No. 637,998. Patented Nov. 28, 1899.

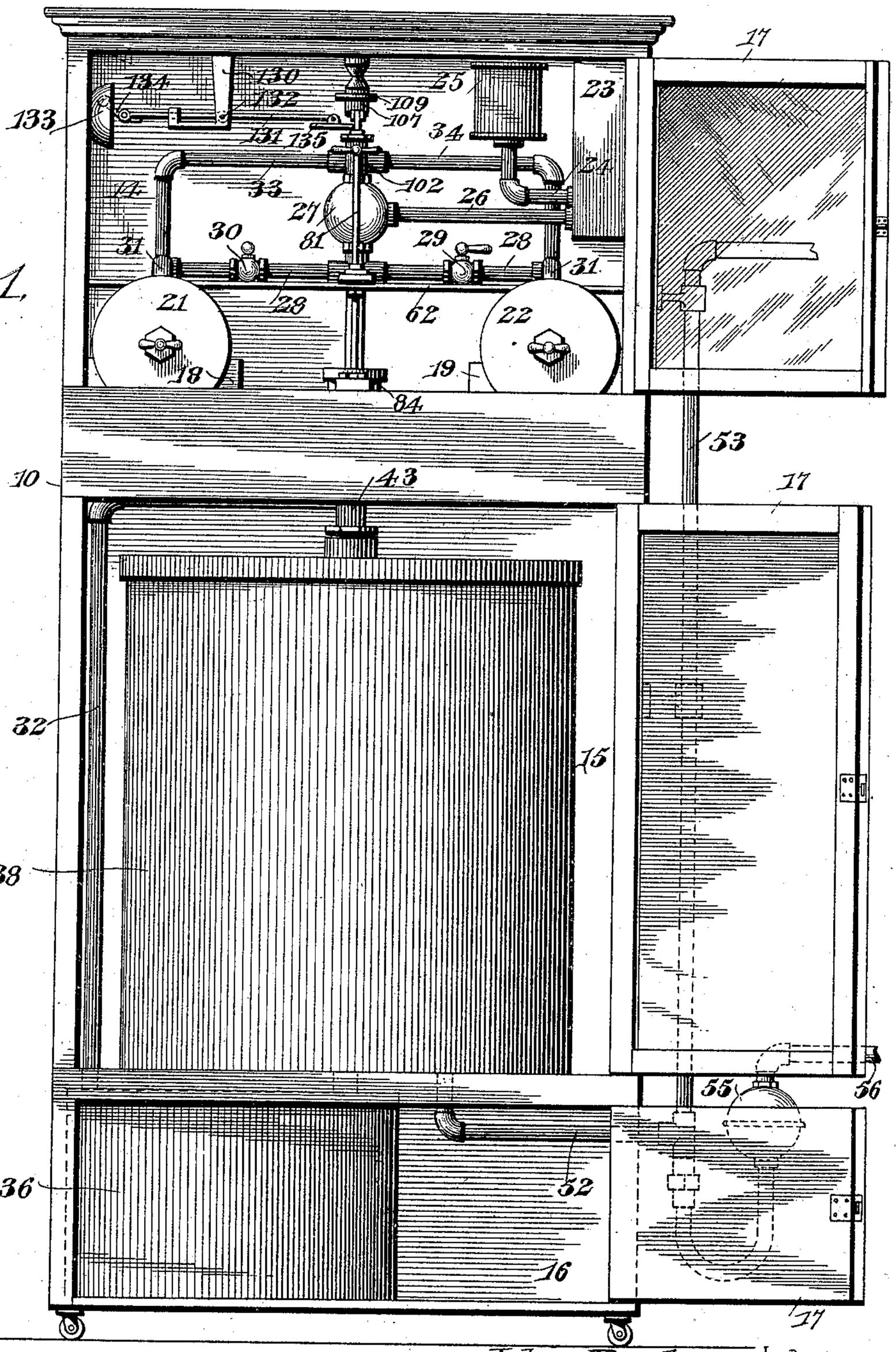
# J. RUTHVEN.

## ACETYLENE GAS GENERATOR.

(Application filed Dec. 9, 1898.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.




Witnesses
Jas. K. McCutchan
H. J. Burhorst

John Ruthven, Inventor
By his Attorneys,
C. A. Snow & Co.

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# J. RUTHVEN.

## ACETYLENE GAS GENERATOR.

(No Model.) (Application filed Dec. 9, 1898.)

5 Sheets—Sheet 2.

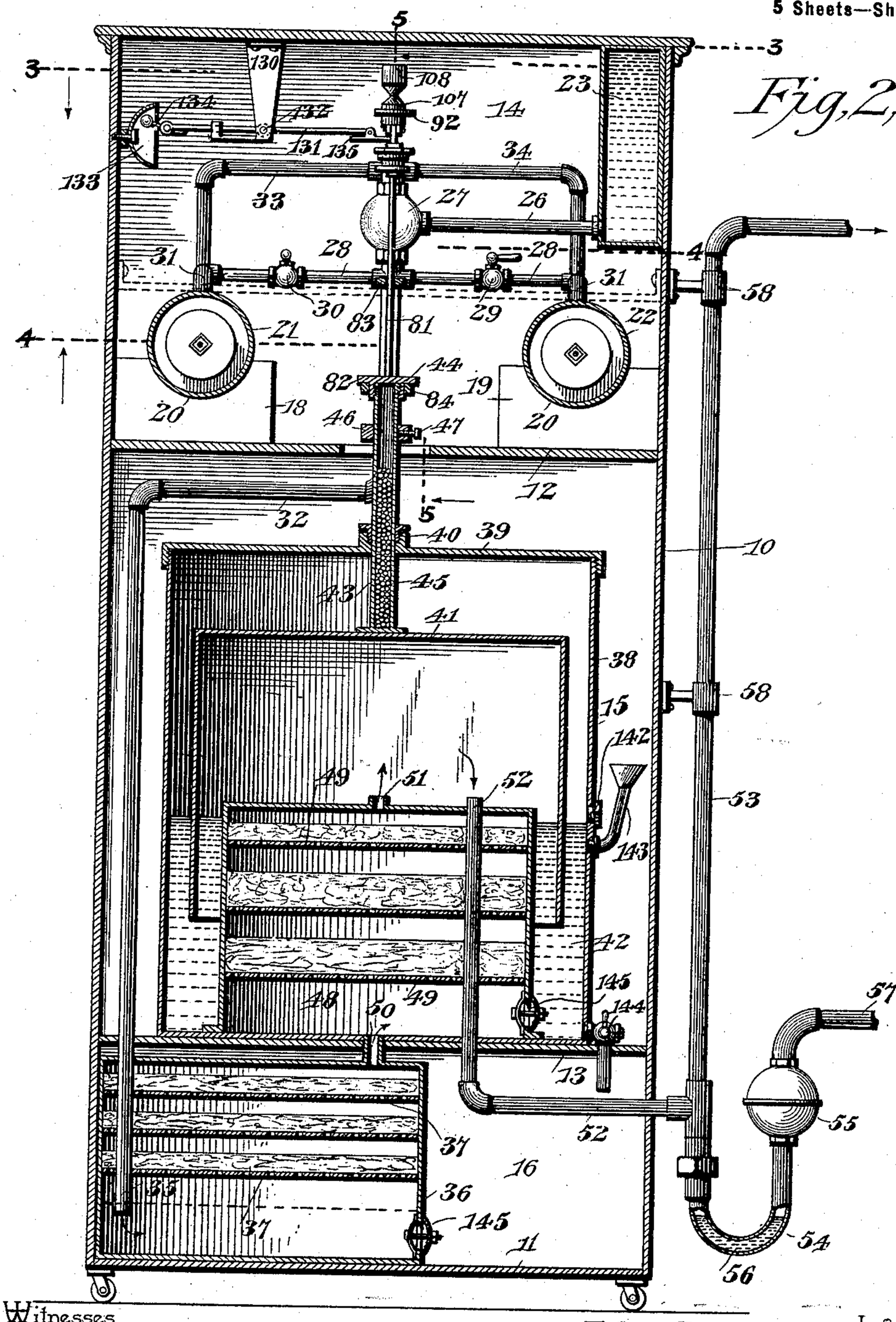


Fig. 2.

Witnesses

Jas. K. McCathran

H. J. Benthorp

John Ruthven, Inventor

By his Attorneys,

C. A. Snow & Co.

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# J. RUTHVEN.

## ACETYLENE GAS GENERATOR.

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(No Model.) 5 Sheets—Sheet 3.

Fig. 3.

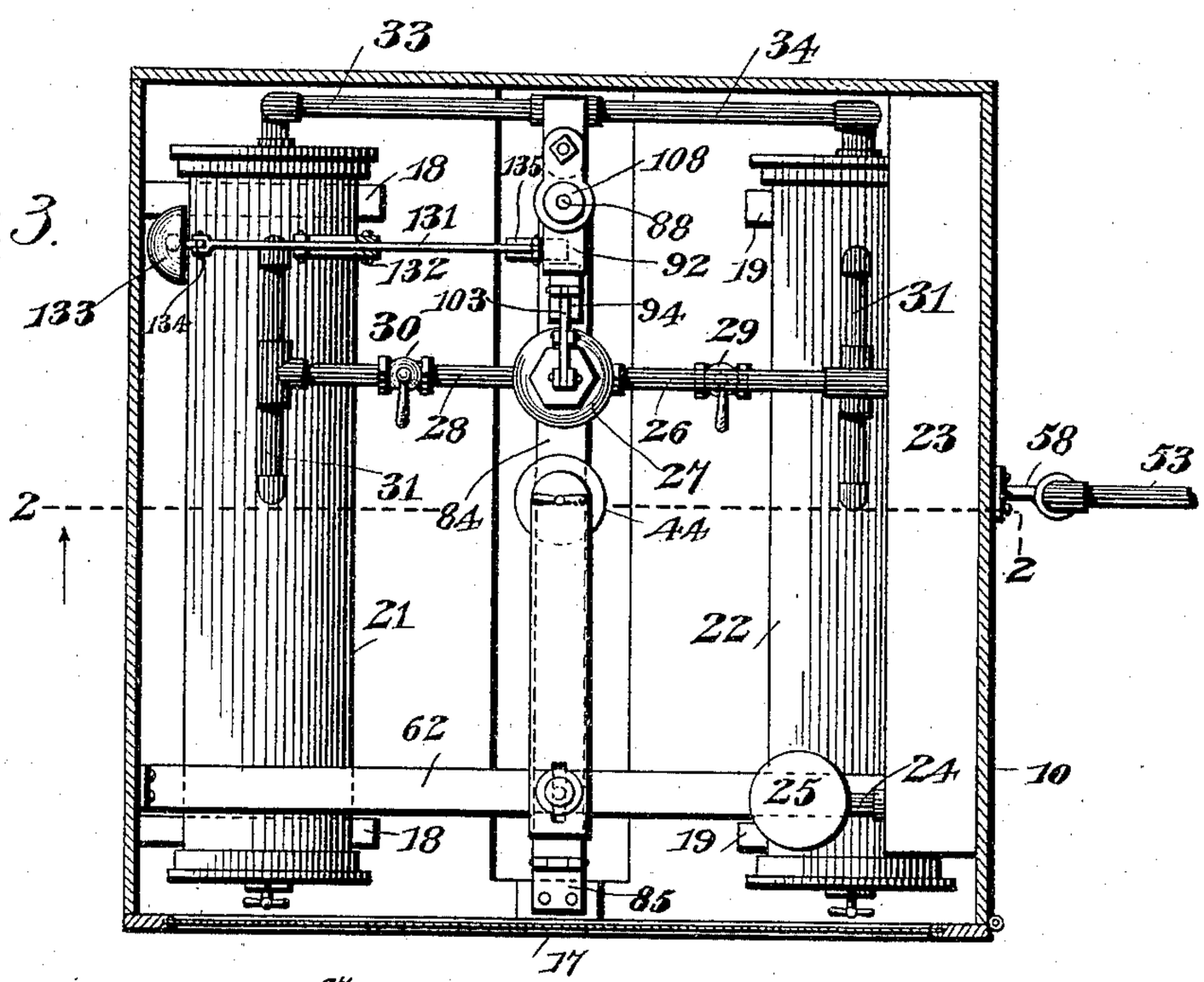
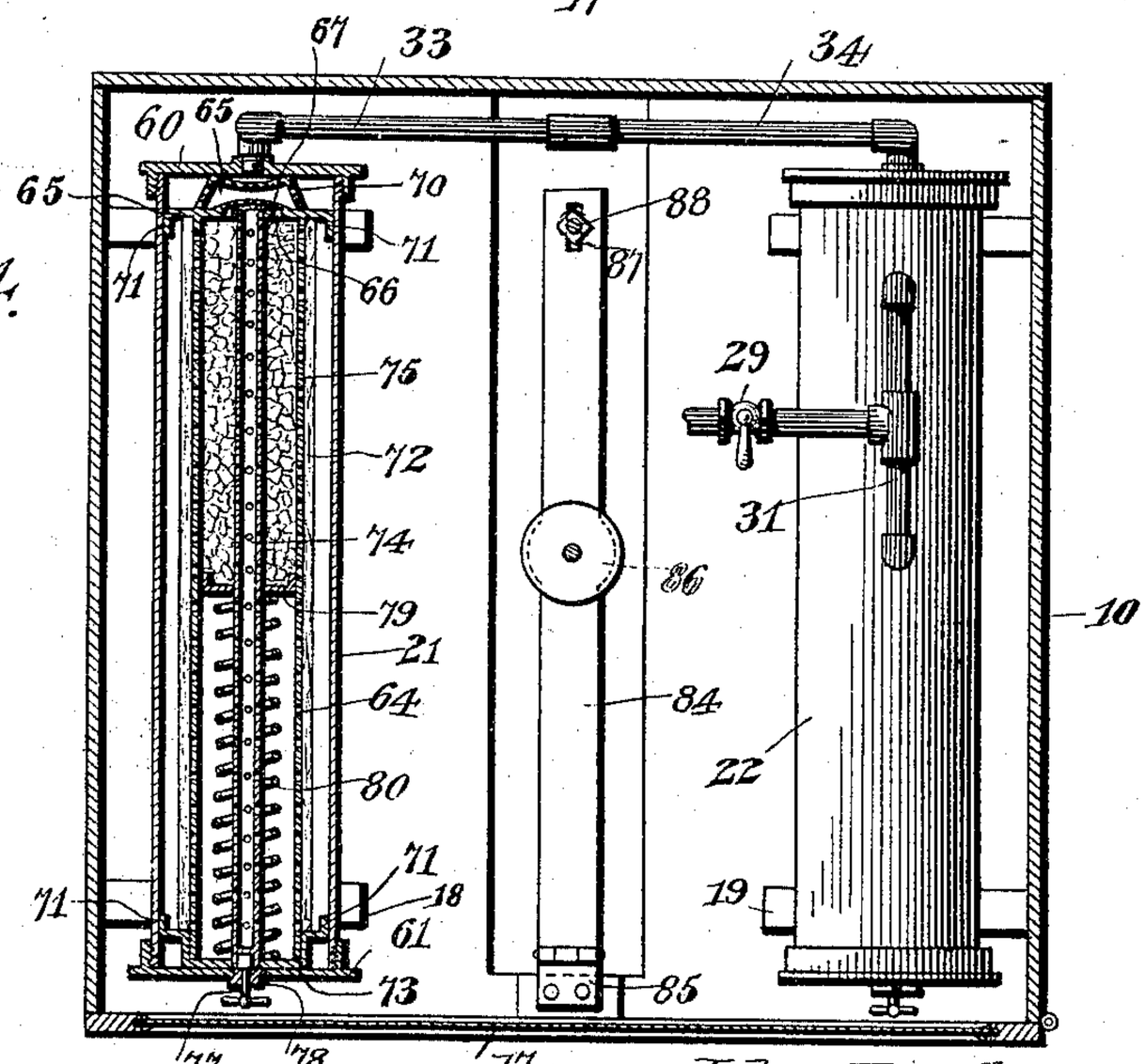



Fig. 4.




Witnesses
Jas. K. McCathran
H. J. Benhoof

John Ruthven Inventor
By his Attorneys.
Church & Co.

No. 637,998. Patented Nov. 28, 1899.

# J. RUTHVEN.

## ACETYLENE GAS GENERATOR.

(Application filed Dec. 9, 1898.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 5.

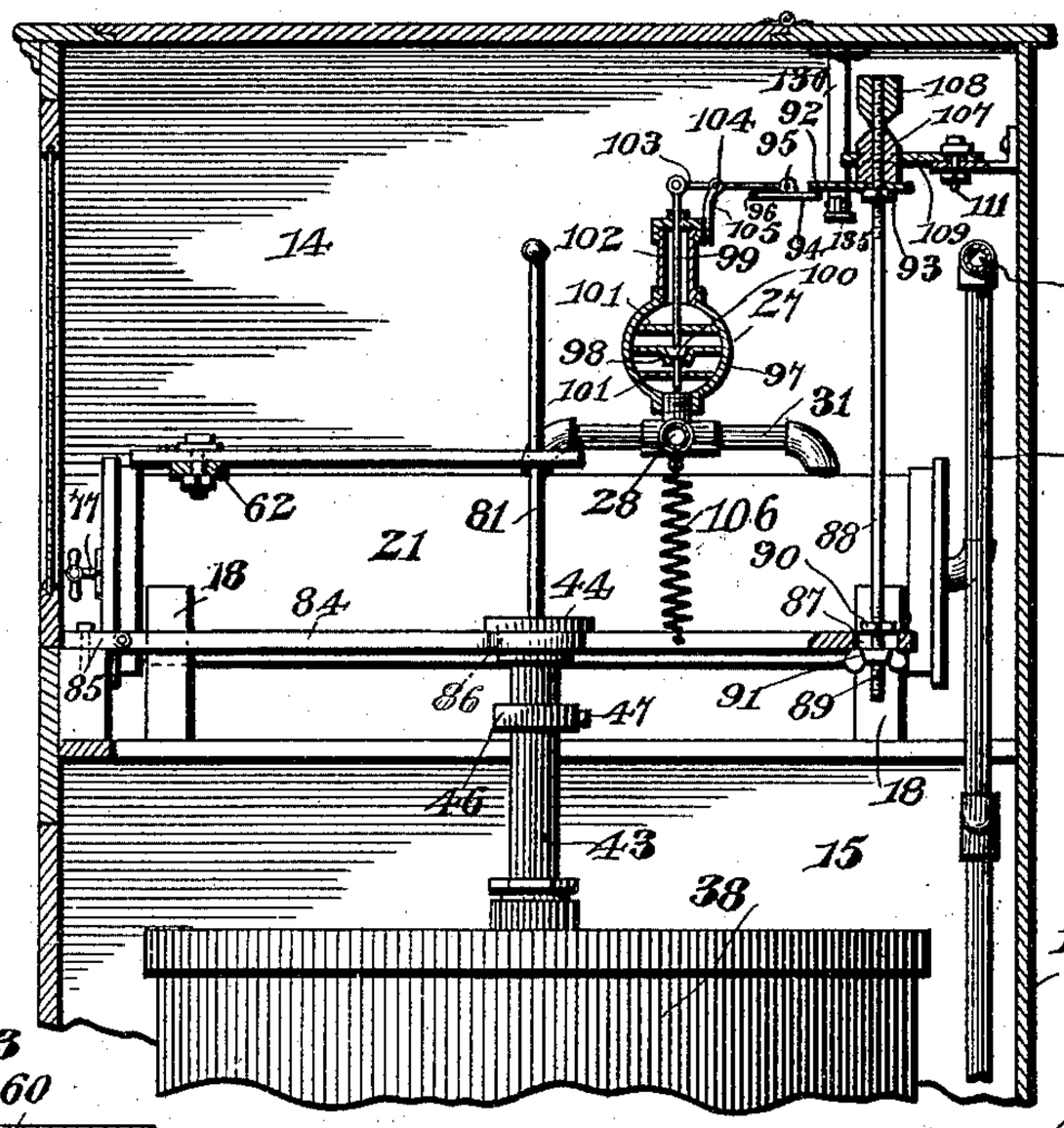



Fig. 8.

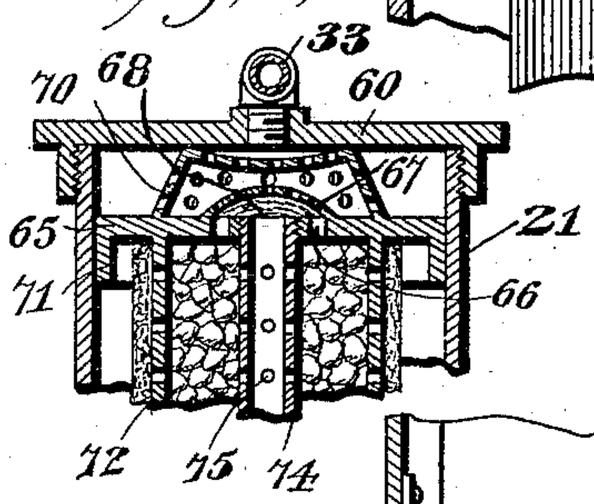



Fig. 10.

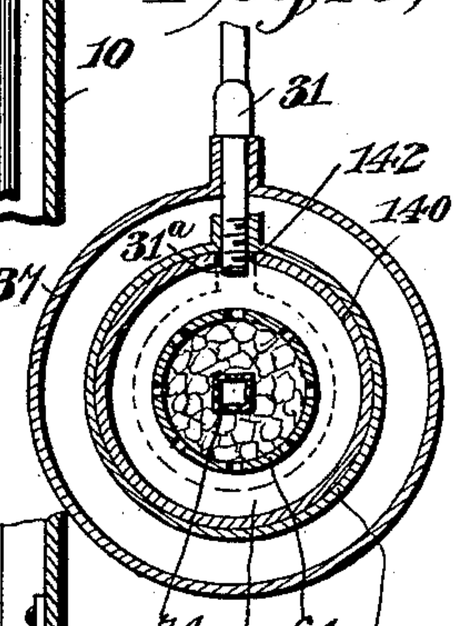



Fig. 6.

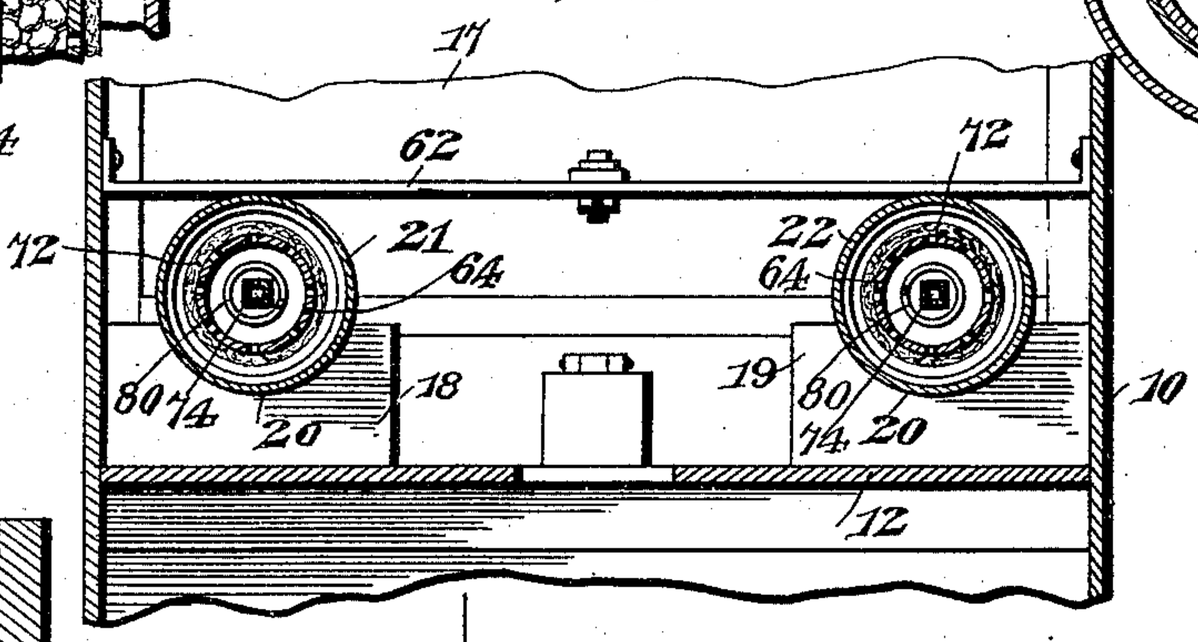
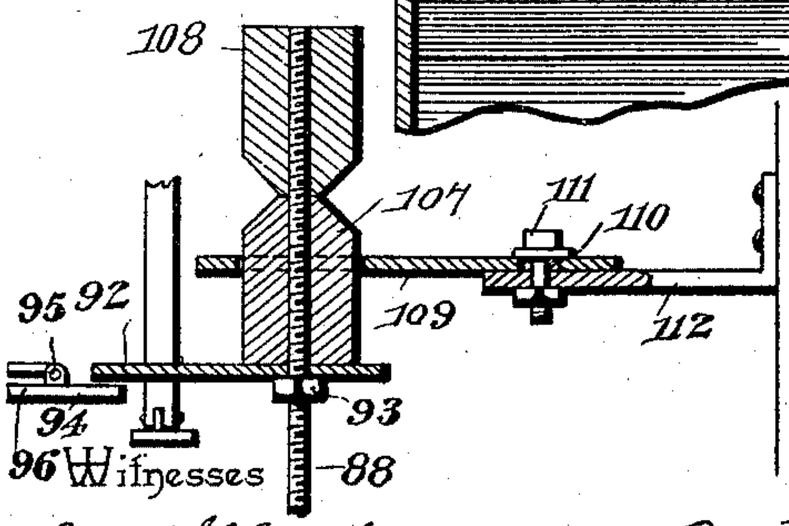



Fig. 7.




Witnesses

Jas. K. McCutchan

H. J. Benthorp

John Ruthven, Inventor

By his Attorneys,

Cachow & Co.

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# J. RUTHVEN.

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(No Model.) 5 Sheets—Sheet 5.

Fig. 9,

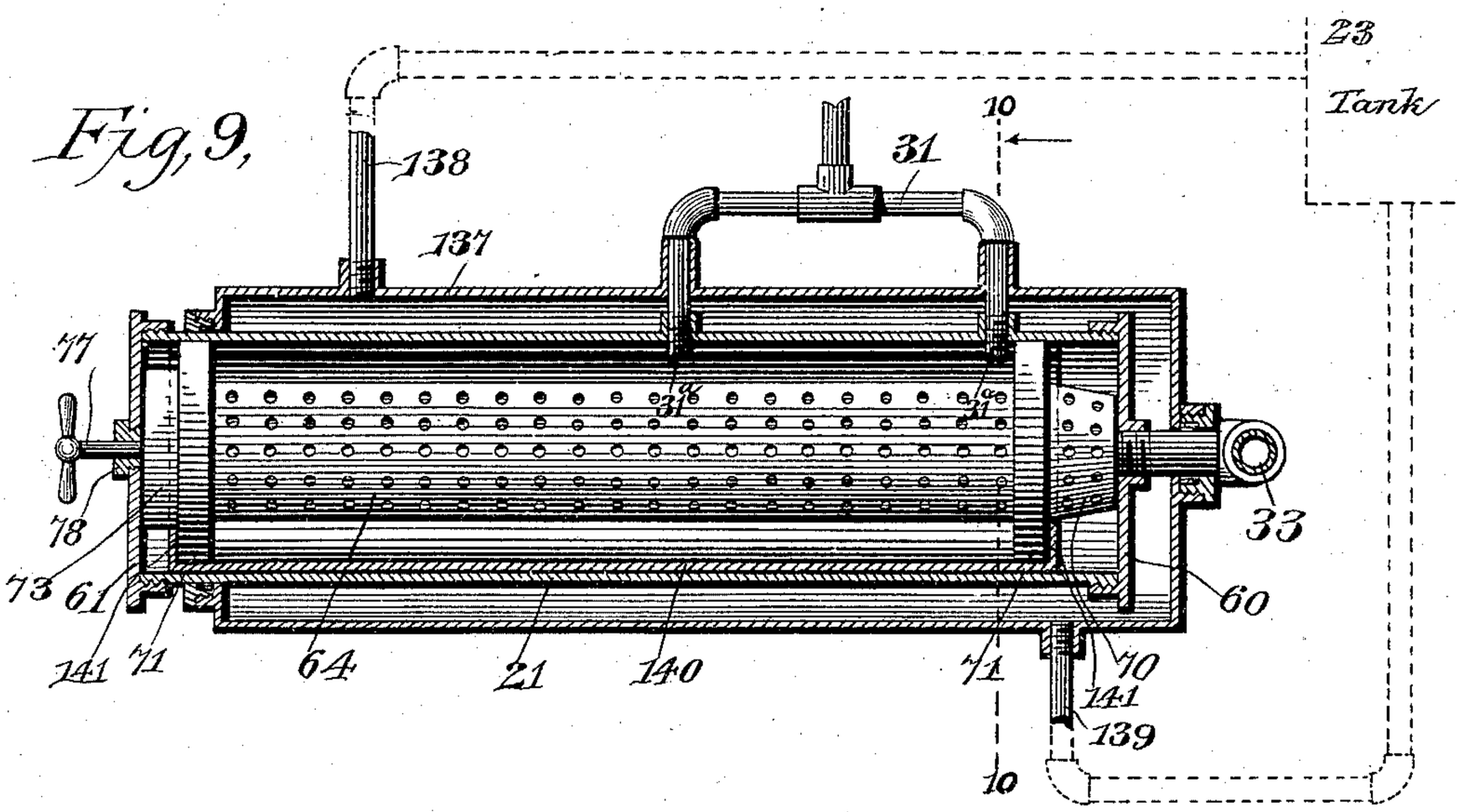
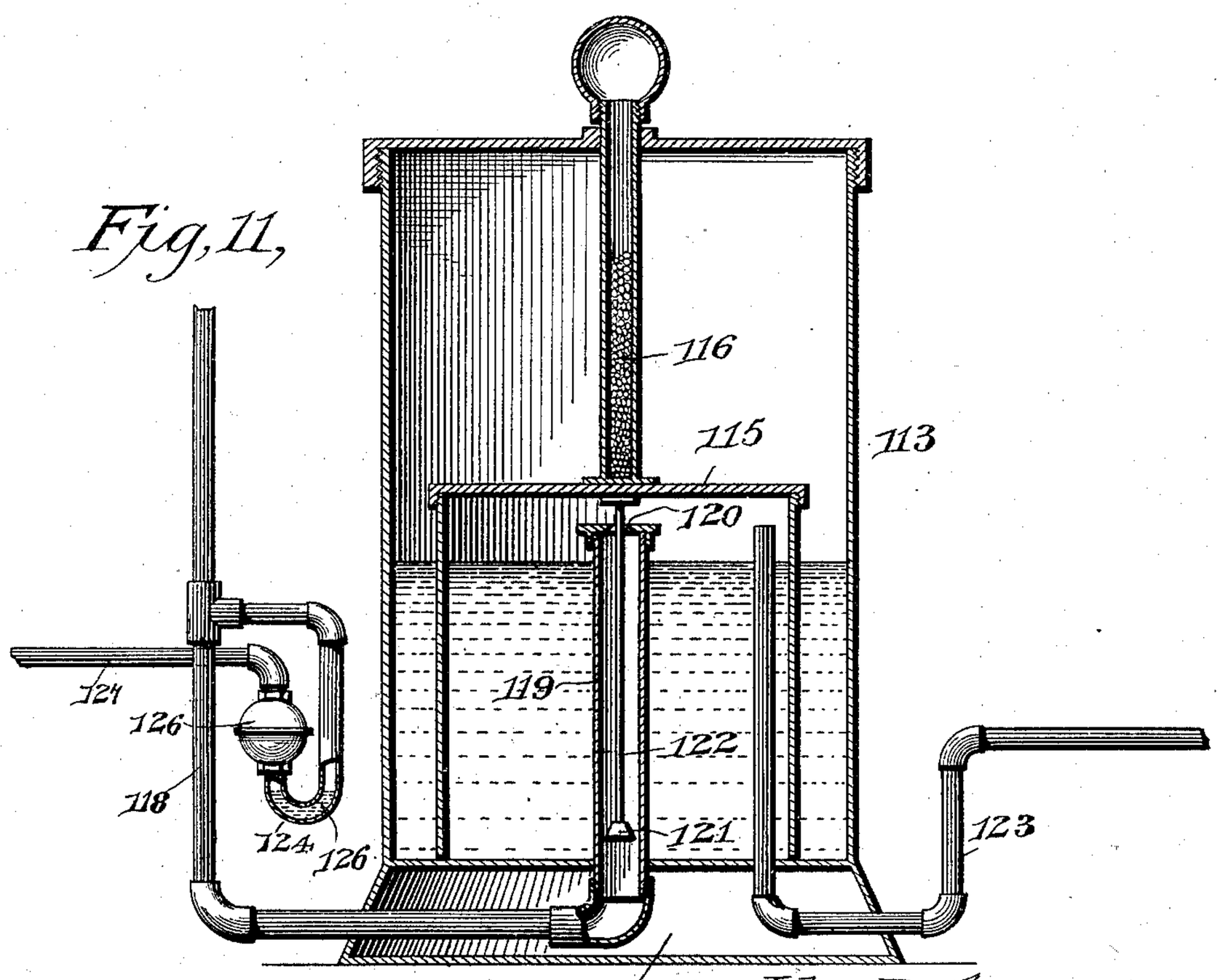



Fig. 11,




Witnesses
Jas. L. McCathran
H. J. Bernhard

114 John Ruthven, Inventor
By his Attorneys,
C. A. Snow & Co.

# UNITED STATES PATENT OFFICE.

JOHN RUTHVEN, OF CHICAGO, ILLINOIS.

## ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 637,998, dated November 28, 1899.

Application filed December 9, 1898. Serial No. 698,751. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN RUTHVEN, a subject of the Queen of Great Britain, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Acetylene-Gas Generator, of which the following is a specification.

My invention relates to generators for the production of acetylene gas by the familiar method of bringing an attacking quantity of water in active relation to calcium carbid or its equivalent.

One of the chief objects of the present invention is to provide an improved generator in which an absorbing-packing is arranged to transmit the moisture or liquid to the carbid in order to prevent the inflowing supply of water from coming in direct contact with the carbid, but, on the other hand, to provide a moist medium which surrounds the carbid, so that the well-known affinity of the carbid for moisture results in the production of acetylene gas. This generator is constructed to utilize the saturated or moistened strata of packing as a means for keeping the metallic elements of the generator in a relatively cool condition and also to employ said moistening strata as a means for mechanically filtering the gas in order to eliminate therefrom the fine particles of dust which may be suspended in the gas, particularly when the carbid is agitated within the generator.

A further object of the invention is to provide means which will keep the carbid in a compact condition and allow expansion of the mass of carbid when it is slaked by absorption of moisture from the saturated surrounding medium within the generator, and, furthermore, to provide means for agitating the carbid, so as to bring the active portion thereof into position where it will be more readily attacked by the moisture.

A further object of the invention is to provide means for admitting water automatically to the generators on the descent of the floatable gas-bell, and this water-feed mechanism is adjustable to vary and regulate the quantity of water which may be admitted to the generators on each downward movement of the floatable bell.

A further object of the invention is to compactly arrange all the working elements of the apparatus, to the end that they may be housed or contained within an inclosing cabinet which is constructed to provide ready access to the working parts.

A further object of the invention is to provide means for purifying the gas and for drying the same before its admission to the gasometer, and also to provide an automatic vent by which the gas in the event of overproduction and excessive pressure may be allowed to escape from the apparatus, thus meeting the requirement of insurance companies in certain sections of the country for the installation of apparatus of this character in buildings and dwellings.

With these ends in view the invention consists in the novel combination of mechanisms and in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a perspective view of an acetylene-gas generator constructed in accordance with the present invention. Fig. 2 is a vertical sectional elevation thereof on the plane indicated by the dotted line 2 2 of Fig. 3. Fig. 3 is a horizontal sectional plan view, the plane of section being taken above the generators and on the dotted line 3 3 of Fig. 2. Fig. 4 is another horizontal sectional view on a plane through the generators and indicated by the dotted line 4 4 of Fig. 2. Fig. 5 is a vertical sectional elevation, on an enlarged scale, through the trip-controlled devices for the automatic water-inlet valve, the plane of the section being indicated by the dotted line 5 5 of Fig. 2. Fig. 6 is a detail view of the rests for one of the generators. Fig. 7 is an enlarged view of the adjusting devices for the trip-rod that actuates the water-inlet valve. Fig. 8 is an enlarged fragmentary horizontal section through the end of the generator from which the gas is taken by the pipe which conveys the gas to the purifier. Fig. 9 is an enlarged longitudinal sectional view through a water-jacketed generator constructed in accordance with my improvements and having the carbid vessel thereof surrounded

by a sediment receptacle or cylinder which is contained within the generator along with the carbid-cylinder and is removable with the latter from the generator when the carbid-cylinder is to be recharged. Fig. 10 is a vertical cross-section through the generator illustrated by Fig. 9 on the plane indicated by the dotted line 10 10 of Fig. 9, and Fig. 11 is a sectional elevation of an auxiliary storage-gasometer designed for use in connection with an apparatus of large capacity.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

In carrying my invention into practice I provide an inclosing cabinet or case 10, within which are housed or contained all of the operating mechanisms of the apparatus, and this cabinet may be finished in any desired ornamental way to make the apparatus present a neat or attractive appearance. The cabinet is provided with a bottom or floor 11 and with the horizontal partitions 12 13, which divide the interior of the cabinet into a series of compartments or chambers adapted to contain the generators, the storage-gasometer, and the purifier. The upper chamber, which contains the generators and the water-supply devices therefor, is indicated by the numeral 14. The middle chamber 15 is formed by and between the partitions and is adapted to receive the gasometer, and the lower chamber 16 is formed between the floor 11 and the partition 13 for the reception of the purifier. Access to these several compartments is obtained by providing the doors 17, which may be of any suitable construction.

Within the upper compartment 14 of the cabinet I provide two pairs or series of rests 18 19 for supporting the generators, and these rests are secured firmly to the upper partition 12. Said rests are formed with concave seats 20, adapted to snugly receive the cylindrical generators 21 22, and said generators are disposed in horizontal positions within the compartment 14. The generators are arranged in the same horizontal plane and on opposite sides of the vertical axis of the cabinet 10, so as to take up a minimum amount of room therein, and these generators are readily removable from the seats of the rests whenever desired. A water-supply tank 23 is secured within the compartment 14 of the cabinet to occupy an elevated position above the horizontal plane of the generators, and this tank may be supported in place by any suitable contrivances. The tank is equipped with a feed-pipe 24, which is properly connected to said tank, and in this feed-pipe is arranged a filter 25 of any suitable construction, adapted to clarify the water previous to its admission to the tank.

A water-supply pipe 26 is arranged between the tank and the generators in order to convey the water from the tank to the generators, and the flow of water through the pipe 26 can take place only by the opening of an automatic trip-valve 27, which is controlled by suitable trip devices actuated by the descent of the floatable gas-bell forming a part of the gasometer, as will hereinafter more fully appear. The water-supply pipe 26 is connected with this automatic trip-valve 27, and from said valve leads a branch pipe 28, which has connection with the shells of the generators 21 22. This branch pipe is provided with cocks 29 30, which are fitted therein on opposite sides of the point of communication between the branch pipe 28 and the trip-valve 27, and either of these cocks may be opened to permit water to pass from the valve 27 to one generator while the other cock remains closed to cut off communication from the valve 27 to the other generator, whereby either generator may be brought into condition for service in the generation of acetylene gas. It will thus be seen that one generator may be recharged with fresh carbid while the other generator is in service, and the apparatus is thus adapted for continuous operation. It will also be evident that the capacity of the apparatus for the generation of gas may be varied by increasing the number of generators or by an increase in the size of each generator to adapt the latter to contain a relatively large quantity of carbid. The branch pipe 28 which communicates with the automatic water-valve is not attached directly to each generator; but on the contrary the ends of this pipe 28 are provided with supplemental pipes 31, which are firmly attached to the pipe 28 and have their ends united or coupled to the generator 21 22, whereby each supplemental pipe 31 is connected at two points to its generator, so as to discharge the water into said generator in a manner to distribute the water-supply over the fibrous absorbent packing and enable the latter to readily take up or absorb the feed-water.

A gas-pipe 32 is provided with branches 33 34, which are attached to the ends or heads of the generators 21 22, respectively, for the purpose of providing a gas-pipe which is common to both of the generators, and the vertical section of this gas-pipe is extended or carried through the partitions 12 13, so that it passes through both compartments 15 and 16 in the cabinet, whereby the discharge end 35 of this gas-pipe may be extended into the purifier 36. This purifier is housed or contained within the lowermost compartment 16 of the cabinet, and it consists of a suitable shell or casing, which contains a series of perforated shelves or trays 37, which are properly supported within the shell. The discharge end 35 of the gas-pipe 32 passes through the shell of the purifier in order to discharge the gas into the purifier-shell at or near the the bottom thereof, and the trays or shelves 37 are adapted to contain suitable substances for the purification of the gas as its circulates within the purifier and through the material on the shelves thereof.

The middle compartment 15 of the cabinet

contains the gasometer, in which the gas is stored ready for consumption by the burners, which are provided in the building or dwelling in which the apparatus is installed. This gasometer has a tank 38, which rests upon the partition 13, and said tank is closed at its upper end by a head 39, which is provided with a central guide-box 40 to receive the weight-tube of the floatable gas-bell 41. This gas-bell is housed or contained within the closed gasometer-tank so as to move freely within the latter, and said bell is inverted over a drier, which is provided within the gasometer-tank. The floatable bell is immersed within a liquid seal 42, also contained within the tank 38, and said bell is provided with a hollow receptacle or tube 43, which plays freely in the guide-box 40 of the tank 38. Said tube 43 of the floatable bell is designed to receive the weight 45, which may be in the form of shot or other substance, and the upper end of said tube 43 is closed by means of a cap 44, which is secured detachably to the tube for the purpose of enabling the operator to obtain access to the tube to vary the quantity of shot or other weight material therein. The tube 43 is secured firmly and centrally to the head of the floatable bell, and by providing the weight within the tube the bell is adapted to exert pressure on the gas which is confined within the bell and prevented from escaping therefrom by the liquid seal 42 within the tank 38. The weight-receiving and guide tube 43 is provided outside of the tank 38 with a collar 46, and this collar carries a clamping-screw 47, which binds or impinges against the tube 43.

In renewing the charge of carbid within the generator it is desirable to remove the pressure from the gas stored within the gasometer, and this end may be attained in my apparatus by loosening the set-screw 47 and raising the collar 46 on the tube 43, so that the gas-bell may be elevated sufficiently to remove the pressure from the gas confined therein, said bell being maintained in its elevated position by tightening the screw 47 and allowing the collar 46 to rest upon the guide-box 40 of a gasometer-tank in a manner to sustain the gas-bell. After the generator shall have been charged the collar 46 is raised free from contact with the tank 38 in order that the weight contained within the guide-tube 43 may act on the floatable bell to cause the latter to exert pressure upon the gas.

A drier is immersed within the seal 42 of the gasometer, and it occupies a position within the floatable gas-bell to avoid interference with the play thereof. This drier 48 is provided with a series of shelves or trays 49, which are spaced at proper intervals and are constructed to contain suitable drying substances, through which the gas is compelled to circulate. The drier is arranged above the purifier 36, and connection between the purifier and drier is established by a short section of pipe 50, which extends through the partition 13 for its lower end to be attached to the purifier 36 and its upper end to extend into the bottom chamber of the drier 48. The gas is compelled to circulate through the purifier, thence passed through the pipe 50 into the lower chamber of the drier to circulate through the latter and to find its exit through an outlet-port 51, which is provided in the top of the drier. The gas is thus purified, cooled, and condensed by the purifier and the drier before it is admitted to the bell of the gasometer, and the moisture and impurities in the gas are eliminated before it passes to the service-pipes. An outlet-pipe 52 extends through the drier 48 for the upper end of said pipe to open into the gas-bell, and this outlet-pipe has a horizontal branch 52, which is carried through the compartment 16 and through the inclosed cabinet. To the protruding end of this outlet-pipe is connected a vertical service-pipe 53, which is fastened to the outside of the cabinet by the braces 58 of any suitable character, and to the lower end of this service-pipe 53 is connected a trap 54. This trap is equipped with an enlarged reservoir or chamber 55, and the trap is designed to contain a suitable liquid seal 56, which normally is below the reservoir-chamber 55. A vent-pipe 57 is attached to the leg of the trap which contains the reservoir-chamber, and in the event of overproduction and excessive pressure of the gas the liquid seal in the trap is forced into the extended chamber 55, so that the gas may escape through the vent-pipe.

I will now proceed to describe the improved construction of the generator, the important feature of which is a perforated carbid-cylinder and a fibrous absorbent packing which surrounds the cylinder, so as to constitute a jacket adapted to be saturated with moisture by the water admitted to the generator; and as each generator is essentially the same in construction a description of one will answer for the other. Each generator has a shell or casing which is closed permanently at one end by the head 60, to which is attached the branch 33 or 34 of the gas-pipe 32. The other end of the horizontal generator-shell is closed by a removable head or cover 61, which is clamped detachably and firmly in place by a clamping or binding device of any preferred construction. The removable head 61 is arranged to be detached from the generator without interference by the rests 18 or 19, on which the generator itself is placed, and the two generators are clamped in place on the rests by a transverse bar 62, which is secured detachably within the cabinet by any preferred means. Within each generator-shell is a perforated carbid-cylinder 64, which may be removed from said shell after the head 61 has been detached, thus making provision for emptying the exhausted or spent carbid and recharging the generator with fresh active carbid. Each perforated carbid-cylinder 64 is provided at its inner end with an imperforate permanent head 65,

except as to the central gas-opening 66, and over this gas-opening is secured a screen 67, which prevents the carbid contained within the cylinder from escaping through the opening 66, while allowing the gas to pass freely into the shell of the generator. The screen 67 is of concavo-convex contour and is secured to the cylinder-head to form an intermediate space or chamber, which is filled with a suitable packing 68, and this packing serves to confine the fine particles of carbid within the cylinder, particularly when the carbid is agitated. This carbid-cylinder is provided at the end adjacent to the permanent head 60 of the generator-cylinder with an offstanding perforated flange 70, which extends in the direction of the length of the cylinder and is adapted to abut against the permanent head 60 of the generator in order to space the carbid-cylinder relatively to said head of the generator and prevent the cylinder when it is inserted in the generator from abutting against said head of the generator and closing the gas-outlet port therein to the pipe 32. The carbid-cylinder is also provided with the annular spacing-flanges 71, which are provided externally on the perforated cylinder at the ends thereof, and are adapted to rest within the shell of the generator in order to revolubly support the perforated carbid-cylinder within said generator. The carbid-cylinder is held by its annular flanges centrally within the generator-shell, so as to provide a space between the perforated cylinder and the imperforate generator-shell for the circulation of gas through the generator, and these flanges 70 provide bearings for the carbid-cylinder within said generator to adapt the carbid-cylinder to be rotated on its longitudinal axis for the purpose of agitating the carbid contained within said cylinder.

The absorbent jacket or packing 72 surrounds the perforated carbid-cylinder externally, and said jacket or packing is confined between the annular spacing-flanges 71 of the cylinder. This jacket may consist of any suitable absorbent material, and as a material suitable for the purpose I may employ cotton wicking or asbestos strands. The wicking or strands may be wrapped or coiled externally around the perforated cylinder to effectually inclose the same from end to end between the annular flanges 71 thereof; but it will be understood that I do not limit myself to the employment of the particular materials mentioned nor to the specific way of applying the jacket. This jacket serves a threefold purpose in my generator, first, as a means for feeding the moisture or attacking liquid to the carbid without permitting the water to come in direct contact with the carbid; second, as a means for keeping the perforated carbid-cylinder in a comparatively cool condition, and, third, as a filtering agent for the gas to eliminate the fine particles of dust which may arise from the carbid, particularly when the carbid-cylinder is rotated for the purpose of agitating the carbid. It will be observed that the ends of the pipe 31 which communicate with the branch water-pipes 26 28 are connected to the generator-shell at points intermediate of the length of the jacketed carbid-cylinder, and the water which flows through this pipe 31 on the opening of the automatic valve 27 is dropped or deposited upon the absorbent jacket 72 of the carbid-cylinder, whereby the jacket is saturated with water and is kept in a cool moistened condition. The gas is generated by the affinity of the carbid for the moisture, which it absorbs from the saturated jacket around the perforated carbid-cylinder, and as the carbid is contained within said cylinder the gas is generated therein, so that it is compelled to find its exit either through the packed and screened port at one end of the carbid-cylinder or through the saturated fibrous jacket. The jacket thus acts as a filtering agent to mechanically eliminate the carbid sediment which may be carried off with the gas, and as said jacket is saturated with water and as it has direct contact with the perforated metallic cylinder 64 it maintains the latter at a comparatively low temperature. The open end of the perforated carbid-cylinder is designed to be closed by a removable cover 73, which is screwed to said end of the cylinder adjacent to one of the annular flanges 71 thereof, and this removable cover has a central opening which supports one end of a polygonal tube 74, which is arranged axially and longitudinally within the carbid-cylinder. This tube is perforated throughout its length, as at 75, and its ends are supported in the head and cover of the carbid-cylinder. Said tube extends through the center of the mass or charge of carbid contained within the cylinder 64, and one end of said tube opens into the packed chamber formed by the screen 67 at the inner end of said cylinder. The tube is thus made to serve as an outlet for the gas within the carbid-cylinder, and this gas is free to pass through the perforations in the tube and the filtering-chamber, so as to find its exit in the chamber of the generator-shell. One end of the central gas-tube is extended through the opening in the head 73 for engagement with the socketed end of an operating-spindle 77, which is revolubly mounted in a stuffing-box 78, fastened to the removable head 61 of the generator-shell. This spindle 77 has a handle portion arranged externally to the generator, and said spindle may thus be operated without opening the generator for the purpose of rotating the carbid-cylinder to agitate the carbid therein.

In my generator the carbid-cylinder occupies a horizontal position, and to keep the carbid in a compact mass a follower 79 is arranged loosely within the cylinder 64. This follower is mounted to travel on the polygonal tube 74, which serves as a guide for the follower in its endwise movement within

the cylinder 64, and the follower is normally pressed against the carbid by a spring 80, which is contained within the cylinder 64 to bear against the follower and the head 73 of the carbid-cylinder. The spring acts against the follower to keep the carbid in a compact mass within the cylinder; but when the carbid becomes slaked, owing to the absorption of moisture from the saturated jacket, the follower is free to move against the tension of the spring and allow the carbid to expand.

To the cap 44 at the upper end of the weight-tube 43 on the floatable gas-bell is rigidly secured a guide-rod 81, which extends upwardly between the generators and is properly fitted in a bridge-bar 83, which is fixed to the cabinet within the upper compartment 14 thereof. The cap 44 on this weight-tube of the gas-bell is formed with an annular collar or head 82, which is adapted to depress an actuating-lever 84, that controls the trip devices for the automatic water-valve 27. This actuating-lever occupies a substantially horizontal position within the upper compartment 14 and between the generators, and one end of this lever is hung or fulcrumed to a bracket 85, which is fixed to the cabinet 10, preferably at the front side thereof. Said lever 84 is provided at a point intermediate of its length with an eye or opening 86, and the unconfined end of the lever has a slot 87. The weight-tube 43 of the floatable gas-bell passes freely through the eye 86 of the lever 84, and the collar or head 82 of the tube-cap 44 exceeds the diameter of said eye in the lever, whereby the collar or head is adapted on the descent of the floatable bell to depress the actuating-lever 84 against the tension of its lifting-spring 106, and thereby lower the trip-rod, which sets in motion the devices that actuate the automatic valve 27. To the free slotted end of the actuating-lever 84 is connected the vertical trip-rod 88, and this rod is provided, near its lower end, with a foot 90 and a male thread 89. The threaded end of the rod passes through the slot 87 in the actuating-lever 84, and it receives a nut 91, adapted to bear against the lever 84, whereby the foot 90 and the nut 91 serve to operatively connect the actuating-lever and the trip-rod properly together. This vertical rod 88 is provided with a male-threaded section at its upper extremity, and on this threaded section of the rod is fitted a trip-plate 92, which is clamped firmly between a jam-nut 93 and one of the adjusting-cones, the nut 93 being screwed on the threaded section of the trip-rod. The trip-plate is adapted to travel vertically with the rod 88 when the lever 84 is actuated on the descent of the gas-bell or by its lifting-spring, and said trip-plate is arranged to impinge against a hinged trip 94. Said hinged trip is pivoted at a point intermediate of its length, as at 95, to the free extremity of a valve-lever, and by thus pivoting the trip a short arm 96 is provided which is adapted to bear against said valve-lever and make the hinged trip fast with the lever when its free end is pressed by the trip-plate 92 on the descent of the trip-rod with the gas-bell. The trip-plate is thus adapted to depress the valve-lever for the purpose of opening the valve 27 on the descent of the gas-bell, and on the upward movement of the trip-plate with the ascent of the gas-bell or with the actuating-lever 84, when the latter is lifted by its spring, the hinged trip 94 is adapted to yield or give to the movement of the trip-plate, whereby the latter may ascend without actuating the valve-lever.

The automatic valve 27 has a shell or casing 97, within which is a valve-seat 98 and the guides 101. A valve rod or stem 99 is slidably fitted in the guides 101 of the shell, and this rod carries the valve-head 100, which is adapted to occupy the seat 98 to close the valve against the passage of water from the supply-tank 23 to the pipe 28, leading to the generators. The valve-shell 97 is provided with a tube or extension 102, which extends upwardly therefrom to a point above the level of the water in the tank 23, and this tube or extension serves as an auxiliary reservoir for the water which is to be supplied to the generators, whereby the water contained in the reservoir, formed by the tube or extension 102 is adapted to pass quickly to the generators on the opening of the valve. The stem or rod 99 of the valve passes through the auxiliary reservoir, and its upper end is pivoted to a valve-lever 103, which is fulcrumed at 104 to a fixed supporting-arm 105, and to the free end of this valve-lever 103 is pivoted the hinged trip 94. The spring to actuate the lever 84 is designated by the numeral 106, and this spring is preferably of the coiled variety, with one end attached to the valve-shell or the pipe 28 and its other end fastened to the lever 84 at a point adjacent to the eye 86 in said lever, although this particular style of spring and the arrangement thereof are not essential.

The trip-rod 88 is loosely connected at its lower end with the actuating-lever, and said rod is guided by adjusting devices which serve to direct the movement of the rod for the trip-plate 92 to engage with the hinged trip 94 for variable periods of time, so as to hold the valve 27 open for longer or shorter periods, and thereby regulate the quantity of water which may be admitted by the valve from the tank to the generators. The adjusting devices consist of two cones 107 108, which have female-threaded openings to adapt them for adjustable connection with the threaded section of the trip-rod 88, and these cones are fitted to the rod for their inclined faces to oppose each other, the lower cone 107 engaging with the trip-plate 92 to coact with the jam-nut 93 in confining the trip-plate to a fixed position on the rod 88. The cone-adjusters are cylindrical for portions of their length, so as to be concentric to the axis of the trip-rod 88, and the cone 107 is slidably fitted in

an opening of a horizontal guide-plate 109, through which the cone-adjuster is free to travel on the vertical movement of the trip-rod. The guide-plate 109 has a longitudinal slot 110, through which passes a clamping screw or bolt 111, which is attached to a bracket-arm 112, suitably fixed within the cabinet. The guide-plate 109 may be adjusted in a horizontal direction on the bracket-arm 112 to move the trip-plate 92 toward or from the pivot of the hinged trip, and this adjustment of the trip-plate is possible because the trip-rod 88 is loosely attached to the actuating-lever. When the adjustable plate is moved outwardly on the bracket-arm, the trip-plate 92 is adapted on the descent of the trip-rod to remain in engagement with the hinged trip for quite a period of time, so as to maintain the valve 27 open for a large quantity of water to pass to the generators; but a reversal in the adjustment of the guide-plate 109 moves the rod 88 to a position where the trip-plate will engage with the hinged trip for a shorter period of time, thus allowing the valve to remain open for a short period only and permit a smaller volume of water to pass to the generator. The adjustment of the trip-plate may be effected vertically on the trip-rod by proper manipulation of the adjusting-cones and the jam-nut to bring the trip-plate in engagement with the hinged trip after the bell shall have descended a certain distance.

When the actuating-lever 84 is depressed by the bell, it draws the trip-rod 88 in a downward direction and the adjusting-cone 107 slides through the opening in the guide-plate 109. Before the cone 107 passes through the guide-plate a distance sufficient to bring its conical upper end in the opening of the guide-plate the trip 92 engages with the hinged trip on the valve-lever to open the valve, and on the continued descent of the rod 88 the conical end of the cone 107 passes through the opening in the guide-plate 109, whereby the plate ceases to maintain the trip-rod in a position for the plate 92 to remain in engagement with the hinged trip. At this period the trip-rod is free to move laterally a limited distance for the trip-plate 92 to clear the hinged trip, and thereby free the valve-lever, and the rod and the trip 92 do not actuate to hold the valve open on the continued downward movement of the rod 88 and the lever 84. The automatic valve is open for a period sufficient for the water to escape from the reservoir-tube 102, and the pressure of the water on the valve-head, in connection with the weight of the valve-stem, effects the closing of the valve to cut off the continued flow of water after the trip-plate 92 clears the hinged trip on the valve-lever. On the upward movement of the trip-rod 88 by the lifting action of the spring on the lever 84 the cone 107 passes through the plate 109 to direct the rod 88 in a vertical path; but the trip-plate does not actuate the valve because the hinged trip 94 yields or gives to the upward movement of said plate 92.

When an apparatus of large capacity is installed in a building, I provide an auxiliary reservoir or gasometer-tank 113, which is operatively connected with the service-pipe of the gasometer 38 within the cabinet for the purpose of receiving the gas which may overflow therefrom, and thus provide two gasometers adapted to safely store a large volume of gas. The gasometer-tank 113 rests upon a suitable base 114, and within said tank is a floatable inverted bell 115, having a weight-receiving tube 116, which is adapted to play in a suitable guide on the head of the tank 113. The two gasometers 38 113 are operatively connected together by a connecting-pipe 118, which is furnished with a branch pipe 119, that extends vertically within the tank 113 for its upper end to lie above the water seal, within which is immersed the inverted bell 115. This upper extremity of the branch pipe has a valve-seat 120, against which is adapted to rest a valve-head 121, which is loosely fitted to the branch pipe 119 and is carried by a rod 122, firmly attached to the head of the floatable bell 115. From this auxiliary gasometer leads a service-pipe 123. The connecting-pipe 118 is provided with a trap 124, one leg of which communicates with said pipe 118, and this trap contains a seal 124 and is provided with a reservoir-chamber 126, to which is connected the vent-pipe 127. When the floatable bell 115 is filled with gas to its utmost capacity, the valve-stem 122 is drawn upwardly through the branch 119, so as to force the valve-head 121 against the valve-seat 120, and thereby arrest the continued ingress to the auxiliary gasometer. A continued generation of the gas, however, to a pressure sufficient to displace the seal 125 of the trap will force the seal into the reservoir-chamber and open the vent-pipe 127; but this contingency and the waste of gas may be obviated by properly regulating the volume of water which is admitted by the valve 27 to the generator.

In the practical embodiment of my apparatus I provide an audible-alarm mechanism to indicate the period when the gas-bell descends below the lowest limit of its travel in the active operation of the bell for the operation of the apparatus in the generation of the gas, so that the attendant will be notified of the exhaustion of the carbid in either of the generators, whereby the water-supply to the generator containing the exhausted carbid may be cut off and the other generator, with active carbid contained therein, may be brought into position for service.

In practicing the invention I employ a hanger 130, which is secured fast to the cabinet, preferably the top thereof, as shown by Figs. 1, 2, and 5, and in this hanger is supported a bell-lever 131, which is arranged in a horizontal position at right angles to the plane of the lever 84, which controls the

trip-rod 81. This bell-lever is fulcrumed at a point intermediate of its length at 132 in the hanger 130, and one end of said lever is contiguous to the bell 133, which is supported within the cabinet in a position for its striker 134 to be in active relation to the lever 131. The bell-lever carries a bell-trip 135, which is pivoted to the free end of the lever, and this lever and the trip are disposed in a plane at right angles to the valve-lever 103 and the trip 94 thereon. The bell-lever and the bell-trip, while occupying this right-angular position to the valve lever and trip, are also disposed in a horizontal plane below that of the valve lever and trip, and this bell-trip is normally free from contact with or engagement by the plate 92 on the trip-rod 88, which travels with the lever 82 and the tube of the gasometer-bell. This gasometer-bell actuates the trip-rod 88 for the plate 92 thereon to have a limited vertical play above the bell-trip 135 for the purpose of controlling the valve trip and lever to admit water at intervals to the generator so long as the carbid in the generator is in an active condition; but when the carbid becomes exhausted the continued admission of water to the generator, which is presumably in service, does not result in the formation of gas, in consequence of which the continued consumption of gas at the burners permits the gasometer-bell to descend below the lowest limit of its travel in the active condition of the bell. Under these circumstances the trip-rod 88 is drawn down to a position for its plate 92 to clear the valve-trip 96, and as the rod 88 and its plate 92 pass the trip 96 the plate 92 is brought into engagement with the bell-trip 135 to actuate the lever for the operation of the bell-striker, thereby giving an audible alarm to attract the attention of the attendant to the apparatus and advise him of the necessity for cutting the exhausted generator out of service and of opening the cock 29 or 30, which leads to the other generator. The water having been admitted to the generator containing the active carbid, the gas is produced by the water attacking the carbid, and the ingress of gas to the floatable bell results in the elevation thereof to restore the trip devices to their normal positions. On the ascent of the trip-rod its plate 92 impinges against the trips 135 and 96, which yield in an upward direction for the plate 92 to freely pass, and the parts having thus been restored to their normal working positions the operation of generating gas in proportion to the consumption at the burners is continued indefinitely.

I have represented another embodiment of my generator in Figs. 8 and 9 of the drawings, in which I provide means by which the generator cylinder or shell is kept at a low temperature by the circulation of the cooling medium around and in contact with the generator itself and the carbid vessel or cylinder within the generator is surrounded by a refuse-receiving cylinder that closely embraces the annular flanges of the carbid-cylinder to support the latter revolubly within the generator, admit of the access of water to the carbid-cylinder, and insure the removal of the refuse-cylinder from the generator with the carbid-cylinder in replenishing the latter with fresh or active carbid.

As represented by Figs. 9 and 10, the generator shell or cylinder 21 is surrounded by a circulating-jacket 137, which extends nearly the length of the generator and incloses that head of the generator to which the gas off-bearing pipe is attached, and this circulating-jacket is so arranged with relation to the generator as to leave its removable head 61 exposed beyond one end of the said jacket, whereby the head 61 may be detached previous to withdrawing the carbid-cylinder and the refuse-cylinder from the generator, and the revoluble spindle for the carbid-cylinder remains exposed for convenient access by the operator when it is desired to agitate the contents of the carbid-cylinder. This surrounding jacket 137 provides a circulating-space between the generator and said jacket, and to this circulating-space is supplied a cooling medium, which preferably consists of water. The water is conveyed to the jacketed generator by an ingress-pipe 139, which is shown as attached to the lower side of the jacket 137, and on the upper side of the jacket is connected a return-pipe 138, both of these pipes being operatively connected with the water-tank, as at 23, indicated by dotted lines in Fig. 9, whereby the water is supplied from the tank to the jacket for circulation around the cylinder and returned to the tank.

It will be understood by those skilled in the art that acetylene gas when it is produced by the decomposition of water and carbid generates considerable heat, and thus causes the cylindrical shell or casing 21 to become heated. The water surrounding the generator-casing has its temperature increased by contact with the casing 21, and thus the upper strata of water will rise through the pipe 138 into the tank. The cool water passes through the pipe 139 from the tank to the lower part of the jacket which surrounds the generator-casing 21, and thus the circulation of water around the generator is established and maintained in order to keep the generator at a comparatively low temperature.

In this embodiment of my invention I prefer to dispense with the absorbent packing or jacket 72 around the carbid-cylinder 64, which is shown by Figs. 4, 6, and 8, and in lieu of this absorbent jacket I employ a sediment-receiving shell 140, which surrounds the carbid-cylinder 64 to receive the calcium residue from the cylinder when it is rotated by the operating-spindle 77. This refuse-cylinder 140 is of imperforate sheet metal, and at its ends the cylinder has inwardly-extending flanges 141, which closely embrace the annular flanges 71 of the carbid-cylinder. The refuse-cylinder 140 is provided in its upper side with a lon-

gitudinal slot 142, and in adjusting the carbid-cylinder and the surrounding refuse-cylinder within the generator the precaution is taken to have the slot 142 in the refuse-chamber in the plane of the branch water-pipe 31, the ends of said pipe 31 being extended at $31^a$ into the generator. It is necessary that the carbid-chamber and its surrounding refuse-cylinder be slid horizontally into the generator for the extended ends $31^a$ of the water-pipe to be received within the slot 142 of the refuse-chamber, and after the pipes have been properly positioned within the generator the head 61 is replaced on the generator for the spindle 77 to engage with the longitudinal rod of the carbid-cylinder. The refuse-cylinder being engaged with the extended ends of the water-inlet pipe, the carbid-cylinder may be rotated by the spindle 77 for the purpose of agitating the carbid therein to discharge the spent residue into the refuse-cylinder, and said cylinder is held in a state of rest in the generator, because the ends $31^a$ in the water-pipe engage with the slotted cylinder 140 to restrain it against rotation with the carbid-cylinder. The refuse-cylinder is thus adapted to contain the carbid residue, which may be discharged from the carbid-cylinder, and this refuse-cylinder serves to support the carbid-cylinder revolubly within the generator and is removable, with said carbid-cylinder, from the generator when it is desired to renew the charge of carbid within the cylinder 64.

Although I have shown and described the carbid cylinder or vessel as constructed of sheet metal perforated throughout its length, I do not confine myself to this particular material, because it is evident that a wire fabric, screen, or other foraminous material may be used in the construction of the carbid-generator.

It is thought that the operation and advantages of my invention will be readily understood and appreciated from the foregoing description, taken in connection with the drawings.

It will be observed that the auxiliary gasometer embodies the essential features of the primary gasometer 38 within the cabinet, except as to the automatic valve mechanism, which is closed when the floatable bell is raised to its highest limit.

Changes may be made in the form and proportion of some of the parts while their essential features are retained and the spirit of the invention embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

Any suitable means may be adapted for regulating the level of water in the gasometer, filling and drawing off the seal, and cleaning the purifier-chamber. As shown by Fig. 2, the tank 38 of the gasometer is provided with a screw-cap 142 at the level of the liquid seal therein, a filling-nozzle 143 for readily introducing water to form the seal, and a drain-cock 144 to draw off the seal. The purifier 36 is also provided with a clean-out hole 145, which normally is closed by a cover, so that the sediment in the lower part may be removed from time to time.

What I claim is—

1. In an acetylene-gas apparatus, a generator comprising a closed casing or shell, a horizontal carbid-receptacle revolubly supported within said casing and withdrawable therefrom by an endwise adjustment through one end of the casing, and an absorbent filtering-jacket surrounding the carbid-receptacle and removable therewith from the casing or shell, in combination with means for rotating the carbid-receptacle within the generator-casing, and means for supplying water to the generator-casing for saturating the absorbent jacket of the carbid-receptacle, substantially as described.

2. In an acetylene-gas apparatus, a generator comprising a closed shell or casing, a perforated carbid-receptacle revolubly supported within said casing and removable therefrom by an endwise adjustment, and an absorbent filtering-jacket attached to and surrounding said perforated receptacle and removable therewith from the generator-casing, in combination with means for supplying water to the upper part of the generator-casing for saturating the absorbent filtering-jacket of the carbid-receptacle, a gas-outlet pipe connected to the closed casing and disconnected from the revoluble carbid-receptacle therein, and means mounted on the closed casing and connected detachably to the carbid-receptacle for rotating the latter, substantially as described.

3. In an acetylene-gas apparatus, a generator comprising a closed shell or casing, a perforated carbid-cylinder supported revolubly within said casing and removable therefrom by an endwise adjustment, an absorbent jacket surrounding the carbid-cylinder and removable therewith from the shell or casing, and a perforated gas-tube supported centrally within the carbid-receptacle and removable therewith from a casing, in combination with a gas-pipe connected with the casing substantially in alinement with the gas-tube of the carbid-receptacle and arranged to receive the gas therefrom, a filtering medium between the gas-pipe and the perforated tube of the carbid-receptacle, and means for supplying water to the casing, substantially as described.

4. In an acetylene-gas apparatus, a generator comprising a shell or casing, a perforated carbid-receptacle supported revolubly therein, an absorbent filtering-jacket surrounding said perforated receptacle, a water-pipe connected to the generator at a point intermediate the length of said absorbent jacket and adapted to drop the water directly thereon for saturating the same, an actuating device connected to the receptacle to rotate the lat-

ter, and a gas-outlet pipe connected to the generator at one end of the carbid-receptacle, said water and gas pipes being disconnected from the carbid-receptacle, substantially as described.

5. In an acetylene-gas apparatus, a generator comprising a horizontal shell or casing, a gas-pipe coupled to one end thereof, a carbid-receptacle provided with a spacing-flange and fitted in said casing for its flange to abut against the head to which the gas-pipe is coupled, and means for supplying water to said casing, substantially as described.

6. In an acetylene-gas apparatus, a generator provided with a perforated carbid vessel having a spacing-flange at one end, an absorbent filtering-jacket surrounding said vessel, and a perforated gas-tube arranged longitudinally within said vessel and extending to the spacing-flange thereof, in combination with a gas-pipe coupled to the vessel opposite to the spacing-flange, a filtering medium between the gas-tube of the carbid vessel and said gas-pipe, and a water-supply, substantially as described.

7. In an acetylene-gas apparatus, a generator having a perforated carbid-receptacle, an absorbent jacket surrounding the same, a perforated gas-tube within said receptacle, a follower mounted loosely on the tube and within said receptacle, and a spring acting against said follower, substantially as described.

8. In an acetylene-gas apparatus, a generator comprising a shell or casing, a perforated carbid-receptacle having a permanent head at one end, a packed gas-port in said permanent head of the carbid vessel, a central, perforated tube within said receptacle, a yieldable follower on said tube, and an absorbent jacket surrounding the perforated receptacle, substantially as described.

9. In an acetylene-gas apparatus, a generator comprising a shell or casing having a gas-outlet port at one end thereof, and a carbid-receptacle fitted removably within said casing and provided with an offstanding flange arranged to limit the adjustment of said receptacle in the casing toward the outlet in one end thereof, substantially as described.

10. In an acetylene-gas apparatus, a generator consisting of a shell, a carbid-cylinder provided with a perforated spacing-flange at one end and with a central gas-tube extending into said flange, said cylinder being revolubly supported within the shell, and a filtering-jacket attached to the carbid-cylinder, in combination with an actuator device mounted on the shell and coupled with the cylinder, a gas-pipe connected to the casing to receive the gas from the chamber thereof and from the perforated flange of the carbid vessel, and a water-inlet pipe, substantially as described.

11. In an acetylene-gas apparatus, a generator consisting of a shell or casing, a carbid-cylinder provided at its ends with the annular spacing-flanges which support said cylinder revolubly within said shell, an absorbent jacket united intimately with the cylinder between the flanges thereof and revoluble therewith within the casing, and an operating-spindle mounted in the casing and provided with means for connecting the same to the revoluble cylinder, substantially as described.

12. In an acetylene-gas apparatus, the combination of a floatable bell provided with an extended tube having a cap, a generator, a water-inlet valve to said generator, an actuating-lever having an eye to receive the capped tube of said bell, a spring to lift the lever, and a trip actuated by the lever and controlling the water-inlet valve, substantially as described.

13. In an acetylene-gas apparatus, the combination with a water-inlet valve, of a trip-rod carrying a trip-plate, a yieldable trip on the inlet-valve, and means for adjusting the trip-rod laterally with respect to the yieldable valve-trip, whereby the trip on said rod may be retracted from the path of said yieldable trip, substantially as described.

14. The combination with a water-inlet valve having a yieldable trip, of a reciprocating trip-rod carrying a fast trip, an adjuster movable with the trip-rod, and a guide within which the adjuster is free to travel, substantially as described.

15. In an acetylene-gas apparatus, the combination with a water-inlet valve having a yieldable trip, of a trip-rod carrying a trip which is fast therewith, an adjusting-cone carried by said trip-rod, and a guide within which the adjusting-cone is free to play with the trip-rod, substantially as described.

16. In an acetylene-gas apparatus, the combination with a generator water-valve having a yieldable trip, of a bell-controlled lever, a trip-rod loosely connected with said lever and carrying a trip adapted to impinge against the yieldable trip, and a guide device which permits lateral movement of the rod and its trip with respect to the yieldable valve-trip, substantially as described.

17. The combination with a generator water-valve, of a bell-controlled lever, a trip-rod connected with said lever and having a trip fast therewith to actuate said valve, an adjusting-cone fast with the trip-rod, and an adjustable guide-plate in which the adjusting-cone is fitted to travel, substantially as described.

18. An acetylene-gas apparatus consisting of a cabinet divided into a number of compartments, generators situated within the upper compartment, a purifier in the lower compartment, a gas-pipe between the generators and said purifier, a gasometer situated within the middle compartment and having a capped tube which is extended into the upper compartment, an actuating-lever arranged within the upper compartment and having an eye through which plays the capped

tube of the gasometer-bell, a trip-controlled valve having pipe connections with said generators, and a trip actuated by the lever and connected operatively with the valve that supplies the generators, substantially as described.

19. In an acetylene-gas apparatus, a gasometer comprising a closed tank containing a liquid seal, a floatable inverted bell housed within said tank, and a weight-receiving tube attached to the floatable bell and guided within the tank, substantially as described.

20. In an acetylene-gas apparatus, a gasometer comprising a tank, a floatable inverted bell having a guide, and an adjustable collar clamped to said guide and adapted to rest upon the tank to suspend the floatable bell therein, substantially as described.

21. In an acetylene-gas apparatus, the combination with a generator, of a floatable gas-bell having its tube or stem provided with a head, an actuating-lever having an eye through which the bell tube or stem is adapted to play, a water-valve, a trip-rod connected to the actuating-lever and carrying a trip arranged to actuate the water-valve, a spring connected to the lever to raise the latter and the trip-rod, and a source of water-supply connected with said valve, substantially as described.

22. In an acetylene-gas apparatus, the combination with a generator, valved water-inlet devices thereto, and a trip mechanism, of an audible-signal mechanism embracing a trip which is disposed out of the path of the valved water-inlet device and lies below the trip devices which control the same, whereby the alarm-trip is operated by the valve-trip when the latter assumes an abnormal position, substantially as described.

23. In an acetylene-gas apparatus, the combination with a generator, a valved water-inlet thereto, and a trip-rod which controls the valved water-inlet, of an alarm mechanism having a trip disposed out of the path and below the normal working positions of the valve-trip and lying in the path of the trip-rod to be actuated thereby when it assumes an abnormal position relatively to the valve-trip, substantially as described.

24. In an acetylene-gas apparatus, the combination with a generator, means for admitting water thereto, a trip for the water-inlet device, and a rod which controls said trip, of an alarm mechanism embracing an operating-lever, and a trip on said operating-lever below the plane of the valve-trip and in the path of the trip-rod to be actuated thereby when it descends below the normal working position thereof, substantially as described.

25. In an acetylene-gas apparatus, a generator having a circulating-jacket which surrounds its shell at one end thereof and provided with a removable head at the exposed end of said generator, combined with circulating-pipes connected with the jacket, and means for supplying a cooling medium to the pipes and jacket, substantially as described.

26. In an acetylene-gas apparatus, a generator comprising a casing, a removable carbid-cylinder, a sediment-jacket provided with a longitudinal slot and interposed between the carbid-receptacle and the generator-casing, and a water-pipe passing through the generator-casing and the slot of the sediment-jacket, substantially as described.

27. In an acetylene-gas apparatus, a generator provided with a carbid-cylinder and a sediment-receiving jacket which surrounds the carbid-cylinder and is removable therewith from the generator, substantially as described.

28. In an acetylene-gas apparatus, a generator provided with a removable carbid-cylinder, a sediment-receptacle surrounding the carbid-cylinder and engaging therewith to support said cylinder revolubly within the sediment-cylinder and the generator, substantially as described.

29. In an acetylene-gas apparatus, a generator provided with a water-inlet pipe, a sediment-cylinder within the generator and engaging with the water-inlet pipe to be restrained thereby against rotation within the generator, and a revoluble carbid-cylinder supported within the sediment-cylinder, substantially as described.

30. In an acetylene-gas apparatus, a generator, a slotted imperforate sediment-cylinder fitted removably within said generator, means engaging with the sediment-cylinder to restrain the latter against rotation within the generator, means for admitting water through the slot in the sediment-cylinder, and a carbid-cylinder supported revolubly within the sediment-cylinder in position to receive water from the feed device, substantially as described.

31. In an acetylene-gas apparatus, the combination with a generator and a water-pipe connected thereto, of a valved sediment-cylinder fitted within the generator and engaging with the water-inlet pipe, and a perforated carbid-cylinder provided with annular flanges which are engaged by the flanges of the sediment-cylinder, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN RUTHVEN.

Witnesses:
A. SCHUCK,
EMIL JABUSCH.