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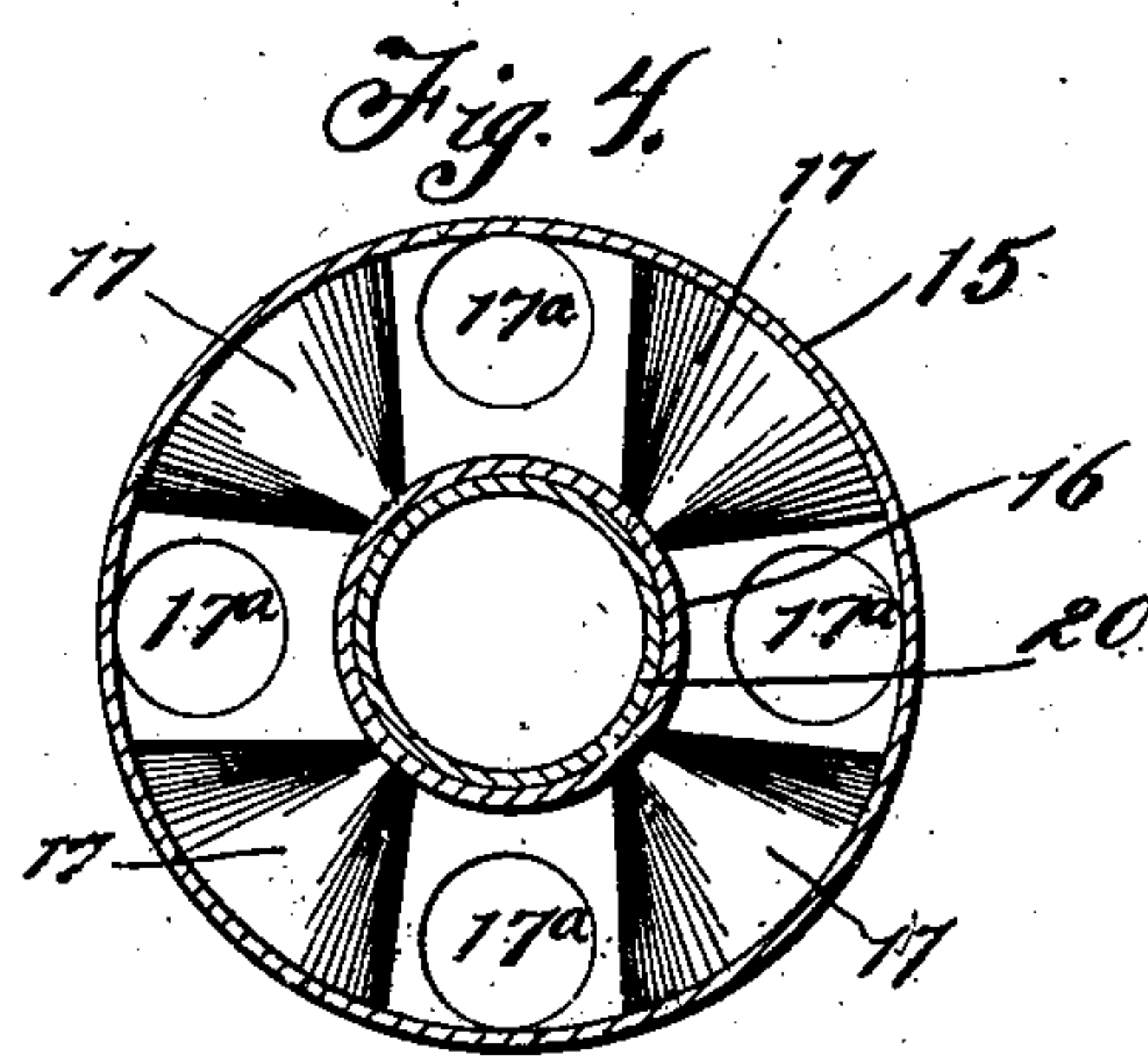
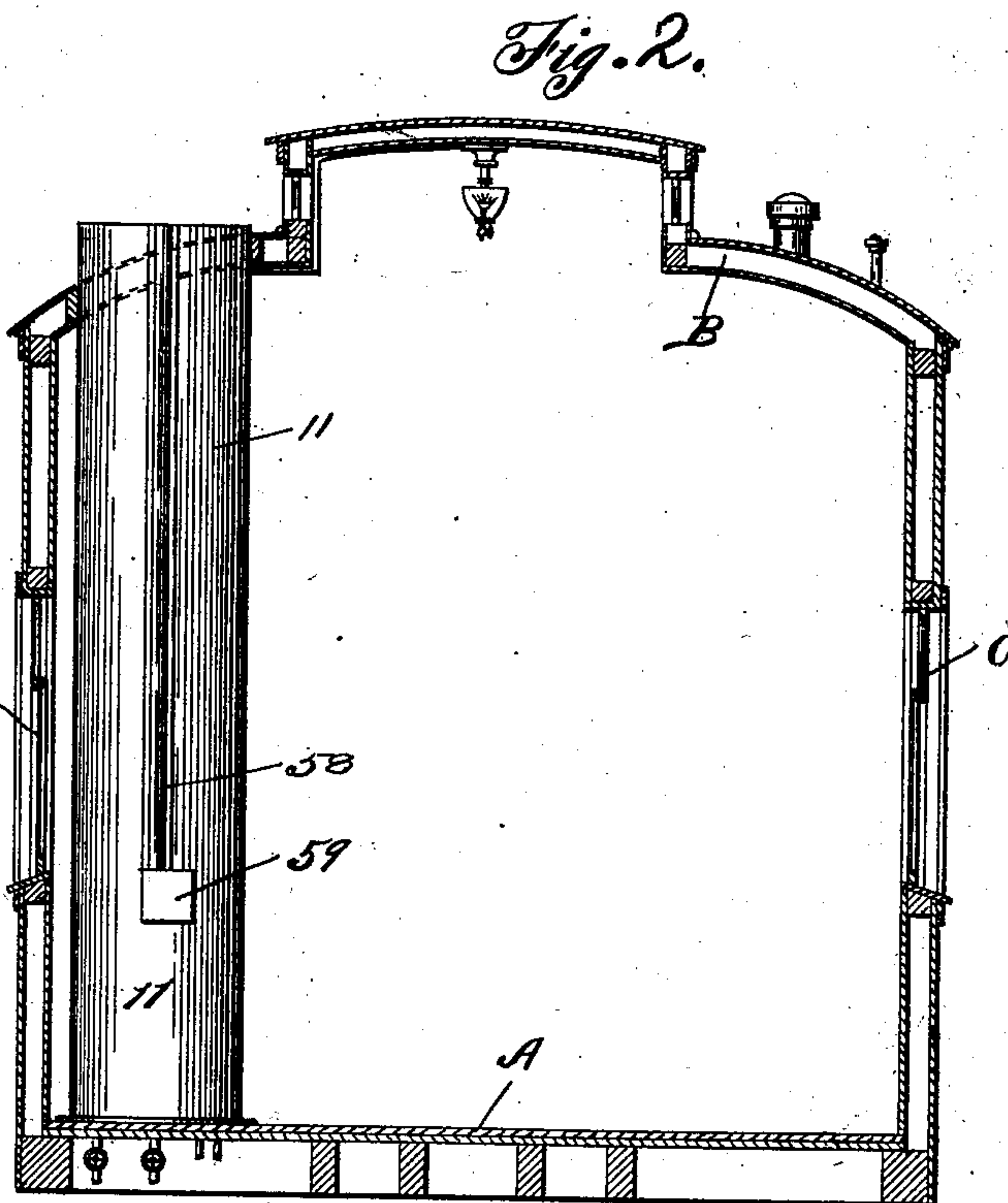
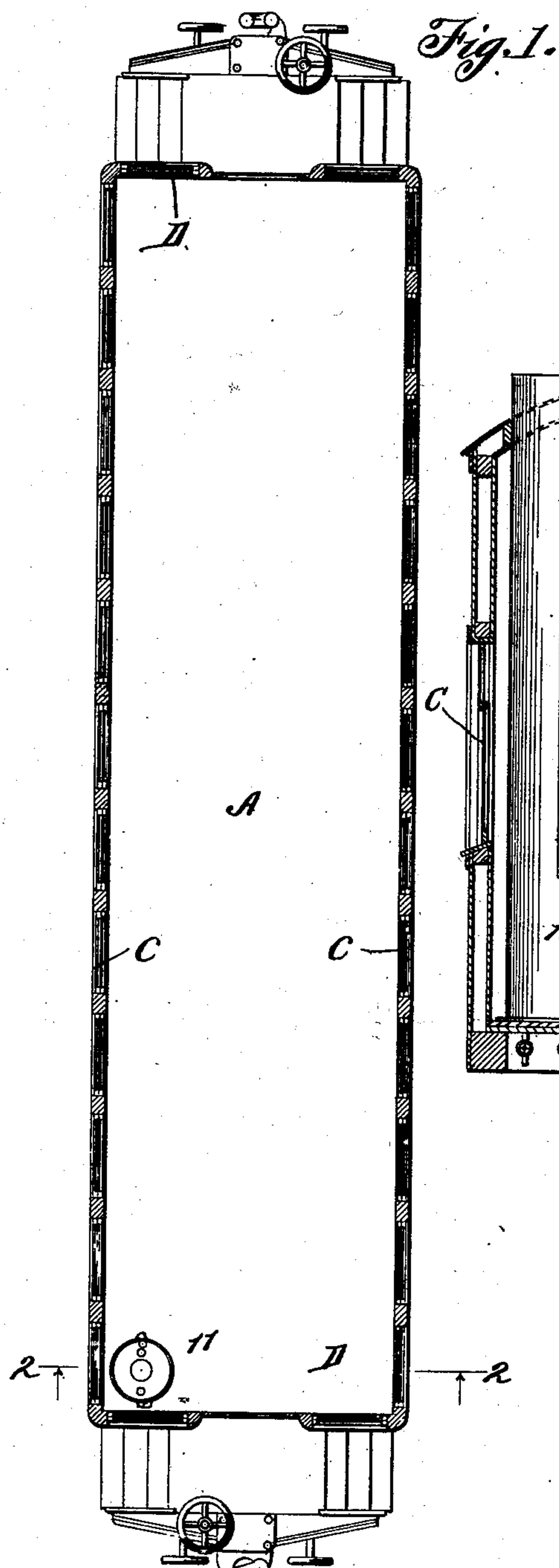
Patented Sept. 2, 1902.

C. W. CALDWELL.
ACETYLENE GAS GENERATOR.

(Application filed Oct. 24, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:
Ira D. Perry
J. B. Weir

Inventor:
Charles W. Caldwell
by *Bond, Adams, Pittman & Jackson*
Attorneys.

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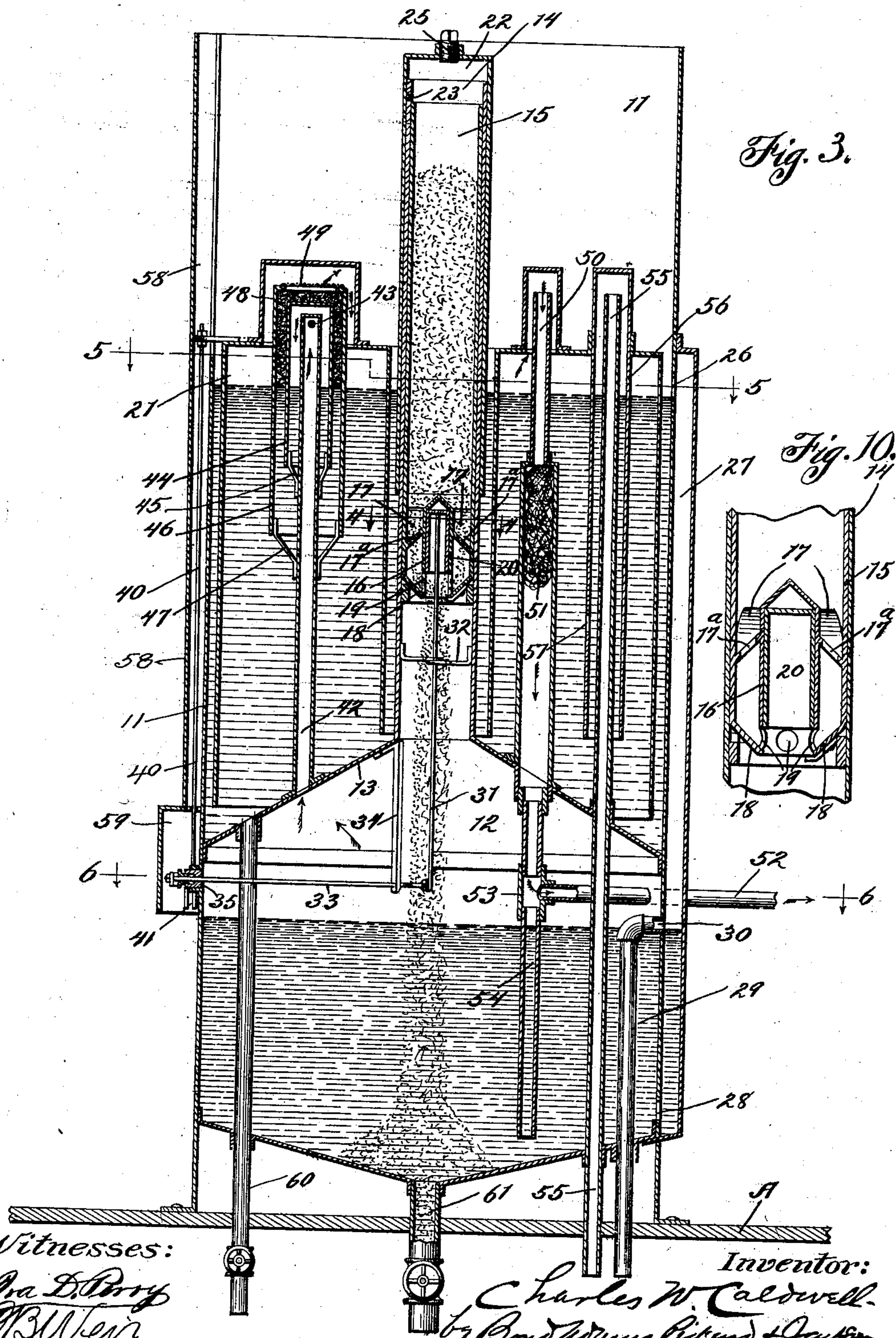
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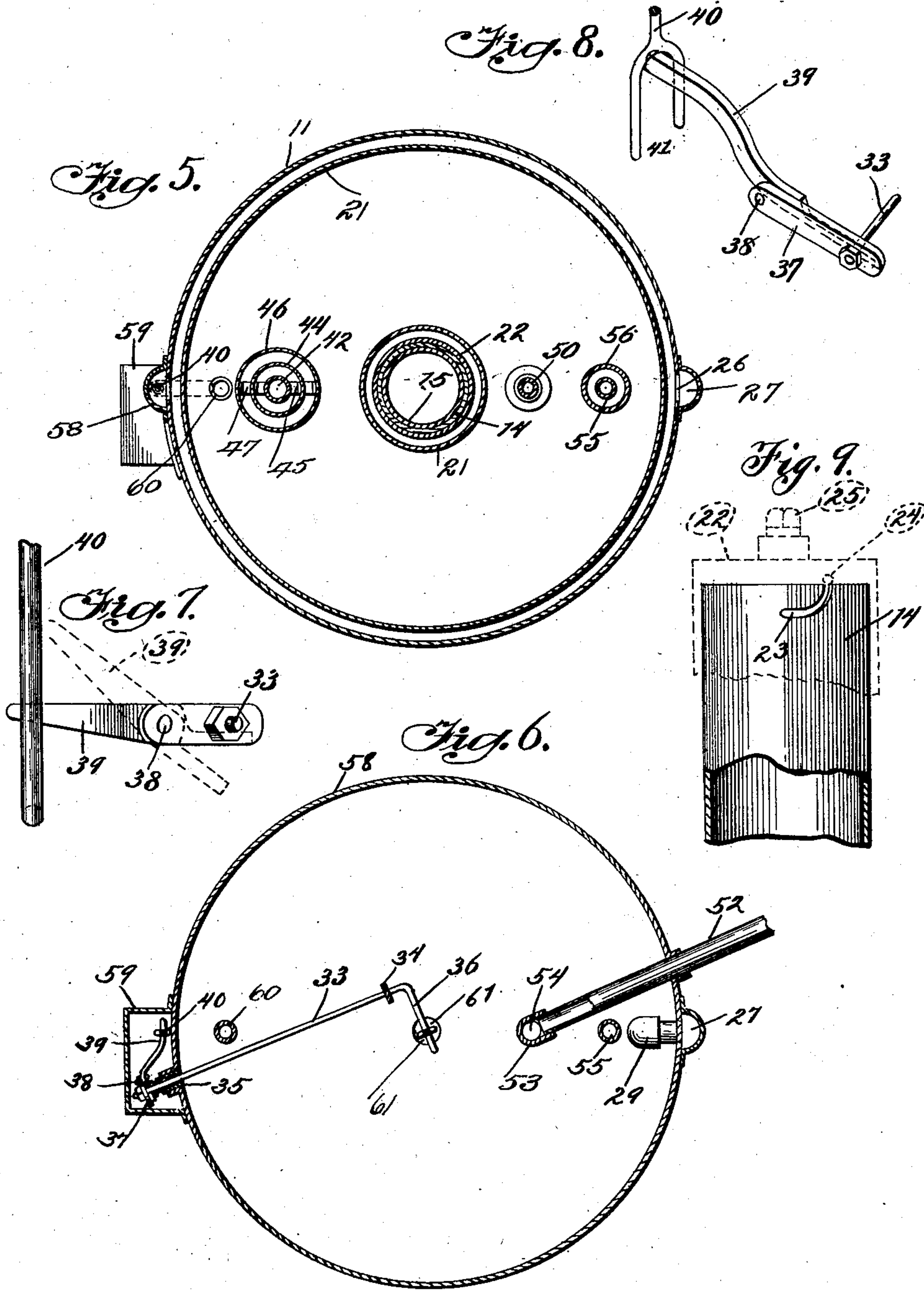
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3 Sheets—Sheet 3.



Witnesses:

E. L. Perry
J. B. Weir

Inventor:

Charles W. Caldwell
By Bond, Adams, Peters & Smith
Attorneys

UNITED STATES PATENT OFFICE.

CHARLES W. CALDWELL, OF WATERLOO, IOWA, ASSIGNOR TO THE RAILROAD GAS LIGHTING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 708,021, dated September 2, 1902.

Application filed October 24, 1901. Serial No. 79,810. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. CALDWELL, a citizen of the United States, residing at Waterloo, in the county of Blackhawk and State of Iowa, have invented certain new and useful Improvements in Acetylene-Gas Generators, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to improvements in acetylene-gas generators designed for use in the manufacture of gas for use in illuminating railway-coaches; and it has for one of its objects the providing of an improved generator which by reason of its shape and size can be conveniently located in a railway-coach, and preferably in one corner thereof, and so constructed and arranged with relation to the coach-body that its upper end will project through the roof of the coach and at its lower end having connections that project through the floor of the coach, whereby the following advantages are secured: In case of the overturning of the coach the movable bell, with which all such generators are ordinarily provided, will be allowed to become disconnected from the body of the apparatus, thereby permitting the escape of such gas as may have been formed and held confined by such bell and preventing an explosion. In the filling of the apparatus with both water and carbide the operations are enabled to be performed entirely from the roof of the coach, and in removing refuse from the generating-chamber and in removing water from both the upper and lower parts of the apparatus, which latter operation is desirable at times, the connections extending through the floor of the coach permit of these operations being performed readily and quickly and without the necessity of an attendant entering the coach.

Other objects of my invention are to provide a new and improved valve for controlling the discharge of carbide to the generating-chamber, to provide improved devices for automatically operating said valve, and to improve the construction and operation of generators of this character.

I accomplish these objects by the means

shown in the drawings and hereinafter specifically described.

That which I believe to be new will be pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal section through a railway-coach, the gas-generator being shown in plan view in one corner of the coach. Fig. 2 is a vertical section through the coach at line 2 2 of Fig. 1, the generator being shown in side elevation. Fig. 3 is a vertical section through the generator. Fig. 4 is a cross-section through the carbide-chamber and valve therein on line 4 4 of Fig. 3. Fig. 5 is a cross-section at line 5 5 of Fig. 3. Fig. 6 is a similar section at line 6 6 of Fig. 3. Fig. 7 is a detail of the valve-operating devices. Fig. 8 is a perspective view of the devices shown in Fig. 7. Fig. 9 is a detail of the upper end of the chamber containing the carbide-holder and the surrounding cover and illustrating the means for locking the two together; and Fig. 10 is a detail, being a vertical section through a portion of the carbide-holder and its inclosing tube and the valve and valve-casing within the carbide-holder.

Referring to the drawings, A indicates the floor of an ordinary railway-coach, B the roof thereof, and C D the side and end walls, respectively.

11 indicates a cylinder which constitutes the fixed portion of the generator and which, as shown in the drawings, is bolted firmly to the floor of the coach.

12 indicates the gas-generating chamber formed in the lower end of the cylinder 11, such chamber being formed by a cross-wall 13 on the interior of the cylinder. Such wall in the construction shown is inclined from the side of the cylinder upward toward the center, an opening being formed in the center of such inclined wall, around which and secured to such wall and extending upwardly therefrom is a long tube 14, open at both ends, into which is adapted to fit and move therein a suitably-shaped carbide-holder 15. In the lower end of the carbide-holder 15 is located a valve-casing 16, the same being formed in the construction shown of a tube open at its lower end and having its closed

upper end inclined so as to direct carbid falling upon it toward the space between the wall of the carbid-holder and the valve-casing. Said casing, as shown, is of very much less diameter than the diameter of the carbid-holder and is supported centrally in such carbid-holder at the lower end thereof by inclined plates 17 18, rigidly secured to the interior of the carbid-holder 15 and the exterior of the valve-casing 16. The inclined plates 17 are provided with suitable openings 17^a, through which carbid is adapted to pass and fall upon the inclined plates 18, the inclination of the plates 18 being such as to direct the carbid toward the openings 19, formed in the lower end of the valve-casing 16. Said openings 19 are normally closed by a valve 20, tubular in shape in the form of construction shown, open at its lower end and closed at its upper end and adapted to fit and move vertically within the casing 16.

21 indicates the bell or movable portion of the apparatus, formed, as are all such bells, with an open lower end and a closed upper end and adapted to fit and move freely within the stationary cylinder 11. The cylinder 11 above the wall 13 is to be partially filled, as will be understood, with water, so as to act as a seal to prevent the escape of gas through the open lower end of the bell.

22 indicates a cover of tubular form adapted to fit over the central tube 14, such cover being long enough to extend well down into the water in the upper portion of the cylinder and when down in place adapted to be removably secured in any suitable manner to said tube 14, the means shown being a lock of well-known form, consisting of an inclined groove 23 in the upper end of the tube 14 and a pin 24 on the inside of the cover 22 and adapted to enter such groove. In the upper wall of the cover 22 is formed a suitable opening through which carbid may be placed in the holder 15, said opening being normally closed by any suitable device, a large screw 25, that engages the side walls of said opening, being indicated as the closing means for such opening.

With the bell 21 removed water is to be poured into the open upper end of the cylinder 11, and upon reaching the level desired it will flow through a hole 26 in the wall of the cylinder and down through a passage 27, suitably formed at the side of such cylinder, and through another hole 28 near the lower end of such passage, and near the lower end of the cylinder 11 it will flow into the generating-chamber 12 and rise to the desired level, the fact of such level being reached being indicated by an overflow of the water through a pipe 29, that communicates at its upper end with the passage 27 through a hole 30 in the wall of the cylinder, the lower end of such pipe passing down through a suitable opening in the bottom of the cylinder and through the floor A of the coach. This arrangement

insures the proper quantity of water and only the proper quantity being placed in both the upper and lower portions of the cylinder, and as any excess is immediately disposed of through the pipe 29 the attendant does not have to exercise any particular care in regard to the quantity placed in the machine, except to continue the filling until the flow of water through the pipe 29 indicates that enough has been placed in the machine.

31 indicates a valve-rod placed vertically in the central portion of the machine and extending up into the central tube 14 and contacting at its upper end the end wall at the upper end of the valve 20, such valve-rod in the form of construction shown not being attached to said valve, but moving it upward, when such valve-rod is properly actuated, as hereinafter described, by the contact of its upper end with the upper wall of such valve, the lower or closing movement of such valve being effected by gravity, although it is evident, of course, that without the exercise of invention a spring might be employed to aid in quickly and effectively forcing said valve down to shut off the supply of carbid through the openings 19.

32 indicates a guiding-support for the valve-rod 31, such support consisting, as shown, of a wire twisted on itself to form a central eye through which the rod passes. The ends of the support are suitably secured at opposite points to the inner face of the tube 14.

33 indicates a horizontally-arranged rod, journaled near its inner end in the lower end of a hanger 34 and journaled near its outer end in a suitable stuffing-box 35 in the wall of the cylinder 11. Said rod 33 projects for a short distance beyond the wall of the cylinder. The inner end of this rod 33 is turned to form a crank 36, which is loosely connected in any suitable manner to the lower end of the valve-rod 31.

On the outer end of the rod 33 and outside of the cylinder 11 is rigidly secured a crank-arm 37, extending in the opposite direction from the crank 36, and to this crank-arm 37, near its outer or free end, is attached by a suitable pivot 38 a lever 39, the point of attachment of this lever 39 being such that one end of it passes beneath the rod 33. This construction holds the lever 39 rigidly when a downward pressure is exerted upon its outer or free end, and consequently such downward pressure will act to rotate the rod 33 in its bearings 34 35, the effect being through the crank 36 to force upward the valve-rod 31, which will force up the valve 20, uncovering the openings 19 and allowing the escape of carbid from the holder 15 into the gas-generating chamber 12. This movement of the parts is effected by the falling of the bell, due to the drawing off of gas, as will be well understood.

To the bell is connected a long vertical rod 40, which in the form of construction shown

is provided at its lower end with a fork 41, adapted to contact with the lever 39 near the outer or free end thereof. As the bell descends the contact of this fork 41 with such end of the lever causes the movements heretofore described for operating the valve, and upon the rising of the bell, due to the introduction thereunder of newly-formed gas, the pressure on the lever of course will be released, and through the reverse movement of the parts the valve will be closed, the weight of the valve or the weight and the effect of a spring, if a spring be used in connection with the valve, causing such reverse movement. It will be understood that but a small amount of carbid will be fed from time to time, and this only as needed, so that under ordinary conditions the rise and fall of the bell will not be great, as it is the intention to keep about the same supply of gas in the apparatus at all times. The parts are so arranged with relation to each other that when the supply of carbid in the holder is exhausted and the bell descends to its lowermost position the rod 40, which will be carried down with the bell, will by contact of its fork with the lever 39 cause such lever to turn to such an extent upon its pivot 38 as to allow the fork to pass such lever and be disengaged therefrom. This release of the connection between the fork 41 and the lever 39 allows the valve to drop down, thus closing the openings 19, and thereby placing the holder in proper condition to be refilled. It will be understood that if the fork were not so arranged as to be disengaged from the lever when the bell descended to its lowermost position the valve would be left open, and hence the carbid-holder could not safely be refilled. After the carbid-holder has been refilled and it is desired to again place the machine in operative condition the lever 39 may be moved by hand sufficiently to release a little carbid, whereby gas will be formed and raise the bell, the raising of the bell, of course, drawing up the rod 40, such drawing up of the rod causing the lever to turn upward at its outer end until such outer end is opposite the fork, at which time the lever will drop again between the arms of the fork, and thereafter the operation of the machine will be automatic, as herein described. After the formation of gas by the dropping of the carbid in the manner described into the water in the generating-chamber 12 such gas passes upward through a pipe 42, communicating with said chamber, from which pipe at the upper end thereof it passes through suitable openings 43, being deflected downward into the body of water in the upper part of the cylinder, such deflection downward being caused by a tubular hood 44, surrounding the pipe 42 and having its lower open end extended down a considerable distance into said body of water. Such hood 44 is, as shown, secured to the pipe 42 by arms 45. This hood 44 is sur-

rounded by another and similar hood 46, also suitably secured to the pipe 42 by arms 47. Between the two hoods 44 and 46 above the water-line is placed a quantity of porous material 48, through which the gas can readily pass and which is adapted to cleanse said gas from impurities. In the top of this hood 46 is an opening 49, which may be covered with a fine-mesh screen, if desired, through which the gas passes and is held confined by the bell 21. In drawing off such gas for consumption it passes down through a pipe 50, which, as shown, is provided also with a mass of porous material 51, through which the gas can readily pass and in passing be still further cleansed.

52 indicates a service-pipe connected to the pipe 50 by means of a suitable union 53, to the lower end of which union is also connected a short section of pipe 54, extending down into the body of water in the chamber 12.

55 indicates a safety blow-off pipe open at both ends and extending vertically through the machine, its lower end passing out through the bottom of the cylinder 11 and through the floor A of the coach, as shown. The upper end of this pipe extends some distance above the water-level in the upper part of the cylinder 11, and around the pipe and extending well down into the said last-named body of water is a tubular shield 56, attached to and carried by the bell 21, said tubular shield being provided near its lower end with an opening 57, through which the gas escapes when the bell is raised sufficiently to bring such opening above the water-level, and thereby permitting the gas to pass off through the pipe 55 until the bell sinks far enough to carry such opening 57 below the water-level.

58 indicates a housing attached to the outer face of the cylinder 11 and designed to surround and protect the vertical rod 40, being enlarged at its lower end, as shown at 59, so as to inclose the lever 39 and attached parts.

By making the cylinder 11 long enough to extend from the floor to the roof and through the roof of an ordinary railway-coach I am enabled to make the diameter of such cylinder only fifteen or sixteen inches and at the same time provide an apparatus capable of holding a sufficient quantity of carbid and water to enable the generation of gas in quantities whereby an ordinary coach may be thoroughly lighted for a long period of time. The size and form of this apparatus enables it to be located in a closet or corner of an ordinary railway-coach, so that it is not in the way of passengers and does not form an unsightly addition to the equipment of such coach. By the construction shown and described I also provide a generator that can be very quickly filled both with water and carbid and such filling operations performed by a workman on the roof of the coach and can also have the water in both compartments readily drained off, as well as the refuse removed

from the machine, without the necessity of entering the coach. As will be seen from the drawings, the water from the upper portion of the apparatus can be drained off through a pipe 60, and the water and refuse from the lower compartment or gas-generating chamber can be drained off through a pipe 61, both of these pipes 60 and 61 passing down through the floor of the coach and being provided near their lower ends with suitable valves.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with a railway-coach, of an acetylene-gas-generating apparatus secured within the same and projecting through the roof of the coach, substantially as specified.

2. The combination with a railway-coach, of an acetylene-gas-generating apparatus secured within the same and projecting through the roof of the coach, said apparatus comprising a fixed portion open at its upper end, and a movable bell within said fixed portion, whereby upon the overturning of the coach said bell will be displaced and release the gas confined thereby, substantially as specified.

3. The combination with a railway-coach, of an acetylene-gas-generating apparatus secured within the same and projecting through the roof of the coach, and pipes leading from the interior of the said apparatus through the floor of the coach, to permit the liquid and solid contents of the apparatus to be drawn off and discharged beneath the coach, substantially as specified.

4. In an acetylene-gas-generating apparatus, the combination with a gas-generating chamber, and a gas-holding bell adapted to receive gas from said chamber and hold it, of a carbide-holder arranged concentrically with said gas-holding bell, a vertical valve-casing, open at its lower end, carried by that portion of the holder within the gas-holding bell and provided with an opening in the side wall thereof through which carbide is adapted to pass, a vertically-movable hollow valve located in said casing, and adapted to normally close the said opening in the wall of the casing, a rod adapted to enter said hollow valve and abut against the end wall thereof, and means for forcing said rod upward to raise said valve, said means being actuated through the downward movement of said bell, substantially as specified.

5. In an acetylene-gas-generating apparatus, the combination with a gas-generating chamber, and a gas-holding bell adapted to receive gas from said chamber and hold it, of a carbide-holder arranged concentrically with said gas-holding bell, a vertical valve-casing, open at its lower end, carried by said holder and provided with an opening in the side wall thereof through which carbide is adapted to pass, an inclined plate adapted to direct carbide toward said side-wall opening, a vertically-moving valve located in said valve-

casing and adapted to normally close said side-wall opening in the casing, and means for actuating said valve through the movement of the bell, substantially as specified.

6. In an acetylene-gas-generating apparatus, the combination of a gas-generating chamber, and a gas-holding bell adapted to receive gas from said chamber and hold it, of a carbide-holder communicating with said gas-generating chamber and provided with a valve for controlling the discharge of carbide, a movable valve-rod, a second rod provided with a crank at each end and connected with said valve-rod through one of said cranks, a lever pivoted to the other of said cranks, means for preventing said lever from turning in one direction on its pivot, and another rod adapted to be actuated by the bell and provided with means for engaging said pivoted lever, whereby through the first two mentioned rods the valve will be opened to permit the discharge of carbide, substantially as specified.

7. In an acetylene-gas-generating apparatus, the combination with a gas-generating chamber, and a gas-holding bell adapted to receive gas from said chamber and hold it, of a carbide-holder communicating with said gas-generating chamber and provided with a valve for controlling the discharge of carbide, a movable valve-rod, a second rod provided with a crank at each end and connected with said valve-rod by means of one of said cranks, a lever pivoted to the other of said cranks, means for preventing said lever from turning in one direction on its pivot, and another rod adapted to be actuated by the bell and provided on its lower end with a fork adapted to contact the said pivoted lever, substantially as specified.

8. In an acetylene-gas-generating apparatus, the combination with a gas-generating chamber, and a gas-holding bell adapted to receive gas from said chamber and hold it, of a carbide-holder communicating with said gas-generating chamber and provided with a valve for controlling the discharge of carbide, a movable valve-rod, a second rod provided with a crank at each end and connected with said valve-rod by means of one of said cranks, a lever pivoted to the other of said cranks, means for preventing said lever from turning in one direction on its pivot, and another rod adapted to be actuated by the bell and provided at its lower end with means for loosely connecting it to said pivoted lever, substantially as specified.

9. In an acetylene-gas-generating apparatus, the combination with a gas-generating chamber, and a gas-holding bell adapted to receive gas from said chamber and hold it, of a carbide-holder communicating with said gas-generating chamber and provided with a valve for controlling the discharge of carbide, a movable valve-rod, a second rod connected at one end with said valve-rod, a lever piv-

oted to the other end of said second rod, means for preventing said lever from turning in one direction on its pivot, and another rod adapted to be actuated by the bell and provided
5 with means for engaging said pivoted lever, whereby, through the first two mentioned rods, the valve in the carbid-holder can be opened to permit the discharge of carbid, substantially as specified.

CHARLES W. CALDWELL.

Witnesses:

BERNHARD STRIEGEL,
C. F. BRADY.