No. 651,881. Patented June 19, 1900.

A. McKENZIE.

ACETYLENE GAS GENERATOR.

(Application filed Jan. 27, 1899.)

(No Model.) 3 Sheets—Sheet 1.

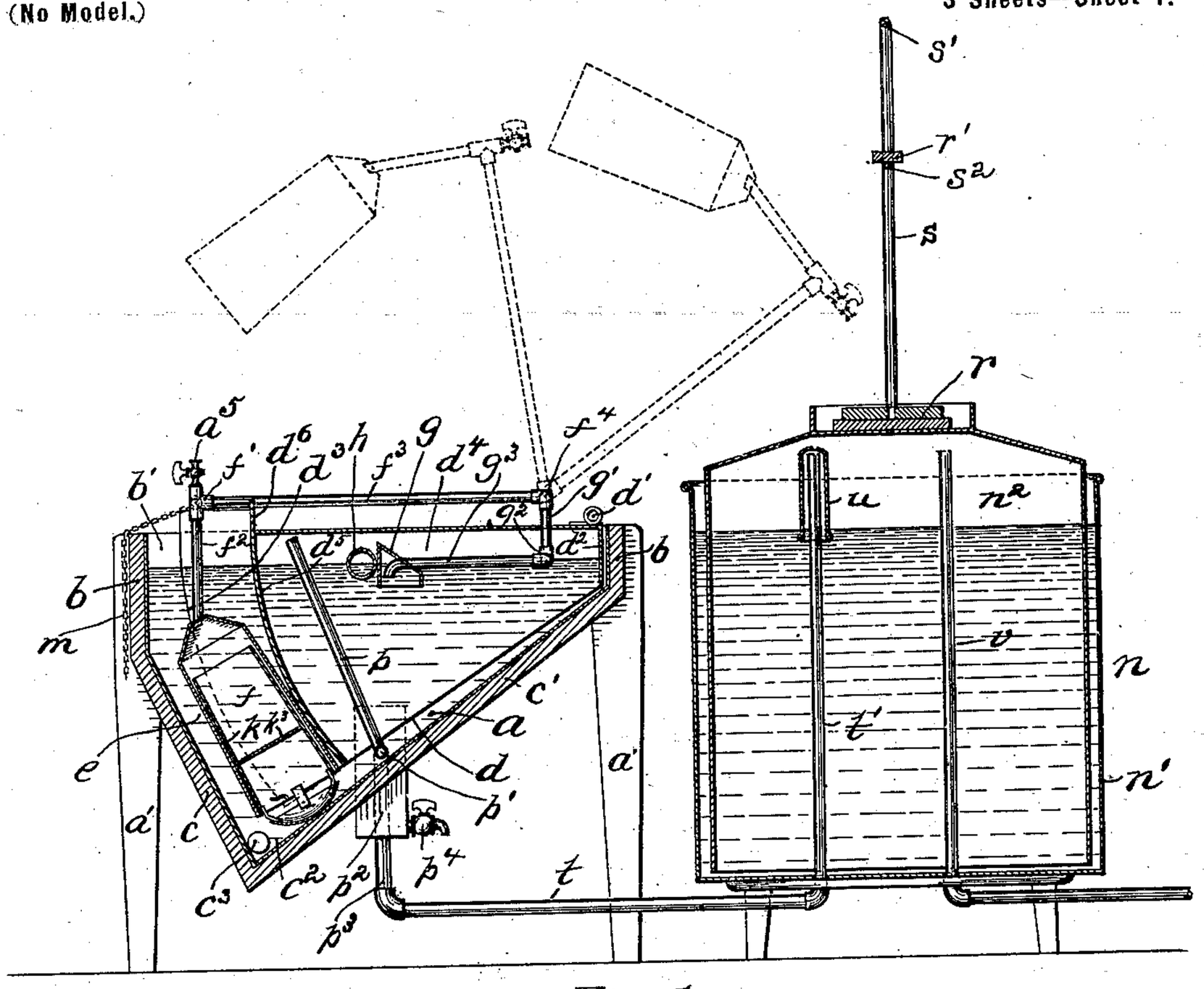


Fig. 1.

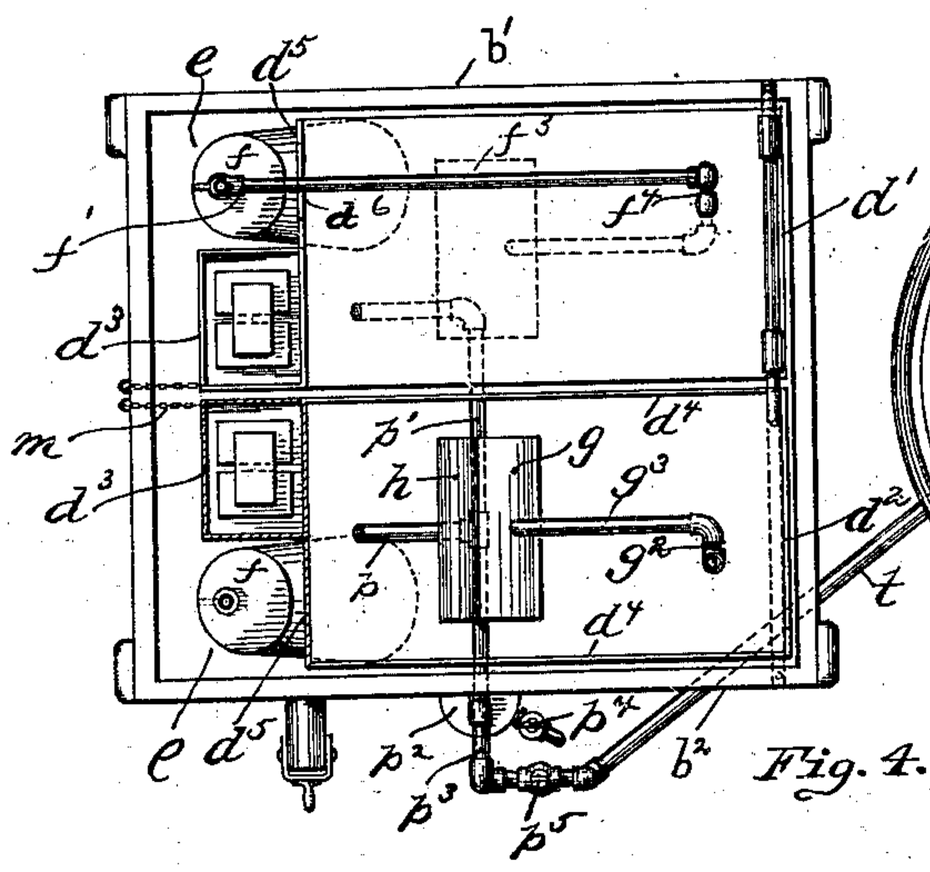
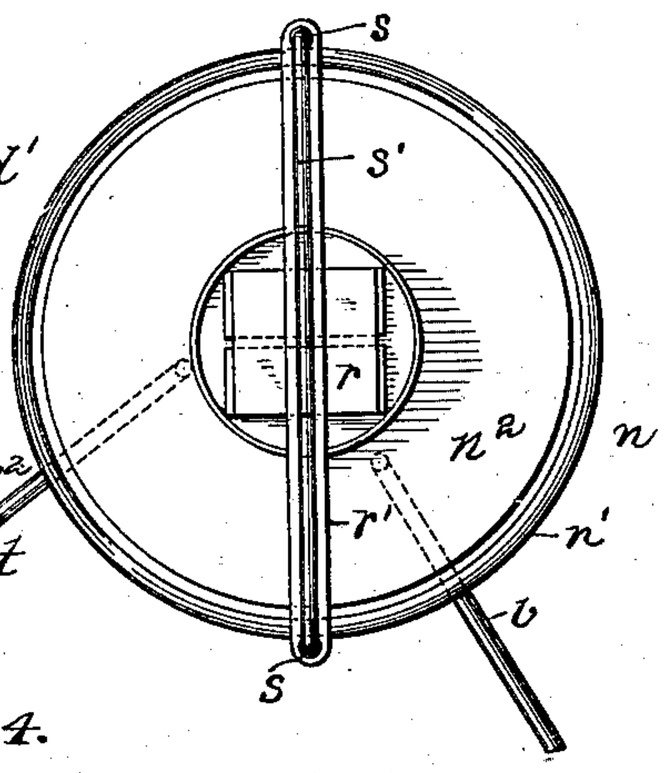


Fig. 4.



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(No Model.) 3 Sheets—Sheet 2.

Fig. 2.

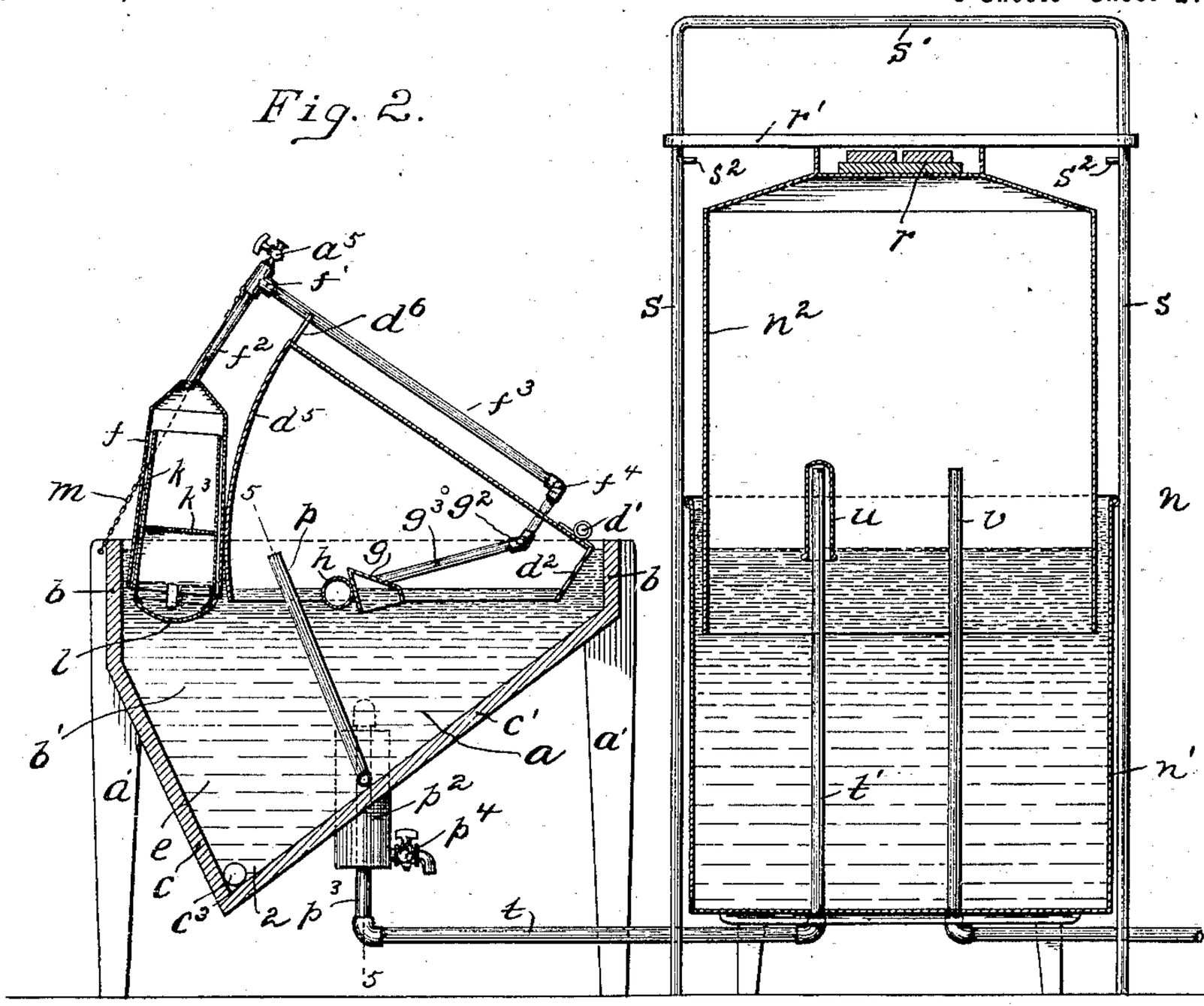


Fig. 3.

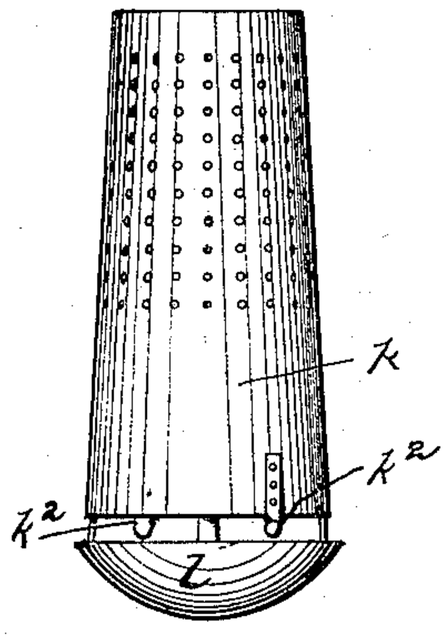
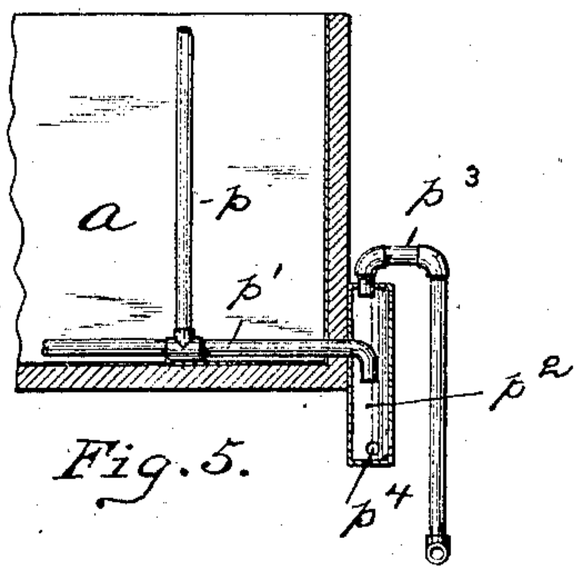


Fig. 5.



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(No Model.) 3 Sheets—Sheet 3.

Fig. 6.

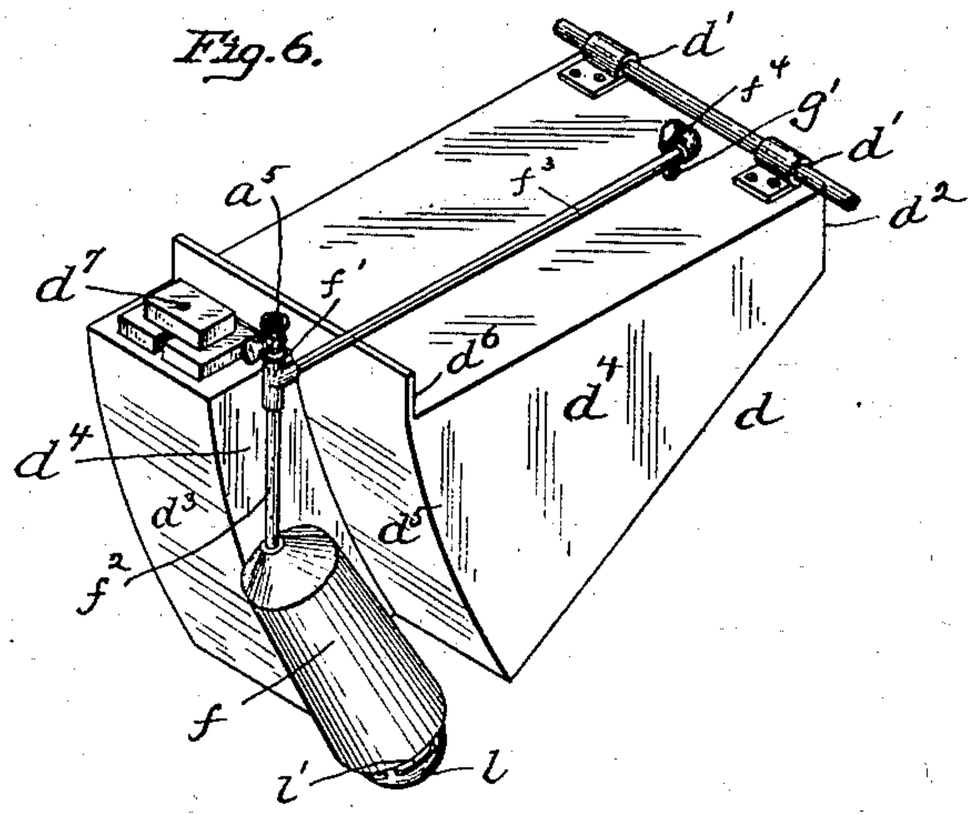
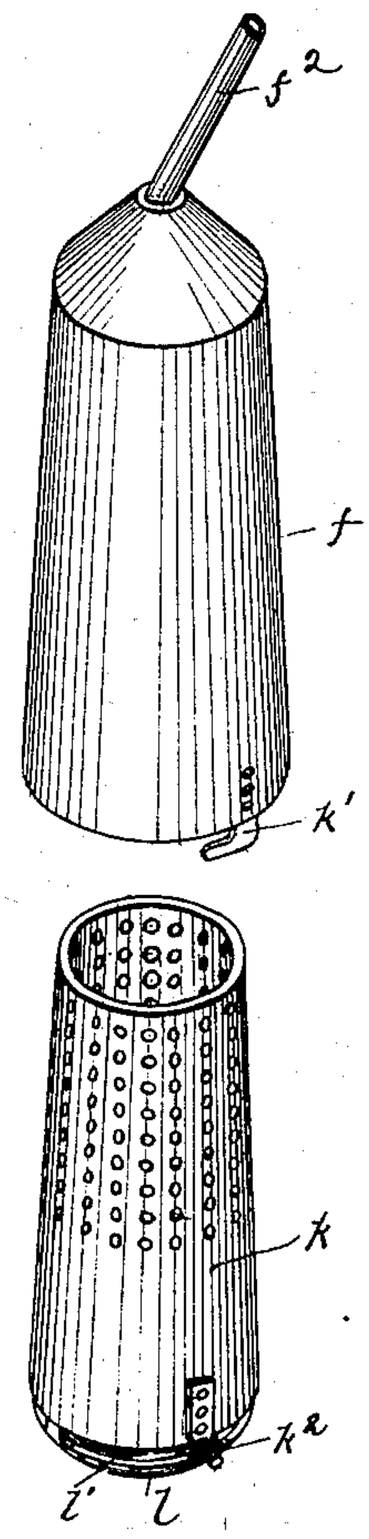


Fig. 7.



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Attorneys.

UNITED STATES PATENT OFFICE.

ANGUS McKENZIE, OF JAMESTOWN, NEW YORK, ASSIGNOR TO THE FENTON METALLIC MANUFACTURING COMPANY, OF SAME PLACE.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 651,881, dated June 19, 1900.

Application filed January 27, 1899. Serial No. 703,565. (No model.)

To all whom it may concern:

Be it known that I, ANGUS McKENZIE, a resident of Jamestown, in the county of Chautauqua and State of New York, have invented a new and useful Improvement in Acetylene-Gas Generators; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to acetylene-gas generators, its objects being to provide gas-generators in which easy and efficient means are provided for the filling of the carbid-holder, for cleansing any parts of the apparatus liable to clog with the deposit of lime, (or "ash," as it is termed,) for maintaining proper seals for the gas which will compel it to pass through the water, thereby aiding in washing or causing separation from the gas of any lime or ash held in suspension and preventing escape of gas when filling the carbid-holder, for maintaining a full supply of gas both in the generator and its accompanying holder, as well as to improve this class of apparatus in other ways hereinafter more fully set forth.

The apparatus comprises, generally stated, a tank having an inclined bottom deeper at one end than the other and a swinging gas-holding bell or generator-chamber hinged at the shallow end of the tank and swinging down into the same, and a carbid-holder supported on a pipe connected to a swivel-joint near the hinged end of the tank and extending forward, so as to carry the carbid-holder in position to enter the tank at its deeper end, the acetylene gas generated from the calcium carbid in the carbid-holder passing through this pipe and entering within the holder through a pipe extending to a trap supported by a float upon the water within the tank and this gas-holder acting as it fills with gas to lift the carbid-holder out of the water, an accompanying or auxiliary gas-holder receiving the gas generated and carrying a lighter weight than the generator during part of its stroke and then lifting a further weight, so that the gas-holder when partly filled with gas becomes weighted heavier than the generator, and the generator will itself fill with gas and will be raised thereby, lifting the carbid out of contact with the water and causing the generation of gas to cease.

The details of construction and the particular invention intended to be claimed will be hereinafter fully set forth.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a vertical section of the generator and gas-holder in their lowest positions, showing also in dotted lines the carbid-holder raised out of the water and in position for filling and in other dotted lines the carbid-holder swung back in position for washing out the holder and pipes. Fig. 2 is a like view showing the gas-holder filled and the generator raised to its highest position, the weight and its guides on the gas-holder being shown at right angles to that in Fig. 1. Fig. 3 is a detail of the carbid-holder. Fig. 4 shows two generators, one in plan and one in section, and a plan view of the gas-holder. Fig. 5 is a section on the line 5 5 through the pipe leading from the generator to the gas-holder. Fig. 6 is a perspective view of the gas-holding bell and accompanying parts, and Fig. 7 is a detached perspective view of the carbid-holder and carbid-basket.

Like letters of reference indicate like parts in each view.

The generator-tank *a* is preferably built of wood, suitably lined, supported on legs or posts *a'*. The sides *b* and ends *b' b²* are vertical, as shown, but the bottom is inclined, being composed of the abruptly-inclined bottom wall *c* and the gradually-inclined bottom wall *c'*, forming a tank deeper at one end than the other, the deepest point *c²* of the tank providing a chamber for the gathering of the lime or ash from the calcium carbid and having an escape opening or faucet *c³*, which can be opened to withdraw the deposit of ash or lime, a large faucet having a free opening through which the ash may be raked, if necessary, being preferred, though it is usually found that all such deposit will flush out through such faucet. The inclines of the bottom walls *c c'* depend upon the swing of the gas-holding bell *d*, which is pivoted at *d'* to the shallow end of the tank and corresponds substantially in shape to the tank itself, having the shallow depending end wall *d²*

at one end and the deep depending end wall d^3 at the other, and the side walls d^4, formed on an incline, connecting the same. As shown in Fig. 4 and in dotted lines in Fig. 1, the end wall d^3 extends for part of the width of the tank close to the end wall c and then parallel with the side walls d^4, and thence at right angles to the side walls, as at d^5, leaving in this way a well e within the tank to receive the carbid-holder f. The weight of the gas-holding bell d may be increased, if desired, by the addition of one or more weights d^7, placed thereon. The main tank a may be arranged to receive as many of these gas-holding bells or generator-chambers d as desired, a battery of two being shown in the drawings, though such battery may be increased according to the desired capacity of the generator.

The carbid-holder f communicates with and is rigidly connected to the elbow-pipe f', one arm f^2 of which extends down with the carbid-holder into the tank, while the other arm f^3 extends parallel with the top wall of the bell d, toward the hinged end of said bell, and is connected by a swivel-joint f^4 to the pipe g', which extends through the top wall of the bell d and thence connects by a swivel-joint g^2 with the pipe g^3, which leads to the trap or inverted washer-box g, which has connected to it the float h, by which it is held upon the top of the body of water within the tank a, with the mouths of the trap or washer-box dipping in the water. In this way the gas generated in the carbid-holder must pass upwardly through the elbow-pipe f' and through the swivel-joint f^4, pipe g', swivel-joint g^2, and pipe g^3 into the washer-box and pass under the water before entering the generator-chamber, being thus washed or refined from any of the lime which might pass over with the gas through the pipes and connections above described. The elbow-pipe f' has the air-cock a^5 at the bend or elbow of the pipe to admit air when the carbid-holder is withdrawn from the tank. As shown in dotted lines, the carbid-holder normally rests on the bracket d^6 of the bell and is thus supported in its well e, so that as the gas generated causes the rising of the bell d the carbid-holder is lifted out of the bell and generation of gas discontinued, and when the bell d descends as the gas is consumed the carbid-holder is lowered into the water and gas generation resumed.

The carbid-holder f, as shown, is a cylindrical downwardly-flaring bell, and the carbid-basket k fits within the same, being secured therein in any suitable way, the means shown being by the hooks k' on the base of the carbid-holder f, into which pins k^2 on the basket pass by the turning of the basket after it has entered into the carbid-holder. The basket may be made of wire or sheet metal perforated to provide for the easy escape of the gas from the same. It has extending across it some distance above its open base the wire or like partition k^3, on which the body of carbid rests, as shown in Fig. 2, this partition being made some distance above the base of the basket, so that the carbid will be lifted out of the water some time before the gas-holder reaches its highest position and before the base of the carbid holder or retort f passes out of the water. The basket k may, if desired, have secured to it the ash-pan l to receive the lime or ash, which will pass through the grating k^3, so that the greater part of the ash can be withdrawn with the basket instead of dropping into and clogging the tank a. Space, as at l', is left between the top of the ash-pan and the base of the basket through which the water can enter into the lower part of the basket and rise into contact with the calcium carbid contained therein. To prevent the bell d from rising out of the tank, so as to permit escape of gas, a chain m is connected to the upper edge of the tank a and to the upper edge of the bell d, which limits the upward movement of the tank.

Though the generators may for small plants be employed alone, depending only upon the space within the generator chamber or bell for storage of gas, it is preferred to employ the gas-holder and the gasometer n in connection with the generators, so that a full supply of gas will always be on hand. In such case the exit-pipe p from the gas-generators leads to the gasometer, as shown, these exit-pipes from the different generators in the battery extending from points above the water-line in the tank a downwardly below the lowest position of the bell d, in line with the same, and the several exit-pipes from the several generators being connected to the horizontal pipe p', which extends through the side of the tank. In order to receive any water or drippings which might pass over with the gas and to insure the open passage in the pipe p', I prefer to employ the drip-tank p^2 at one end of the main tank a, into which the pipe p' enters, the exit-pipe from such tank communicating with the exit-pipe p^3, communicating with the upper end of the drip-tank p^2 and leading thence to the gasometer n. The drip-tank has the valve p^4 to withdraw any drippings from the same.

The gasometer n is preferably of the ordinary cylindrical form, having the tank n' and gas-holder n^2, and the gas-holder carries at the upper end the weights r, resting within a seat for the same. The weights r are arranged so as to give a less weight per square inch of surface to the gas-holder n^2 of the gasometer than to the bell d of the generator, so that the gasometer will be filled first; but to control the position of the gasometer and prevent its rising to too great height, while at the same time providing surplus storage in the gasometer to prevent strain upon the whole apparatus in case of overgeneration of gas, I provide the supplemental weight r', which is suspended above the gas-holder n^2 in such position that as the gas-holder rises it will come in contact with and lift this supple-

mental weight, in which case it will carry a greater weight to the square inch than the generator-bell d, so that the bell will be gradually filled and will lift the carbid-holder out of the water and generation of gas will cease. It will be noticed that the gas-holder n^2 takes up this supplemental weight r while there is still considerable gas-storage space in the holder. The advantage of this is that in case of overgeneration of gas when the generator-bell d cannot rise farther the gas will simply be stored by the raising of the gas-holder n^2, lifting the supplemental weight r', and storing this surplus gas, so that the necessity of having any escape or vent from the generator is overcome. The supplemental weight r' may be suspended in any suitable way, the preferable and most efficient way being illustrated, the tank n' carrying vertical guide-bars s, which extend above the tank and are connected to the cross-bar s', so forming a positive limit or stop to the upward movement of the gas-holder n^2, while the supplemental weight r' is formed of a long bar having holes fitting around and supported on pins s^2 on the guide-arms s, which hold it in line to be taken up by the gas-holder in the manner above described.

The exit-pipe p^3 from the generator leads to the valve p^5, which can be closed when desired to cut off supply of gas to the gasometer, and from the same the pipe t leads into the base of the gasometer, communicating with the vertical pipe t', which rises up above the water-line therein, while fitting over the upper end of and supported by the vertical pipe t' is the cap-trap u, which extends down below the water-level in the tank n', so compelling the gas passing into the gasometer to pass downwardly and through the water within that tank to further wash the same. The outlet-pipe v leads from above the water-level in the tank n' out to the point of consumption.

When the generator is in operation, the generator-tank a and the gasometer-tank n' having been filled with water, the usual operation is to raise the carbid-holder f, with its elbow-pipe f', so that the pipe f^3 is in practically vertical position, when the basket k can be inserted in the open lower end of the carbid-holder and turned, so that its pins k^2 engage with the hooks k', so charging the carbid-holder. The usual custom is then to lower the carbid-holder and push it down into its well e of the tank, so forcing the carbid-holder under the water in the tank. The water will then pass upwardly into the carbid-holder and through the grating k^3 of the basket and will generate the gas from the calcium carbid in the usual way, the gas rising through the pipe f^2 and the pipe f^3 and then descending through the pipe g' into the pipe g^3 and into the trap g, which is held under the water by the float f, as above described, the gas being thus compelled to pass through the water before entering the bell d, and any lime which has been carried over in suspension by the gas through the pipes, as above described, being washed out and deposited in the tank, where it will collect in the lower or funnel end thereof, ready to be withdrawn through the faucet c^2. As the generator-bell is more heavily weighted than the gas-holder of the gasometer u, the gas will then naturally pass through the exit-pipe p over to the gasometer, and as it rises through the pipe t' thereof will pass into the cap-trap u and will be again forced throuhg the water to further wash the same in case of the possibility of carrying ash over with the gas, though there is little liability of the same. As the gas is generated, the gas-holder gradually rises, and it continues to rise until it contacts with the supplemental weight r', supported on the vertical bars s, above described, when the gas-holder n^2 will be more heavily weighted than the bell d, in which case the bell d will commence to rise, and with it will lift the carbid-holder f, and the entire body of carbid will be lifted from the water before the bell d reaches its highest position, so that as the carbid continues to generate gas from any water adhering to the surface of the lumps or particles thereof the bell will normally provide space for the storage of the same. In case sufficient space for such storage is not found, however, when the bell reaches its highest position, limited by the chain m, the gas will pass over in the gasometer n and will overcome the weight r' and lift the gas-holder n^2, so as to store the surplus gas, such operation continuing, if necessary, until the gasometer strikes the cross-bar s', when no other movement can take place and the gas will simply be stored under further compression. As the gas is consumed the gas-holder n^2 will descend until relieved of the supplemental weight r, after which it will naturally remain in normal position, holding the full body of gas, and to generate any gas needed to keep up the supply the bell d will descend, so as to dip the calcium carbid contained in the carbid-holder into the water, the bell d fluctuating in such way as to continue the generation of gas, and finally after all the acetylene gas has been obtained from the carbid in the holder the bell d will drop into its lowest position, as shown in Fig. 1, when the gas stored in the gas-holder n will maintain the supply until it is exhausted.

In order to recharge the generator, no attention need be paid to the gas-holder or other parts than the carbid-holder and its pipes. The operator simply opens the air-cock a^5, so that as he raises the carbid-holder and its elbow-pipe the air can pass into the same, in which case as the pipe f' is reduced to atmospheric pressure the pressure of the gas within the bell d of the generator will force the water upwardly within the trap g and pipe g^3, so forming a positive seal to prevent

the escape of gas. The operator then turns the basket and withdraws it from the carbid-holder, cleans it from ash and recharges it, and reinserts it within the carbid-holder, as above described, and forces it down into the well *e* of the tank and closes the cock f^5, when the generator operates in the way above described. In case it is found that the ash or lime is carried up with the gas in such way as to fill or clog the pipe connections from the gas-holder through to the trap *g* the operator before refilling the carbid-holder swings it over into the second dotted position shown in Fig. 1, in which case the carbid-holder is raised, so that its open base extends upwardly, when he can pour water downwardly through the same and its connecting-pipes and thoroughly wash them out, washing such ash into the tank, where it can descend into the base thereof and be withdrawn through the faucet c^3. In case it is desired to open any generator—that is, to withdraw the bell from the water seal in which it normally rests—for repair of that chamber or other reasons no gas can escape back from the gasometer *n* through the connecting-pipes because of the cap-trap *u*, forming a water seal to the inlet-pipe *t'* of the gasometer, the water rising within this trap and forming an efficient seal against the escape of gas.

The apparatus is simple in construction and operation, provides for the easy and rapid filling of the carbid-holder without disturbing the other parts, has practically no valves to get out of order, and provides for access to all of its parts without disturbing gas generation of other parts or necessitating the closing down of the plant.

While the generator and apparatus above described is primarily intended for use in generation of acetylene gas, it is of course to be understood that it can be employed in connection with any suitable material in which gas is generated by a solid by contacting with a liquid, as may be found desirable.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with a tank having an inclined bottom formed of one abrupt and one gradually-slanting portion, and a gas-holding bell hinged above the water-level of the tank and having side and end portions extending down below the water-level when in raised position, said bell being adapted to swing down into the tank, substantially as set forth.

2. The combination of a tank having an inclined bottom provided with an outlet-faucet at the bottom of the inclined portions and a gas-holding bell hinged at one end of the tank and adapted to swing down into the same, substantially as set forth.

3. The combination of a tank, a gas-holding bell adapted to pass into the same, and a carbid-holder adapted to pass into the tank and a pipe communicating with the upper end of the holder and extending above and thence into the bell, and having a swivel-joint above the bell to permit the raising of the carbid-holder independent of the bell, substantially as set forth.

4. The combination of a tank, a bell-holder adapted to enter the same, a carbid-holder adapted to pass into the tank, and an elbow-pipe communicating with the upper end of the carbid-holder and extending to and communicating by a hinge or swivel joint with pipe connections entering the bell, substantially as set forth.

5. The combination of a tank, a bell-holder adapted to pass into the same, a carbid-holder having pipe connections leading from the upper end of the same above the bell and having a swivel connection with the pipe entering within the bell, and an air-cock in such pipe leading from the carbid-holder, substantially as set forth.

6. The combination of a tank, a gas-holding bell adapted to enter the same, a carbid-holder adapted to enter the tank and having pipe connections leading from the upper end thereof above the bell and into the same, a pipe within the bell connected by a swivel-joint with such pipe, and a trap communicating therewith, substantially as set forth.

7. The combination of a tank, a gas-holding bell adapted to enter the same, a carbid-holder adapted to enter the tank and having pipe connections leading from the upper end thereof above the bell and into the same, and a pipe within the bell connected by a swivel-joint with such pipes, a trap communicating therewith, and a float connected to the trap.

8. The combination of a tank, a gas-holding bell adapted to pass into the tank and having pipe connections leading above the bell and thence into the same, a carbid-holder adapted to enter the tank and having an open lower end, a basket adapted to enter the lower end of the carbid-holder, the carbid-holder and basket being correspondingly cone-shaped, substantially as set forth.

9. The combination of a tank, a gas-holding bell adapted to enter the same, a carbid-holder adapted to enter the tank and having pipe connections leading from the upper end thereof above the bell and into the same, said carbid-holder having an open lower end, a basket adapted to enter the lower end and be secured to the carbid-holder, and an ash pan or receiver connected to the basket, substantially as set forth.

10. The combination with a tank having an inclined bottom, of a gas-holding bell hinged at one end of the tank and adapted to swing down into the same, a carbid-holder adapted to enter the tank and having pipe connections extending from its upper end above the bell and thence down into the same, and a water-trap within the bell having a pipe connected by a swivel-joint with such pipe connections, substantially as set forth.

11. The combination of a tank, a gas-holding bell adapted to enter the same, an exit-pipe leading downwardly within the said bell and thence horizontally within the tank, a drip-tank into which such exit-pipe enters and an exit-pipe leading from the upper end of the drip-tank, substantially as set forth.

In testimony whereof I, the said ANGUS MCKENZIE, have hereunto set my hand.

ANGUS MCKENZIE.

Witnesses:
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A. F. WEBER.