One Hundred Years of Gas Lighting

An Account of the Early Days of This Art, Which First Stood on Solid Ground in 1820

By William Ressman Andrews

THE centenary of illumination by gas practically falls in this year. Eighteen hundred and twenty was the dividing line between the experimental stage of gas lighting and the period of its demonstrated practicability. The history of its expansion is similar to other discoveries in physical science which have developed factors now recognized as fundamental in the advancement of modern civilization.

As in the case of steam and electricity, its practical application to everyday use came long after the researches of the original investigators. Although this general recognition was somewhat tardy at first the progress made in gas lighting was rapid from the time, in 1820, that its merits became thoroughly established. Street illumination by gas was introduced in Paris by Frederick Winsor in that year and thenceforth was extended generally throughout Europe. He organized, some time before, the first gas company in London and was known from the successful culmination of his Paris venture as the "father of modern gas lighting."

In America, too, the feeling, that gas—introduced in Philadelphia and in Baltimore in a tentative way and with some misgivings at an earlier date—had proved to be a practical means of lighting, began to take strong hold on the public mind in 1820. An important improvement which increased the popularity of the new illuminant was made in this year. This was the invention by J. B. Neilson of the Glasgow Gas Works in Scotland, of the "fishtail" burner, or union jet, which gave greater luminosity to the flame. Furthermore it was largely this year which saw the fruitful efforts of scientific men who, having realized the boon of gas lighting, had set forth its advantages in their writings.

Chief among them was Fredrich C. Accum, a Westphalian chemist, living in London, who had published a short time before a "Practical Treatise on Gas Light." This epoch-making work on the subject was immediately translated into French, German, and Italian. The municipal authorities of the continent were at once impressed with the fact that they now had the means at hand to lessen considerably the dangers which from time immemorial had lurked in their streets and alleys after nightfall.

A high degree of pioneer activity characterized the experimental and promotion period. Passing over the earliest events connected with the subject—such as the fitful industry of an ecclesiastical dilettante in England who amused himself by filling bladders with the fumes of coal distilled on the hearth of the rectory kitchen—it was reserved for the experiments of a Scotchman, William Murdock, to point the way to the possibilities of a new illuminating agency. He was the first to show that gas could be made on a large scale for lighting purposes. The experiments were conducted near the close of the eighteenth century at Redruth, Cornwall, where his house was lighted at first by a flame emitted from the crudest form of jet—or rather the absence of a jet. The gas was consumed as it flowed from the open end of an iron pipe. The gas consumption was of course out of all proportion to the volume of light obtained. But he checked the waste by welding the orifice and then boring three small holes in a way to produce three divergent flames. There was now less gas consumed, but the light was poorer. In the next step Murdock flattened the end some little distance down the pipe and bored a number of holes close together along the top. This arrangement produced a series of flame spurts which greatly increased the illuminating power of the burner, called, on account of its shape, the "cockspur."

Shortly afterward the scene of his experiments was transferred to England. The engine factory of Boulton, Watt and Company, at Soho, near Birmingham, was lighted with gas by the Scotch inventor. Its successful application here revealed the fact that the ubiquitous candle and its pushing rival, the whale oil lamp, would be obliged in time to give way before the acknowledged superiority of the new illuminant.

The stage of development which followed was marked by the introduction of a saw-cut across the top of the welded end of the pipe to take the place of the row of small holes. As a result the gas burned in a sheet of flame resembling a bat's wing, and this form of burner was on this account known by that name.

Murdock's later experiments included the adaptation of the principle of the Argand burner, which had a ring of holes at the top of a hollow cylinder through which the air circulated. The draught passing through the center of the cylinder was necessary to insure proper combustion; also the flame, to be of any service, had to burn without flickering, and these requirements were obtained by the use of a chimney.

At first iron tips were employed in the flat flame and the Argand types, but they were soon discarded for tips composed of steatite and similar substances. This improvement came about when it became known that the light intensity depended upon the degree of heat in the flame. Hence the use of non-conducting material for gas tips to keep as much of the heat as possible in the flame itself.

The improvement made by Neilson over these jet forms was based on a simple process. He discovered that the light burned much brighter when two streams of flame were made to strike each other squarely. The impact spread the blaze out into a flat flame. The burner in a short time was universally adopted. The use of clay retorts and the introduction of sulfate of iron as a purifier are other contributions made to the progress of gas lighting by this Scotch mechanical genius.

In another method of purifying gas lime purifiers were employed, the invention of Samuel Clegg, who contributed to an elaborated treatise on gas making brought out by his son in 1850, a volume which proved to be of great value in spreading information as to the advantages of gas lighting. The elder Clegg was also the inventor of a water meter for measuring gas. His device has proved to be the basis of the improvements since made in gas measuring methods.

The year of Neilson's discoveries which evolved the union jet saw the introduction of gas in Boston, and in 1823 there were twenty-three cities in Europe using gas. Berlin, the city from which so much "natural gas" about world dominion was to escape later on from royal lips, began to illuminate its streets and houses in 1826. Dresden followed in 1827 and by 1850 gas had been introduced into twenty-six German cities.

The use of gas in Baltimore dates from 1816; New York, 1823; Brooklyn, 1825; Boston, 1828; New Orleans, 1833; and Cincinnati, 1840.

The New York date is associated with the name of a family long prominent in the business and social life of the city. In that year Samuel Leggett organized the New York Gas Company. It was incorporated at $100,000 and obtained a 30-year franchise to lay pipes south of Grand Street. In September they were laid in the principal thoroughfares and were very different in appearance from the huge metal mains we are accustomed to see nowadays. Wooden logs, laboriously pierced by the primitive tools of the period, and tapering at the ends, served to convey the gas to the point of use. Leggett's house, at 7 Cherry Street, was, according to tradition, New York's first dwelling to be lighted by gas. In 1825 Broadway from the Battery to Canal Street was added to the gas illuminated area.

At that early day in the history of the industry in America, coal was not used for the distillation of gas, except in the anthracite regions. Coal was being shipped from Newcastle and Liverpool and the expense of such importations put coal far beyond the reach of the gas manufacturers who might have been considering its use outside the anthracite sections. Leggett's company distilled its gas from resin, which in his time was cheaply transported by water from the South. The gas fixtures and burners were not made in this country at that period but were brought over from England.

A great advance in gas lighting was brought about by the introduction of the atmospheric burner in 1855, the invention of R. W. von Bunsen. It marked an important stage in the history of gas because it made possible the use of coal gas for heating and cooking purposes.

But a more important invention came from the hands of a man who had been a student under Bunsen—Karl Auer Welsbach, whose burner, known the world over by his name, has achieved a striking and impressive distinction. According to Prof. H. Bunte, in a paper read before an International Gas Congress in Paris, a short time after the Welsbach burner had been introduced in 1886:

"The Welsbach lamp is now the recognized form for both private and public use; the older types are continually losing ground. It has effected a complete revolution, not merely in regard to the illuminating effect and the economy of gas lighting, but even the fundamental factors by which gas is valued and the properties and the manufacture of gas have been entirely altered."

The inverted incandescents, a development of the Welsbach principle, first made their appearance in 1900, and proved to be more satisfactory than the upright lamps. Another strong point in the appeal made by the lamps burning in reverse order was their adaptation to decorative treatment.

When Professor Bunte addressed the Paris assembly the Welsbach light seemed to be the last word in illumination, and yet it was the dawn of an inconceivably greater illuminant — electricity. While electricity is superior to gas in one respect, it may be asserted confidently that gas will hold its own for some time with overworked housewives, who for the last decade have been relieved from the drudgery and uncertainty of the coal range.

ONE of life's little ironies for the editor of a sheet like the SCIENTIFIC AMERICAN *is the frequency with which he is asked to state name and date for an "invention" which in reality was not at all a single invention by one man, but came rather through a long series of experiments and semi-commercial developments by many men. If we name the first of these men as the inventor, we are immediately challenged to show just what he invented; if we name the last, we are driven into a corner and compelled to acknowledge his indebtedness to all his predecessors. With all this in mind, it was with considerable diffidence that we followed Mr. Andrews into his effort to establish 1920 as the centenary of gas lighting. But we believe all readers will agree that he has made out a passable case, and that he is entitled to say that the present year comes about as close as any year can to rounding out an even century of this style of illumination.*—THE EDITOR.

Attractive Farm Signs

ONLY a few years ago the signs encountered in a farming district were all of clothiers, hardware houses, druggists, and other city stores, or of tobacco manufacturers, medicines for man and beast, baking powders, and the like. These varied interests saw an advertising opportunity in placarding the countryside with metal and wooden signs. But times have changed. The signs one now sees in growing number are more and more the farmer's own, designed to convert to his own use such advertising opportunity as exists.

Some of the signs are to advertise products for sale, the appeal being to the passing auto traffic. Another use of signs is to advertise the fact that the farmer is the member of the local farm bureau, and a supporter of its project. Some Western districts are using the farm sign, or are planning to, in a campaign to displace the scrub animal.

The other day a large California cooperative association, the Prune and Apricot Growers Association, placed a big order for baked enameled signs, in colors, to be posted on the orchards of members. This association will need over 10,000 to begin. These snappy, up-and-coming signs will help to maintain the prestige of the association at home, and incidentally will be a good advertisement to all visitors. The prune and apricot growers are not the first to use them—the raisen growers, the citrus growers, and the walnut growers already do.

Thus we see that the roadside sign is not disappearing, only changing in character. It becomes now a business device of the progressive farmer. And in this new use, ultimately, it is to be expected that it will lose the ugliness which formerly always was associated with it. The users of the old-time country metal sign were indifferent to its appearance, so long as it "advertised." Farmer-users won't long be.—By *J. T. Bartlett.*