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A Few Extracts from Letters from British Consuls, etc.

"I have to thank you very heartily for the copy of your Directory for 1901. I have always found it most valuable in supplying reliable information in answer to inquiries."—H. B. M.'s Consul at Asuncion, Paraguay, Aug. 20th, 1901.

"I am directed to thank you for the book and to express the opinion of this Consul that the work is one which cannot fail to be very useful to the commercial community."—The Secretary of the Chamber of Commerce of Georgetown, Demerara, Aug. 12th, 1901.

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"I beg to thank you for the copy of your Merchants Directory, which is a most useful work, and one to which I am constantly referring business people who send inquiries to this Consul as to the names and addresses of houses connected with different trades."—H. B. M.'s Consul at Adiz.

"I have the last copy of the Directory—a most useful work, but which I think is not consulted by exporters as much as it deserves to be, as I am constantly receiving letters asking for information which could be obtained from its pages."—H. B. M.'s Vice-Consul at Paysandu.

"I beg to inform you that I shall be very pleased to offer you every assistance in my power to facilitate your very interesting work for the benefit of commerce and industry."—H. B. M.'s Consul at Jaffa.

"I have duly received your valuable and useful Directory of Merchants, Manufacturers and Shippers for 1899, and beg to express my best thanks for same."—British Vice Consul, Spria (Italy).

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"The only book consulted is Kelly's Directory."—From British Consular R. turn, Riga.

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"The copy of Kelly's Directory has already been of great use to me."—B. V. C. Thorshavn.

"It is a Directory which is very often consulted by the Merchants of our town."—B. V. C. Dedagatch, Turkey.

"Your Directory was useful to me and the merchants in general."—British Consular Agent, Teuan.

coal can be utilized, and hence one can understand the importance of discovering some means of simplifying the process. If by some way electricity could be obtained direct from the coal so as to give even 50 per cent. only of the stored energy, all steam engines would disappear from use immediately, as it would be so much cheaper then to obtain whatever power is needed by means of electric motors, not to say anything of the greater convenience of the latter. Such a discovery would do even more, as it would postpone by three or four times its length the dreaded period of exhaustion of the available supply of coal, so its importance to a country like England may well be realized.

As long ago as 1842, Robert Mayer, to whom we owe the theory of the conservation of energy and the mechanical equivalent of heat, pointed out the great advantage of utilizing the energy of coal in the direct production of electricity. But it was not until the success of the dynamo had practically demonstrated the value of the coal, that the loss in the process was fully realized and attempts were made to mitigate it.

The great difficulty is the resistance to chemical reaction on the part of the coal at ordinary temperature. To overcome this, coal was heated in an iron pan with saltpetre or soda, when an electric current was obtained from the coal to the iron, but it was found that the heating took away all the advantage. So further experiments were tried by mixing coal with strong sulphuric acid without applying heat, but this process also proved too expensive, and the only gain of these attempts was the determination of the electrotechnic equivalent of coal. The want of success, has, however, not discouraged chemists, many of whom are still experimenting in this direction, and Dr. Weber thinks that their efforts, if sympathetically carried out, must lead to the solution of the problem before many more years have passed.—Kuhlow's.

PROPERTIES OF NICKEL STEEL.—Analyzing the results of various and many investigations, experiments and tests that have been made in order to obtain scientific deductions on which to base consistent methods of manufacturing different grades of nickel steel suitable for the requirements of varied service, it is found that the remarkable properties of this alloy are imparted to it through the peculiar effect that the nickel has on the carbon contained in the steel. We understand that in the cooling of carbon steel from the fluid state the iron crystallizes out of the mother liquor, and from the latter a carbide of iron cement is formed which surrounds the iron crystals and binds them together, and so the amount of carbon in the composition of the steel has much to do with the physical properties of the metal, this element causing a peculiar hardening effect, especially under the influence of water or oil-tempering. Now with iron, practically pure, or containing only a very small amount of carbon, nickel forms a homogeneous alloy much tougher and stronger than either nickel or iron alone, each

one per cent. of nickel up to five per cent. causing an increase of about 5,000 pounds in elastic limit and 4,000 pounds in tensile strength.

The effect of nickel upon the resultant metal as the percentage of carbon increases, varies within limits in accordance with the amount of the latter in the alloy. A range of from three to six per cent. is found to be best adapted for general service.

Nickel-steels show an increase in elongation and contraction of area when compared with simple steels of the same tensile strength. A steel having 0.25 per cent. carbon and three per cent. nickel is equivalent to a 0.40 per cent. carbon steel in tensile strength, while the elastic limit and elongation are higher. In steels of less than 0.50 per cent. carbon the elastic limit is about 50 per cent. of the ultimate strength, and usually less than this when properly annealed. Nickel raises the proportion about five per cent. for each one per cent. of nickel added.

Nickel-steel for commercial uses (three to six per cent.) is not hard when properly annealed, but is exceedingly tough, the nickel seeming to impart some of its own properties to the alloy. In color it is lighter than simple steel of the same carbon, and when polished has the

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