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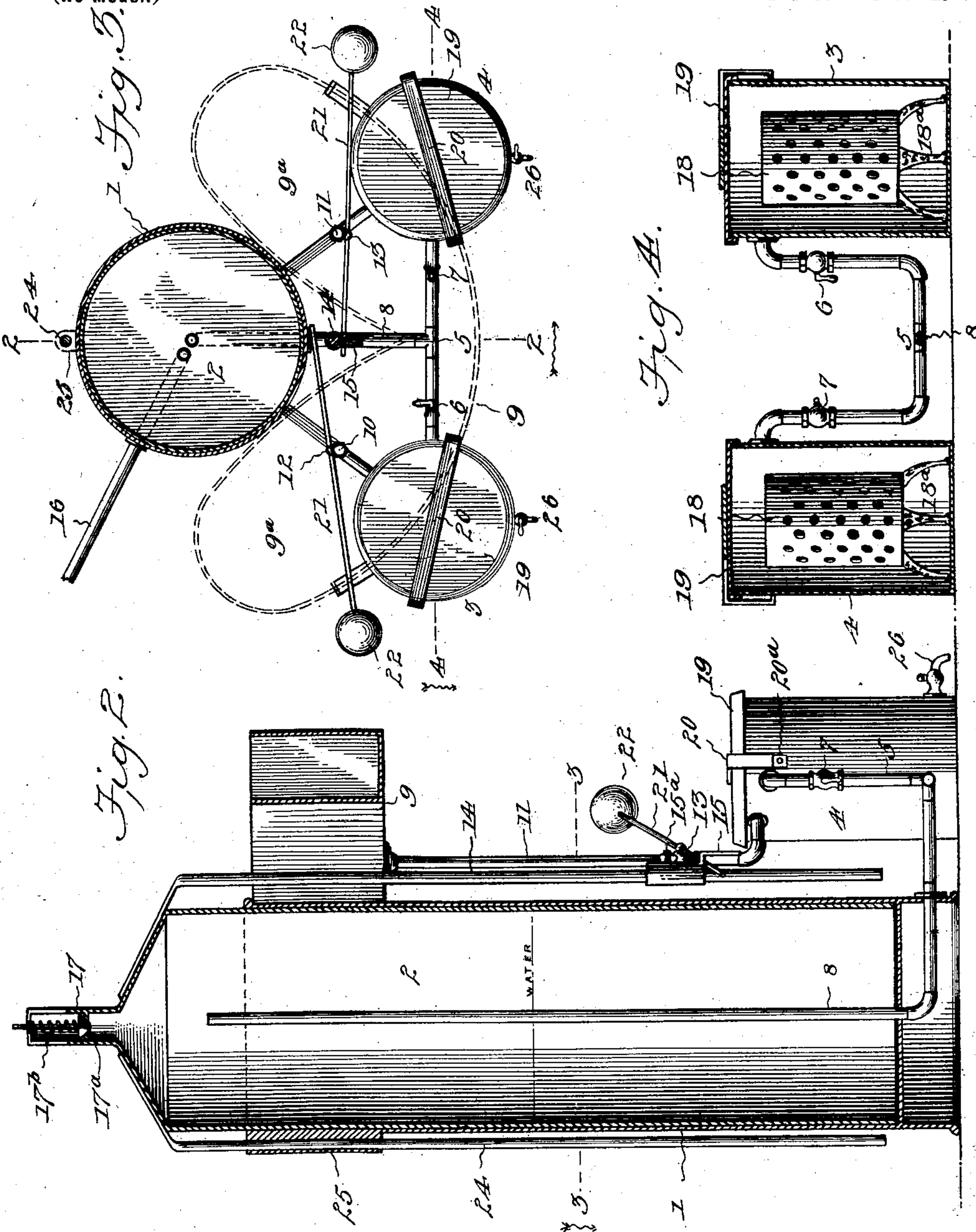
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ACETYLENE GAS GENERATOR.

(Application filed Nov. 13, 1897.)

(No Model.)

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# UNITED STATES PATENT OFFICE.

WALTER S. POWERS AND ADRAIN J. REYNOLDS, OF NASHVILLE, MICHIGAN.

## ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 608,270, dated August 2, 1898.

Application filed November 13, 1897. Serial No. 658,465. (No model.)

### *To all whom it may concern:*

Be it known that we, WALTER S. POWERS and ADRAIN J. REYNOLDS, citizens of the United States, residing at Nashville, in the county of Barry and State of Michigan, have invented a new and useful Automatic Acetylene-Gas Generator, of which the following is a specification.

Our invention relates to improvements in apparatus for generating acetylene gas; and the object that we have in view is to provide an improved apparatus by which the gas generation may be carried on continuously and without arresting the operation of the machine, rendered necessary in ordinary machines for the purpose of recharging a fresh supply of calcium carbide therein.

A further object that we have in view is to provide an improved apparatus in which one gas-generator may be brought into service and automatically controlled to maintain a supply of acetylene gas in the holder or gasometer while a second generator is being charged, said apparatus having its elements so combined and arranged that the parts may be adjusted to throw the first-named generator out of service and bring the last-named generator into service and in a manner to control the operation of said last-named generator automatically according to the volume of gas contained within the holder or gasometer.

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

To enable others to understand the invention, we 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 a gas-generator embodying our invention. Fig. 2 is a vertical sectional elevation on the plane indicated by the dotted line 2 2 of Fig. 3. Fig. 3 is a transverse horizontal sectional view on the plane above the gas-generators and indicated by the dotted line 3 3 of Fig. 2. Fig. 4 is a vertical transverse sectional view through the independent generator-chambers, the plane of section being indicated by the dotted line 4 4 of Fig. 3. Fig. 5 is an enlarged detail view illustrating a reversible

trip by which either water-admission valve for one or the other of the generator-chambers may be brought into service.

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

1 designates a tank, and 2 a vertically-movable bell slidably fitted within the tank and forming therewith a gas-holder or gasometer of a pattern familiar to those skilled in the art to which our invention relates.

3 4 designate independent gas-generators, which are situated externally to the holder or gasometer and in close relation one to the other. These generators are independent; but they are coupled together by a transverse elbow-shaped pipe 5, in which is provided the independent cocks or valves 6 7, either of which may be opened or closed, according as it is desired to employ one or the other of the generators 3 4 to supply the gas to the holder or gasometer. This elbow-shaped pipe 5 is attached to the shells of the generators at or near the upper ends thereof, and the valves 6 7 are situated in said pipe quite close to the generator-shells, so as to be readily accessible to the operator when it is desired to cut one generator out of service and to bring the other generator into service. To this elbow-shaped connecting-pipe 5 is attached a delivery-pipe 8, said pipe being coupled to the transverse elbow-shaped pipe at a point between the valves 6 7 therein, so as to form a common connection between the gasometer and the independent gas-generators 3 4. This delivery-pipe 8 extends through a foot-flange of the gasometer-tank 1, thence through the bottom of the tank at a central point, and is thence extended through the water seal in said tank, so as to discharge the gas into the chamber or space of the vertically-movable bell 2.

It is to be understood that the gasometer-tank 1 contains a suitable quantity of water and that the bell 2 is always immersed in the water for the purpose of forming a liquid seal to prevent the escape of gas from the gasometer and at the same time insuring the necessary vertical movement of said bell 2 according to the quantity of gas which accumulates in the holder.

To provide for the proper supply of water to the independent generators 3 4 for the purpose of effecting the chemical decomposition

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of the calcium carbid contained within said generators, we employ an overhead water-tank 9. This water-tank may be supported directly upon the gasometer-tank 1 or it may  
 5 be fixed on any suitable supports in a position above the generators to insure the flow of water by gravity to said generators. In the drawings we have illustrated said water-tank 9 as divided by a transverse partition to  
 10 have its interior form isolated water chambers or compartments 9<sup>a</sup>, and from these chambers or compartments of said tank 9 lead the water-feed pipes 10 11, which are suitably coupled at their lower ends to the shells of  
 15 the generators 3 4. Each water-feed pipe is equipped with a balanced water-admission valve arranged for operation automatically in connection with the vertically-movable gasometer-bell, so that as the bell is lifted by  
 20 the pressure of the gas accumulating therein the admission-valve is closed to cut off the supply of water from the overhead tank to the generator-chamber; but when the gas-pressure in the gasometer is reduced, owing  
 25 to the consumption of the gas, the bell 2 descends and sets in operation devices which open the water-admission valve and supply the proper quantity of water to one generator or the other, and thus start afresh the gener-  
 30 ation of acetylene gas by the decomposition of water and calcium carbid within the generator which is in service.

The feed-pipes 10 11 between the overhead tank and independent generators are paral-  
 35 lel to each other, and the admission-valves in said feed-pipes are designated at 12 13 in the drawings. Each valve consists of a shell or body suitably attached to one feed-pipe and a movable element which is adapted to be ad-  
 40 justed to open the passage through the body or shell or to close the same. This movable element of the valve is controlled automatically by a balanced lever 21, which is attached to the movable valve element, so as to have  
 45 its overweighted end 22 remote from the gasometer-tank 1, while its short arm is adjacent to an operating device, presently described, which is movable with the gasometer-bell 2.

The balanced valves 12 13 of the independ-  
 50 ent parallel feed-pipes 10 11 are so arranged that the short arms of their controlling-levers lie on opposite sides of a vertically-movable trip-rod 14, which is rigidly fastened at its upper end to the head of the gasometer-bell  
 55 2. This rod is parallel to the gasometer-tank 1, outside of which it is arranged under all conditions of service, and said trip-rod is adapted to rise and fall with the gasometer-bell. The lower part of the trip-rod plays  
 60 idly or freely between the short arms of the controlling-levers for the water-admission valves 12 13, and on said trip-rod is mounted a trip 15, which may be adjusted to bring it into operative relation with either of the con-  
 65 trolling-levers for the water-admission valves 12 13.

Any suitable form of trip may be attached

to the trip-rod in a manner to be turned or adjusted thereon to enable said trip to en-  
 70 gage with either of said controlling-levers for the valve 12 or 13, and in the drawings we have illustrated one form of this reversi-  
 75 ble trip as consisting of an offstanding arm loosely fitted on the trip-rod and held in place thereon by a clamp 15<sup>a</sup>, such as a set-screw. It is evident that this trip 15 may be held on  
 80 the rod to engage with the controlling-lever of the valve 12, or said trip may be reversed on the trip-rod to have its arm engage with the controlling-lever of the valve 13. This  
 85 adjustment of the trip is effected at the same time that the valve 6 to the generator 3 is closed, and the valve 7 to the generator 4 is opened for the purpose of cutting the first-named generator 3 out of service and bring-  
 90 ing the last-named generator 4 into service; and under these adjustments of the valves and the trip the generator 4 is designed to be supplied with water from the pipe 11 and tank 9 in the same manner that the generator  
 95 3 was supplied with water from the pipe 10 and overhead tank.

The reversible trip provides a convenient means whereby the supply of water to either generator may be controlled according to the  
 95 rising and falling motions of the gasometer-bell 2, because it is evident that said trip which is on the rod movable with the bell is withdrawn from engagement with the valve-  
 100 controlling lever for the generator in service when the gasometer-bell is raised by the pressure of gas in the gasometer, thus cutting off the supply of water to the generator in service and arresting the generation of gas  
 105 therein; but when the supply of gas decreases in the gasometer or holder the bell and trip descend to have the trip engage with a lever of the admission-valve to open the latter and permit a proper quantity of water to pass  
 110 from the tank to the calcium carbid contained within the generator.

The gas in the gasometer or holder is supplied to the system of piping by an outlet-pipe 16, having a vertical branch extending  
 115 through the water seal in the holder and open for the free admission thereto of gas contained within the holder.

The movable bell 2 of the gasometer is provided with a guide-rod 24, which is attached rigidly to the head of said bell and plays idly  
 120 or freely in a keeper or guide 25, fastened to the gasometer-tank 1, and said guide-rod and keeper serve to position the bell within the tank 1 in a manner to prevent the trip-rod and trip from moving out of position with  
 125 relation to the controlling-levers of the water-admission valves in the feed-pipes 10 11. This vertically-movable bell is also equipped with an automatic vent-valve 17, which is fitted to a seat 17<sup>a</sup> in the head of the bell 2,  
 130 said valve being normally held firmly to its seat by a pressure-spring 17<sup>b</sup>. The tension of this spring is sufficient to hold the vent-valve to its seat under the desired pressure



of gas stored within the holder; but when the gas-pressure exceeds its limit it overcomes the resistance of the spring and opens the valve in order to permit a limited quantity of the gas to escape, after which the spring again closes the vent-valve.

The cartridge of calcium carbid to be supplied to either generator 3 or 4 is contained within a cage 18, said cage being constructed of perforated sheet metal or foraminous material to enable the water to obtain free access to the calcium carbid. Said cage is also provided with pendent feet 18<sup>a</sup>, adapted to rest upon the bottom of the generator-shell and to elevate the contents thereof a suitable distance above the liquid contained in the bottom part of the said generator, and, if desired, the perforated cage may be provided with a suitable handle, by which it can be conveniently placed in or removed from the generator. The generator-shell is equipped with a removable head or closure 19, which fits snugly to the generator-shell, and is adapted to be clamped tightly thereon by means of a clamp 20, arranged to straddle the cover and to engage with suitable binding-lugs 20<sup>a</sup>, rigid with the generator.

Each generator is further equipped with a drain-cock 26, fastened to its shell at or near the lower part thereof, and by opening said cock the sediment and liquid contained within the generator may be discharged into a suitable vessel.

The operation of our invention may be described, briefly, as follows: The trip 15 is adjusted to engage with the controlling-lever of the valve 13 in the pipe 11, leading to the generator 4, as shown by Fig. 1, and the valve 6 from the generator 3 is closed, while the valve 7 from the generator 4 is open. Water having been supplied to the overhead tank 9 it passes through the pipe 11 and valve 13 to the generator 4, and this water having access to the calcium carbid contained within the generator 4 the carbid and water are decomposed to produce acetylene gas, which flows through the pipes 5 and 8 to the tank and bell of the gas-holder. As the gas increases in volume in the holder it lifts the bell, the trip-rod, and the trip, and the latter is thus withdrawn from engagement with the controlling-lever and the valve 13, permitting the lever to close the valve and shut off the supply of water to the generator 4. When the charge of calcium carbid in the generator 4 is spent or exhausted, the valve 7 is closed, the valve 6 opened, and the trip 15 is adjusted to engage with the controlling-lever of the valve 12, thus permitting the water to pass from the tank 9 to the calcium carbid contained in the generator 4.

The operation of generating gas in this generator 3 is controlled automatically by the trip which operates the valve 12, and while the generation of gas continues in the generator 3 the charge of calcium carbid in the

generator 3 may be renewed without interruption to the production of gas, which may thus be carried on continuously.

It is evident that slight changes in the form and proportion of parts and in the details of construction may be made without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described the invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In an acetylene-gas apparatus, the combination with a gasometer, and a water-tank, of the independent generators, the water-supply pipes between the water-tank and said generators, the independent water-valves in said pipes and provided with the weighted operating-levers which extend into the space between said water-pipes, a trip-rod arranged between the water-pipes contiguous to the free ends of said weighted levers and attached to the gasometer-bell for movement therewith, and a manually-operative trip rotatably fitted to said trip-rod and having a clamping device and a projecting arm, said trip adapted to be turned by hand to bring its arm into position to engage with either valve-operating lever to open and close one water-valve on the vertical play of the gasometer-bell and also adapted to engage operatively with the lever of the other water-valve, substantially as described.

2. In an acetylene-gas apparatus, the combination with a gasometer, and a water-tank, of the independent generators, a gas-pipe spanning the space between and connected to said generators and having a pipe which discharges to the gasometer and the independent cocks, 6, 7, situated between the generators and the gasometer-pipe, the water-pipes connecting the generators separately with the water-tank, a trip-rod arranged between the water-pipes and connected to the gasometer-bell to travel therewith, the independent water-valves in said water-pipes, the weighted levers attached to the water-valves and having their free ends extended toward the trip-rod, and a reversible trip mounted for rotary adjustment on the trip-rod and having a clamping device and an extended arm adapted to engage with one or the other of the valve-levers, whereby the trip may be adjusted to engage with one valve-lever to operate the valve on the vertical travel of the rod and the trip may also be engaged with the other valve-lever to actuate the valve thereof in like manner, substantially as described.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

WALTER S. POWERS.  
ADRAIN J. REYNOLDS.

Witnesses:

JULIA POWERS,  
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