

No. 642,003.

Patented Jan. 23, 1900.

R. REID.

ACETYLENE GAS GENERATOR.

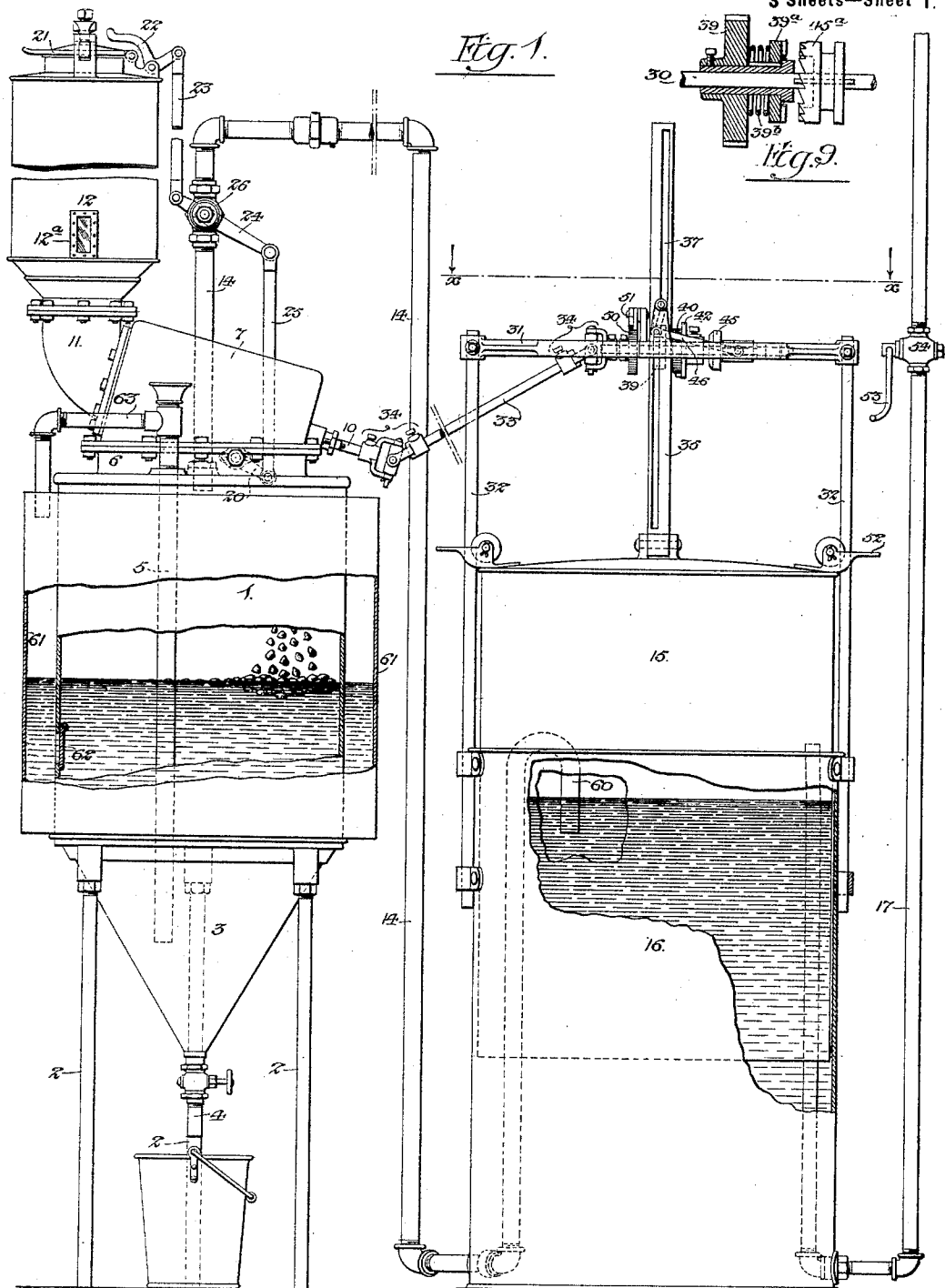
(Application filed Aug. 6, 1898.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

Fig. 2.



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3 Sheets—Sheet 2.

Fig. 2.

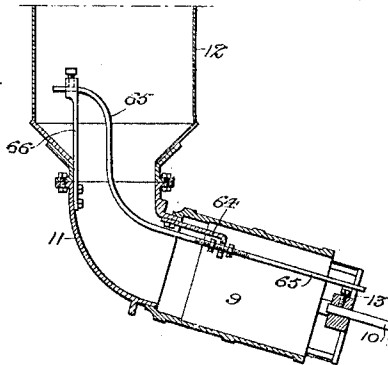


Fig. 10.

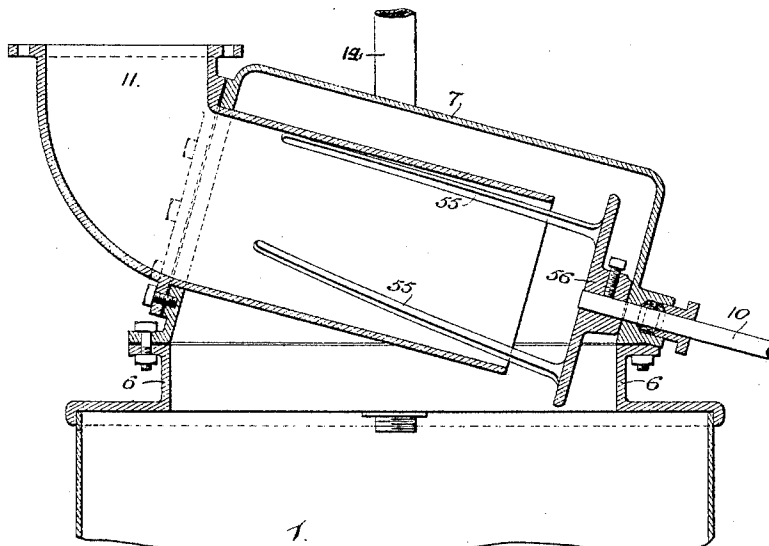
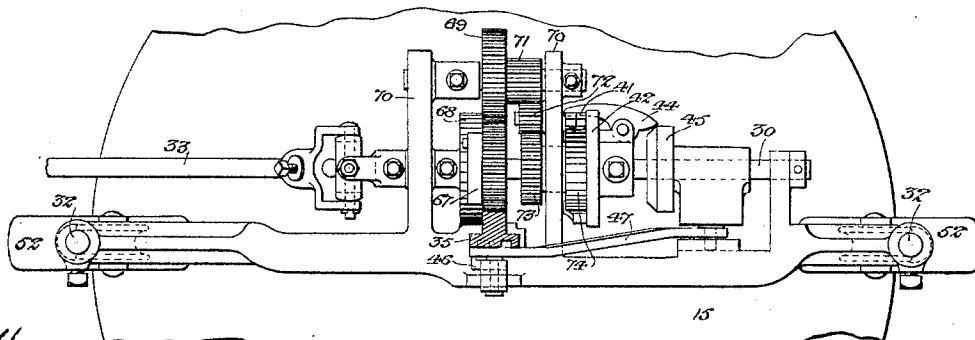


Fig. 11.



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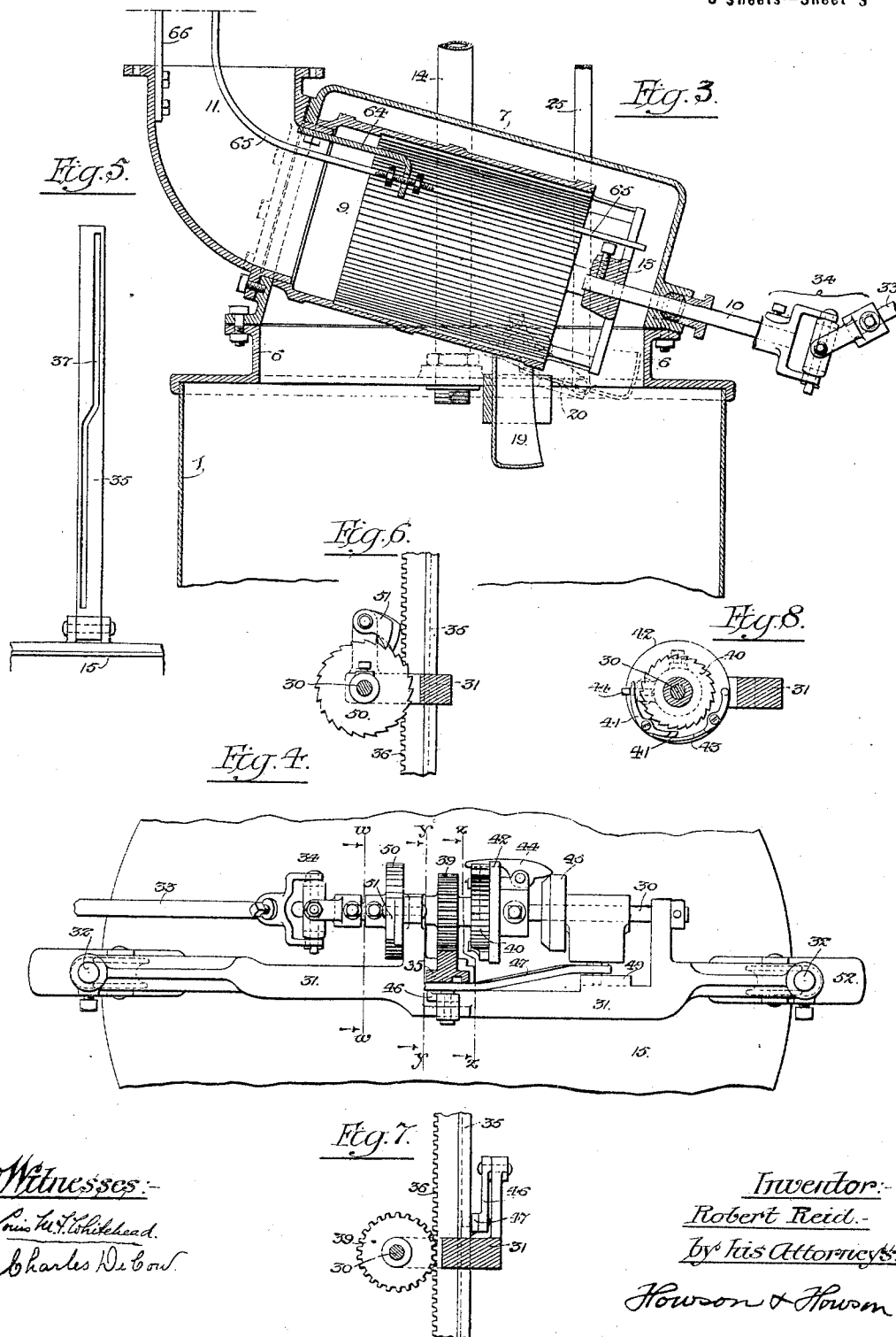
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(No Model.)

3 Sheets—Sheet 3



Witnesses:-

Louis H. Whitehead.

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UNITED STATES PATENT OFFICE.

ROBERT REID, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO JOHN CONDON, OF SAME PLACE.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 642,003, dated January 23, 1900.

Application filed August 6, 1898. Serial No. 687,885. (No model.)

To all whom it may concern:

Be it known that I, ROBERT REID, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Acetylene-Gas-Generating Apparatus, of which the following is a specification.

My invention consists of certain improvements in that class of acetylene-gas apparatus in which the calcium carbide is delivered in graduated volume into a supply of water, so as to be decomposed by contact therewith, and thus generate the gas, one object of my present invention being to provide a feeding device which will not become obstructed and which is capable of feeding carbide whether the same is in the form of powder or comparatively large lumps, a further object being to stop the feeding of carbide into the water when the desired amount of gas has been generated or when at any other time it becomes advisable that such feed should be cut off, another object being to prevent the feeding of carbide into the water or the backflow of gas from the holder when the cover of the carbide-holder is opened for the purpose of replenishing the same or for any other reason, another object being to prevent the heating of the generator, and a final object being to prevent the flow of particles of carbide into the pipe which conveys the gas from the holder. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of acetylene-gas apparatus constructed in accordance with my invention, showing some of the parts broken away to illustrate internal construction. Fig. 2 is a sectional view of the carbide-feeder. Fig. 3 is an enlarged longitudinal section of the upper portion of the generator with the feeding device and its accessories. Fig. 4 is a sectional plan or top view, on an enlarged scale, on the line *x x*, Fig. 1. Fig. 5 is a front view of a cam-bar forming part of the apparatus. Fig. 6 is a transverse section on the line *w w*, Fig. 4. Fig. 7 is a transverse section on the line *y y*, Fig. 4. Fig. 8 is a transverse section on the line *z z*, Fig. 4. Figs. 9 and 10 are views illustrating modifications of the invention, and Fig. 11 is a view illustrating

a special construction of operating mechanism for the carbide-feeder.

The water vessel constituting part of the generator is represented at 1 in Fig. 1, this water vessel being mounted upon suitable legs or feet 2 and having a conical bottom 3, with valved delivery-pipe through which the waste water and spent lime can be discharged into a pail or other receptacle placed beneath the same, a valved pipe 5 extending down into the water vessel and serving as a means of refilling the same with water when desired.

The cover of the water vessel 1 has a flanged neck 6, upon which is mounted the casing 7 of an inclined feed-drum 9, which is secured at its lower end to a shaft 10, projecting through a stuffing-box on the casing 7. The open upper end of the drum 9 forms a ring which is free to turn upon the inwardly-projecting end of an elbow 11, which is bolted or otherwise suitably secured to the upper end of the casing 7 and carries the holder 12 for containing the supply of calcium carbide. This holder has a sight-glass 12^a in one side. The calcium carbide is usually in the form of lumps of varying sizes, which will pass freely down through the elbow 11 and into the upper end of the drum 9, assuming in the latter the natural angle of repose of material of this character. The drum is ribbed internally, as shown in Fig. 3, and has at its lower end an open frame or spider, through which the lumps of carbide can be delivered into the water vessel below when said carbide is caused to flow down through the drum. This flow of carbide is effected by rotating the drum, thereby subjecting the mass of carbide to agitation and causing it to flow or slide slowly down through the drum and to be discharged in small quantities either continuously or at intervals through the openings in the lower end of said drum, so as to maintain a practically constant generation of gas as long as the rotation of the drum is kept up, the gas escaping from the generator through a pipe 14 and entering the gas-holder 15, which consists of a cylinder closed at the top and having its open lower end submerged in the water in a tank 16 in the usual manner, the gas escaping from the holder through the service-pipe 17. It may sometimes happen that fine parti-

cles of carbid will be carried over with the gas from the generator to the gas-holder, and in order to prevent this fine carbid from escaping from the holder through the pipe 17 the top of the pipe 14 is bent so as to form a gooseneck 60, with its discharge end submerged in the water in the tank 16. Hence the fine carbid will be caught and held by the water as the gas rises through the latter from the submerged mouth of the said gooseneck.

The chemical change arising from the decomposition of the carbid frequently develops considerable heat in the generator, and in order to lessen the danger of accident from this cause the said generator is surrounded by a casing 61 of somewhat greater diameter, so as to form a water-jacket around the generator, the water in this jacket being free to flow into the generator through an inwardly-opening valve 62. The feed-pipe 5 has above the generator a branch 63, which discharges into the water-jacket. Hence if the pressure of gas in the upper portion of the generator is such as to force the water up in the pipe 5 said water will overflow into the jacket and when the pressure is reduced will flow back again into the generator through the valved opening 62.

In order to prevent choking of the carbid in the neck 11 of the feeding device, said neck has a bracket 64, which projects into the cylinder 9 and serves as the fulcrum for an agitator-rod 65, which extends up through the neck 11 and is bent at its upper end so as to pass through an opening in a post 66, projecting upwardly from the neck, as shown in Fig. 2. The rod is secured to the post by a set-screw. The lower end of the agitator-rod 65 projects into the path of the arms of the spider 13 at the lower end of the feed-cylinder 9. Hence as said cylinder rotates said projecting end of the rod is struck by the arms and being secured at the upper end and fulcrumed at an intermediate point is thereby subjected to lateral motion and when its lower end passes out of contact with the arm at once springs back to its normal condition, thus suddenly shaking or jarring any carbid which may be in contact with it in the neck 11, and thereby preventing the jamming of the carbid in said neck, so as to choke the same. On the rod 65, at each side of the bracket 64, are adjustable collars. By adjusting the rod and moving the collars the lower end of the rod 65 may be caused to project more or less past the arms of the spider 13, and the action of the latter upon the rod may be thus rendered more or less pronounced.

In order to provide for cutting off the supply of carbid to the generator whenever it may be advisable to do so, I mount in the neck 6 of the generator a dished or scoop-shaped valve 19, which is hung to trunnions adapted to suitable bearings at the opposite sides of said neck 6, one of said trunnions having an arm 20, whereby the valve may be readily manipulated by hand, so as to move

it from the inoperative position shown by full lines in Fig. 2 to the operative position shown by dotted lines in said figure. It is always advisable to move this valve to the position shown by dotted lines whenever the lid or cover 21 of the carbid-holder 12 is opened for the purpose of supplying fresh carbid. Hence the said lid or cover is adapted when swung back to act upon a lever 22, hung to the top of the carbid-holder and connected by means of a rod 23 to a lever 24, which in turn is connected by means of a rod 25 to the arm 20 of the valve 19, whereby whenever the lid 21 is thrown back in order to gain access to the interior of the carbid-holder the lever 22 will be so operated as to swing the valve 19 into the position shown by dotted lines in Fig. 3, and thus cut off the flow of carbid into the water in the generator. It is also advisable to cut off communication between the generator and the gas-holder whenever the cover of the carbid-holder is opened. Hence the lever 24 is secured to the spindle of a valve 26, located in the pipe 14, which affords communication between the generator and the gas-holder. Consequently when the cover 21 of the carbid-holder is opened the valve 26 will be closed, and there can be no outflow of gas from the holder during the filling of said holder.

The shaft 10 is rotated from a horizontal shaft 30, adapted to suitable bearings in projecting brackets on a cross-bar 31, mounted upon the upper ends of the standards 32, which guide the gas-holder in its vertical movement, the movement of said shaft 30 being transmitted to the shaft 10 through a shaft 33, which is connected to the shaft 10 and to the shaft 30 by means of gimbal-joints 34, in order to provide universally-swinging power-transmitting joints, such as are necessitated by the different angles of the shafts 10 and 30. Bevel-gears, a flexible shaft, or other equivalent means may, however, as will be evident, be substituted for this construction, if desired.

Hung to the movable gas-holder 15 is a bar 35, which is suitably guided in a bearing on the cross-bar 31 and has on one face a rack 36 and in the other face a cam-slot 37. (See Fig. 5.) The rack 36 engages with a spur-wheel 39, mounted so as to turn freely on the shaft 30, and secured to or formed in one piece with the ratchet-wheel 40, which is adapted to be engaged by pawls 41, hung to a disk 42, which is secured to said shaft 30, the pawls 41 being so constructed that when one of them is in engagement with a tooth of the ratchet-wheel the other will overlap about half-way an adjoining tooth, thus providing for fine graduations of movement without the necessity of forming excessively fine teeth upon the wheel 40.

The pawls 41 are normally held in engagement with the teeth of the ratchet-wheel 40 by means of a spring 43; but they can be pressed out of engagement with said teeth, as

shown in Fig. 8, by the action of a lever 44, which is hung to the hub of the disk 42 and projects through a slot in the same, so as to overhang the tails of the pawls 41. Hence
 5 when said lever 44 is acted upon by a cone 45, which is free to slide on the shaft 30, the end of the lever which overlaps the tails of the pawls 41 will be moved inward and said pawls will be lifted out of engagement with the teeth
 10 of the ratchet-wheel 40; but when said cone 45 is retracted the pawls 41, under the influence of the spring 43, will again engage with the teeth of said ratchet-wheel 40. The movement of the cones 45 is effected by the cam-
 15 slot 37 of the bar 35, said cam-slot acting upon a pin projecting from a crank-lever 46, which is hung to a bracket on the cross-bar 31, said lever also being connected to one end of a rod 47, the other end of which is connected to a
 20 pin projecting from the hub of the cone 45 and sliding in suitable guides 49 on said cross-bar 31. The teeth of the ratchet-wheel 40 are so formed that they will engage with the pawls 41 and move the disk 42 when the gas-holder
 25 15 falls, but will slip under the pawls 41 when the gas-holder rises. There can, therefore, be no movement of the shafts 10 and 30, and consequently no operation of the carbid-feeding drum 9, except that due to a falling movement
 30 of the gas-holder.

When the holder contains its normal amount of gas, the pin of the lever 45 occupies a position in the upper portion of the slot 37—that is to say, a position above the angular
 35 offset or bend in said slot—and the cone 45 is consequently retracted, so as to permit the pawls 41 to engage with the ratchet-wheel 40, and thereby impart movement to the carbid-feeding drum whenever the gas-holder falls
 40 by reason of the consumption of gas being in excess of the generation of it. If, however, gas should be generated in such volume as to raise the gas-holder, so that the pin of the lever 46 will be acted upon by the inclined portion
 45 of the slot 37, the cone 45 will be drawn forward beneath the lever 44, and the latter will be operated so as to press upon the tails of the pawls 41, and thereby lift the same out of engagement with the ratchet-wheel 40 and
 50 prevent any further operation of the carbid-feeding mechanism until the amount of gas in the holder has been reduced to its normal volume and the holder has descended to such an extent as to bring the pin of the lever 46
 55 again into the upper portion of the slot 37. Secured to the shaft 30 is another ratchet-wheel 50, having teeth facing in the opposite direction from those of the ratchet-wheel 40, and with these teeth engage pawls 51, hung
 60 to a bracket on the cross-bar 31, as shown in Figs. 4 and 6, these pawls being, so far as regards their relation to the teeth of the ratchet-wheel 50, similar to the pawls 41 in respect to the ratchet-wheel 40.

65 In place of the means which I have described for clutching the shaft to and releasing it from the ratchet-wheel 40 other means

may be used, if desired, without departing from the essential features of my invention. For instance, in Fig. 9 I have shown an ordi-
 70 nary toothed clutch 45^a splined upon the shaft 30, said clutch being moved into and out of engagement with a similar clutch 39^a on the back of the spur-wheel 39 by a connection similar to that which operates the
 75 cone 45, a spring 39^b being interposed between the clutch 39^a and spur-wheel 39, so as to permit the clutches 39^a and 45^a to separate when the spur-wheel 39 is turned forwardly by a rising movement of the gas-holder. 80

If in spite of the precautions which I have adopted there should be at any time such an excessive generation of gas as to demand an examination of the generator by the attendant, a projecting lug 52 on the movable gas-
 85 holder will strike an arm 53, projecting from the stem of a valve 54 in the service-pipe 17, and will operate said valve so as to cut off the flow of gas through the service-pipe, and thus extinguish the lights supplied by the
 90 apparatus, thereby forcibly calling attention to the defective working of the apparatus and compelling a correction of the abnormal conditions of working to which the excessive generation of gas was due. 95

While I prefer in all cases to use the rotating feed-drum 9, this construction may, if desired, be departed from within the scope of my invention. For instance, in Fig. 10 I have
 100 shown a modification in which the drum 9^a is stationary and the feeding of the carbid is effected by means of fingers 55, projecting into the drum from a disk 56, which is connected to the shaft 10, the fingers being
 105 slightly inclined or spiraled, so as to aid in feeding the carbid forward through the drum, and the said drum may in either of the constructions described be horizontal instead of inclined, if desired, although I consider that
 110 the best results are attained by the use of the inclined drum. In either case the carbid is loose and unconfined, and hence the feed-drum is not likely to be obstructed or rendered inoperative.

In order to increase the capacity of the ap-
 115 paratus, I may provide for a rotation of the feeding device and consequent feeding of the carbid into the generator during both the falling and rising movements of the gas-holder, only stopping the feed when said holder
 120 reaches a predetermined point in its rising movement. In such case the gearing shown in Fig. 11 may be used, the spur-wheel 39 having a pawl or pawls 67, with which en-
 125 gages a ratchet-wheel 68, secured to the shaft 30, so that said shaft will be turned on the downward movement of the rack 35, the pawl or pawls slipping over the teeth of the ratchet-wheel on the upward movement of said rack.

The spur-wheel 39 meshes with a spur-
 130 wheel 69, turning loosely on a shaft secured to brackets 70, projecting from the bar 31, and said wheel 69 has secured to it a pinion 71, which meshes with a pinion 72, hung to

a stud on one of the brackets 70 and meshing with a spur-wheel 73, turning loosely on the shaft 30. Secured to said spur-wheel 73 is a ratchet-wheel 74, having teeth facing in a direction the reverse of those of the ratchet-wheel 68 and engaging with the pawl or pawls 41, carried by the disk 42 and controlled by a lever 44 in the same manner as before. On the fall of the rack movement is imparted to the shaft 30 directly by engagement of the pawl or pawls 67 with the ratchet-wheel 68, the ratchet-wheel 74 turning in the reverse direction and slipping under the pawl or pawls 41. On the upward movement of the rack the pawl 67 slips over the teeth of the ratchet-wheel 68, and the teeth of the ratchet-wheel 74 engage with the pawl or pawls 41 and impart movement to the disk 42 and thence to the shaft 30.

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

1. In acetylene-gas apparatus, the combination of a generator having a closed chamber at the upper end, a carbid-feeder contained in said closed chamber, and having as an element a drum open at the lower end, means for delivering carbid to said drum, and a shaft connected to the lower end of the feeder and projecting through the casing at the upper end of the generator, substantially as specified.

2. In acetylene-gas apparatus, the combination of a generator having a closed chamber, and consisting of a drum open at both ends and free to rotate in said chamber, means for delivering carbid to said drum, and a shaft connected to the open discharge end of the drum, and projecting through the casing at the upper end of the generator, substantially as specified.

3. In acetylene-gas apparatus, the combination of a generator having a closed chamber at the upper end, a carbid-feeder contained in said chamber and consisting of a drum having a free passage through the same for the carbid, in combination with means for stirring up the unconfined mass of carbid as it passes through the drum, substantially as specified.

4. The combination in acetylene-gas apparatus, of a generator having a carbid-feeder consisting of a drum mounted so as to rotate on an axis inclined in respect to the horizontal, said drum having internal ribs and being adapted to discharge at the lower end, with means for rotating said drum, substantially as specified.

5. The combination in acetylene-gas apparatus, of a generator having a carbid-feeder consisting of a drum mounted on an axis inclined in respect to the horizontal and adapted to discharge at its lower end, provision for stirring up the carbid as it flows through said drum, a movable gas-holder in communication with the generator, and means whereby the

stirring up of the carbid in the drum is effected by said movable gas-holder, substantially as specified.

6. The combination in acetylene-gas apparatus, of a gas-generator having a carbid-feeder consisting of a drum mounted on an axis inclined in respect to the horizontal, an inclined feeder-shaft, a gas-holder, a horizontal shaft having a driving connection with said holder, and an intermediate power-transmitting shaft having universal-joint connections with said horizontal and inclined shafts, substantially as specified.

7. The combination in acetylene-gas apparatus, of a generator having a carbid-feeder, a shaft for operating the latter, a movable gas-holder, and mechanism whereby said shaft can be turned on the movement of the gas-holder, said mechanism including a clutch on the shaft, and a cam-bar moving with the gas-holder and controlling said clutch, substantially as specified.

8. The combination in acetylene-gas apparatus, of a generator, a carbid-feeder, a shaft whereby said feeder is operated, a movable gas-holder, and mechanism whereby said shaft can be turned on the movement of the gas-holder, said mechanism having as elements a clutch on the shaft, a cam-bar moving with the gas-holder, a swinging lever acted on by said cam-bar and a connection between said lever and the clutch, substantially as specified.

9. The combination in acetylene-gas apparatus, of a generator, a carbid-feeder, a shaft whereby said feeder is operated, a movable gas-holder, and mechanism whereby said shaft is operated on the movement of said holder, said mechanism having as elements a clutch on the shaft, a clutch-shifter, and means whereby said clutch-shifter is operated so as to release the clutch when the gas-holder reaches a predetermined point of movement, substantially as specified.

10. The combination in acetylene-gas apparatus, of a generator, a carbid-feeder, a shaft for operating the latter, a movable gas-holder, a ratchet-wheel loose on the shaft, means for operating said ratchet-wheel by the movement of the gas-holder, a disk secured to the shaft and having a pawl engaging with said ratchet-wheel, a lever for tripping said pawl, a cone for operating said lever, and means for effecting the movement of said cone when the gas-holder reaches a predetermined point in its movement, substantially as specified.

11. The combination in acetylene-gas apparatus, of a generator, a carbid-feeder, a shaft for operating the same, a movable gas-holder, a ratchet-wheel loose on said shaft, means for operating said ratchet-wheel by the movement of the gas-holder, a disk secured to the shaft and carrying a pawl which engages with said ratchet-wheel, a lever for tripping said pawl, a cone for acting on said lever, a cam-bar movable with the gas-holder and means

whereby said cam-bar is caused to effect movement of said cone, substantially as specified.

12. The combination in acetylene-gas apparatus, of a generator having a carbid-feeder consisting of an open drum through which the carbid is loosely fed, a casing for said drum, a carbid-holder having an elbow projecting into said casing and forming a bearing for one end of the drum, a shaft connected to the other end of the drum, and means for rotating said shaft, substantially as specified.

13. The combination in an acetylene-gas apparatus of the generator having a surrounding water-jacket, and an inwardly-opening valve through which the water from said jacket can flow into the generator, substantially as specified.

14. The combination in an acetylene-gas apparatus, of a generator having a rotating feed-drum, a carbid-holder having a neck through which the carbid passes into said drum, a rod contained in said neck and projecting into the path of a portion of the feed-drum so as to be struck and moved thereby as the drum rotates, substantially as specified.

15. The combination in an acetylene-gas ap-

paratus, of a generator having a rotating feed-drum, the carbid-holder having a neck through which the carbid passes into said drum, and a rod passing through said neck, said rod being hung to a fixed fulcrum and connected at its upper end to a support in the neck, and projecting at its lower end into the path of a rotating portion of the feed-drum, substantially as specified.

16. The combination in an acetylene-gas apparatus, of a generator having a feeding device adapted to be rotated, a gas-holder, a shaft connected to the feeding device, a rack, pinions and clutches whereby said shaft will be rotated in the same direction both by the rise and fall of the gas-holder, and means for throwing said rotating device out of operation when the gas-holder rises to a predetermined point, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT REID.

Witnesses:

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JOS. H. KLEIN.