer section having a grate bottom and an inner section movable vertically relatively to the grate and having its side walls in contact with the carbid, means for discharging jets of water across the upper surface of the grate and against the adjacent surface of the carbid, a valved water-supply pipe in combination with a gas-receiver having a movable bell and connections between the movable bell and valve whereby the raising and lowering of the bell operates to open and close the valve.

6. In an acetylene-gas generator, a shell having a subchamber for the water and gas, a superimposed carbid-holder having a grate bottom, a head composed of outer and inner water-pipes each having a series of nipples discharging against the lower surface of the carbid adjacent to the grate, the nipples of the inner pipe projecting through the walls of the outer pipe and alternating with the nipples of said outer pipe, and means for shutting off the supply of water to one of the pipes.

7. A water-supply head for acetylene-gas generators consisting of two pipes one within the other, each pipe having a series of nipples for discharging jets of water against the carbid, the nipples of the inner pipe projecting through the walls of the outer pipe and means to cut off the water-supply of one of the pipes.

8. An acetylene-gas generator, comprising a shell having a water and gas chamber and an inverted conical bottom provided with an opening in its apex, a carbid-holder consisting of outer and inner hollow sections, one being provided with a grate bottom, and the other movable endwise relatively to the grate, water-pipes discharging against the upper surface of said conical bottom wall toward its central opening, and means for discharging water against the carbid.

9. A carbid-holder comprising horizontal grate-bars for supporting the bottom of the body of carbid and a vertically-movable shell open at the top and bottom and movable through the grate for supporting the sides of the carbid.

10. In an acetylene-gas generator, a carbid-holder comprising outer and inner shells, the outer shell being open at the top and provided with a grate at the bottom and the inner shell being movable lengthwise of the outer shell and through the grate to support the sides of the carbid and to move downwardly therewith as the carbid is dissolved, said inner shell being open at the top and bottom.

11. An acetylene-gas generator comprising a shell having a holder and gas-receiving chamber at the bottom, and a superimposed carbid-holder consisting of outer and inner tubular sections, the outer section being open at the top and provided with a grate-bar and the inner section being open at the top and bottom and movable through the grate and into the water and gas chamber.

12. An acetylene-gas generator comprising a shell having a water and gas chamber, a superimposed shell having a water jacket or chamber, a follower movable in the water-jacket, a carbid-holder consisting of outer and inner tubular sections, the outer section being suspended within said superimposed shell and provided with a grate bottom, and the inner section being movable vertically through said bottom, said follower having a central body projecting through the carbid-holder.

In witness whereof I have hereunto set my hand this 19th day of February, 1903.

MARTIN JAY ERK.

Witnesses:

JAMES W. MANIER,

ROBT. W. MANIER.