No. 652,974. Patented July 3, 1900.

# J. A. MOSHER.

## ACETYLENE GAS GENERATOR.

(Application filed Feb. 26, 1900.)

(No Model.) 4 Sheets—Sheet 1.

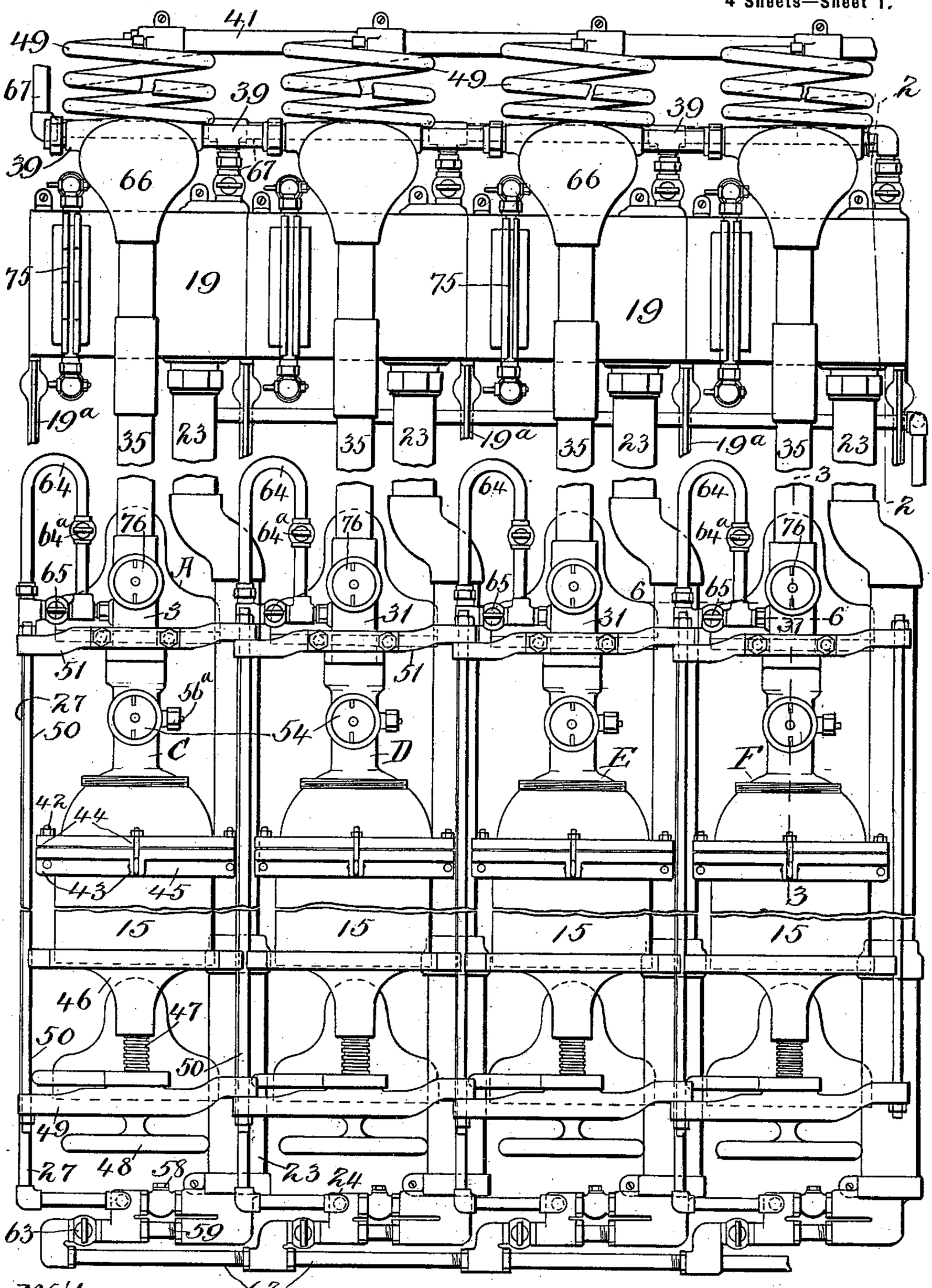


Fig 1

Witnesses,
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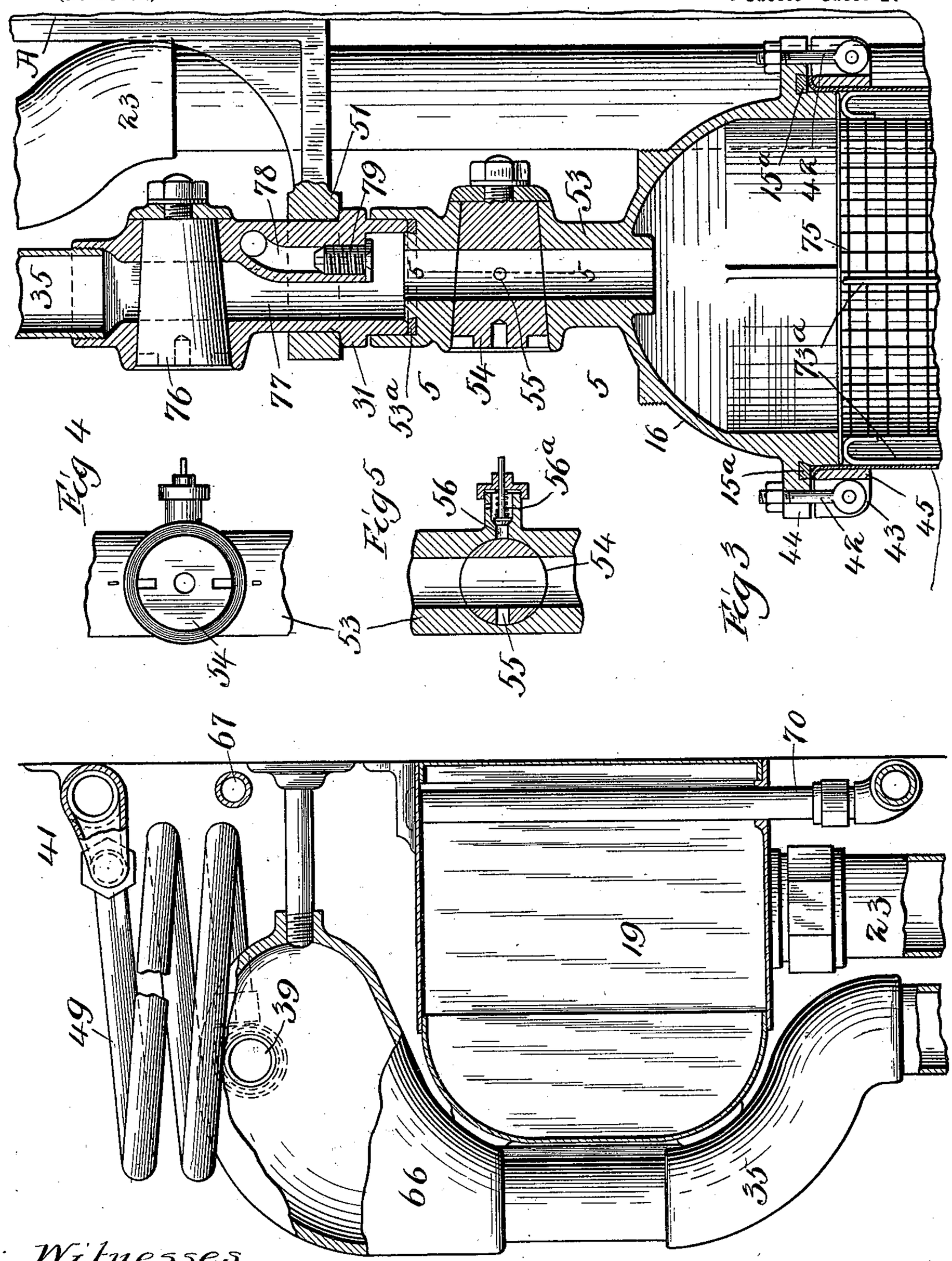
(No Model.) 4 Sheets—Sheet 2.




Witnesses
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## ACETYLENE GAS GENERATOR.

(Application filed Feb. 26, 1900.)

(No Model.) 4 Sheets—Sheet 3.

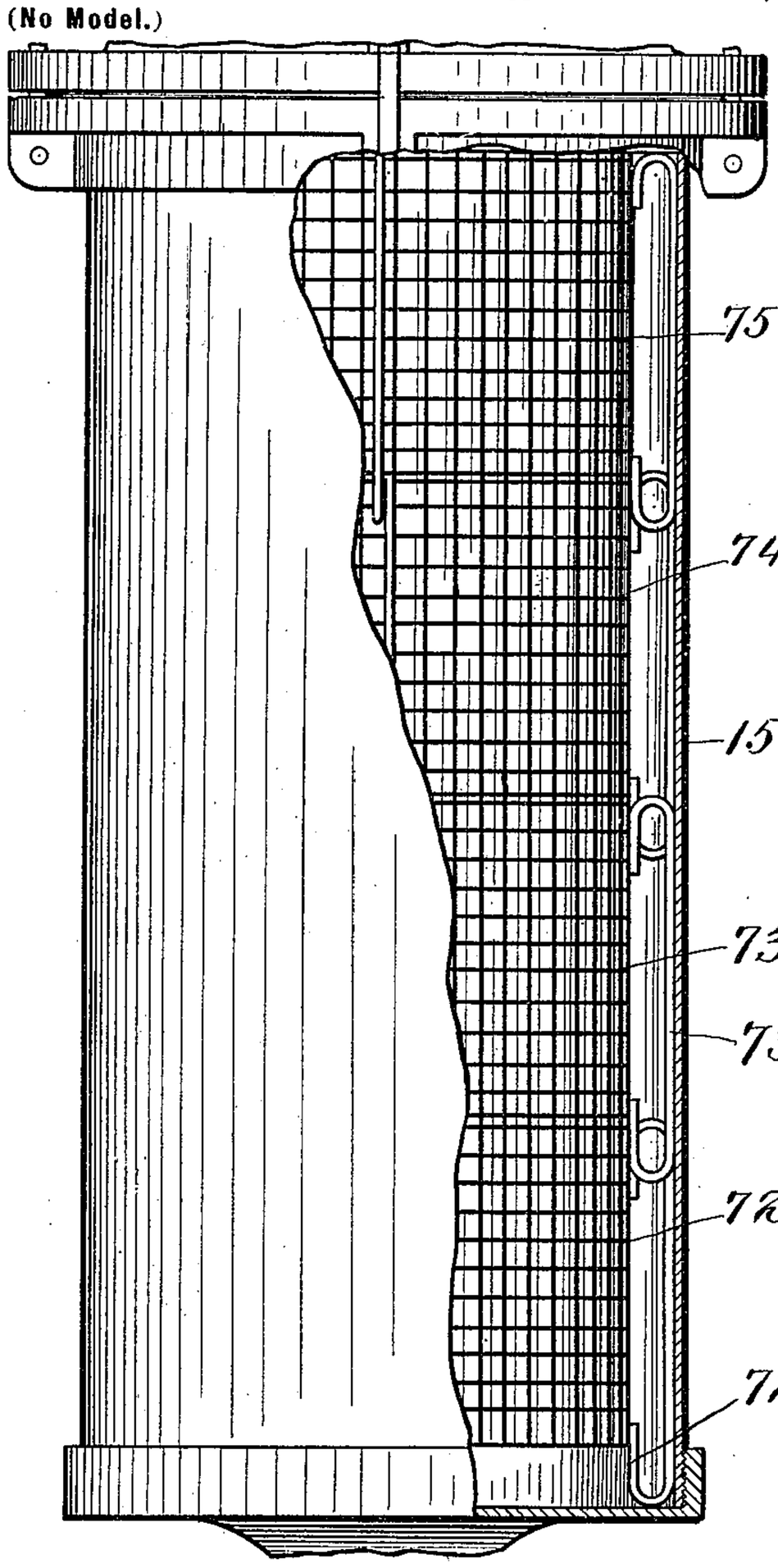
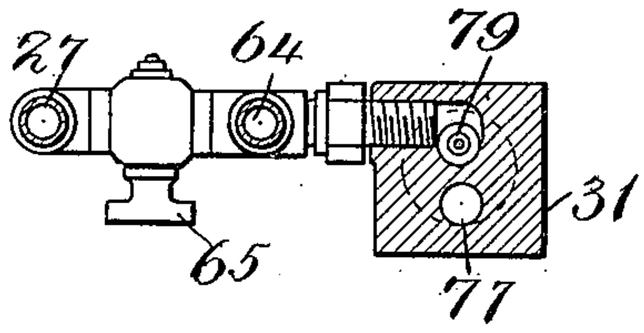



Fig 6



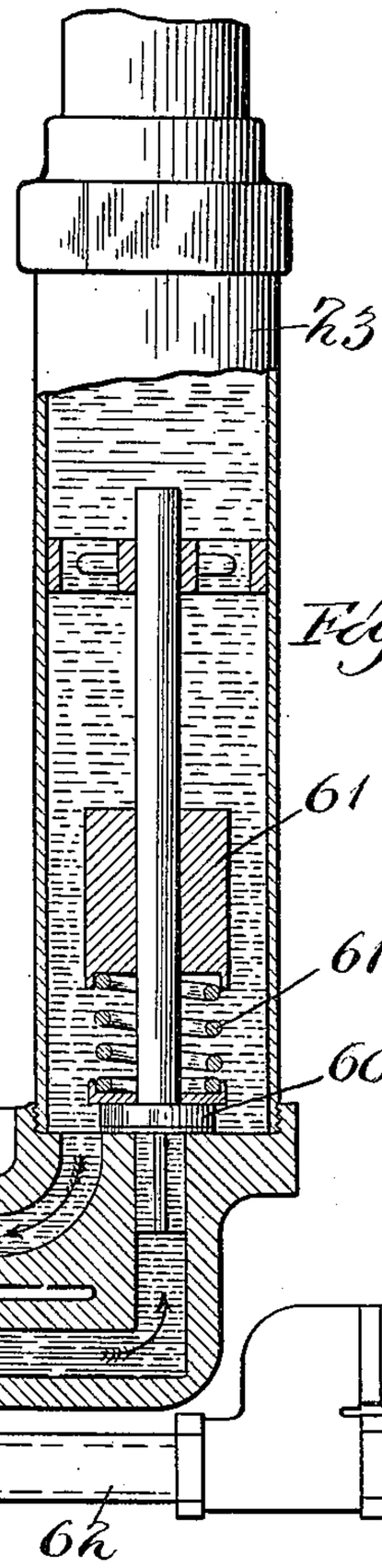
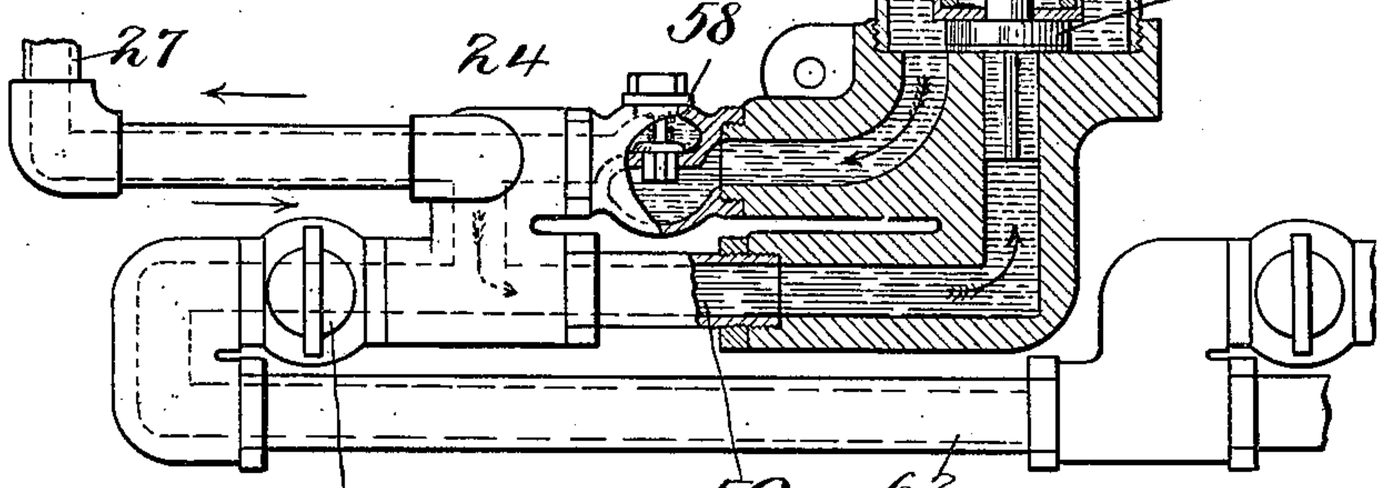




Fig 7

Fig 8

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## ACETYLENE GAS GENERATOR.

(Application filed Feb. 26, 1900.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 9.

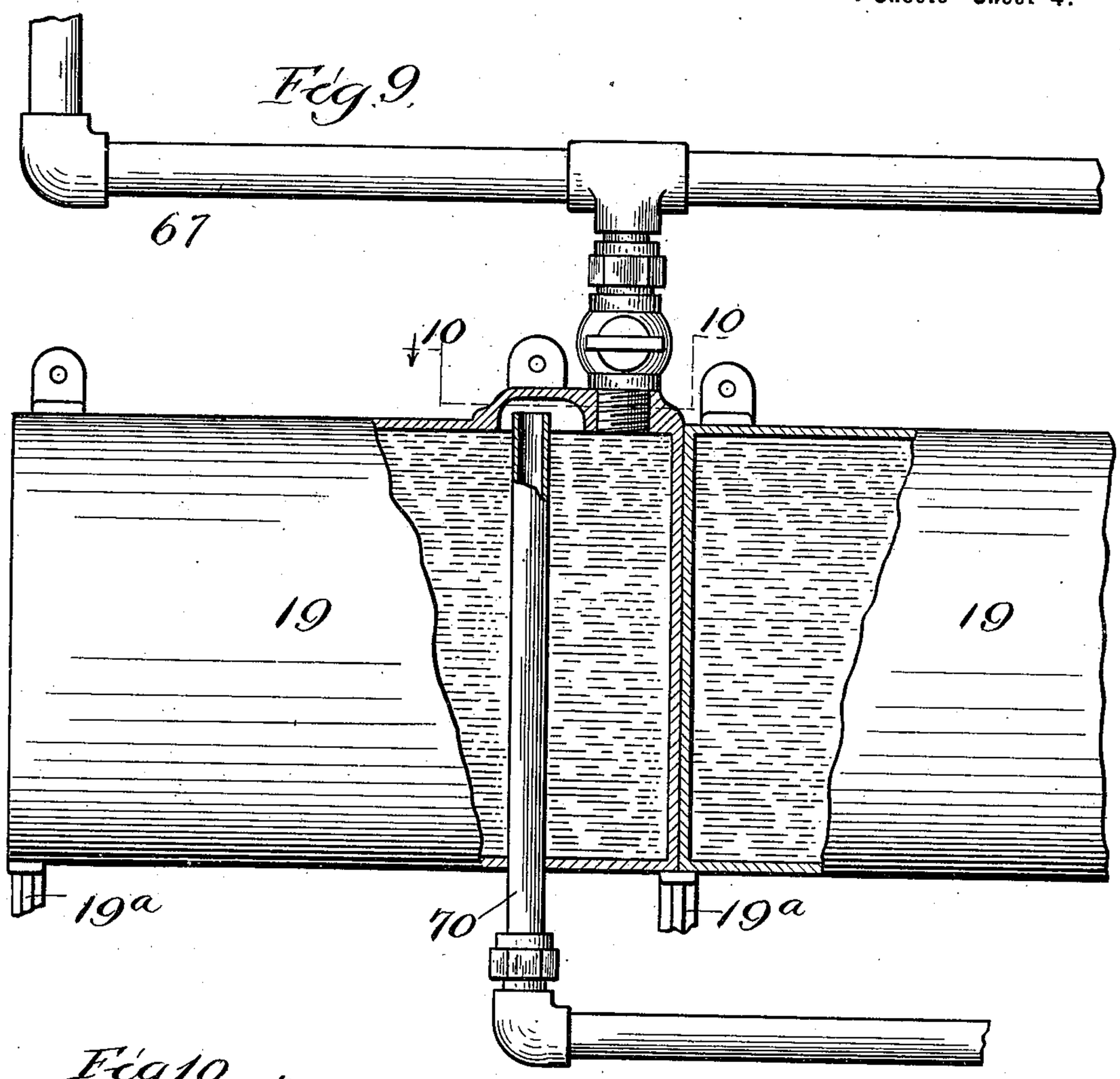



Fig 10

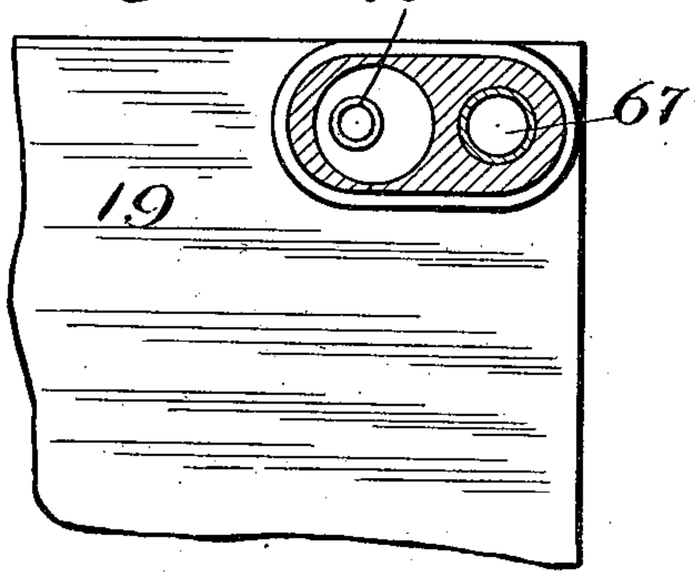
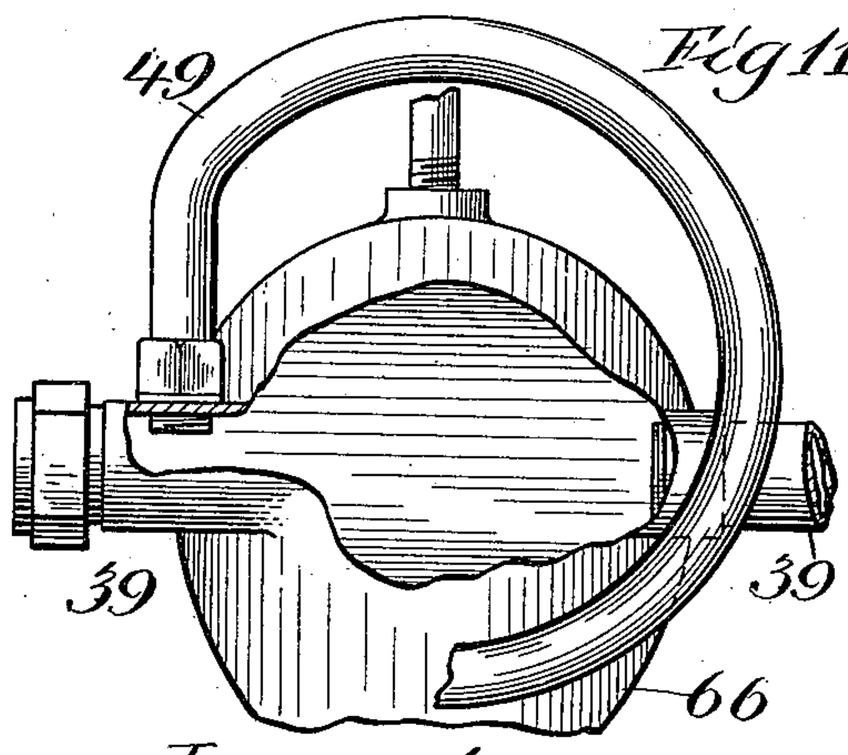



Fig 11

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# UNITED STATES PATENT OFFICE.

JOHN A. MOSHER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE ADAMS & WESTLAKE COMPANY, OF ILLINOIS.

## ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 652,974, dated July 3, 1900.

Application filed February 26, 1900. Serial No. 6,532. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN A. MOSHER, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Acetylene-Generators, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

This invention relates to acetylene-gas generators designed more especially for railway-car service, but being adapted also for domestic uses. One object is to provide a simple and highly-efficient generator of the type in which water is conveyed in small quantities to a mass of carbid, the flow of water being controlled by the gas-pressure developed, and a special object being to provide means for combining in a single battery a number of comparatively-small generators which may be used in unison or in succession, as may be desired, means being provided for automatically bringing into action one or more generators after others have been exhausted of their charges.

Further objects are the provision of means for preventing any disarrangement of other generators of the group by any irregularity in the action of one of them and improved means for holding an excess of pressure accidentally developed.

These various objects are attained in the construction hereinafter fully described, and illustrated in the accompanying drawings, in which—

Figure 1 is a detailed elevation of a battery of generators connected to a single distributing system. Fig. 2 is a sectional view, partly in elevation, on the line 2 2 of Fig. 1. Fig. 3 is a sectional view on the line 3 3 of Fig. 1. Fig. 4 is a detail elevation of the generating-cell. Fig. 5 is a detail section on the line 5 5 of Fig. 3. Fig. 6 is a detail section on the line 6 6 of Fig. 1. Fig. 7 is a side elevation, partly in section, of a portion of the water-feed system. Fig. 8 is a side elevation of one of the generating-cells, a portion of the side wall being broken away. Fig. 9 is a detail front elevation, partly broken away, of the water-tanks. Fig. 10 is a plan view, partly in section, on the line 10 10 of Fig. 9; and Fig. 11 is a detail plan of the condensing-coil.

The generator as a whole consists of a series of water-tanks and generating-cells, with water and gas pipes, all secured to a wall or vertical plate A by means of suitable brackets. Preferably a plurality of generators are united in a single system. A battery of four such generators is shown in the drawings, and as they are all alike a description of one in detail will be sufficient.

The generator proper is shown at 15 and consists of a cylindrical shell or case having a removable dome-shaped cap 16, provided with a plurality of recessed lugs 44, adapted for the engagement of eyebolts 42, pivoted in apertured lugs 43, formed upon a ring 45, encircling the upper end of the body of the case. A suitable gasket $15^a$ is interposed at the joint of the cap with the body of the case to insure a tight fit. The bottom of the case 15 is provided with a central stem 46, adapted to rest upon the end of an adjusting-screw 47, which is provided at its lower end with a hand-wheel 48 and runs in a suitable bracket 49, carried by the rods 50, which depend from a bracket 51, secured to the plate A.

Within the case 15 there is placed a series of baskets for containing carbid, as shown at 72, 73, 74, and 75, these baskets being mounted one upon another, being supported above the bottom of the case by means of the feet $72^a$ and being spaced apart from the side walls of the case by the laterally-projecting brackets $73^a$. The cap 16 of the case has a central nipple 53, within which is seated a three-way cock 54, from the seat of which leads laterally a duct 56, controlled by a safety-valve $56^a$. When the nipple 53 is closed by the valve 54, the generating-chamber is in communication with the duct 56 through the valve-passage 55 and the main passage of the valve. The end of the nipple 53 is annularly channeled to receive the end of the connection 31 which is carried by the bracket 51. A gasket $53^a$ being placed within the annular channel at the end of the nipple tends to insure a gas-tight joint.

It will be seen that the generator, as described, may be removed by turning down the

screw 47, so as to disengage the nipple 53 from the connection 31. Before thus disconnecting the generator the valves 54, 65, and 64ª and the valve in the connection 31 should be closed. Should there be present in the generator when this valve is closed any unexpended carbid and sufficient water to slack it, so that a considerable pressure of gas is developed, relief therefor is found through the agency of the valve 56ª.

A sufficient water-supply to entirely decompose the carbid in the generator is provided in the tank 19, carried by the brackets 19ª, secured to the plate A. This water is fed to the generator through a suitable system of piping, comprising a downpipe 23, extending below the generator 15 and being connected by means of a cross-pipe 24 with a riser 27, which extends upwardly to and is connected with the connection 31, this connection being by means of a valve-controlled pipe-section 65, leading to a duct 78 in the connection 31. The inner end of the duct 78 is directed downwardly, and within it is fitted a screw-plug 79, having a longitudinal duct of considerably-less diameter than the duct 78. The cross-pipe 24 is provided with a check-valve 58 and is firmly seated by any back pressure.

From accidental causes a gas-pressure in excess of that desired to be maintained may at times be developed. It is common practice, for this reason, to use a gas-holder in connection with a generator and employ in connection therewith a suitable pressure-governor. Such devices are presupposed in connection with the apparatus forming the subject of this application and, being of such common use, it is not deemed necessary to show them. To guard against extraordinary pressures in the holder, a relief-valve is necessarily employed. Such devices are themselves subject to accident and wear and not infrequently become leaky, so that they allow the escape of gas even at and below the pressure which it is desired to maintain. In order to provide a suitable relief-valve and to guard against the disadvantages due to accident and wear, I locate it within the water-pipe, so that in order to afford relief the water must be forced backwardly through the pipe and past the valve. To this end a by-pass is provided around the check-valve 58, as shown at 59, and this by-pass is controlled by the back pressure of the relief-valve. As shown, the by-pass is connected directly with the lower end of the pipe 27 and the valve 60 is seated over its end, so that it will be raised by back pressure. A weight 61 is loosely mounted upon the stem of the valve 60 and determines the maximum pressure which may be maintained. The normal pressure of gas maintained is determined by the head of water, measured from the point of discharge from the riser 27 into the connection 31 to the level of the water in the tank 19. Any excess of pressure over this head will check the flow of water into the generator. Should there be a development of pressure in excess of the weight applied to the valve 60, the water will be forced downwardly in the pipe 27 and back into the tank 19. It is obvious that as the water is forced downwardly in the pipe 27 the head or water pressure increases, so that when the pipe 27 has become entirely emptied this increase is quite material. In the device constructed by me, and which is represented in the drawings in this application, the normal head of water is one pound, and the head when the pipe 27 has been emptied is two pounds. It follows, therefore, that in the absence of the valve 60 there would be no escape of gas backwardly through the water-passage until the pressure had reached and exceeded two pounds. Hence if the valve 60 becomes leaky I am still able to hold one pound of the excess pressure, as there can be no loss of gas because of the leak at the relief-valve until the pressure has reached two pounds.

When the generator is intended to be used in a railway-car, a cushioned spring 61ª should be interposed between the valve 60 and the weight 61 to relieve the valve in its seat of undue wear and consequence of jarring. A drain-pipe 62 leads from the by-pass 59 and is provided with a valve 63.

The connection 31 is provided with a gas-passage 77, across which is seated the two-way cock 76, and from this passage there leads upwardly a gas-pipe 35, which communicates with a cross-pipe 39, located above the water-tank, from which cross-pipe there leads a condensing-coil 49, which in turn communicates with a gas-pipe 41, which may lead directly to any suitable gas-holder. The gas-pipe 35 has at its upper end an enlarged chamber 66, the capacity of which is as great as the entire passage leading thereto from the connection 31. Should the pipe 35 by any accident become filled with water and when so filled there should be set up within the generator 15 an active development of gas, this column of water would be raised into the chamber 66, but would not be carried into the gas-pipe 39, as the gas would bubble up through it after leaving the comparatively-restricted passage of the pipe 35.

A by-pass in the form of an upwardly-extending loop 64, being a prolongation of the pipe 27, is provided around the valve 65, and this by-pass may, if desired, be provided with a valve 64ª. The pressure at which the gas is generated is measured by the weight of a column of water from the upper end of the riser 27 to the level of the water in the tank 19. It will be seen that when the valve 65 is open, so that water gains access to the duct 78 therethrough, this water-column is longer than when the valve 65 is closed, and the water must pass through the loop 64. All the generators of the battery discharge their gas into the cross-pipe 39. When it is desired to bring the generators successively into action, the height of the water-column

from which water is fed to the several generators is varied, so that in each the pressure at which the water-feed is automatically cut off is somewhat different from that of the other cells, and hence the water is automatically cut off from all of the cells except the one at which the feed is under the greatest pressure, the various cells coming into action successively as the carbid is exhausted in the one last in action.

I prefer to use the cells in pairs, so that the chemical action will be distributed instead of being concentrated in a single place, and in the drawings I have illustrated a battery of four cells thus divided into pairs, and the piping is so arranged that the several cells may be paired off in any desired combination. If it is desired to combine the cells C D as one pair and the cells E F as another pair, the valve 65 of one pair, as E F, will be closed, the valve 64ª thereof being opened. The water will enter the cells C D before reaching the cells E F and will instantly generate a sufficient pressure to prevent the water from passing through the loop 64 of the last-named cells, and such pressure will be maintained until the carbid in the cells C D has become entirely exhausted. A slight drop in pressure will now allow the water to pass through the loop 64 into the cells E F, and generation of gas will be continued therein.

The several tanks 19 are filled by means of a pipe 67, and each tank is provided with an overflow-pipe 70.

I show in connection with each of the water-tanks 19 a water-gage 75, but make no claim to the combination of such device with an acetylene-generator, as this feature is not of my invention, but is shown and described in a concurrently-pending application of William S. Hamm.

A further advantage in using a plurality of generating-cells and bringing them into action successively, either separately or in pairs, is found in the fact that it permits the substitution of charged cells for those which have become exhausted without cutting off the entire system. In practice when the generator is applied to a railway-car provision is made at certain stations on the road for the inspection of the lighting system, and any cells which may be found exhausted, or nearly so, will be replaced by others newly charged, and in order to do this it is necessary only that the valve 54 and the valves 64ª and 65 and the valve in the connection 31 be first closed in connection with the cell to be removed. The valves will now be set, of course, so that the generation will be continued in the cells already in service, to be automatically started in the new cell or cells after they have been exhausted.

The generating system herein described, while primarily designed for use in railway-cars, is equally efficient for domestic use and provides for the lighting of houses by means of acetylene gas, the generator system being installed and connected with the system of pipes which may be already in place for the use of common illuminating-gas. The generating-cells, being removable and portable, may be delivered to the users from a central depot, the substitution of newly-charged cells for empty ones being made without inconvenience to or annoyance of the user.

While I have shown as means for varying the head of water for the several generating-cells or for sets of cells the upwardly-extending loop 64, forming a prolongation of the riser 27 beyond the point of its direct connection with the cell and prefer such construction, I do not desire to be limited thereto, for the reason that any means by which the head of water may be varied for different generating-cells in which means is provided for maintaining a uniformity of gas-pressure will come within the scope of my invention.

While I have shown as means for preserving a uniform gas-pressure in the several cells a receiving-pipe common to all, any other means of connection between the several cells whereby uniformity of gas-pressure is maintained therein will come within the scope of my invention.

I claim as my invention—

1. In an acetylene-generator, in combination, a plurality of generating-cells, a source of water-supply for the several cells, the head of water for the several cells not being uniform, and means for maintaining an equal gas-pressure in the several cells.

2. In an acetylene-generator, in combination, a plurality of generating-cells, a source of water-supply for the several cells, the head of water for the several cells not being uniform, and a gas-pipe leading from each cell to a receiver common to all.

3. In an acetylene-generator, in combination, a plurality of generating-cells, a source of water-supply, a pipe connecting the water-supply with each cell and leading upwardly to its connection therewith, a valve at the delivery end of the water-pipe, an upwardly-extending by-pass around such valve, and means for maintaining an equal gas-pressure in the several cells.

4. In an acetylene-generator, in combination, a water-tank, a generating-cell below the tank, a water-pipe leading from the tank downwardly below the cell and thence upwardly and discharging into the cell from above, a check-valve in the water-pipe, a by-pass around the check-valve and a back-pressure valve controlling such by-pass.

5. In an acetylene-generator, in combination, a water-tank, a generating-cell, a gas-pipe leading from the cell and adapted to connect with a gas-receiver, such gas-pipe being enlarged above the tank, and a water-pipe leading from the tank to the cell and discharging thereinto through the gas-pipe.

6. In an acetylene-generator, in combination, a plurality of generating-cells, a source of water-supply, a pipe connecting the water-

supply with each cell and leading upward to its connection therewith, such pipe being subdivided at its delivery end into branches extending to different elevations, means for diverting the water through either branch, and means for maintaining an equality of pressure in the several cells.

7. In an acetylene-generator, in combination, a generating-cell, a source of water-supply to the cell, and a submerged relief-valve for the cell, such valve being held to its seat by a column of water exceeding in weight the gas-pressure desired.

8. In an acetylene-generator, in combination, a generating-cell, a source of water-supply to the cell, a U-shaped water-filled relief-passage for the cell, the outer leg of such passage carrying a column of water exceeding in weight the gas-pressure desired, and a back-pressure relief-valve located within such passage.

9. In an acetylene-generator, in combination, a water-tank, a generating-cell, a gas-pipe leading from the cell and adapted to connect with a gas-receiver, such gas-pipe being enlarged above the tank, and a water-pipe leading from the tank to the cell.

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Witnesses:
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