above Company's property. One of these immense ore bodies is a true fissure vein ore ledge, and is upwards of five hundred feet in width and solid ore, the contents of which are gold, silver, copper, lead and zinc and belonging to the granite series. The footwall of this enormous body is the primitive granite its hanging wall is diorite, also of the granite family and this ore body is sufficient to supply any of the large trunk lines on the continent of America to its full capacity, as it can easily produce five thousand tons per day, if no other bodies of ore are found, but there are several other ledges found that will produce from 100 to 500 tons per day, and that from a radius of not more than 20 miles square, besides the large bodies of free milling and cyanide gold quartz, some of these carry high values in free gold and some high values in copper, silver, and gold."

"From Shakes Creek on the Stikine river to the head of Dease lake is 85 miles and will prove to be a very easy section to build as it offers no obstacles of great importance. With plenty of fairly good coal near the proposed line, this coal I understand is good for steam purposes. Of course I have not visited the ground in person but I have been told by men who have that the measures are from 10 to 40 feet in thickness, and was only taken up last season for the first time, and no doubt could be bought cheaply if taken in time."

MAGNETIC SEPARATION. *

(By F. T. Snyder, Oak Park, Ill.)

EVERY one is familiar with the simple fact that a magnet will pick up small pieces of iron; many persons are familiar with the fact that sufficiently powerful magnets will attract a large number of materials in which the presence of iron is, at least, not in evidence, but few persons realize that the design of magnetic separators and the practice of magnetic separation have developed to a point where it can be stated that there is no material which cannot be moved by magnetism if the commercial conditions under which its movement is desired will permit the necessary expenditure. For many materials the cost is usually prohibitive. but as a curiosity, pieces of wood, apples and other things generally magnetically inert, have been moved through distances of several inches.

In the early days of magnetic separation, previous to half a century ago, it was generally thought that the law of magnetic attraction was simple, and even quite recently it has been stated in text books that the attraction of a magnet for a movable particle varied directly as the strength of the magnet and inversely as the square of the distance. This, in common with the other simple laws of natural phenomena, has proved to be simple only under theoretical conditions which are not secured in practice. However, the law of movement of a free particle in a magnetic field was understood and perfectly formulated at least half a century ago. In such formula the distribution of the field is assumed as known, while it is from this factor that the complications in the theory of magnetic separation usually occur.

The early types of magnetic separators consisted of a straight bar permanent magnet or an equally simple electro magnet. The material to be separated was either touched by one end of this bar or allowed to fall near it and in that way dragged out from the non-magnetic material. From this were developed numerous types of machines, similar in theory but better in mechanical form. Two troubles which developed were, first, the entanglement of non-magnetic material by the material attracted, and second, the question of getting the attracted material off the magnet again so that the magnet could operate continuously. Most of these machines were weak and applied to highly magnetic materials only and as the results were indifferent, the commercial growth of the industry was slow. During this time—that is, in the period of the last twenty years—the question of magnetism has come to be relatively very well understood in connection with the design of dynamo machinery, and as the necessity for magnetic concentration was urged with more and more persistency, it eventually fell into the hands of competent dynamo designers. The result was magnetic separators of greatly increased power and from them has developed a knowledge of the design of such separators which makes it possible to-day to build a separator which will handle practically all materials, the limit being that the more difficult the material is to handle, the greater the cost of the machine and consequently the less return commercially.

This great advance in design was largely due to the conception of a magnetic field as made up of lines of force which are assumed to emerge from a pole-piece of one polarity and pass through the air to a pole-piece of opposite polarity. In the production of this magnetic field the conditions are similar to those in an electric circuit, the magnetism produced being the equivalent of the current. The magneto-motive force due, in electro-magnets, to the current circulating in the windings of the coil, is the equivalent of the electro-motive force in the electric circuit while the resistance of the magnetic circuit is analgous to the resistance of the electric circuit. It was early seen that a large part of the cost of exciting a magnet was due to the resistance of the parts of the magnetic circuit at which the lines of force were compelled to jump through the air, air having a very high magnetic resistance as compared with iron. In an endeavour to reduce this resistance, the air path was shortened by bringing the magnet poles close together. In the early types of machines the material to be separated was passed through the field in such a manner that both of the poles were on the same side of the material so that in falling, the material passed through the loops of the lines of force twice. It was this looping of the lines that led to the entanglement of the non-magnetic materials with the magnetic materials and

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