bonized material, if coal or lignite, can be turned into fuel for domestic purposes, steam raising, power gas plants, or smelting of ores in blast furnaces, depending on the preparation, which is varied to suit requirements.

The process of coal carbonization can be divided into two distinct systems:—

(a) High temperature carbonization, the chief function of which is to extract the maximum amount of gas for illumination purposes, heating, cooking, etc.

(b) Low temperature carbonization, which is specially adapted to the production of the maximum of by-products, comprising crude oil, sulphate of ammonia, chemical bases and carbon residue.

In speaking of coal, it is meant that shale, cannel, lignite and other analogous materials are included, such as can be treated in a heated retort or other closed vessel for the purpose of producing gas and by-products.

New Low Temperature System

In the high temperature system, notwithstanding the high heat applied, the coal must remain in the retort for a long period—6 to 8 hours—before it is considered to be sufficiently carbonized. Thus it naturally follows that the lower the heat of the retort the longer will be the time required for carbonization, and the smaller the quantity carbonized in a given time in a retort of given dimensions.

These difficulties are further increased in proportion as the smaller sizes of coal are fed into the retort, as these lie "dead." In low temperature carbonization various schemes have been adopted to assist this slow process of carbonization, such as internal shafts, travelling chains, stirrer arms, and other appliances to work inside the retort for the purpose of agitating and stirring up the charge and conveying it through the retort, with a view to getting a more rapid and thorough carbonization. So far these efforts have met with but very indifferent success and have proved of no commercial value.

The invention described in this letter was designed to meet and remedy the aforementioned defects by combining the principle of low temperature carbonization with two other important processes, neither of which had hitherto been worked in conjunction with same.

In the first process the coal is pulverized to a granulated condition, thus allowing the use of the smallest and consequently the cheapest grade, also allowing every particle of coal to come into quick contact with the surface or reflected heat inside the retort, and by this means securing rapid and almost instantaneous carbonization, This necessarily finely granulated condition of the charge is further ensured by drying and partially heating the coal before entering the retort.

In the second process this rapid carbonization is secured by the use of a tapered revolving retort into which the coal is continuously fed at the one end and the carbonized material continuously discharged at the other, both operations done mechanically and automatically."

Automatic Feed and Discharge

The retort is corrugated longitudinally, the corrugations serving a dual purpose: (a) To strengthen the retort body; (b) to increase the internal heating surface; and (c) to agitate the layer of finely granulated coal in its passage through the retort. There are no moving parts inside the retort to give trouble. The charge is fed into the retort by a self-sealed revolving screw feed and is discharged by a similar appliance at the opposite end. The feed and discharge are continuous and automatically controlled without any ingress of air or egress of gas.

The discharged carbon is in an ideal state for being agglomerated with a small proportion of bituminous matter or lime, and converted into block fuel, especially valuable for domestic purposes or for manufacturing uses. The fuel is practically smokeless.

The retort can be heated by part of the gas produced in it.

Labor is reduced to a minimum, and no skilled attention is necessary to operate the retort bench. The capacity of the retort is very great and much exceeds any other form of carbonizer, gas works retort or coke oven. The product is more uniform in quality, whether gas, oil or carbon is the objective.

A great feature in favor of this type of retort over the coke oven is the ease with which the plant can be increased without disturbing the existing plant, its great capacity for producing a large amount of the highest quality of blast furnace fuel at a low cost, and the continuous process of manufacture.

As a smelting fuel, the carbon is superior to coke. The granulated carbon is turned into blocks of 20 lbs. weight very cheaply, and in this form it is strong and capable of carrying a very heavy "burden." It takes up a position in the furnace which tends to produce perfect combustion, admitting of the blasts having a free course, and thus producing a more uniform heat throughout the furnace, and reducing the amount of fuel per ton of ore smelted.

This fuel is almost pure carbon; it has no equal for open fires or closed furnaces. It is practically smokeless, whether made from bituminous coal or lignite, and the calorific value is greater, weight for weight, than the raw material.

In the manufacture of smelting fuel, the agglomerate may be hydrated lime, whilst in the manufacture of domestic fuel, very little agglomerate is required if the retort works in direct conjunction with the press. If agglomerant has to be used, it may be the pitch produced from the carbonization, or tar, sulphite pitch or the residuum from oil refineries, or a mixture of the two latter. It depends entirely on local conditions and circumstances.

Says Private Capital Is Available

The carbon makes an excellent fuel for producer gas plants, and in this connection a good yield of sulphate of ammonia is obtained. The volume of good, clean gas of first-class quality is very great. The retort can be adapted to producing gas for domestic use and its adoption places within the reach of every small town a public supply of gas for heating and lighting purposes.

Canada has the raw material; it wants only brains and money to exploit them. There is no dearth of brains, experience and practical knowledge, and the capital is forthcoming providing that the owners have the co-operation and protection of the government. In other words, let the provincial governments grant concessions for the development of these resources by private capital and by men who know how to do it; it is not amateurs' work. Resources, men and money are available and waiting to develop Canada.

WILLIAM ARMSTRONG.

Montreal, November 4th, 1919.

The Ontario Section of the American Society of Mechanical Engineers held its first meeting of this season last Friday evening. The season's work was discussed, and it was decided to hold one meeting per month, the meetings to be alternately a technical session and a dinner with an address. Members of the society came from as far as Chatham, London and Belleville to attend last Friday's dinner, and it was felt that this indicated that considerable interest would be taken in the work this season. After the dinner, which was held at the Engineers' Club, Toronto, Brig.-Gen. C. H. Mitchell delivered an address upon some phases of mechanical engineering which had come under his observation in France and Italy during the war. He particularly covered transportation and the mobile shops in the advanced areas in France. He made some interesting observations regarding Italian hydro-electric power developments as he found them at the end of the war in comparison with their condition and size in 1906. He also gave a vivid description of the Italian engineering feats in the construction of the "teleferrica," or wire cableways, which transported munitions and men in hanging carriers over mountainous peaks and across great chasms even when subject to heavy shell fire.