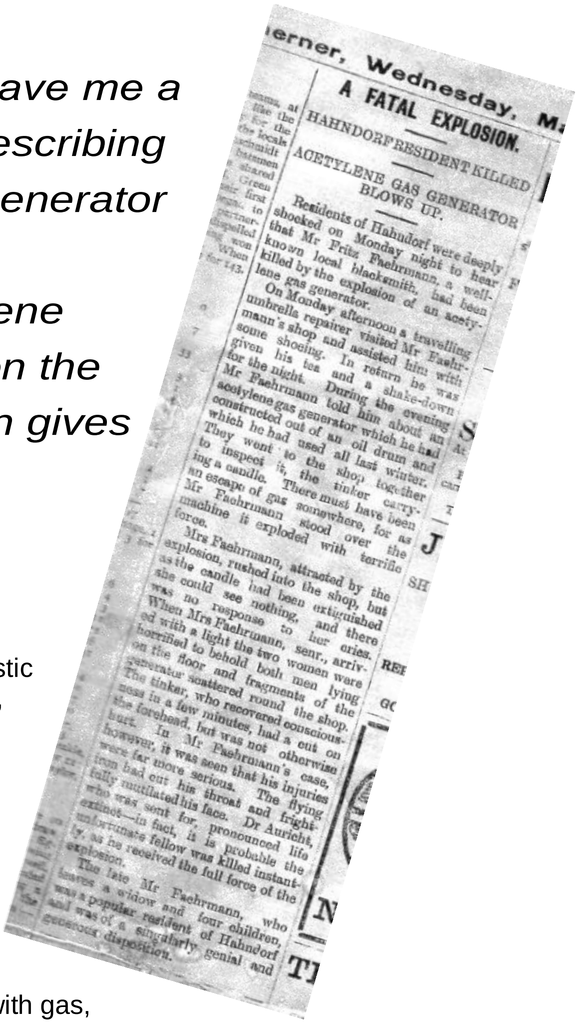
“At the February meeting Jack Muller gave me a copy of a newspaper item from 1906 describing a fatal episode with an Acetylene gas generator (see Jack’s News paper clipping)
I realised how little I knew about acetylene generation and so did some research on the internet. I think the following information gives a pretty good overview of the subject.
I hope you find it interesting.”



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A FATAL EXPLOSION.

HAHNDORF RESIDENT KILLED

ACETYLENE GAS GENERATOR BLOWS UP.

Residents of Hahndorf were deeply shocked on Monday night to hear that Mr Fritz Faehrmann, a well-known local blacksmith, had been killed by the explosion of an acetylene gas generator.

On Monday afternoon a travelling umbrella repairer visited Mr Faehrmann's shop and assisted him with some shoeing. In return he was given his tea and a shake-down for the night. During the evening Mr Faehrmann told him about an acetylene gas generator which he had constructed out of an oil drum and which he had used all last winter. They went to the shop together to inspect it, the tinker carrying a candle. There must have been an escape of gas somewhere, for as Mr Faehrmann stood over the machine it exploded with terrific force.

Mrs Faehrmann, attracted by the explosion, rushed into the shop, but as the candle had been extinguished she could see nothing, and there was no response to her cries. When Mrs Faehrmann, senr., arrived with a light the two women were horrified to behold both men lying on the floor and fragments of the generator scattered round the shop. The tinker, who recovered consciousness in a few minutes, had a cut on the forehead, but was not otherwise hurt. In Mr Faehrmann's case, however, it was seen that his injuries were far more serious. The flying iron had cut his throat and frightfully mutilated his face. Dr Auricht, who was sent for, pronounced life extinct—in fact, it is probable the unfortunate fellow was killed instantly, as he received the full force of the explosion.

The late Mr Faehrmann, who leaves a widow and four children, was a popular resident of Hahndorf and was of a singularly genial and generous disposition.

Types of Acetylene Generators

There are two general methods of generating acetylene for domestic illuminating and heating purposes: that of adding carbide to water, and that in which the water is mixed with carbide. The two types are illustrated in the diagrams shown in Figs.1 and 2. The first method, that in which the carbide is dropped into water, is shown in Fig. 1. The tank A is the generator and B is the receiver or gas-holder. The tank A holds a considerable quantity of water and is provided with a container C for holding the supply of carbide. The tank A is connected with the gas-holders by a pipe which extends above the water line in the tank B, where the gas is allowed to collect in the gas-holder G. A charge of carbide, sufficient to fill the holder with gas, is pushed into the tank A by raising the lever H. Immediately the water begins to combine with the carbide and the bubbles of gas pass up through the water and are conducted into the tank B. The holder G is lifted by the gas and its weight furnishes the pressure necessary to force the gas into the pipes, which conduct it to the burners. If this machine were provided with the proper mechanism to feed into the generator a supply of carbide whenever the gas in the holder is exhausted, the machine would represent the modern "carbide to water" generator.

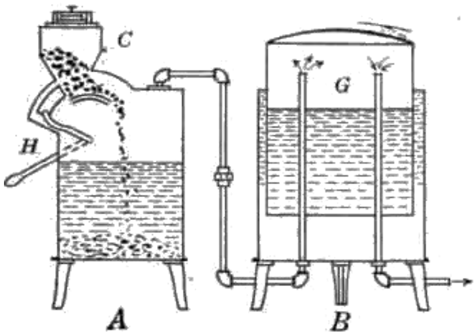


Diagram of a carbide-to-water acetylene-gas generator.

The "water to carbide" generator is shown diagrammatically in Fig. 2. As in the other figure, A is the generator and B is the gas-holder. A supply of carbide S is placed in the generator and water from a tank C is allowed to drip or spray onto the carbide.
The gas collects in the gas-holder as before. This apparatus represents in principle the parts of a machine for generating acetylene by this process. The actual machines are arranged to perform the functions necessary to make the machines automatic in their action.
Whatever the type of the machine, the object is to keep in the holders a sufficient amount of gas with which to supply the demand made on the plant. Machines representing each of the types described are to be obtained, but the greater number of those manufactured are of the "carbide to water" form.
In the formative period of acetylene generators many accidents of serious consequence resulted from imperfect mechanism. Imperfections have been gradually eliminated until the machines which have survived are efficient in action and mechanically free from dangerous eccentricities. The qualities demanded of a good generator are: There must be no possibility of an explosive mixture in any of the parts; it must insure a cool generation of gas; it must be well-constructed and simple to operate; it should create no pressure above a few ounces; it should be provided with an indicator to show how low the charge of carbide has become in order that it may be recharged in due season, and it must use up the carbide completely.

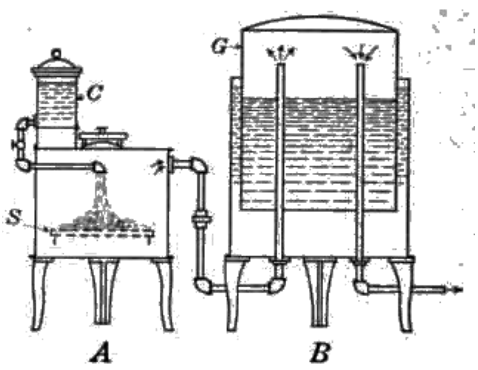
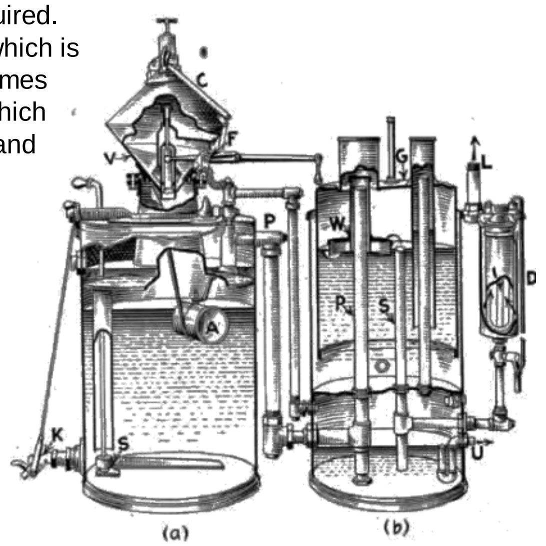


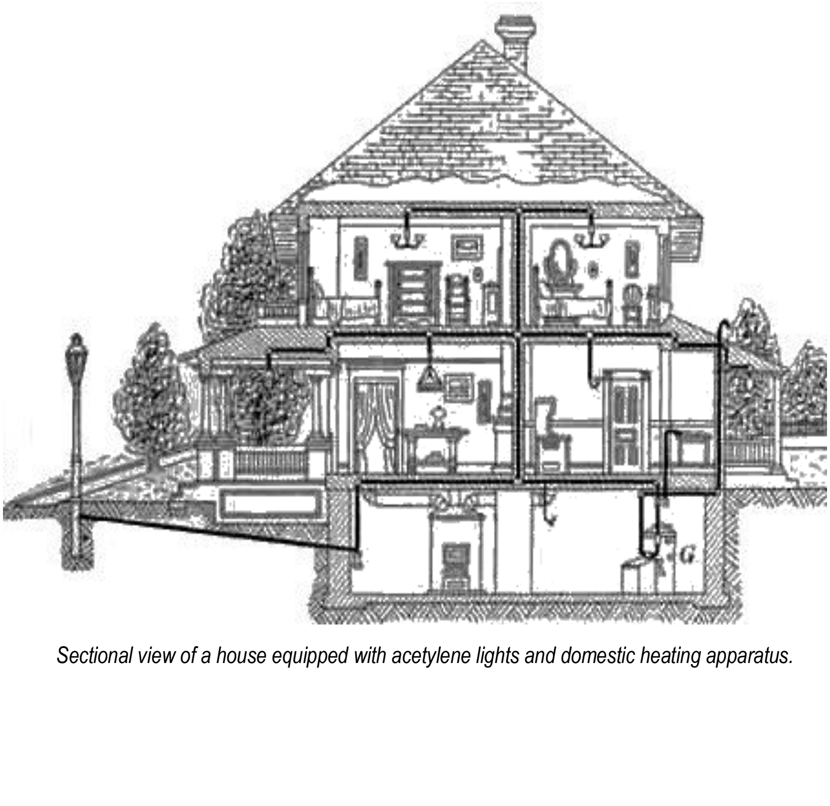
Diagram of a water-to-carbide acetylene-gas machine.

Because of the fact that the greater number of acetylene-gas machines of today are of the "carbide to water" type, in the description to follow that type of machine is used. They are generally made in two parts, one part containing the generating apparatus and the other acting as gasometer (gas-holder), but some machines made in which one cell contains both the generator and gasometer.
In Fig. 211 is shown a two-part, gravity-fed machine, in which all of the internal working parts are exposed to view. The tank (a), as in the diagram, is the generator and the tank (6) contains the gasometer marked G. Each tank possesses a number of appliances which are necessary to make the machine automatic in its action. The part C of the generator contains the supply of carbide, broken into small pieces, a portion of which is dropped into the water whenever additional gas is required.



Sectional view of the Colt acetylene-gas machine.

The feed mechanism F is controlled by the gasometer bell G, which is buoyed up by the gas it contains. When the supply of gas becomes low, the descending bell carries with it the end of the lever F, which is attached to the feed valve; this motion raises the feed valve and allows some of the carbide to fall into the water. The gas that is immediately generated passes into the gasometer through the pipe P, and as the bell is raised by the accumulating gas the valve V is closed. The gas as it enters the gasometer passes through a hollow device W, that looks like an inverted T, the lower edge of which is tooth-shaped and extends below the surface of the water. The gas, in passing this irregular surface, is broken up and comes through the water in little bubbles, in order that it may be washed clean of dust. This device also prevents the return of the gas to the generator tank during the process of charging. The gas escapes from the bell through the pipe S to the filter D, where any dust that may have escaped the washing process is removed by a felt filter. It finally leaves the machine by the pipe L, at which point it enters the system through which it is conveyed to the different lighting fixtures.
It will be noticed that the tank (b) is divided into two compartments, the upper portion containing the water in which the gasometer floats. The lower compartment is also partly filled with water which acts as a safety valve to prevent any escape of gas into the room in which the generator is located. The lower end of the pipes P and S are immersed in the water at the bottom chamber of the tank, from which the gas could escape in case too much is generated and finally exit through the vent pipe U to the outside air.
The float A in the tank (a) is a safety device that prevents the introduction of carbide unless the tank contains a full supply of water. The float is a hollow metal cylinder connected by a rod to a hinged cup under the bottom opening of the carbide holder. When the water is withdrawn from the generator, the float falls and the cup shuts off the carbide outlet.
The accumulation of lime, from the disintegrated carbide, requires occasional removal from the tank (a); the valve K is provided for this purpose. The lever S is used to stir up the lime which is deposited on the bottom of the tank, that it may be carried out with the discharged water. Machines of this kind that are safeguarded against leakage of gas or the possibility of accumulated pressure are practically free from danger in the use of acetylene.
The accidental leakage of gas from defective pipes and fixtures produce only the element of risk that is assumed with the use of any other form of gas for illuminating purposes.
Acetylene is distributed through the house in pipes in the same manner as for ordinary illuminating gas.

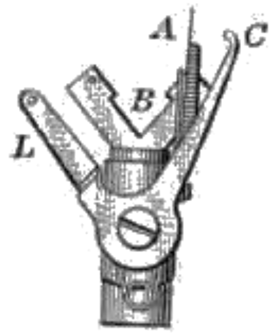


Sectional view of a house equipped with acetylene lights and domestic heating apparatus.

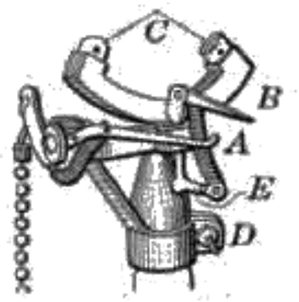
Acetylene gas burner.

The sizes of the pipes to suit the varying conditions of use are regulated by rules provided by the National Board of Fire Underwriters.
These rules state definitely the sizes of pipes required for machines of different capacities. Rules of this kind and others that specify all matters relating to the use of acetylene may be obtained from any fire insurance agent.
The general plan of piping is shown in Fig. 4.
The generator G is in this case a "water to carbide" machine and is shown connected to the kitchen range, as well as the pipe system which may be traced to the lamps in the different rooms, to the porch lights and to the boulevard lamp in front of the building.
Fig. 7. - Electric igniter for acetylene gas burners.
The type of burner used in acetylene lamps is shown . The gas issues from two openings to form the jet as it appears in the engraving. These burners are made in sizes to consume 1/4, 1/2, 3/4,and 1 foot per hour depending on the amount of light demanded.
Carbide is CaC_2. It is produced by treating lime and Coke in an electric arc furnace. An energy demanding process which was apparently only possible commercially in the US with the advent of the Niagara falls hydro electric scheme.
The reaction formula for the production of acetylene is:
$CaC_2 + 2H_2O = C_2H_2 + CaOH_2$ that is Calcium Carbide + Water = Acetylene gas + Calcium hydroxide

Dick Turpin



Electric igniter for acetylene gas burners.



Electric igniter for acetylene gas burners.