

Producer Gas and Gas Producer Plants

Second of a Series of Articles to Appear in the Power Edition, Taking up This Subject in an Educative Way. Information Has Been Gleaned from Various Noteworthy Authorities, Names of Authorities Being Given. Absolute Confidence Can be Placed in all Statements and Claims, as They Come from Some of the Highest Authorities on This Subject. This Series of Articles will be Followed by Another Series on Large Power Gas Engines. Each Article will be Complete in Itself. This Article: Early History; Detail Description of Pressure Type.

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HISTORY OF THE DEVELOPMENT OF THE PRODUCER GAS PLANT

Everyone knows the old proverb, "Necessity is the mother of invention"; and it was true in the case of the producer gas plant. The four-cycle gas engine was invented by Mr. Otto, Deutz, Germany, in 1876. The fuel used was ordinary illuminating gas as made in large plants by the distillation of

from a small vertical boiler A. The gas upon leaving the generator or producer passes through a water seal in the hydraulic box C. This not only helps to cool and clean the gas, but the seal prevents gas in the other parts of the apparatus being fired accidentally by the incandescent fuel in B. From C the gas goes to the cooler and scrubber D, and passes up through a column of coke, where the gas is cooled and washed by

The latter is, of course, required with any style of plant where it is necessary to store gas, or where it is used for anything else than gas engines. The separate steam boiler involves the consumption of about 25 per cent. more fuel than is actually used in the generator in the production of the gas. This is, of course, a very serious consideration from an economical standpoint.

THE BERNIER GAS PLANT.

It was seventeen years after Dowson developed his plant, before there was any improvements to his plant suggested.

In 1895, M. Bernier, of Paris, invented a gas-making plant working upon the Dowson principle of a simultaneous blast of steam and air through incandescent fuel, but designed to utilize the waste heat of the generated gas in making steam. This plant is shown in Fig. 2. It was M. Bernier's ambition to make all the steam from the sensible heat of the gas, as in the proper operation of engines, gas has to be cooled in any case and until his experiments, all the sensible heat had been wasted. He was successful in raising some steam at atmospheric pressure, but it was then evident that some apparatus had to be devised to force or draw the steam and air through the fire. He decided to provide an auxiliary piston by the side of the working cylinder of a gas engine, and arrange this to

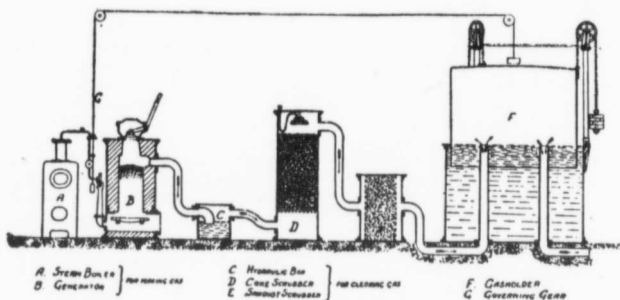


Fig. 1—The Early Dowson Gas Plant.

coal. The high thermal efficiency of the internal combustion motor appealed strongly to the engineers of the day; but it was realized that the gas engine would not be able to compete with steam engines in the large sizes if the type of fuel was to be illuminating gas. There was required a cheap form of gas, and fuel economy being of such importance in European countries at the time, it was natural that there should be considerable experimental work conducted, with the object in view of obtaining a process for the manufacture of a cheap form of gas, in order that the high thermal efficiencies of internal combustion motors might be fully taken advantage of.

DESCRIPTION OF THE DOWSON PLANT.

To Mr. Emerson Dowson, London, England, is due the credit of having placed on the market, the first successful producer gas plant. This plant was invented just two years after the gas engine was invented, so it is evident that no time was lost in preliminaries. This plant was the foundation of all producer gas plants; and the importance of Dowson's invention cannot be overestimated. The style of the earliest form of Dowson plant is shown in Fig. 1. In this diagram B is the gas producer, the gas being made by forcing, through the bed of incandescent fuel in B, a mixture of superheated steam and air, by which producer gas is formed as described in the article appearing in the last POWER EDITION OF THE CANADIAN MANUFACTURER. The steam is supplied

the spray of water shown. The gas next passes through the dry scrubber E, which is filled with sawdust, to the gas holder F. From here it is piped to the different points at which it may be needed.

The use of the gas holder is to maintain a uniform pressure in the plant, and to act as a storage tank, in case of fluctuation in the use and production of the gas. The gas holder is assisted in this duty by the mechanism G, by which the rate of production of the gas is automatically governed to suit the rate of consumption from the holder.

A jet of steam from the boiler injects into the producer the air required for carrying on the partial combustion of the fuel.

The rate of gas production depends upon the quantity of steam and air sent into the producer, and through the governing arrangement the rise or fall of the gas holder raises or lowers a weighted lever which acts on the valve admitting the steam to the producer.

OBJECTIONS TO THIS PLANT.

This plant was successful, but for all that it had many faults. In the first place it was too complicated and required too much space and attendance to be completely successful; and then too the style of fuel was restricted to anthracite or comparatively hard coal such as is mined in Wales and Pennsylvania. This last was a serious drawback to its universal adoption throughout England because of the predominance of the soft grades of coal.

The chief objectionable features were the separate steam boiler and the gas holder.

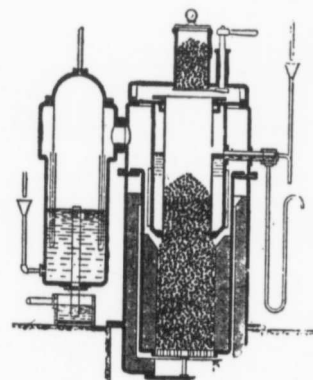


Fig. 2—The Bernier Gas Plant.

suck the gas from the plant and deliver it to the engine.

OTHER EARLY GAS PLANTS.

M. Bernier's plant, while encouraging, was not very successful, although considerable improvements were made later on. M. Taylor & Co., of Paris, still further developed the producer, and a view of their plant is given in Fig. 3. This plant became a commercial success both in France and in Eng-