N. GOODYEAR.

GAS GENERATOR.

APPLICATION FILED OCT. 24, 1906.

931,293.

Patented Aug. 17, 1909.

3 SHEETS—SHEET 1.

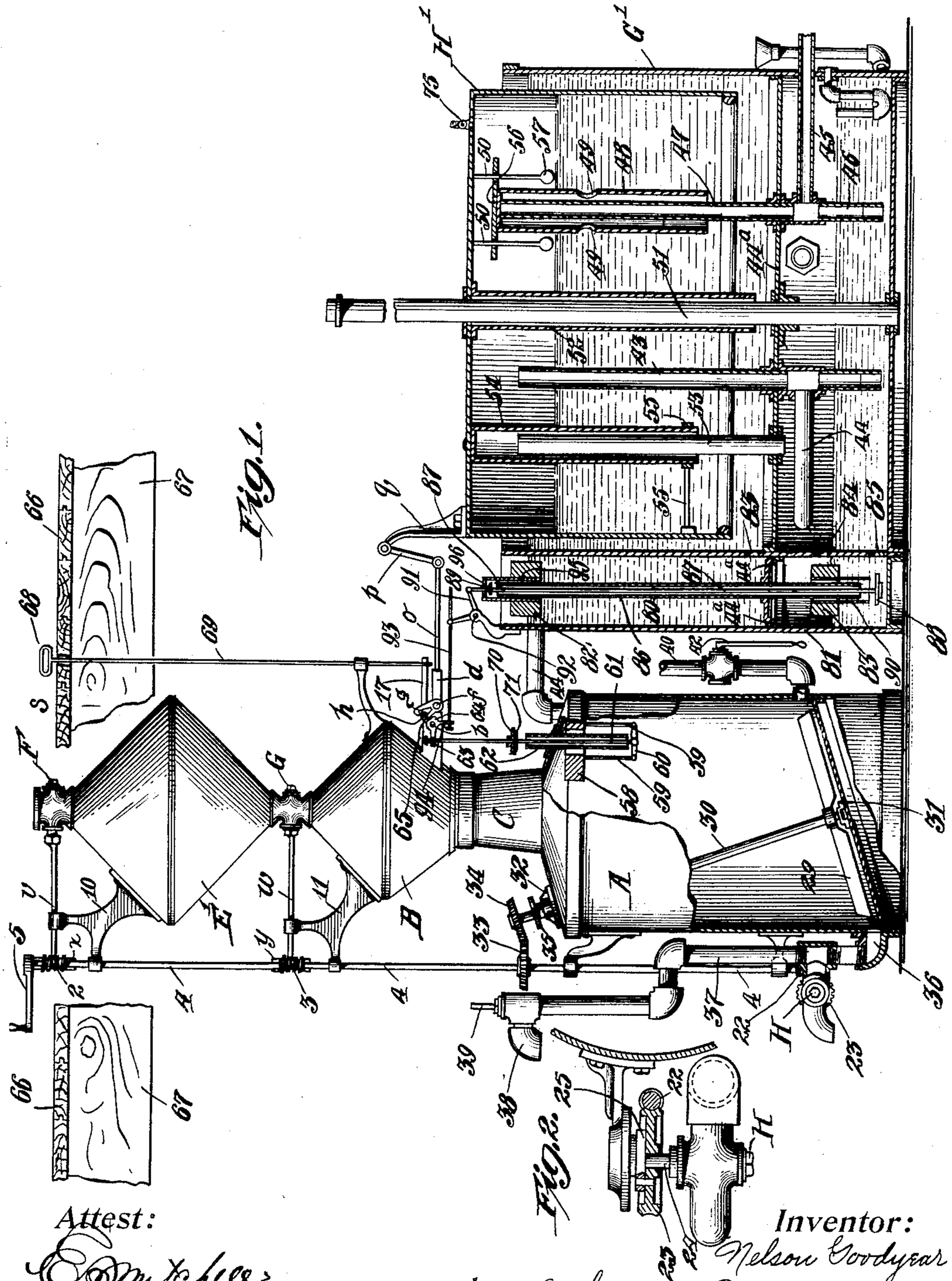

Fig. 1.

Fig. 2.

Attest:

E. D. Mitchell

A. L. O'Brien

Inventor:

Nelson Goodyear

by Dickerson, Brown,

Raegener & Binney Attys.

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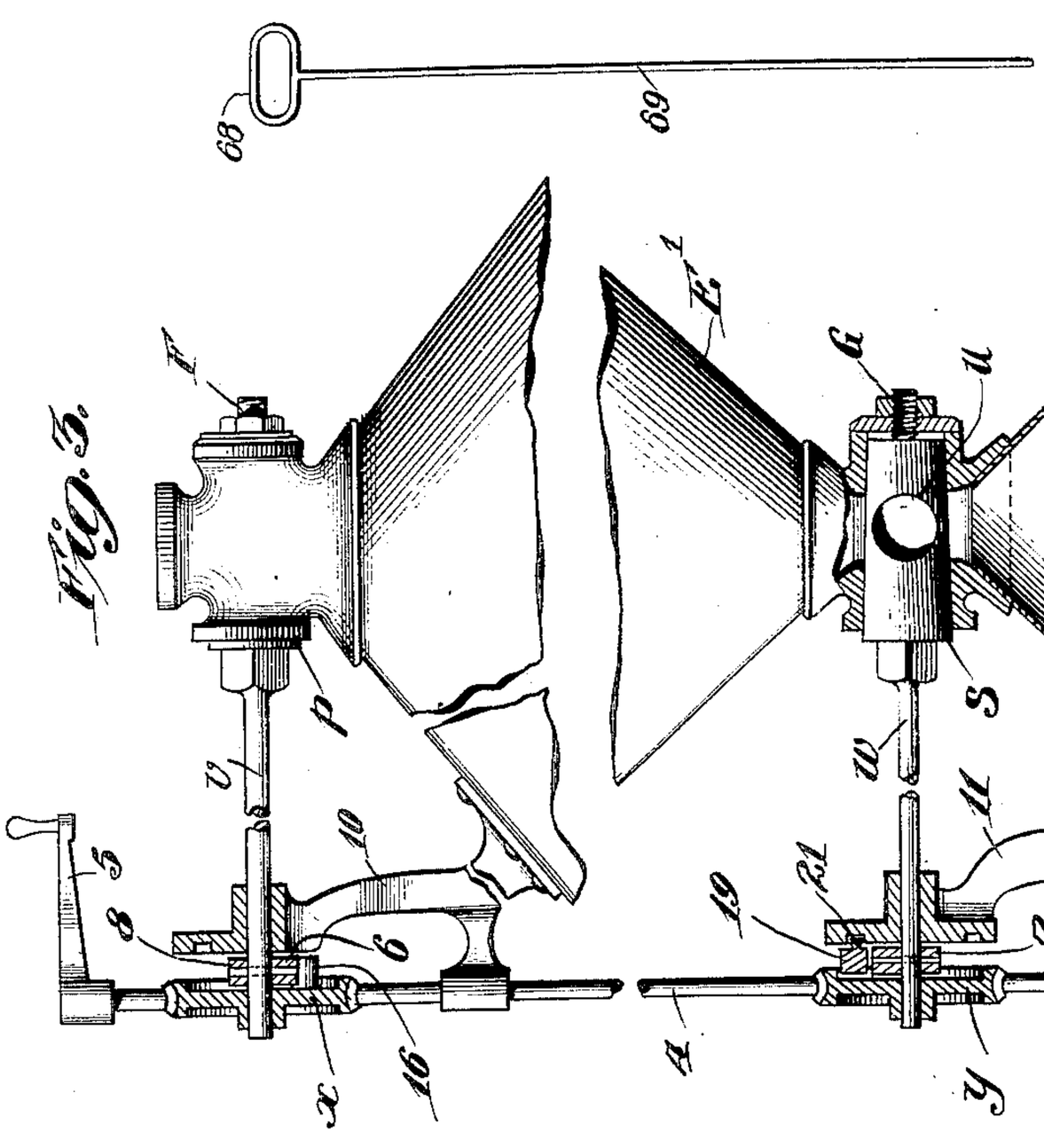


Fig. 5.

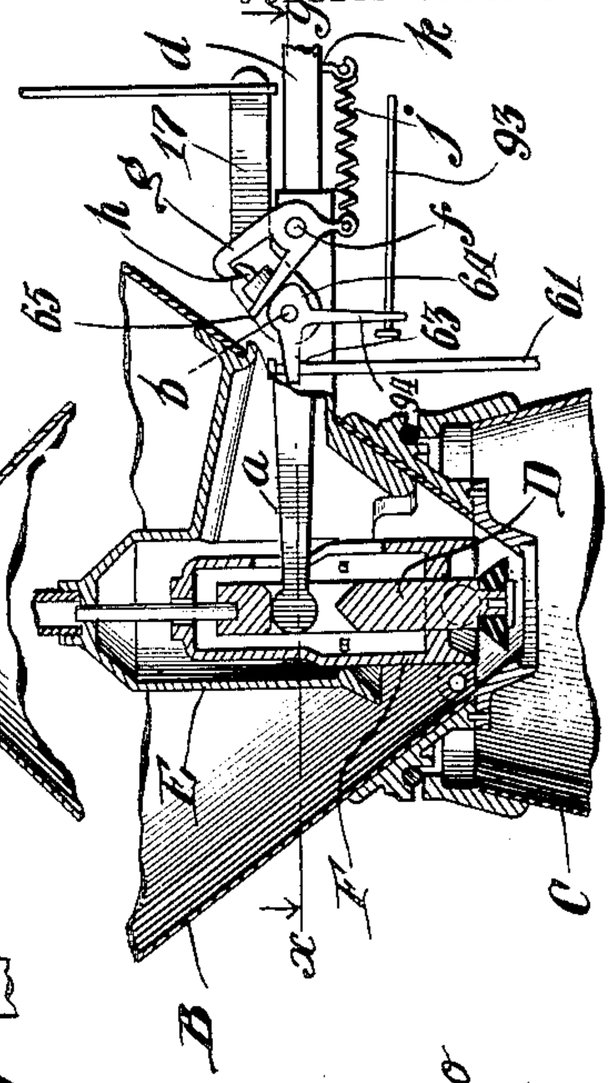


Fig. 6.

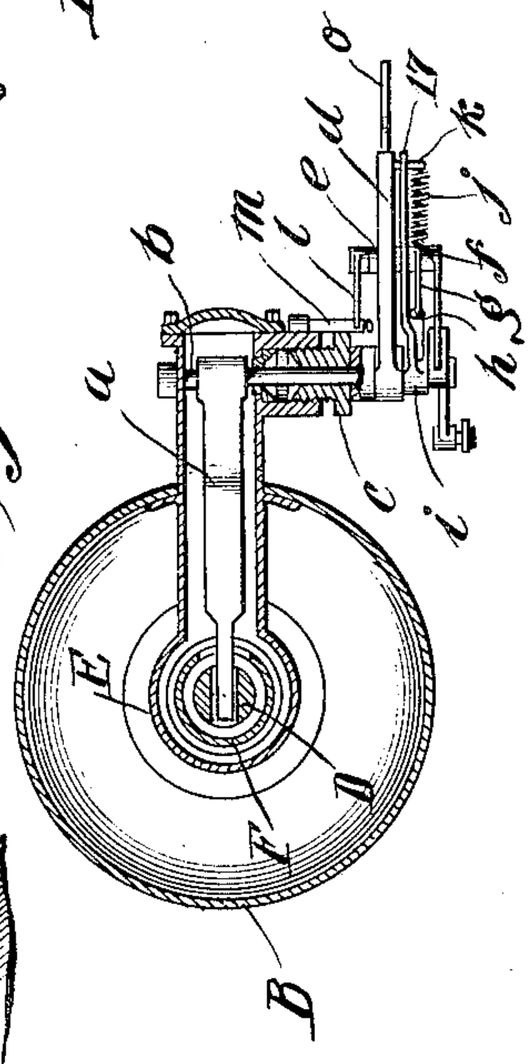


Fig. 4.

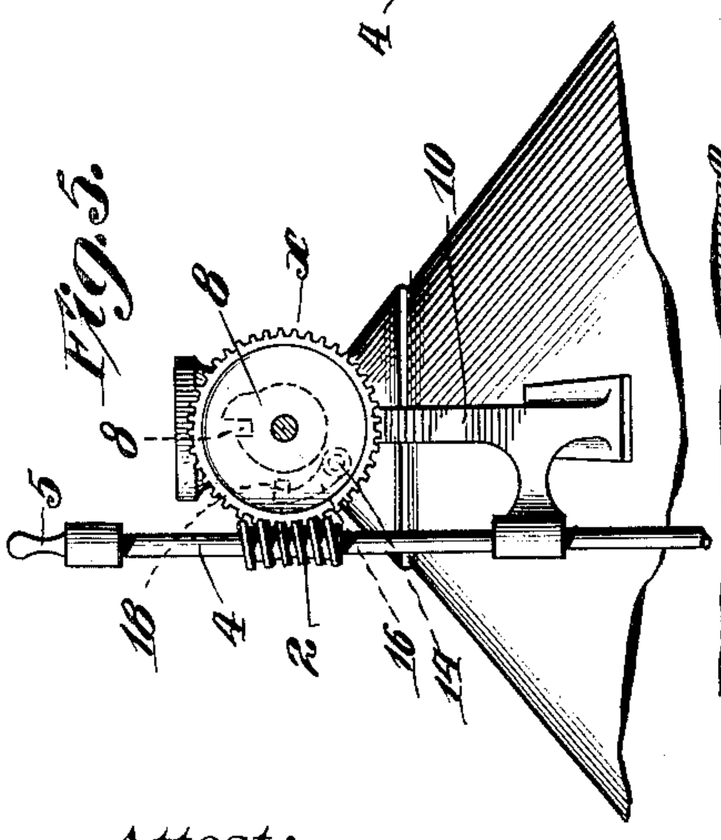
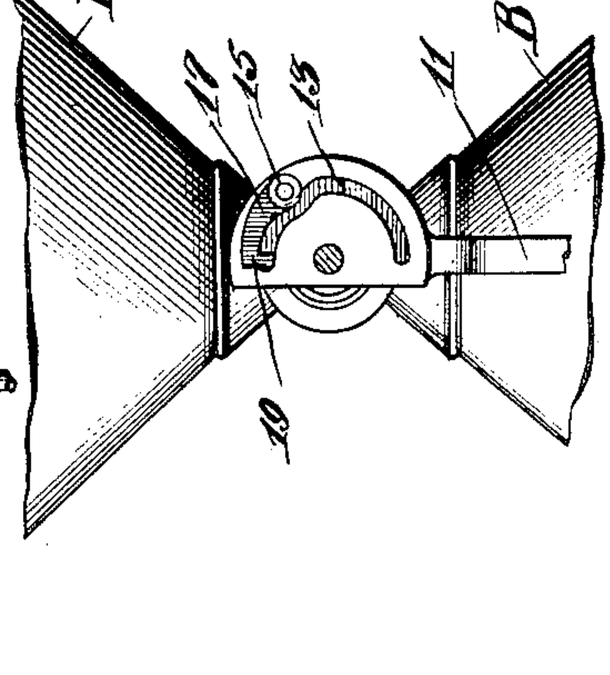


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 8.

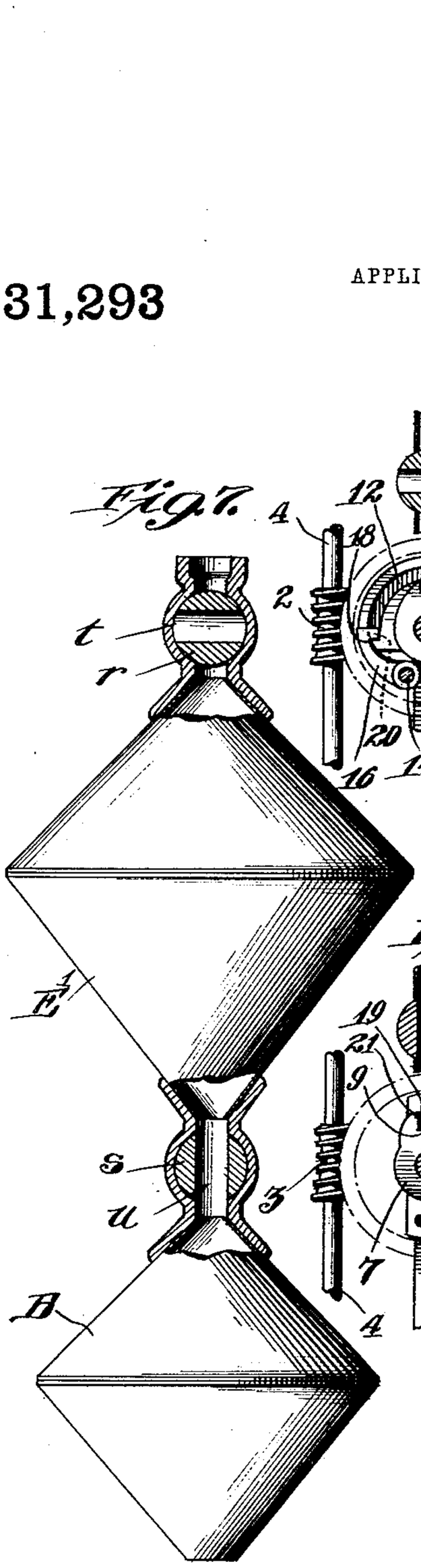


Fig. 10.

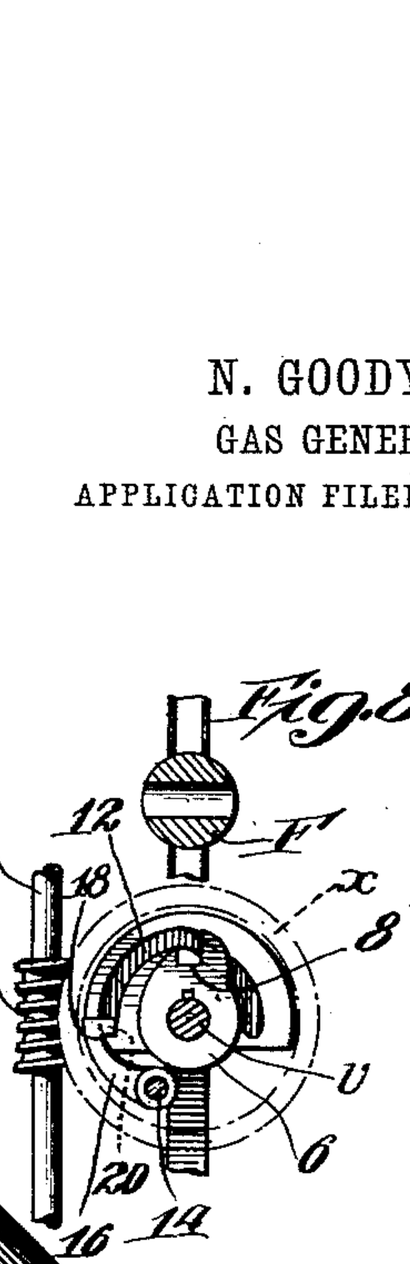
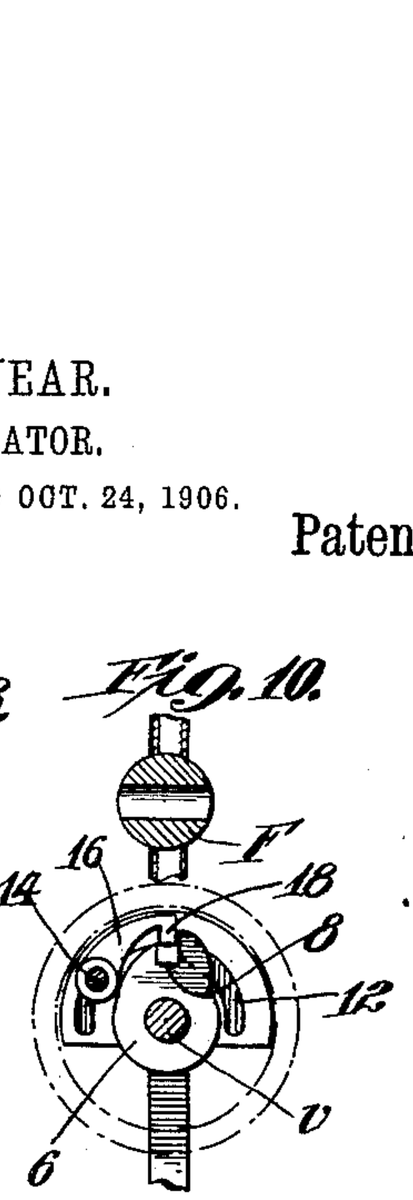


Fig. 12.



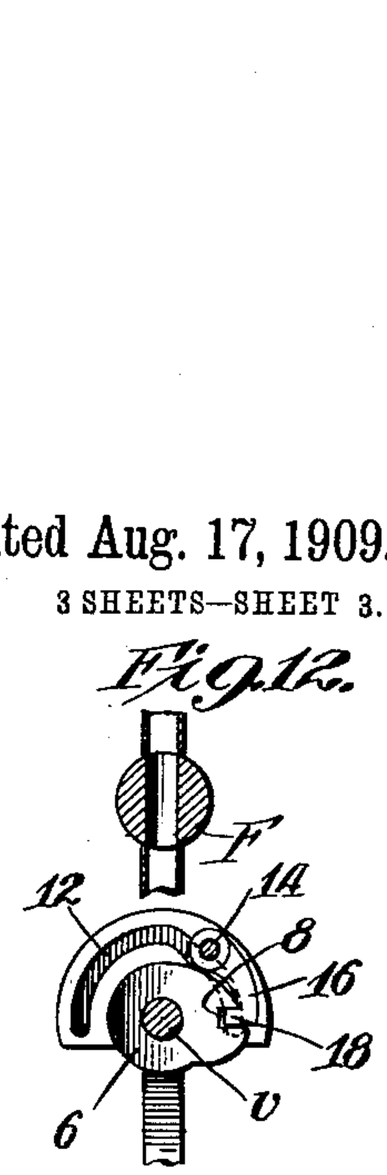


Fig. 9.

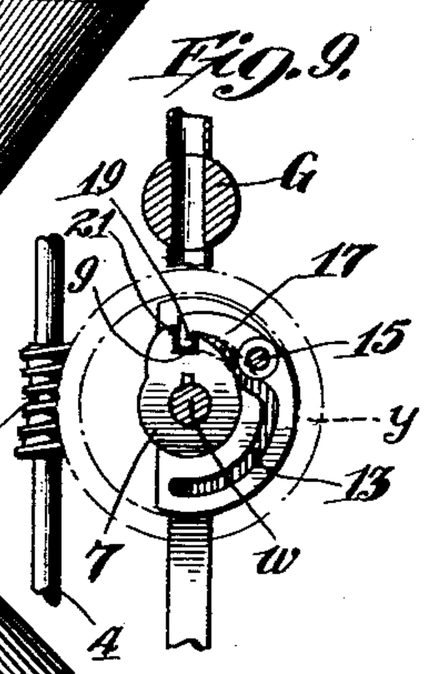


Fig. 11

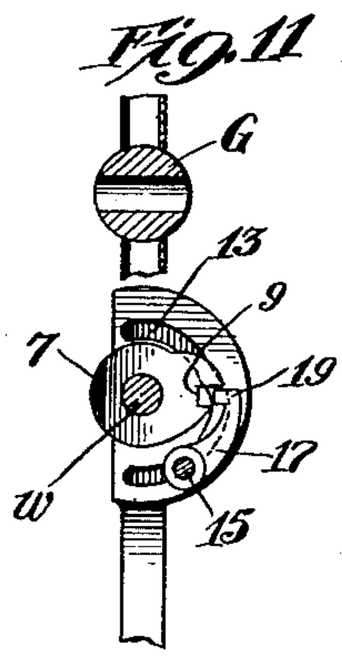


Fig. 13.

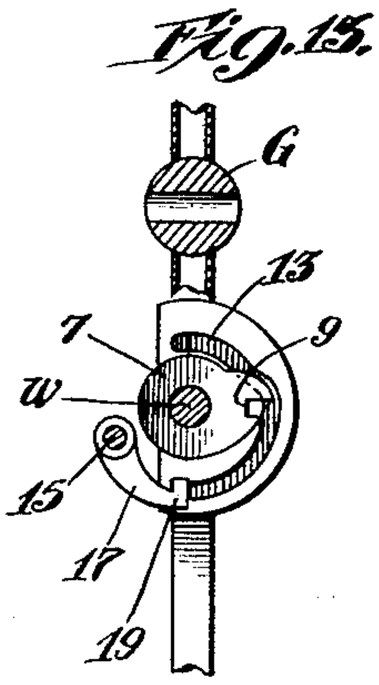


Fig. 14.

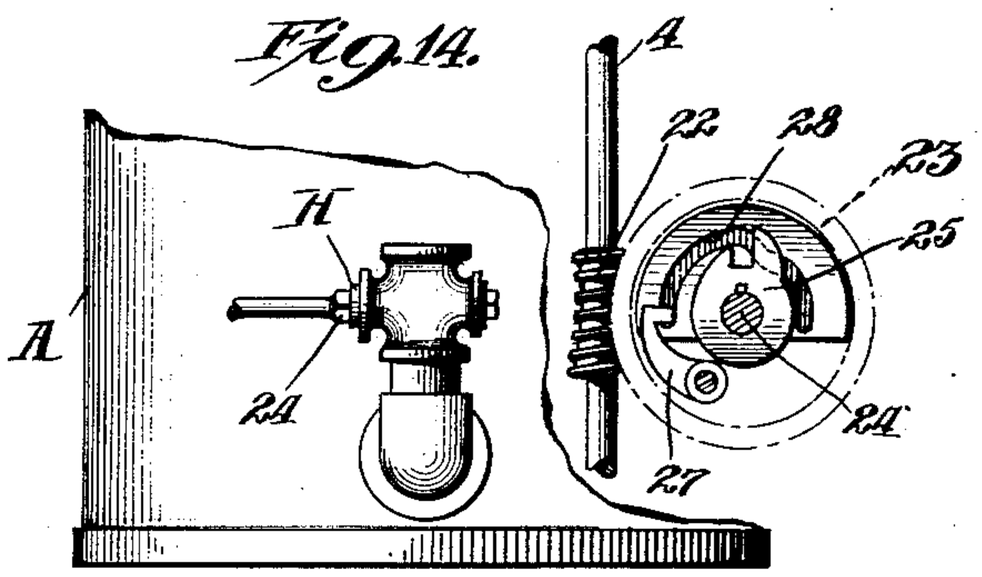
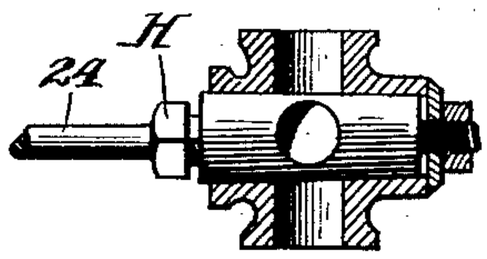


Fig. 15.



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Inventor:

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UNITED STATES PATENT OFFICE.

NELSON GOODYEAR, OF NEW YORK, N. Y., ASSIGNOR TO J. B. COLT COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

GAS-GENERATOR.

No. 931,293. Specification of Letters Patent. Patented Aug. 17, 1909.

Application filed October 24, 1906. Serial No. 340,281.

To all whom it may concern:

Be it known that I, NELSON GOODYEAR, a citizen of the United States, and resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Gas-Generators, of which the following is a specification accompanied by drawings.

This invention relates to gas generators, more especially to apparatus for generating acetylene gas, and the objects of the invention are to improve upon the construction of such generators, render them certain and efficient in operation and provide for the safety of the apparatus at all times and under all circumstances, thereby preventing accidents in use.

Another object of the invention is to enable the generator to be flushed out and charged with water and carbid without admitting air to said tank, and to make the admission of air to the tank or an escape of gas from the tank impossible.

Further objects of the invention will hereinafter appear, and to these ends the invention consists of a generator for carrying out the above objects embodying the features of construction, combinations of elements and arrangement of parts having the general mode of operation substantially as hereinafter fully described and claimed in this specification, and shown in the accompanying drawings, in which,—

Figure 1 is a side elevation partly in section of apparatus embodying the invention; Fig. 2 is an enlarged detail top plan view partly in section showing the flush out; Fig. 3 is an enlarged detail elevation partly in section of the hopper and carbid feeding mechanism; Fig. 4 is a plan view partly in section of the line *x*—*y* of Fig. 3; Fig. 5 is a detail elevational end view of a portion of the apparatus shown in Fig. 3; Fig. 6 is a detail elevational view of a portion of the apparatus shown in Fig. 5; Fig. 7 is an enlarged detail elevation of the hopper and valves partly in section; Figs. 8, 9, 10, 11, 12 and 13 are detail views partly in section, illustrating the relative positions of the valves in the hopper; Fig. 14 is an enlarged detail elevational view partly in section of the flush out; Fig. 15 is a detail longitudinal elevation partly in section taken through the flush out valve.

Referring to the drawings, the generator tank A is provided with a suitable carbid hopper B supported upon the neck C, and in the hopper is arranged suitable carbid feeding mechanism, in this instance shown as a valve D, moving in a protective casing E, while between the casing and the valve is a stop F which is raised by the valve D after the valve is raised and which seats itself before the valve is seated. Any other suitable form of valve may be provided if desired.

The valve D is adapted to be controlled by the gas pressure in the gasometer G′, which, as shown, is provided with a rising and falling gas bell H′ and suitable operative connections are provided between the gas bell and the valve for operating said valve. In this instance the arm *a* is connected to be operated by the rock shaft *b*. When the shaft *b* is rocked in one direction the valve D will be raised, and when the shaft is released the valve will fall by its own weight. The arm *a* is suitably connected to the rock shaft *b*, in this instance a squared portion being provided upon the rock shaft, which is thrust through the end of the lever. The rock shaft *b* extends through a stuffing box *c* and is provided with an arm *d* loose thereon having a bearing *e* in which is supported a small rock shaft *f*. Suitably secured to the rock shaft *f* is a latch *g* adapted to coöperate with a hook *h*, secured fast to the rock shaft *b* in any suitable manner by means of the hub *i*. A spring *j* secured to the latch *g* and also to projection *k* on the arm *d* holds the latch normally in engagement with the hook so that downward movement of the arm *d* will rock the shaft *b*. The other end of the rock shaft *f* is provided with a finger *l* secured fast thereon and projecting over a stop *m* projecting from the casing, so that at the downward limit of the movement of the arm *d* the finger *l* will engage the stop *m* and rock the shaft *f*, thereby releasing the latch *g* from the hook *h*, and permitting the rock shaft *b* to rotate and close the valve D in the hopper. The arm *d* as shown is suitably connected to a rod *o* pivoted to a link *p*, which is in turn pivoted to a bracket *q* on the gasometer bell H′ so that downward movement of said bell will rock the shaft *b* and open the valve D, while upward movement of the gasometer bell H′ will permit the valve D to close. Any other suitable

operative connections may be provided for carrying out these objects.

The hub *i* of the hook *h* is provided with an arm 17 extending substantially parallel to the arm *d*. By depressing the arm 17 the hook *h* may be brought into engagement with the latch *g*. In starting the apparatus by slightly depressing the outer end of the arm 17 some carbid is then fed into the water and the generation of the gas causes the gasometer bell to rise, thereby bringing the latch *g* into engagement with the hook *h* automatically to enable the apparatus to operate thereafter.

The apparatus is so constructed that the generator may be flushed out and charged with water and carbid without admitting air to the generator tank, and the admission of air to the tank, or the escape of gas from the tank, other than through the gas educting pipe, is impossible. As shown, the carbid hopper B is provided with an upper story or second hopper E′. The upper section of the hopper is provided with a carbid charging valve F and a gas lock valve G is provided between the two portions B and E′ of the hopper. Operative connections are provided between these two valves F and G, so constructed that both valves cannot be opened at the same time, although both may be closed at the same time. When the carbid valve F is closed the gas lock valve G may be opened and vice versa, when the gas lock valve G is closed the carbid valve may be opened. According to this construction the carbid valve F may be opened to permit the feeding of carbid to the hopper and the gas lock valve G will be closed automatically, thereby preventing the entrance of air or escape of gas from the tank. After carbid has been fed to the hopper E′, the carbid valve F may be closed and the gas lock valve G may be left closed, or else it may be opened to permit the carbid to pass from the portion E′ to the portion B of the hopper. Valves F and G are tied together by operative connections in such manner that the movement of the valves takes place as described.

Any suitable valves may be provided for the hopper, in this instance rotary plug valves being shown, comprising the plugs *r* and *s*, provided with the valve apertures *t* and *u*. These plugs *r* and *s* are connected to shafts of spindles *v* and *w*, which are provided at their outer ends with gear wheels *x* and *y* loose thereon, meshing with worms 2 and 3 carried by the vertical shaft 4 provided with the operating handle 5. Any other suitable connections may be provided for operating the valves F and G, but the connections I have shown are suitable and convenient. Fast on the shafts *v* and *w*, adjacent the gears *x* and *y*, are disks 6 and 7 provided with notches 8 and 9 respectively. Suitably supported from the portions E′ and B of the hopper are brackets 10 and 11 forming bearings for the shafts *v* and *w*, and also provided with cam slots 12 and 13 respectively. Suitably pivoted to the gears *x* and *y*, as by means of pins 14 and 15 are pawls 16 and 17 having hooked ends 18 and 19 respectively adapted to coöperate with the notches 8 and 9 in the disks 6 and 7. The pawls 16 and 17 are also provided with small outwardly projecting studs or pins 20 and 21 which form followers adapted to move in the cam slots 12 and 13 respectively when the gear wheels *x* and *y* are rotated. Stationary cam slots 12 and 13 respectively are so positioned in the brackets 10 and 11 and the pawls 16 and 17 are so positioned on the gear wheels *x* and *y* that the pawl 16 for the carbid valve F may be rotated from its initial position as indicated in Fig. 8 when the valve is closed through a quarter of a revolution or 90 degrees without moving said valve, while at the same time the pawl 17 for the gas lock valve G is in engagement with the disk 7 and has rotated said disk through a quarter of a revolution or 90 degrees, thereby rotating the spindle *w* of the gas lock valve G through the same angle and turning said valve from open to closed position.

Figs 8 and 9 illustrate the position of the valves F and G and the valve operating mechanisms when the valve F is closed and the valve G is opened. The movement of the handle 5 to rotate the gears *x* and *y* through a quarter of a revolution moves the valve operating mechanisms from the positions indicated in Figs. 8 and 9 to those indicated in Figs. 10 and 11 through a quarter of a revolution, in which case both valves F and G will be closed. As the gears *x* and *y* are rotated through the next 90 degrees, the valve F will be opened while the valve G will remain closed, thereby forming a gas lock while carbid is being charged into the hopper E. In order to accomplish these movements the cam slots 12 and 13 are provided with high and low portions so that as the pawls 16 and 17 are carried around by the gears the studs or pins 20 and 21 follow the high and low portions of the slots and at the proper points in the movement of the disks 6 and 7 the hooked ends 18 and 19 are automatically raised out of engagement with the notches 8 and 9 in said disks, thereby releasing the pawls 16 and 17 respectively and stopping the movement of the valve F or G respectively. As shown, the pawl 16 starts from its initial position as indicated in Fig. 8 and having rotated through a quarter of a revolution the hooked end 18 engages the notch 8 of disk 6 because the stud or pin 20 following in the cam slot 12 carries said hooked end into engagement with notch 8 as indicated in Fig. 10, and the

disk 6 is rotated a quarter of a revolution into the position indicated in Fig. 12, thereby turning the valve from closed to open position. The pawl 17, starting from the position indicated in Fig. 9, in which the hooked end of said pawl is in engagement with the notch 9 of disk 7, is rotated in the same direction as the pawl 16, but after a quarter of a revolution the stud or pin 21 rides on to the high portion of the cam slot 13, thereby carrying the hooked end 19 of the pawl out of engagement with the notch 9 of the disk 7, which leaves the valve G in closed position as indicated in Fig. 11. The further revolution of the gear *y* through a quarter of a revolution carries the pawl 17 into the position indicated in Fig. 13 without moving the valve G. In the reverse movement of the pawls 16 and 17 a reverse series of operations takes place. The pawl 16 which starts in engagement with the disk 6 first turns the valve from open to closed position as indicated in Fig. 10 and then the pin or stud 20 on said pawl rides on to the high portion of the cam slot 12, thereby raising the end of the pawl out of engagement with the notch 8 of the disk 6 leaving said valve F in closed position. The rotation of the pawl 16 through the next quarter of a revolution does not affect the valve. The reverse movement of the pawl 17 through the first quarter of a revolution carries the hooked end of the pawl into engagement with the notch 9 of the disk 7 without moving the valve and then the further rotation of the pawl carries the valve from closed position as indicated in Fig. 11 to open position as indicated in Fig. 9.

In accordance with this invention the carbid charging valve F and the flush out valve H are adapted to be opened and closed together automatically so that these two valves are both open or both closed at the same time. While any suitable operative connections may be provided between the valve operating means for the carbid charging valve and the flush out valve, I have shown the shaft 4 extending downwardly and provided with another worm 22, meshing with the gear 23 loose on the spindle 24 of the flush out valve H. A similar arrangement of notched disk 25, pawl 27, and cam slot 28 is provided in connection with the valve H whereby the movements of said valve follow the movements of the carbid charging valve F, so that these valves are opened and closed at the same time. The object of having the carbid charging valve and flushing out valve operate in this manner is to insure the flushing out of the machine when a new charge of carbid is being charged into the hopper E, while the gas lock valve G is closed to cut off communication between the two hoppers B and E'. In this way the water and residuum in the machine may be flushed out without the entrance of air because no vent to atmospheric air for the tank A is provided, and provision is made for permitting the flushing out of the machine without venting it to the atmosphere.

To insure that the consistency of the residuum is such that it may be flushed out readily agitator blades 29 are provided in the tank A carried by the shaft 30, suitably supported in bearings 31 and 32 and adapted to be operated by the shaft 4, any suitable connections, in this instance, a bevel gear 33 being provided on the shaft 4, meshing with a bevel gear 34 on the agitator shaft 30. In order to seal the bearing 32 a suitable stuffing box 35 is provided on said bearing. During the time that the gas lock valve G is being closed and the carbid charging valve opened, and while the flush out valve H is being opened, the agitator 29 is being operated to stir up the residuum. In order that air may not enter and gas may not escape through the flush out valve H, the valve casing is positioned at a point above the outlet 36. An overflow pipe 37 having an outlet 38 is shown connected to the casing of the flush out valve H and provided with a suitable vent 39 to prevent the siphoning of the machine, if the outlet 38 of the overflow should be connected by a pipe, as for instance to the sewer. A suitable inlet pipe 40 for water is provided having valve 41 and operating handle 42.

As the contents of the tank A is flushed out, provision is made to permit gas which has been trapped in the gasometer H' to pass over to the tank A and take the place of the water and residuum instead of permitting air to enter in the tank A. As water is charged into the tank A the gas therein passes back into the gasometer. The gas educting pipe 44 passes from the tank A into the gasometer G' and is provided with a downwardly extending gas pipe 43 which passes through the partition into the gasometer. The service pipe 45 connects with the drain pipe 46 and the gas outlet pipe 47, which has a telescoping cap 48 provided with gas apertures 49. The telescoping portion 48, as shown, is connected by means of the rods or chains 50 to the gasometer bell H' and thus rises and falls with said bell. The gasometer bell H' is guided on the central shaft 51 by means of the guiding sleeve 52 and suitable means are provided for preventing the bell from rotating about the axis of the shaft 51, in this instance a tubular upright 53 being provided extending from the partition 44^a, while a sleeve 54 connected to the gasometer bell H' telescopes over the upright 53 and is guided by the bracket 55, thus preventing the bell from turning and deranging the carbid feeding mechanism and also forming a telescopic blow-off. After all the carbid has been used up in the hopper

B and the gasometer bell H′ has sunk in the hopper B sufficient gas will be trapped in the bell H′ above the water to substantially fill the generator tank A when the water and residuum have been flushed out. In order to accomplish this end, provision is afforded for the automatic closure of the gas pipe 47 in the gasometer when the bell has sunk to a predetermined distance. The telescoping tube 48 as shown is always water sealed and the gas openings 49 are so situated that when these openings are closed by the water there will be sufficient volumetric space in the gasometer bell above the water to supply enough gas to fill the generator tank A as the water and residuum are flushed out of said tank. As the water recedes in the tank A, gas passes over from the bell H′ and the bell sinks farther down, which is permitted by the rods or chains 50 which simply pass down loosely through openings in the rod or plate 56. These chains or rods are provided with stops or balls 57 which engage the plate 56 and raise the telescoping cap 48 when gas is again generated in the generator.

The gasometer is preferably provided with a cock 75, by means of which the gasometer bell may be open to atmospheric air to permit the escape of air from the apparatus when the machine is first started.

In order to prevent accidents the feeding of carbid to the generator tank A should be prevented or made impossible when there is little or no water in the tank, and in order to afford this safeguard in the operation of the machine I have constructed the apparatus in such manner that the carbid valve D is automatically closed when the water falls slightly below its normal level in the tank A. As shown, a float 58 is provided in the tank A suitably connected to the operating mechanism of the carbid valve B so that as the float 58 falls the latch *g* is disconnected from the hook *h* of the valve mechanism. The float 58 is provided with downwardly extending rods 59 having a cross piece 60 to which is pivoted a vertical rod 61 passing upwardly through a water sealed sleeve 62 and connected at 63 to a cam 64 on the end of the rock shaft *b*. The latch *g* is provided with a finger 65 bearing upon said cam and as the float 58 and rod 61 fall slightly the cam 64 is rotated, thereby pushing the finger 65 outwardly and carrying the end of the latch *g* away from the hook *h*, disengaging said connection and permitting the carbid valve D to fall and close the opening in the lower end of the hopper B, thereby preventing the feeding of carbid until the water has again risen to its normal level. A suitable stop 70 is provided on the rod 61 and this stop has a washer of suitable material 71 connected thereto, which closes over the upper end of the sleeve 62 and prevents the entrance of air when the water unseals the lower end of the sleeve.

In order to further provide for the safety of the apparatus and guard against leakage in the gasometer, I provide the gasometer with a separate compartment 80 formed by the casing 81, which is connected to the walls of the gasometer tank G′ and is of sufficient size to accommodate the floats 82 and 83. The compartment 80 communicates with the upper chamber of the gasometer tank G′ as by means of the opening 83. The partition 44^a is extended across the chamber 80 and the lower portion of the chamber 80 communicates with the lower portion of the gasometer tank as by means of the apertures 84 and 85, so that the water stands in the upper and lower portions of the chamber 80 on a level with the water in the corresponding portions of the gasometer tank G′. The lower portion of the gasometer tank beneath the partition 44^a will be termed the gasometer trap. A vertical pipe 86 passes through the partition 44^a in the chamber 80 and is suitably supported therein. Passing down through the pipe 86 is a rod 87 provided with a lower stop 88 and upper stop 89, while the lower float 83 is provided with downwardly extending arms 90 adapted to bear against the stop 88 when the water level fall slightly below the normal, and thereby force the rod 87 downwardly. Said rod 87 is connected at its upper end to a bell crank lever 91 pivoted at 92 and connected at its other end to the rod 93 having a loose connection with an arm 94 connected to the cam 64, so that the downward movement of the rod 87 rotates the cam 64 and throws the finger 65 outwardly to disconnect the latch *g* from the hook *h* and permit the carbid valve D to close. The upper float 82 is provided with upwardly extending arms 95 having portions 96 bearing over the stop 89 so that the downward movement of the float 82 will also carry the rod 87 downward in case the water level in the upper portion of the chamber 80 falls slightly below the normal. The construction of the operative connections and the three floats 58, 82 and 83 is such, as will be seen, that no one float interferes with the operation of any of the others and each one operates independently of the others, although they may all operate at the same time if necessary since they all tend to move the cam 64 in the same direction.

In machines of very large size the total height of the generator tank and hopper may be sufficient to reach from one floor to the next floor, or from the ground to the floor above, or a suitable platform which may be erected over the top of the generator. In Fig. 1, 67 represents the beam and 66 the floor or planking of the platform, as shown, in this instance arranged substantially on a level with the top of the generator, and

from this platform or floor the handle 5 may be conveniently operated and the hopper E′ may be conveniently charged with carbid. Another operating handle 68 is provided above the floor connected to a rod 69, which in turn is connected to operate with the arm 17, whereby said arm may be moved to operate the valve D.

I do not herein claim the combination of the generator tank and gasometer, with means for trapping an amount of gas in the gasometer sufficient to fill the volumetric space of the generator tank when said tank is substantially flushed out, since these features are claimed in my copending application Serial No. 328,874, filed Aug. 2, 1906.

Obviously some features of this invention may be used without others and the invention may be embodied in widely varying forms, therefore, without limiting the invention to the devices shown and described, and without enumerating equivalents, I claim and desire to obtain by Letters Patent the following:—

1. In a gas generator, the combination with the generator tank and stirrer, of a carbid charging device, and means for simultaneously causing the operation of the stirrer while the carbid charging device is being opened.

2. In a gas generator, the combination with the generator tank and stirrer, of a carbid charging device, and means for simultaneously causing the operation of the stirrer while the carbid charging device is being opened or closed.

3. In a gas generator, the combination with a generator tank and hopper, of a carbid charging device, a flushing out device, a gasometer, means for trapping gas in the gasometer, means for returning said gas from the gasometer to the generator tank when flushing out, and means for preventing communication between the generator tank and that portion of the hopper into which carbid is charged when charging in carbid.

4. In a gas generator, the combination with a generator tank and gasometer, of means for trapping gas in the gasometer, means for permitting said gas to enter the generator tank as said tank is flushed out, carbid charging and flushing out devices, means for opening said devices together, and means for closing communication between the generator tank and the outside air when flushing out or charging in carbid.

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

NELSON GOODYEAR.

Witnesses:
E. VAN ZANDT,
A. L. O'BRIEN.