No. 789,856. PATENTED MAY 16, 1905.

F. HOLLY.

ACETYLENE GENERATOR.

APPLICATION FILED JUNE 7, 1904. RENEWED APR. 8, 1905.

2 SHEETS—SHEET 1.

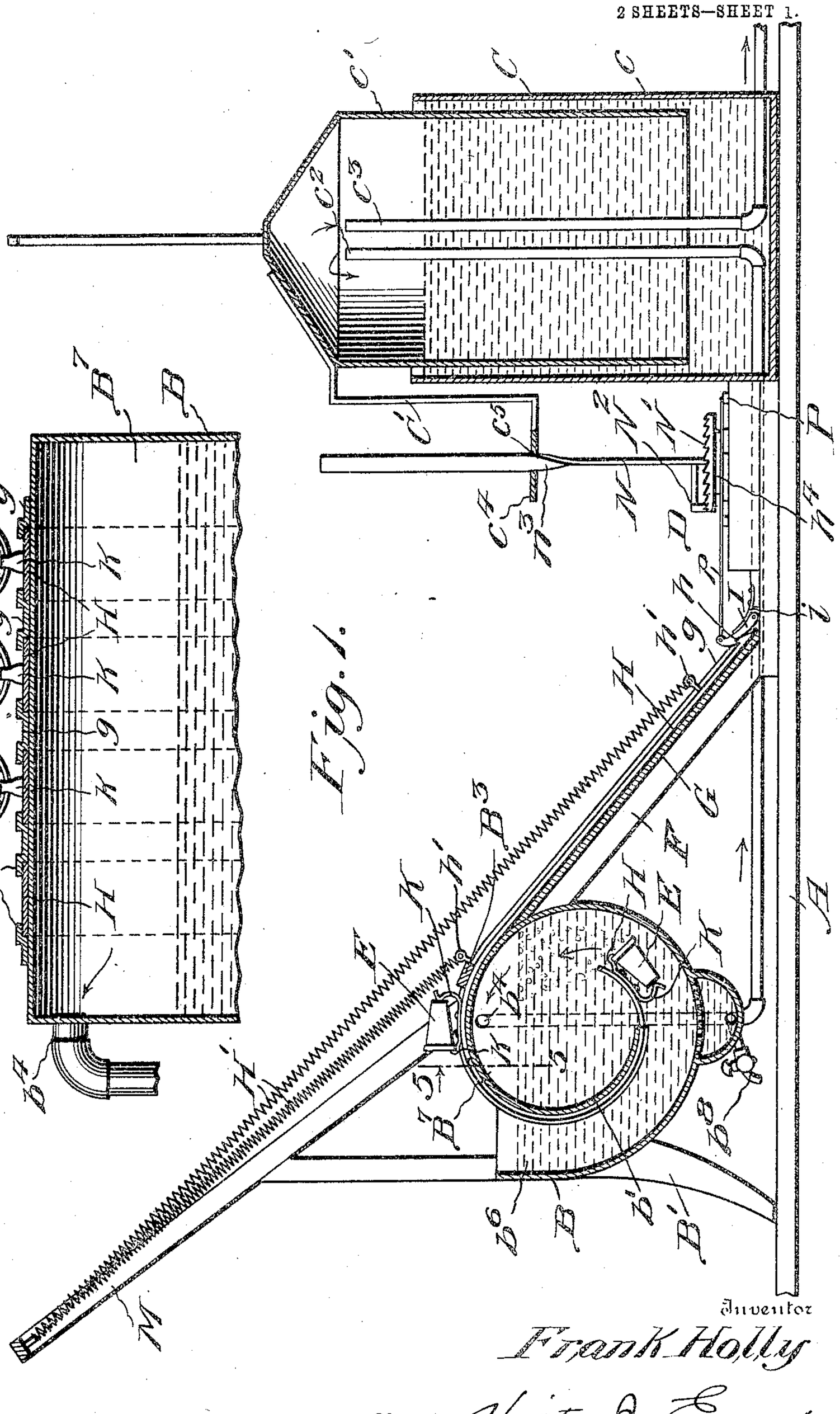

Fig. 1.



Fig. 5.

Witnesses

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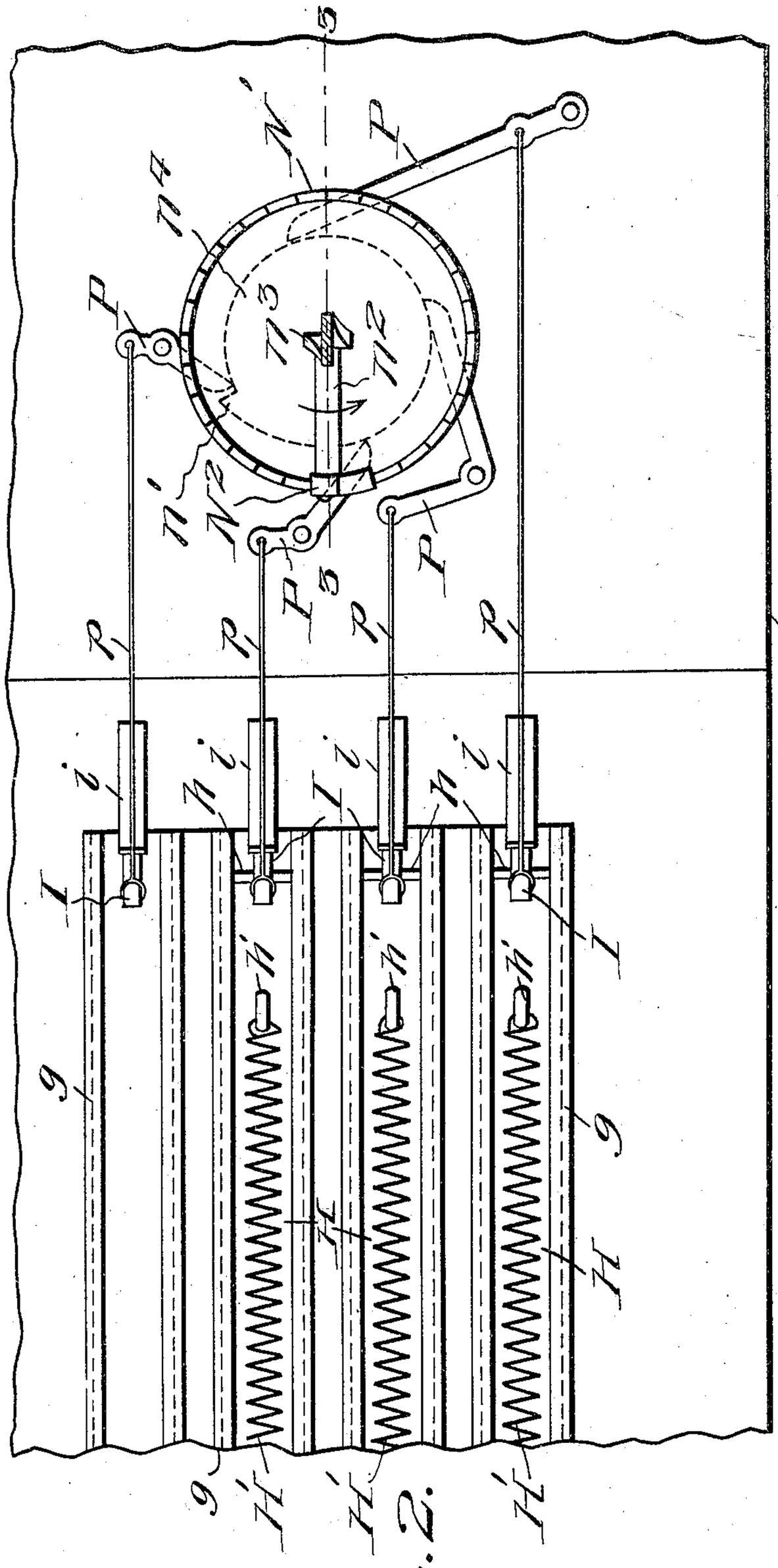


Fig. 2.

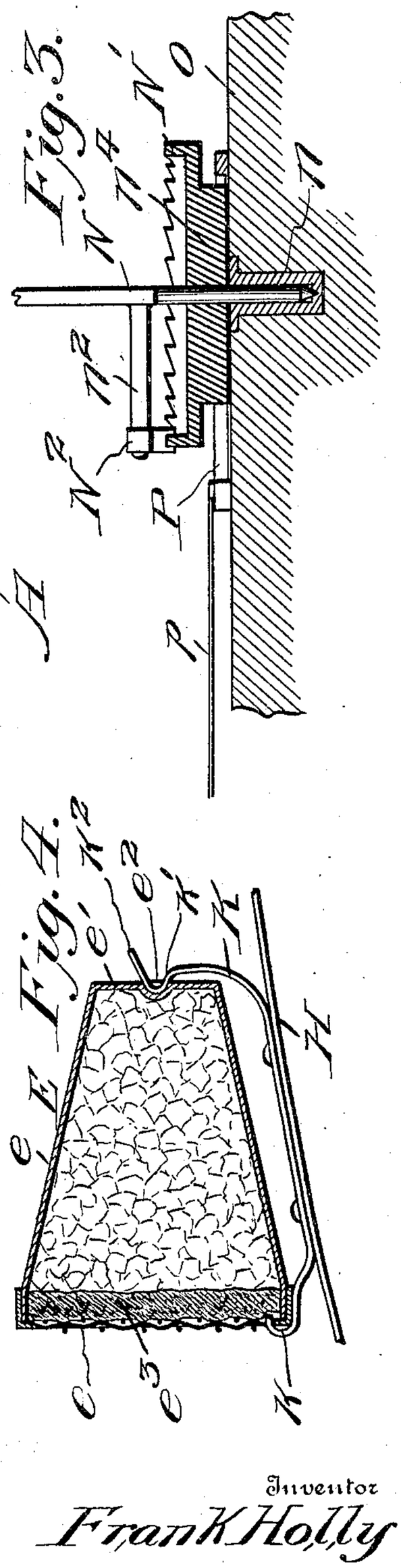


Fig. 3.




Fig. 4.

Witnesses

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# UNITED STATES PATENT OFFICE.

FRANK HOLLY, OF KANSAS CITY, MISSOURI.

## ACETYLENE-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 789,856, dated May 16, 1905.

Application filed June 7, 1904. Renewed April 8, 1905. Serial No. 254,590.

*To all whom it may concern:*

Be it known that I, FRANK HOLLY, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented new and useful Improvements in Acetylene-Generators, of which the following is a specification.

This invention relates primarily to a generating apparatus for economically and continuously manufacturing acetylene gas in small quantities for domestic use. The principle, however, may be applied to large plants for commercial use.

The principal object of my invention is to generate acetylene gas in an open tank containing a large quantity of water by introducing successively thereinto and at suitable times proportionately small amounts of carbid, which after being exhausted may be withdrawn from the water independently of a second charge of carbid automatically following the exhaustion of the first charge and a fresh charge substituted. By thus putting small charges of carbid in succession in a large quantity of water the generated gas, heated by the chemical reaction, is greatly reduced in temperature and rendered practically odorless. The loss of gas by this process is insignificant and all danger of explosion by internal pressure made impossible.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section through my improved apparatus. Fig. 2 is a plan view, on a larger scale, of a portion of my apparatus, showing more clearly the automatic trip mechanism. Fig. 3 is a detail view in section, taken on the line 3 3, Fig. 2. Fig. 4 is a longitudinal sectional view of the carbid-cartridge and its holder. Fig. 5 is a sectional view on the line 5 5, Fig. 1.

Similar letters of reference indicate the same parts on the several figures.

On a base A is placed a gas-generating tank B, a gas-holder C, and a tripping mechanism D, operated by the gas-holder for automatically causing the carbid holders or cartridges E to be immersed in water contained in the gas-generating tank B. The several sections of my apparatus placed as above described are not a necessary part of the invention; but for the purpose of illustration they are so grouped.

The generating-tank B, supported on legs B′ and by inclined braces F, has its bottom and inner side helically curved in the manner indicated in Fig. 1, the curvature continuing over the top and into the tank in such manner as to form a partition *b* within the tank, dividing it into an open water-space $b^6$ and a gas-collecting chamber *b*′. Supported on the inclined braces F is a plate or table G of a width substantially that of the generating-tank B and extending from the base A to the top of said tank. The upper surface of the plate G is tangential to the curved top of the generating-tank, to which plate is secured a series of guides or ways *g*, that extend over the top of the tank and around the partition *b* to its end. H represents strips or carriers of brass, phosphor-bronze, or other spring metal non-corrosive in water, which are adapted to slide in the ways or guides *g*, each strip or carrier having a shoulder or tooth *h* on its lower end to be engaged by a pawl I, while on its upper end is fastened a spring-holder K for carrying a carbid-cartridge E.

To a frame M, extending above the generator-tank B, are attached a number of spiral springs H′, the lower end of each spring being fastened to a pin *h*′ on a corresponding carrier H. The gas-holder C is of the usual construction, having an outer tank *c* and vertically-movable inner tank or bell *c*′, with a water seal and gas inlet and outlet pipes $c^2$ $c^3$, respectively. Depending from the top of the bell *c*′ is an arm C′, the lower end of which is turned horizontally, as at $c^4$, and provided with a horizontal opening $c^5$, through which passes a flat vertically-pivoted bar N. The bar N is journaled and supported in an upright position in a bearing *n*, let into a base-plate O, and at the base of said bar and loosely mounted to turn thereon is a crown ratchet-wheel N′, on the hub $n^4$ of which is a tooth *n*′. An arm $n^2$ projects laterally from the vertical bar N and has pivoted thereto a pawl $N^2$ to engage the teeth of the crown ratchet-wheel N′ and give it a partial rotation when

the vertical bar N, turned by the arm C′ in its downward movement, passes a spiral turn $n^3$ on said vertical bar.

Pivoted to the plate O around the ratchet-wheel N′ are a number of levers P, there being as many levers P as carriers H. Four are shown in the drawings; but this number may be increased or diminished. Each lever P is held in contact with the hub $n^4$ by means of a plate-spring $i$ pressing on a pawl I, connected to a lever P by a wire, rod, or other connection $p$.

The carbid-cartridge E is formed of a truncated conical metal case $e$, the smaller end $e'$ being closed and provided with a depression $e^2$, while the larger end is open; but when in use it is temporarily closed by a piece of sponge $e^3$ or similar material held in place by a woven-wire cover $e^4$.

The carbid-cartridge is held in position by a holder of spring metal riveted to the end of the carrier next the generating-tank B, one end of said holder K being bent into a hook $k$ to engage the larger end of the cartridge E, while its opposite end is turned upward, ending in a loop $k'$ and finger-piece $k^2$. The loop $k'$ enters the depression $e^2$ of the cartridge.

The pipe $c^2$, leading to the gas-holder, leaves the gas-collecting chamber $b'$ of the generating-tank B near the top at $b^4$, running thence to the bottom of the holder, into which it enters, and passes thence up through the water to near the top of the bell $c'$. The outlet-pipe $c^3$ passes downwardly parallel with the inlet-pipe and out through the side of the holder near the bottom. Passing as they do through the water in the gas-holder, the pipes are kept cool and the temperature of the gas reduced.

The operation is as follows: Before the generation of gas begins all the carriers H are drawn down until the pawls I engage the lugs $h$ thereon. In this position of the carriers the cartridge-holders are on top of the generating-tank B. A cartridge E is inserted in each holder K by engaging its larger end with the hook $k$ and pressing its closed end against the loop $k'$, which will spring into the depression $e^2$ of the cartridge. The bell $c'$ of the holder will at this time be in its lowest position, the horizontal portion $c^4$ of the arm C′ being below the spiral turn $n^3$ of the vertical rod N. One of the pawls I may now be disengaged by hand from its connection with a carrier, which latter under the influence of its spring H′ will slide upward in its guides $g$ until it is stopped by the pin $h'$ striking a bar $B^3$, extending across the generating-tank. The cartridge will be carried by the movement of the carrier through the water-space $b^6$ around the partition $b$ to the inner part or gas-collecting chamber of the tank. It will be observed that the cartridges are so placed on the carrier that their open ends will enter the water first, which arrangement admits only the minimum amount of air into the water, the gas generated being thus kept free from an appreciable mixture of air which is detrimental to the brilliancy of the light and if in sufficient quantity is liable to cause an explosion when the gas is ignited. In its operative position the cartridge is held with its larger or open end upward, so that water passing through the sponge in the mouth of the cartridge combines with the carbid within and the reaction takes place, releasing acetylene gas. The gas escapes through the sponge and collects in the top of the tank B, passing from thence through the pipe $c^2$ into the gas-holder, lifting the bell $c'$, with the arm C′, the latter turning the vertical bar backward a quarter-revolution. The pawl $N^2$ during this backward movement passes over the teeth of the crown ratchet-wheel N′. The gas-holder is of such size as to safely hold all the gas generated by the cartridges. As the gas is used the bell $c'$ falls. The arm C moving downward with it engages the spiral turn $n^3$ and causes the pawl $N^2$ to turn the ratchet-wheel N′ until the tooth $n'$ on its hub rocks the lever P next in order. The latter through the connections described will raise the pawl I connected thereto and release the carrier held thereby, carrying another cartridge into the water. This automatic movement continues until all the cartridges have been used. In the meantime each carrier may be drawn down individually into engagement with its pawl, the exhausted cartridge removed, and a new one inserted in its place.

The quantity of water in the generating-tank being so much greater in quantity than the charge of carbid, the heat and odor generated by the chemical reaction are absorbed by the water, and the gas emerges therefrom at a comparatively low temperature and with little odor, about ninety per cent. of the heat being absorbed. The water in the tank is kept practically free from sediment by incasing the carbid, the residue thereof remaining in the cartridge. Should, however, any sediment collect in the tank, it can be drawn off through the cock $b^8$.

If at any time the generation of gas be so great that it cannot be carried off through the outlet-pipe, the tank cannot explode by the internal pressure, as it is not sealed otherwise than by the water contained therein, which would be forced out of the tank and the gas allowed to escape before the pressure reached the danger-point.

While I have represented one form of apparatus adapted to perform the functions of my improved acetylene-gas generator, it is to be understood that I do not confine myself to the exact construction and arrangement of parts described and shown, but reserve the

right to make such change and reorganization of parts as fall within the limits of my invention.

Having thus described the invention, what is claimed as new is—

1. In an acetylene-gas apparatus, the combination of a partly-open generating-tank, a curved partition therein continuous with the top of said tank, a plate or table tangential to said curved top, and a plurality of carbid-carriers adapted to slide over said plate and around said partition.

2. In an acetylene-gas apparatus, the combination of a partly-open generating-tank, a curved partition therein continuous with the top of said tank and forming a gas generating and collecting chamber, a plate or table tangential to said curved top, and a plurality of carbid-carriers adapted to slide over said plate and around said partition, each carbid-carrier having an independent movement.

3. In an acetylene-gas apparatus, the combination of a generating-tank, a curved partition therein continuous with the top of said tank dividing it into an open water-space and a gas generating and collecting chamber, a plate or table tangential to the top of said tank, a plurality of independently-movable carbid-carriers adapted to slide over said plate and around said partition, and means for securing a charge of carbid to each of said carriers.

4. In an acetylene-gas apparatus, the combination of a generating-tank adapted to contain water, a curved partition therein continuous with the top of said tank, a tangential plate or table, carbid-carriers independently movable over said plate and around said partition, means for attaching a charge of carbid to each carrier, means for independently and successively immersing each attached carbid charge, and means for holding said charge out of the tank.

5. In an acetylene-gas apparatus, the combination of a generating-tank adapted to contain water, independently-slidable flexible carriers, each having a carbid-holder at one end and a lug on the other, means such as a spring for independently moving each carrier and immersing its carbid-holding end in said tank, means for separately engaging the lug on each of said carriers, and means for successively disengaging them.

6. In an acetylene-gas apparatus, the combination with a gas-holder, of a pivoted vertical bar having a spiral twist, carbid-feeding mechanism including a ratchet-wheel, a pawl or its equivalent on said bar adapted to operate said ratchet-wheel, and means carried by said gas-holder to coact with the twisted portion of said vertical bar and oscillate it at each rise and fall of the gas-holder to actuate said pawl.

7. In an acetylene-gas apparatus, the combination with a gas-holder, of a pivoted vertical bar having a spiral twist, a pawl or its equivalent on said bar adapted to operate detaching devices, carbid-carriers adapted to engage said detaching devices, and means carried by said gas-holder to coact with the twisted portion of said vertical bar and partially turn said bar at each rise and fall of the gas-holder.

8. In an acetylene-gas apparatus, the combination with a gas-holder, of a pivoted vertical bar having a spiral twist, a wheel adapted to be intermittently rotated, a pawl or its equivalent on said bar adapted to intermittently rotate said wheel, detaching devices, each successively operated by the movement of the wheel, carbid-holders adapted to engage said detaching devices, and means carried by said gas-holder to oscillate the vertical bar.

9. In an acetylene-gas apparatus, the combination of a partly-open generating-tank adapted to contain water, a curved partition therein continuous with the top of said tank and forming a gas generating and collecting chamber with a water seal, a plate or table tangential to said curved top, guides thereon and on said curved top and partition, and a plurality of carbid-carriers adapted to slide in said guides.

10. In an acetylene-gas apparatus, the combination of a generating-tank adapted to contain water, independently-slidable flexible carriers, each having a carbid-holder at one end and a lug on the other, means for independently moving each carrier and immersing its carbid-holding end in said tank, means for separately engaging the lug on each carrier, means for successively disengaging them, and a stop to arrest each of said carriers after being disengaged.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK HOLLY.

Witnesses:
A. B. ANDERSON,
E. McD. COLVIN.