the manufacture of coal gas and the profits derivable from the by-products. It remains to be seen what effect may be had through the invention of the "Metallic Gas" referred to in a recent number. At a recent meeting of the British Association for the Advancement of Science, a paper was read by Professor Siemens on the subject of gas lighting. The Professor argues: Assuming the cost of electric light to be practically the same as gas, the preference for one or other will in each application be decided upon grounds of relative convenience, so that it is probable that gas lighting will hold its own as the friend of the masses in all places large enough to pay for its manufacture. It meets in this country a strong rival in kerosene lighting, and the price of gas must be greatly reduced ere the people cease to look for cheaper light. The time, it is supposed, is not far distant when all classes will largely resort to gas as the cleanest and cheapest of heating agents. But the quasi monopoly so long enjoyed by gas companies has had the inevitable effect of checking progress. The gas being supplied by meter, it has been seemingly to the advantage of the companies to give merely the prescribed *illuminating power*, and to discourage the invention of economical burners in order that the consumption might reach a maximum. The application of gas for heating purposes has not been encouraged, and is still made difficult in consequence of the objectionable practice of reducing the pressure in the mains during the daytime to the lowest possible point consistent with prevention of atmospheric indraught. The introduction of electric light has convinced gas managers and directors that such a policy is no longer tenable, but must give way to one of technical progress; new processes for cheapening the production and increasing the purity and illuminating power of gas are being fully discussed, and improved burners rivaling the electric light in brilliancy are being introduced, especially in England, where a new and energetic awakening has appeared in this connection.

The capital invested in gas works in England amounts to about 150 million dollars, and the total amount of coal annually converted in the United Kingdom may be estimated at 9 million tons, and the by-products therefrom at 500,000 tons of tar, 1,000,000 tons of ammonia liquor, and 4,000,000 tons of coke, according to the returns furnished by the managers of many of the gas-works and corporations. To these may be added say 120,000 tons of sulphur, which up to the present time is a waste product

Previous to the year 1856—that is to say, before Perkin had invented his practical process, based chiefly upon the theoretical investigations of Hoffman regarding the coal-tar bases and the chemical constitution of indigo—the value of coal-tar in London was scarcely a halfpenny a gallon, and in country places gasmakers were glad to give it away. Up to that time the coal-tar industry had consisted chiefly in separating the tar by distillation into naphtha, creasote, oils, and pitch. A few distillers, however, made small quantities of benzine, which had been first shown—by Mansfield, in 1849—to exist in coal-tar naptha mixed with toluene, cumene, etc.

The discovery, in 1856, of the mauve or aniline purple gave a great impetus to the coal-tar trade, inasmuch as it necessitated the separation of large quantities of benzine, or a mixture of benzine and toluene, from the naphtha. The trade was further increased by the discovery of the magenta or rosaniline dye, which required the same products for its preparation. In the meantime carbolic acid was gradually introduced into commerce, chiefly as a disinfectant, but also for the production of coloring matter. The color industry utilizes even now practically all the benzine, a large proportion of the solvent naphtha, all the anthracene, and a portion of the naphthaline resulting from the distillation of coal-tar, and the value of the coloring matter thus produced is estimated by Mr. Perkin at $16,750,000. The demand for ammonia may be taken as unlimited, on account of its high agricultural value as a manure; and, considering the failing supply of guano, an increased production of ammonia may be regarded as a matter of great importance, for the supply of which England must look almost exclusively to the gasworks. The present production of 1,000,000 tons of liquor yields 95,000 tons of sulphate of ammonia, which, taken at the local price of $100 a ton, represents an annual value of $9,500,000.

The estimate of the annual value of the gasworks by products is given as follows: coloring matter, $16,750,000; sulphate of ammonia, $9,500,000; pitch (325,000 tons), $1,825,000; creasote (25 million gallons), $1,000,000; crude carbolic acid (1 million gallons), $500,000; gas coke, four million tons (allowing two million tons consumption in working the retorts), at $3, $12,000,000,—total over $41,000,000. Taking the coal used, nine million tons, at $3, equal to $27,000,000, it follows that the by-products exceed in value the coal used, by $14,000,000.

The annual consumption of coal by the Montreal City Gas Co. is about 23,000 tons, of which nearly 1,000 tons is Cannel coal. The by-products consist of some 23,000 chaldrons (828,000 bushels) of coke, of which about one-third is employed in heating the retorts; the balance is sold in the city, bringing, after cartage has been paid, from $3 to $3.20 per chaldron; the coal-tar product is about 172,500 gallons, and the sulphate of ammonia about 18 tons, or 16 pounds per ton of coal consumed. There is no creasote or carbolic acid produced, due perhaps to the want of a sufficiently large market. It will thus be seen that besides the much higher price of coal, as compared with Great Britain, there is considerably less realized from the by-products. A comparison with Manchester, as has been done, is therefore out of reason, moreover when it is remembered that the number of houses supplied in that city is nearly ten times that of Montreal. An idea of the extent to which coal oil is used for domestic lighting in this city may be gleaned from the fact that only some six thousand houses are supplied by the Gas Company. Nevertheless it is a patent fact that even in Montreal, and probably in other Canadian cities also, the by-products are worth much more than the cost of the coal.

The Professor draws much attention to the loss of all these by-products where raw coal is used for heating purposes, and to the noxious effects of the semi-gaseous by-products that escape as smoke. It is estimated that the soot in the pall hanging over London on a winter's day amounts to fifty tons, and the carbonic oxide resulting from imperfect combustion about five times that amount. Tar vapor is another result of imperfect combustion, which might be turned to better account at the dye-works. The superiority of gas for heating and culinary purposes is dwelt upon with much emphasis and at considerable length in the course of the lecture, but this should furnish the subject of an article by itself.

LOANS ON COLLATERALS.

We sincerely hope that the discussion in which the press has been actively engaged on the above subject will be productive of good. There has been a general recognition of the necessity on the part of the banks of making loans on call, secured by the transfer of negotiable securities. There are doubtless many advantages in holding such securities in a market which will not be materially affected by the calling up of such loans. Those who borrow money on call must, as