cants, give notice of an application to Parliament for an Act with power to build, construct and operate a railway from a point at or near the Village of Buckingham, in the County of Ottawa, extending along the River Lievres, upon either side, northerly to White Fish Lake, and thence along the River Lievres to its source; with power to make and enter into running arrangements with other railway companies. This line, when constructed, will be a great stimulus to the development of the mineral industries on the banks of the Lievres River.

A Safety Brake for Hoists.

Mr. Robert Middleton, of Leeds England, has favoured us with particulars of his patent "grip" safety apparatus for hoists and suspended lifts or cages. The method of action of the apparatus will be readily understood. It is fixed at the top of the well over the hoist, and the rope which passes over the grooved pulley is fastened, after passing through the grip, to the top of the cage. The other end, after passing under a pulley fixed on the bottom of the hoist well, is fastened to the *underside of the cage or in some* cases to a balance weight. The speed of the cage, therefore, regulates the number of revolutions of the grooved pulley. This pulley in its turn drives the regulator. When the latter exceeds the desired speed the strikers compress the springs, and flying out come in contact with the lever and shaft. This shaft and levers are held in position by the simple contrivance of passing a piece of copper wire through the lever and into the casting. The force of the blow from the striker shears the wire, and the "grip" comes at once into action. When once the rope is in contact with this, the greater the pull, and the heavier the weight, the more securely is the cage held. On reversing the hoist the "grip" at once relaxes its hold and sets the rope free. A new piece of wire inserted in the hole resets the apparatus, and the hoist is ready for work in a few minutes after the action has taken place. The rope, it is stated, is undamaged in any way. At a test trial, we are informed this apparatus gave most satisfactory results. The cage of the hoist was disconnected from its hoisting ropes, and propped up from below. Forty 56 lb. weights were then put into the cage, the props struck, and the cage was stopped and held fast in the space of 14 inches. The same result practically took place with the cage empty. This apparatus can be connected direct to the cage itself, or can be used as a certain means of bringing into action any other kind of safety apparatus fixed on the cage and acting on the slides of the hoist well. No hoist cage can, it is asserted, fall with or without occupants with this apparatus, and its action takes place without waiting for a breakage of parts before being put into motion.

The Lechesne Nickel-Steel Process.

A foreign exchange states that the Ferro-Nickel Company, of France, has succeeded in obtaining nickel iron and steel containing a large percentage of nickel, and participating in the remarkable properties of this metal (non-oxidizability, brightness, &c.), and susceptible of being substituted for it in a large number of uses from which it has hitherto been excluded by the high price of pure nickel.

In continuing the series of ferro-nickels, the lowering the percentage of nickel below 25 per cent. forms a category of metals, the new properties of which constitute a special class of altogether peculiar interest. We have here no longer alloys of a somewhat high price, capable, on account of their richness in nickel, of replacing the pure metal, but metals comparable to iron and steel, and in which the intervention of even a small proportion of nickel modifies the constitution of the metal without (in low percentages) materially increasing its cost, and gives to the iron and steel employed an improvement of quality which is very remarkable.

The process consists in the simultaneous employment of manganese and aluminum with or without addition of carbon, under the form of charcoal, or metallic or ferro-cyanides. In the case of manganese, either pure manganese is used or oxides mixed with a reducer, or ferro-manganese. In like manner for aluminum, either the pure aluminum is used or a mixture of iron and aluminum. The nickel itself is introduced either in the form of pure metal or in the form of malleabilized metal, or crude metal more or less rich in nickel, proceeding either from the treatment of nickel ore up to the point of elimination of the iron, or from previous fusions of cast iron, wrought iron or steel with nickel.

With regard to the carrying out of the process, current experience has indicated the following method as the most suitable for obtaining a good result. It is preferable to take the pure nickel or mixed with iron at the outset of the operation. The manganese, under whatever form it is employed, mixed or not with the chosen carbonizer, is added in one or two additions in the course of fusion. The quantity of aluminum necessary is projected at the close of the operation in the bath of metal or in the casting ladle.

With regard to fusing apparatus use is made of that which is ordinarily employed in metallurgy—crucibles, reverberatory furnaces, converters, Siemens furnaces, cupolas, &c. Experience has shown that in the quantities of the intermediary agents the best results are obtained, with proportions of aluminum varying from a ten-thousandth to about one-thousandth, and of manganese varying from one-thousandth to about two hundredths per kilogramme of alloy to be produced according to the quantity of nickel and the quality of the metal to be attained.

From the point of view of the carbonizing agents it has been ascertained that according as it is wished to obtain metal soft or hard, carburetted or not, with the same percentage of nickel, carbon or cyanide must be used in variable proportions. In this way it is possible, by the employment of ferro-cyanide with manganese and aluminum, without even the addition of nickel, to transform the iron into a tempered steel naturally susceptible of furnishing turning tools without tempering and by direct forging.

We shall give for instance the best quantities for obtaining on the hearth a ferro-nickel with 5 per cent. of nickel, starting with a nickeliferous pig. The work is proceeded with as for the manufacture of steel, and after partial or complete decarbonization, according to the quality of the metal to be obtained, metallic manganese or ferro-cyanide of manganese is added, and at the moment of tapping the aluminum is added, either in furnace or in the casting ladle. For 500 kilogrammes of alloy the proportions are as follows:—

	Kilos.
Pig, with 25% nickel	100
Soft Iron or Steel	400
Ferro-manganese, with 75% of manganese	3
Aluminum	0.25
Total	503.25

The character of these various alloys is as follows: These metals possess a much more perfect homogeneity than that of iron or steel obtained by the usual processes, and consequently they have the qualities of malleability, *ductility, tenacity, elasticity, etc., to an altogether superior* degree. The coagulation of the ingots is very rapid and bubbles are avoided. Ferro-nickel, with 25 per cent. of nickel, whatever the quantity of carbon, does not take tempering, but according as the proportion of nickel diminishes, the property of being tempered reappears and goes on asserting itself until, with proportions of 7, 5 and 3 per cent. below, we obtain alloys capable of being tempered according to laws analogous to those which govern the tempering of ordinary kinds of steel. The proportion of carbon, the distribution and special forms of the carbon in the cement and the metallic core (*modification due to the presence of the nickel*), the fall of the temperature between the heating and the cooling, and the rapidity of the cooling, combine to produce various degrees of hardness, as could be predicted by the complete analysis made according to the very exact methods recently discovered, and by the remarkable investigations into the constitution of steel which have appeared of recent years.

The influence of the agents of malleabilization in the application of these processes is demonstrated by the fact that, when these agents are employed without the intervention of nickel, the products obtained present much *superior qualities to those of iron and steel treated by the* ordinary processes.

Hauling Coal by Electricity.

Following close upon the experiments of the Delaware, Lackawanna and Western Company, in Scranton, comes news of the successful experiments that have been made with electricity for hauling purposes by the Hillside Coal and Iron Company. At the Erie colliery of this company an electrical hauling plant is in operation. It consists of a 60 horse-power Thomson-Houston generator. The engine and dynamo room are in charge of the engineer and assistant who operate the other mining machinery. The electric locomotive is run by one man, who is assisted by a boy in making up the trains and turning the switches. This locomotive displaces 7 mules and 3 drivers. During a period of 112 days the average number of cars delivered at the shaft bottom by the locomotive was 559, against 526 per day delivered by mule haulage, much time being consumed by waiting at the bottom of one shaft for empty cars. Thus far it has shown that it will increase the daily output to 700 cars per day. To deliver 700 cars per day of ten hours, the time of running the locomotive is 5 hours and 30 minutes, leaving 4 hours and 30 minutes for contingencies. The total distance run is 21.28 miles, and the locomotive is reversed 232 times. Besides this hauling power the current is used for lighting purposes, so that in every department of the work there is abundant light. Altogether the company managers have found the new system a great improvement over the old, and they intend in the near future to extend it to their other works.

INSTEAD of the suggested one pound notes, Sir Henry Bessemer proposes an aluminium coin. He points out that the new metal may be slightly alloyed so as to harden and increase its durability, and at the same time raise its fusing point, and thus render the casting of it in plaster moulds quite impossible. The specific gravity of aluminium is 2·56, while that of silver is 10.47, so that an aluminium coin of the exact size and thickness of a common florin would weigh a minute fraction less than a silver sixpence; hence, if taken from the pocket in the dark it would be instantly recognised by its extreme lightness, and could never be mistaken for any coin made of gold or silver, while the great weight of all lead or pewter alloys, which are capable of being cast in plaster moulds, could never be passed off as aluminium coins, however their external surface might be coated or coloured in imitation of that metal.

The Value of Bore-Hole Records.

The State Geologist of Missouri, in his preliminary report on the coal deposits of that State, appreciates the value of all these local records as a means of assisting him formulating a State geological map, and we cannot do better than present his own words on this point. He says: Of especial value in this report are the records of the various deep shafts and drill holes which are included. They are furnished by many different individuals, and, in each case where the results are quoted, recognition of this assistance is expressed. With a few exceptions, the individuals and corporations of the State have generously contributed such results in a free, public-spirited manner. The importance of furnishing such records to the survey, where they may be kept on file for ready reference, cannot be too strongly emphasized. Hundreds of such holes have been put down in the State for various purposes, and from comparatively few of such are reliable results now available. Such holes are generally sunk for a definite purpose, and when that end is reached it occurs to few that the results may still be valuable for other purposes. But this is almost always the case. Whether a thick coal be encountered or not a good record establishes a series of facts concerning the geology of the locality, and is, hence, valuable. For instance, the record though *apparently* barren of results of economic value, may show that the drilling stopped in a certain limestone, which, by comparison with a record obtained elsewhere, we know is 20 or 50 feet, as the case may be, above a certain valuable coal bed. Hence, from the study and comparison of these two records we are able to predict the probable existence of workable coal within a short distance of the bottom of the hole. Again, the hole may *have penetrated rocks which we recognize as below any* coal in the State; and in this case the result is of general value in preventing further exploration below this depth. Only from the results of such deep drilling can the area of available coal in the State be exactly determined and the limits of the individual beds be defined, especially in those parts of the State where the coal beds are deep beneath the surface. The reason why records of value are not always attainable is, however, not only because of negligence on the part of those immediately interested to preserve them, nor yet because of refusal to contribute them. It is unfortunately the case that many holes have *been put down by incompetent men, or by men who* know merely how to handle a drill without having sufficient knowledge of lithology or geology to be able to accurately describe and record the descriptions of the rocks they encounter, or to interpret the meaning of all they pass through. In cases it is even worse than this, and the history of many a deep and expensive drill hole in the State shows evidence of trickery and bad faith on the part of the driller towards those in whose service he was supposed to be working. The uncertainty attending such work has thus brought disfavour in many localities upon deep drilling as a public enterprise, many having acquired *the impression that only indefinite results of small practi*cal value could be reached. This impression is wrong and unfortunate, for such work can and should be prosecuted by every progressive community in the coal regions which is anxious to determine the existence of coal beds and is anxious to have them developed. In view of these facts the survey suggests a possible plan of co-operation which, if adopted, would ensure a well conducted drill hole, a reliable record and an official report on the same, and would, at the same time, secure for the State complete results of the drilling in such condition that they can be unhesitatatingly used and will be entirely comparable. *To any private individual or community desiring to have a deep* drill hole sunk the survey could arrange to recommend reliable men whom the the individual or community can employ to do the work of drilling; second, it could supervise this work, and last, it could furnish an official statement of the results of the drilling. In return for this service it would be required that the survey be allowed full and free use of the results for the benefit of the State. That this would be in every way a liberal offer, cannot be disputed. In addition to securing reliable results, the individual would, by this means, be put in possession of a report, which would be, as it were, negotiable. Being of an official nature, *from an impartial source, others will place faith in it and will* invest money on its authority, for purposes of actual development, where they would not do so were the report of a private nature, emanating from an interested source. If such a plan of co-operation were generally adopted, the State would soon have accumulated an invaluable mass of material from which it would be possible to outline, with a high degree of accuracy, the general limits of each and every coal bed in the State. From this the prospects of finding coal at any one point could be predicted, as well as its probable depth and thickness when found. Surely the attainment of such a condition of exact knowledge is worthy of our serious efforts.

The Copper Combine.—The latest information at hand concerning the new combination of the copper producers, is to the effect that the agreement has been perfected; that all the American companies have assented to it, and that all that is now needed is to get certain foreign properties in. The allotment of annual production as finally decided upon is said to be as follows: Anaconda, 75,000,000 pounds; Calumet and Hecla, 60,000,000; Quincy, 12,000,000; Parrott, 14,000,000, and the Clark-Bigelow properties—the Tamarack, Osceola, Kearsage, Montana, Butte and Boston, and others, 65,000,000, making an aggregate of 225,000,000. These figures represent a considerable increase over last year's total production.