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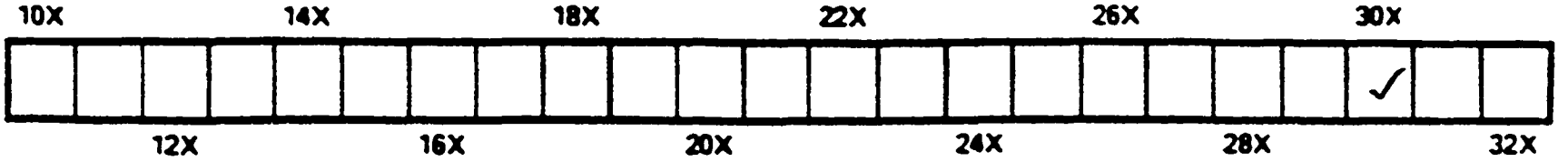

The Canadian Mining Review

Established 1882

Vol. VIII.—No. 8. 1889.—OTTAWA, AUGUST—1889. Vol. VIII.—No. 8.

ONTARIO Mining Regulations.

The following summary of the principal provisions of the General Mining Act of the Province of Ontario is published for the information of those interested in mining matters in the Algoma District, and that part of the Nipissing District north of the Mattawan River, Lake Nipissing and French River.

Any person or persons may explore for mines or minerals on any Crown Lands surveyed or unsurveyed, not marked or staked out or occupied.

The price of all lands sold as mining locations or as lots in surveyed townships is two dollars per acre cash, the pine timber being reserved to the Crown. Patentees or those claiming under them may cut and use such trees as may be necessary for building, fencing or fuel, or for any other purpose essential to the working of mines.

Mining locations in unsurveyed territory shall be rectangular in shape, and the bearings of the outlines thereof shall be due north and south, and due east and west astronomically, and such locations shall be one of the following dimensions, viz: eighty chains in length by forty chains in width, containing 320 acres, or forty chains square, containing 160 acres, or forty chains in length by twenty chains in width, containing 80 acres.

All such locations must be surveyed by a Provincial Land Surveyor, and be connected with some known point or boundary at the cost of the applicant, who must file with application surveyor's plan, field notes and description of location applied for.

In all patents for mining locations a reservation of five per cent. of the acreage is made for roads.

Lands patented under the Mining Act are free from all royalties or duties in respect to any ores or minerals thereon, and no reservation or exception of any mineral is made in the patents.

Lands situated south of the Mattawan River, Lake Nipissing and French River are sold under the Mining Act at one dollar per acre cash.

Affidavits showing no adverse occupation, improvement or claim should accompany applications to purchase.

A. S. HARDY,
Commissioner.

department of Crown Lands, Toronto.

Canadian Syndicate Limited. — This syndicate was registered in London on the 3rd inst., with a capital of £20,000, in £1 shares, 200 being founders' shares, to acquire lands and heritages, coal, iron and other mines and industrial propertics in Canada. The number of directors is not to be less than two nor more than five; the subscribers are to nominate the first; qualification, 100 shares; remuneration, £200 per annum and five per cent. on any dividend, to be divided as they may determine.

Powdered Coal in Place of Natural Gas.—Erastus Wiman and others are experimenting with a new process of heating iron with powdered coal instead of natural gas. The experiments are being conducted at the Vesuvius Iron Works, Pittsburg, and are said to be satisfactory. Speaking of the test, Mr. Wiman said: "It is yet rather limited in its scope, but eminently satisfactory in its results. One heat consumed 684 pounds of pulverized coal. The quantity of iron heated by that quantity of fuel was 4,600 lbs. We are confident, from the present results, that we can heat iron at 50c. per ton, including the cost of pulverized coal, while the existing rates for natural gas at the different mills make the cost of heating iron upwards of $1 per ton. While a contrast test was not attempted, the lack of facilities necessary for the perfect operation of the new experiment rendered the test successful in only a limited degree, but sufficient to prove that we can produce the same quantity of iron with the pulverized coal process in an hour as the natural gas facilities at present afforded can produce in two hours. Of course, while the tests thus far have proven satisfactory, unforseen difficulties may arise in the future, although we feel confident of success in a very short time." The tests will be continued in order to remove all doubts as to the success or failure of the plan.

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Tenure of Nova Scotia Mineral Lands.

The policy of the Province of Nova Scotia with regard to its mineral resources has been somewhat different from that adopted in other parts of the Dominion, and it has many points recommending it to the attention of the mining public, as well as to the Crown Land Departments of the Local Governments. Here the interests of the individual have been consulted equally with those of the government which derives an important revenue from Crown minerals.

The early land grants were made to three classes of people—Individual Settlers, Emigrants arriving in a body, and receiving through Commissioners, lots included in one grant or patent sometimes covering 125,000 acres; and wealthy individuals who were able by money or influence to secure grants sometimes as large as 20,000 acres. The names of men prominent in the early history of the country in this way became attached to numerous localities, as in the case of the DesBarres, Wilkins, Wentworth, Franklyn and other grants.

Land grants made previous to 1759 do not appear to have had any minerals reserved to the Crown, unless perhaps the royal metals were reserved even if not specifically mentioned. After this date usually gold, silver, precious stones, *Lapis Lazuli* were reserved, and after 1764, lead, copper and coal were added to the list. In some large grants, however, aggregating several millions of acres, made about this time only gold, silver and coals were reserved. After the year 1009, iron was added to the list of reserved minerals. The importance of reserving the coal in Cape Breton was recognized at an early date. In 1784 when the Island was first created into a separate province upon the recommendation of Governor DesBarres, an Order in-Council was passed at St James, that in all grants of land a reservation should be made "of all coals, and mines of gold, silver, copper and lead which may be discovered in such lands."

In 1825, George the Fourth, by an exercise of the royal prerogative, gave his brother, the Duke of York, a lease of all the reserved minerals of the Province (including Cape Breton) for sixty years. However, in 1853, arrangements were made by which this lease was terminated on conditions advantageous both to the Province and to those holding under the Duke of York's lease. By an Act passed in the last named year, the Province relinquished to the land grantees all the minerals previously reserved except gold, silver, lead, copper, iron, tin, coal and precious stones, and all other minerals, including limestone, gypsum, slate, clay, etc., are the property of the grantees. And all grants since that date have been in uniformity with that statute.

Two minerals only of importance have since been discovered and worked, viz., antimony and manganese ores, which, under the Act, are the property of the owner of the soil and pay no royalty. As large areas of Laurentian rocks are known in Cape Breton, it is possible that phosphate may be added to the list of fee simple minerals. From the standpoint of the Provincial revenue, it is to be regretted that iron ore was not reserved at an earlier date, as many of the large township grants in the Annapolis Valley, Cobequid Mountains, and elsewhere, contain important deposits of this metal, which have been largely worked at Londonderry.

The principle adopted with respect to these reserved minerals over one hundred years ago—that of never selling, but only leasing on short renewable terms—has been steadily maintained. The fact that this policy was adhered to at times when influence and favoritism ruled the day, may have been due to the custom adopted in England of letting the Crown minerals on royalties. The early lettings of coal in the Province were on short terms, from two to six years, at exorbitant royalties, sometimes as high as a dollar per Chaldron.

Upon the termination of the Duke of York's lease in 1858, when the mineral lands were thrown open, it was decided that licenses to search for minerals other than gold covering five square miles should be granted; out of which, within one year, an area of one square mile could be selected for mining. Upon the commencement of effective mining operations, the licensee was entitled to a lease for twenty years, renewable three times, provided that at the end of each term he was mining and complying with the conditions of his lease. Leases of gold areas are for a term of twenty-one years, and many contain any number of areas 150 by 250 feet; and as they are laid off in regular ranges, no ground is lost by the Government, and the individual miners' boundaries are readily ascertainable. In the same manner, the coal areas present regular outlines, a matter of importance, as coal can be mined in larger quantities, and more cheaply, than from the seams lying under fee simple properties, presentiug every irregularity of boundary. The adoption of the principle of having the boundaries prolonged vertically on all sides of the leases frees the miner from the "law of the apex" and the inevitable crop of lawsuits, so prominent a feature of precious metal mining in the United States.

In order to facilitate business, the Nova Scotia Mines Department has been made a court of registry of all titles, transfers, etc., of leases and licenses of Crown minerals, free of cost. Any transfer, etc., of mining title in any part of the Province is registered at the Departmental office, and is equivalent to the county registration, as in the case of land titles. The Crown having reserved the minerals, has secured to all lessees the right of taking land for the purpose of mining; failing a friendly agreement with the owner of the soil, the miner can obtain by arbitration the surface soil necessary for his works. At present revenue is received only from coal and gold. In the case of the former, sworn quarterly returns are made by the lessee of the amounts of mineral sold and of the labor performed. In the case of the gold mines, licenses are issued to parties building quartz mills, who are placed under bonds to place royalty on all the gold they extract. While the lessees make sworn returns direct to the Department of his labor and the number of tons sent to the mills.

When the monopoly of the Duke's lease ceased in 1858, and the coal lands were opened to the public, it was considered that leases should contain as conditions a royalty of about 10 cents on every ton of round coal sold, and stipulations for effective and continuous working, a non-compliance with which rendered a lease liable to summary forfeiture. The lessee of a gold ore was, under like penalties, required to perform annually a certain number of days' labor.

Practically speaking, no government could deal in so summary a manner with defaults in carrying out the lease conditions to the letter, as many extenuating circumstances could be alleged, such as fluctuations in trade, litigation, etc. Nor could the Mines Department be allowed to exercise a discretion as to cancellation of leases, as those aggrieved by its decisions would be ready to complain of harsh treatment. The remedy for the difficulty was the admission of the general public as a party of the third part, and for many years forfeitures have been made acceding to a prescribed procedure in the requisition of any person desiring possession of an area not being worked. The government of course reserving its right to act of its own motion in questions of royalty, etc. At another time it may be pointed out how this system worked, though steps have been taken to prevent harrassing forfeitures, and to maintain a balance between legitimate mining and speculation.

The Ottawa and Gatineau Valley Railway.

An enterprise of no secondary importance has now taken practical shape, is about to proceed, and will be prosecuted energetically. We refer to the Ottawa and Gatineau Valley Railway, a line which commences south of the Gatineau railway bridge, and proceeds along the river to the well-known Gilmour mills at Chelsea; thence to the Pêche, still hugging the water course; thence to Kasabazua, and on to the Desert. The Gatineau Valley road has had a

hard struggle, but now, with a cash bonus of $10,400 per mile and 6,000 acres of land per mile, there will be no trouble found in financing it. The subsidies given by the Dominion and Provincial Governments are a fair criterion of the public estimation in which this railway is held; it is an acknowledgment of its utility and advantages. The line will open up a great mineral, agricultural and timber country, and prove a source of great convenience to the travelling community, as up to the present time the old stage coach has to do what modern appliances perform with so much more speed and acceptability. We look to new life and an era of marvellous progress along the Gatineau so soon as the line is completed. The President is Mr. H. J. Beemer, of Montreal, and the Vice-Peesident, Mr. C. H. MacIntosh, of Ottawa.

Artificial Fertilizers.

By Francis Wyatt, Ph. D.

Chemistry may be described as that branch of science which investigates into the nature and properties of the elements of matter, and determines the manner in which they react upon, and combine with each other. If we hand over a grain of wheat to the botanist, he can discern in it nothing but a tiny, yellow, opaque and brittle seed, whereas, if we pass it to the chemist, he will discover by analysis that it is composed of a woody fibre, starch, gum, sugar, fat and protein. Again; ask a geologist to examine the soil, and he will designate the different ages to which it belongs and the various rocks from which it is derived, but, without the chemist, he is unable to determine the nature of its constituents, and hence cannot foretell, before any cultivation has been attempted, whether it is destined to be fertile, or of what kind of vegetation it is best able to promote the growth.

The application of chemistry to agriculture is thus naturally indicated; by its aid we obtain from the soil, from plants and from animals, at the lowest possible expenditure of time and money, the highest possible quantity of those substances indispensable to our physical well-being.

Production, in order to be cheap, must be rapid and plenteous, and we all know that the progress of unaided nature is methodical and slow.

Chemistry, by investigating the natural laws which govern the development of all living things, and by carefully observing the facts acquired by the practical experience of centuries, endeavours to provide the farmer with means by which he may assist and hasten the processes of nature. His work is, of course, still far from complete, but it has familiarized us with those elements which are essential to plant growth, taught us how those elements are distributed, shewn us what portion of them is or should be contained in our soils, and what soils are most propitious for different kinds of plants.

When our globe was launched into space, it was a liquid somewhat similar in consistency to molten glass, and, therefore, presented a vastly different appearance to that with which we are acquainted. It was made up of about sixty elementary bodies, so deposited, by order of weight or density, that the heaviest, such as gold, silver, lead and copper, were in the centre, while the lighter, such as calcium, aluminum and silicon, remained, and still exist, near the surface, where they have combined to form clays, limestones and sands.

Encircling its interior was a heavy, poisonous atmosphere, comprising all those elements which at a very high temperature assume the gaseous form—notably sulphurous, sulphuric, phosphoric, hydrochloric, nitric, boric and carbonic acids, with torrents of steam, and dense clouds of mercurial, antimonial, arsenical and other metallic vapors. When this mass began to cool it probably resembled an immense glass ball the solidified sides of which were uplifted by the bubblings of the intensely hot liquid mass within These solid projections formed our mountains and, passing from the transparent to the opaque, they gradually assumed the crystalline form. What is known as the earth's crust must have resulted from an extraordinarily forcible action consequent upon the fall of temperature. The vapors already alluded to were condensed into rain. The rain dissolved all the acid bodies, and these acids, attacking the alkaline crust, combined with its most powerful bases to form various salts. These salts soon underwent decomposition; some—such as sulphate of lime or gypsum—were deposited, while others, principally the chlorides, remained in solution and formed the seas. The neutralization of the stronger and more corrosive acids permitted the weaker carbonic acid to develop its activity, and it is this acid which has continued to play the most important part in nature in our own times. Held in solution by the running waters, it attacked and dissolved the various bases which existed in such large quantities in the mountains, and deposited them in the form of carbonates in the still warm valleys. This process of saturation, or neutralization, being entirely accomplished, chemical equilibrium may be said to have become established; the period of great geological catastrophes, therefore, came to an end, and the temperature of the earth gradually sank below the boiling point. A few volcanic disturbances continued, it is true, to occasionally convulse it; there was the upheaval, splitting asunder and complete overthrow of the most gigantic mountains, the drying up and the division of seas, and the formation of lakes of both fresh and salt water. As the temperature continued to cool, however, these disturbances became more and more rare, and there then commenced that formation of the soil which gave rise to the phenomena of vegetation.

VARIETIES OF SOIL.

It is the general custom to class arable lands according to the nature of their predominating constituents, and thus we allude to soils as sandy, clayey and limey.

Sandy soils are distinguished by their extreme porosity, and are frequently in such a fine state of division, that in the dry season the least wind will displace and scatter them in all directions. In such cases they are naturally sterile; but, when they are sufficiently moist, they facilitate and encourage the growth of an immense variety of plants of the lower order, which, by their eventual decomposition or putrefaction, form considerable deposits of that valuable substance called humus.

Such soils are more propitious than any others for the development of plants with very delicate or fine roots, such as barley, rye, oats, lucern, lupins, lentils and potatoes; but they require constant attention, and a large and regular quantity of manure, because their porosity permits them to absorb such an abundance of oxygen, that all their organic matter is rapidly burnt up.

Clayey soils are heavy and compact, and, when they contain more than fifty per cent. of pure clay, are onerous to work, and unprofitable to cultivate. It has, however, fortunately been discovered that the addition to them of so small a quantity as two per cent. of burnt lime suffices to so entirely change their nature and consistency, by transforming the silicate of alumina into a porous silicate and aluminate of lime, that it is now an easy matter in districts where lime is cheap and plentiful, to overcome this difficulty. In hot countries or in windy regions or in districts where the sub-soil is of a very permeable character, good clay lands offer great advantages, and although they periodically require the application of large quantities of reconstituents, they possess the faculty of retaining all the precious elements supplied to them, and of storing them up for the use of successive crops. When they contain a proportion of about ten per cent. of carbonate of lime, or chalk, they are the best of all soils for the extensive growth of such important plants as wheat, corn, clover, hemp, peas and beans, and of such trees as the chestnut and the oak.

Limey, or purely calcareous, are even lighter than sandy soils, and when, as is sometimes the case, they are very white and dry, they are absolutely barren. Such as these are, however, easily encountered, for we generally find them mixed with a sufficiency of clay to give them some degree of consistency, and render them available for ordinary purposes. Few soils are entirely devoid of lime, owing to the fact that all rocks contain it in greater or lesser proportion, and because it is transported in immense quantities by waters, in the form of bi-carbonate, and deposited. If it were otherwise, or if, in the absence of lime, other alkaline substances were not forthcoming, the acid principles secreted by all plants could not be saturated, and the inevitable result would be decomposi-

tion and death. In its pure form, however, lime is such an extremely strong base, that it is incompatible with life, and hence it is never allowed to exist in the soil, unless it be combined either with carbonic or silicic, or sometimes with sulphuric and nitric acids.

The general properties of every variety of soil are much influenced by colour; those which are white, and hence unable to absorb the solar rays, being invariably cold, whereas those which are dark are warm and fertile. In this regard both iron and manganese are of undisputed value, for by their transformation into ferric and manganic oxides, they produce the deep red or brown so much admired by sagacious farmers. In damp climates or in very moist soils, however, too much iron is apt to become a source of considerable danger, from the fact that, by the exclusion of air, the ferric is reduced, by its affinity for water, into ferrous oxide, and in that form exercises a highly corrosive action on vegetable life.

ELEMENTS OF PLANT LIFE.

Sixty years ago there was no such thing as what we now call scientific agriculture. In the old countries men were asking themselves the very question that faces us to day—how it is that lands which were once so fertile and productive now show signs of approaching exhaustion. The answer to this question could only be given after we had found how out-door plants live, whence they obtain their food, of what elements that food is composed; how it is conveyed to the plants and how they absorb it into their organisms. In point of fact the manner of life in plants is very similar to the manner of life in animals and man. They require certain foods in stated proportions which pass through the process of digestion; they must breathe a certain atmosphere and they are subject to the influenses of heat and cold, light and darkness.

The tissues of their bodies, like ours, are composed of carbon, hydrogen and oxygen, and contain besides nitrogenous principles, certain minerals, such as phosphoric acid, lime, potash' sulphur, magnesia and iron. It will be seen at once that if it is necessary for us to constantly absorb a sufficiency of these self-same elements to keep up our normal heat and provide us with new tissue, it must be no less essential for plants to acquire similar food, for similar purposes.

Pure atmospheric air is a mixture of nitrogen and oxygen, with a small proportion of aqueous vapor, and about 4-10,000th of carbonic acid, while water is formed by the combination of two parts of hydrogen and one part of oxygen. It is therefore apparent that the principal organic elements of plant food exist in the atmosphere as air, water and charcoal, and may be absorbed from without by the leaves, while the whole of the mineral bodies in order to be found in the soil, should be taken up from within by the roots.

How plants absorb and elaborate the inorganic matter necessary to the food of those graminiferæ which afford to man the bulk of his animal sustenance, or what process is undergone in the assimilation of carbon, hydrogen, oxygen, and nitrogen, which, in the form of carbonic acid, water and ammonia, or nitric acid, are taken from the air and the soil, we have no space to discuss; but, it will be interesting to quote a very beautiful and practical illustration of the contrast between them and ourselves, furnished by Dumas.

	Vegetables.		*Man and Animals.*
Decompose Produce.	Nitrogenous Matter, Fatty Matters, Gum, Sugar, Starch.	Consume	Nitrogenous Matter, Fatty Matters, Gum, Sugar, Starch.
	Carbonic Acid, Water, Ammonia.	Produce.	Carbonic Acid, Water, Ammonia.
	Evolve oxygen, constitute apparatus of *reduction* and are *stationary.*		*Absorb*, oxygen, constitute apparatus of *oxidation* and are *locomotive.*

The consideration of this remarkable contrast leads us to contemplate the progressive exhaustion of the soil, and the necessity for its reconstitution by the aid of chemistry, for, while admitting that *we produce those very elements* which the plants decompose, and which are so necessary to their existence, it is nevertheless a fact that *we are locomotives, and do not in practice give back to them what we have taken away.*

The elementary composition of plants being thus determined, the next step that suggested itself to investigators was the analysis of the soil, in order that comparisons might be established between virgin lands which had borne no cultivated crops and old soils which had long been tributaries to every kind of vegetable culture.

Briefly stated, it was found that good, ordinary young lands, contain in abundance most of the dominating ingredients discovered in plant organisms, and that soils which have long been under cultivation, and now show themselves incapable of their former remunerating production, only contain these dominants in minute proportions, or lack them altogether.

These data form the basis of our present science, and may be summed up in the following manner:

A. Plants require for their nourishment and prosperity a given quantity of food, composed in varying proportions and according to their different natures, of hydrogen, oxygen, nitrogen and carbon, and of phosphates, sulphates and chlorides.

B. The hydrogen and oxygen, in the form of rain or dew, are supplied as water, and the carbonic acid is mainly derived from the air.

C. Good virgin soils contain the whole of the necessary minerals, in addition to considerable quantities of nitrogenous and carbonaceous matter.

D—Long-cultivated and non-productive soils may be termed exhausted, since chemical analysis *proves their inability to furnish the needful substances in quantities equal to those found in the ashes of healthy plants.*

FERTILIZERS AND AMENDMENTS.

Having arrived at this important stage of progress we understand that, if agriculture is to continue to be the basis of national wealth and prosperity we must find means of restoring to our soils, if not in a natural in some artificial form, the chief elements yearly taken away from it by our crops—we say *chief* elements because a great number of the necessary minerals are only required in very minute proportions, and therefore generally exist in sufficient abundance. We may consequently disregard all these, and devote our attention to nitrogen, potash, phosphoric acid and lime, since these not only play the most important part in the functions of vegetation but are the most liable to complete exhaustion. The following figures representing averages compiled from the official reports of the United States Department of Agriculture extending over a series of years, will be found very *àpropos* for the purpose of illustrating the arguments already put forth.

ELEMENTS OF FERTILITY TAKEN FROM THE SOIL PER ACRE AND PER ANNUM, IN POUNDS.

——	Nitrogen.	Lime.	Phosphoric Acid.	Potash.
Wheat	25	15	30	45
Maize	55	45	80	40
Oats	30	14	18	20
Barley	35	12	18	20
Rye	25	13	25	35
Buckwheat	35	12	40	38
Hay	40	40	15	40
Tobacco	not calc'd.	160	not calc'd.	340
Turnips	do	100	45	150
Potatoes	44	60	52	185

These are, of course, only a few examples, but they will suffice for present purposes, and it is perhaps hardly necessary to add that if, according to the nature of the crop desired, at least a sufficient proportion of each of these essential elements be not present in the soil, the plants will languish, various malignant diseases will declare themselves, and death will inevitably ensue before they reach maturity.

Now, the practical question that must naturally arise, is, how may all this loss be repaired, and whence are all the elements needed to repair it to be derived? It is not so very long ago since this question would have been generally answered by the words, "farm-yard manures," and even to-day there are a large majority of farmers who depend exclusively upon this valuable fertilizer.

The fallacy of their policy is, however, made apparent by a simple calculation, which any interested reader can work out for himself, in this wise.

The necessary elements to the growth of a medium crop of hay have been put down, approximately, per acre, as:—

Nitrogen	40	pounds.
Lime	40	"
Potash	40	"
Phosphoric acid	15	"

The very best farm yard manure is found to contain, on an average, for every hundred pounds, exclusive of water and fibre :—

Nitrogen.....not quite ½ pound.
Lime.....little more than ½ "
Potash.....about ½ "
Phosphoric acid.....(say) ¼ "

With a very moderate allowance for loss in storage, drainings, evaporations, etc., it must be conceded from these figures that to repay what has been borrowed from the soil by a single crop of hay would call for some six tons of material per acre; and there is probably only a very limited number of farmers—even if there are any—who could produce anything like this quantity. The practical answer to the question propounded, therefore, is that we must profit by the teachings of science and turn to artificial or chemical fertilizers as the only means of avoiding present loss and eventual poverty. This leads to a brief glance at the most accessible materials, and the forms in which they are most appropriate for the requirements of growing plants.

NITROGEN.

The sources and the supplies of nitrogenous elements, outside the free nitrogen and the ammonia that exist in the atmosphere, are numerous and plentiful. Every species of plant, roots, stalks, leaves and seeds yield it up in varying proportions, under the influence of decay. The refuse or waste from an average crop of clover contains about fifteen pounds of assimilable nitrogen per acre, and some of the other green crops are so rich in this element that it has become customary to occasionally grow them for the express purpose of plowing them under directly they have reached maturity. Outside the farm, we have guano, fish, wool rags, horns, hoofs, hair, blood and all other animal refuse from the slaughter-house, and, failing a sufficiency of all or any of these, there are the nitrates of soda and potash, and sulphate of ammonia.

The following are about the proportions of nitrogen contained in every 100 pounds of some of the foregoing materials :—

100 lbs.	shoddy	contain	7	lbs. nitrogen.
100 "	wool dust	"	9½	"
100 "	dried blood	"	12	"
100 "	rope cake	"	5	"
100 "	cotton	"	5½	"
100 "	sugar scum	"	3	"
100 "	leather cuttings	"	8	"
100 "	sul. ammonia	"	21¼	"
100 "	nitrate of potash	"	13¾	"
100 "	" soda	"	16½	"

POTASH.

We have seen that the quantity of potash absorbed by the most important of our crops is greatly in excess of phosphoric acid. It may consequently be assumed that continued fertility depends upon a preponderance of this important base. This, nature has in a great measure provided for, by promoting the continuous decomposition of feldspathic and other rocks, and by favouring the transfer of potash in the various forms of silicates, carbonates, and oxides from the subsoil to the surface.

When all these varieties fail, however, it is easy to secure inexhaustible supplies from the nitrates and chlorides, which are either deposited in various localities on the surface, or in the interior of the earth's crust, or held in solution by the waters of the sea.

Potash salts, to be readily assimilable, or useful to the plant, must be liable when introduced into its sap, to so easy a decomposition, that their liberated alkali may enter at once into the necessary combination with the organic compounds.

If, as it is applied, the potash be united to its acid by too strong a bond, the vegetable will be unable to effect a dissociation; and the salts will accumulate in the tissues, and become a mere burden instead of promoting healthy growth.

This question of assimilation, therefore, is one that demands very att ntive study; and it is from the data collected by the most recent scientific discoveries in relation to the laws and powers of affinity, that the various salts, according to their adaptability, have been classed in the following order :

Carbonate, Sulphate,
Nitrate, Chlorides.

The amount of potash contained, in round figures, in each of these salts when puré is as follows :

100 pounds Carbonate contains 68 pounds of potash.

100 pounds Nitrate contains 46½ pounds potash.

100 pounds Sulphate contains 54 pounds potash.

With regard to the chlorides, which are compounds of chlorine and *potassium*, it is necessary before they can furnish anything available that they should undergo a preliminary decomposition in the soil, but it may be assumed that when this has taken place, every 100 pounds of the pure chloride would be equal to about 63 pounds of potash.

On the assumption that neither the sulphate of potash, nor the chloride of potassium is directly assimilable by plants, their efficacy must depend upon the composition of the soil under treatment, and the character of any other fertilizers with which they are simultaneously used.

To illustrate this it is only necessary to imagine a mixed fertilizer containing in suitable proportions, superphosphate of lime, sulphate of ammonia, and muriate of potash.

As soon as this compound reaches the soil, a reaction is commenced between the whole of the salts, resulting in the production of phosphates of ammonium and potassium, and sulphate and chloride of calcium.

The two latter will be washed down into the subsoil by the rains and carried away, while the two first will enter the roots, and be very readily decomposed in the sap, and utilized by the plant.

If, instead of the above, a mixture be chosen of nitrate of soda, and either the muriate or the sulphate of potash, a similar transformation will take place; chloride or sulphate of sodium being produced on the one hand, and nitrate of potash on the other.

Dispensing with unnecessary reiteration, these typical examples sufficiently illustrate the importance and advisability of making preliminary trials upon a small scale, with each salt, in every case where the use of potash has been determined upon, since, under the varying influences of the different elements in every soil, uncertain and unlooked-for results may be obtained.

PHOSPHORIC ACID.

This indispensable fertilizing agent is probably the one in which all cultivated soils are most deficient, and, to make matters still more complicated, its occurrence though so plentiful in nature, is found to be most unequal.

It does not exist in the atmosphere; soils of the granitic and teritiary formations are nearly deprived of it; and many other species only contain it in very slight traces.

The following are the principal and most available commercial sources of phosphates for agricultural purposes, viz.:

First, Natural phosphates, of animal or mineral origin, such as bones, bone-ash, and apatites very finely ground.

Second, Superphosphates, manufactured by treating these raw materials with a sufficient quantity of sulphuric acid to transform them from an insoluble into a soluble form.

Third, Precipitated phosphates, obtained by dissolving raw phosphates in hydrochloric instead of sulphuric acid, and adding to the liquid a milk of lime.

From which of these forms the most direct advantage is to be obtained by the farmer, is a somewhat disputed question. Accepting the generally admitted and rational theory, that no element can penetrate into the interior of a plant unless it be in the form of solution, it naturally follows that preference will be invariably given to those commercial phosphates which are most readily subject to dissociation; and this will entirely depend upon two conditions :

(a) Their own degree of aggregation.

(b) The nature and composition of the soil in which they are employed.

The first thing to be obtained is undoubtedly a fineness of pulverization, which will so divide the molecules as to render them easily decomposable by the natural action of the elements contained in the ground, and in this only partial success has been achieved by mechanical means. So long ago as 1851, Leibig recognized the difficulty, and proposed, in order to solve it, to chemically perform this operation by manufacturing superphosphates.

From the standpoint of disintegration, this method has been entirely satisfactory, and has enabled agriculture to rapidly obtain results from the use of phosphoric acid, which would otherwise have been impossible. From a chemical point of view, however, the whole

theory fails. We know that superphosphates are only soluble in water so long as the sulphuric acid with which they have been manufactured retains its ascendency over the lime, and that when they reach the soil, especially where carbonates are in abundance, the sulphuric acid is at once overpowered. The phosphoric acid, being unable to exist in a free state is taken up by the lime and iron and at once reverted to a tribassic form. In other words the whole question is one of time, and of dollars and cents.

The farmer buys a ton of raw phosphatic material finely ground, and containing say twenty-five per cent of phosphoric acid for $10. If his land contains neither humus nor acid elements nor a sufficiency of lime, the phosphate will not decompose and he will have to wait perhaps several years before obtaining any appreciable results for his outlay. On the other hand he buys a ton of superphosphates, containing only fourteen per cent. of phosphoric acid for $20 and applying it to an exhausted soil, producing the desired results on his very next crop. Hence it is apparent that the phosphoric acid of the latter is more assimilable than that of the former case; and this assimilability can only be due to the absolute state of division insured by the series of decompositions to which the raw phosphate is exposed during the manufacturing process. To define with scientific accuracy the the exact merit or intrinsic value of any specific phosphate, is a matter of very serious difficulty; since, besides that of its own physical conditions, so much depends upon the nature and composition of the soil in which it is to be employed. No better examples of this truth could possibly be found than the preliminary comparative experiments, conducted during the past two years, with raw basic slag, and various other phosphatic materials; for they have so far proved, that whereas, in some soils the effects produced by crude phosphates fairly rival those obtained with superphosphates, in other soils they are either quite inert or insignificant in their action.

LIME.

All farmers are familiar with the use of lime, but it is doubtful whether many of them know the exact reasons for its application or clearly understand its influence. It may therefore be broadly premised that the objects for which it is employed are two in number.

First, To exercise a chemical action upon the numerous constituents of the soil, and thereby produce a complete modification of its physical and chemical properties.

Second. To furnish it with the quality required by plants for their alimentation and growth. From the figures already given it will occur to the reflective mind that, regarded as a plant food, lime is of less direct importance from a commercial standpoint than either nitrogen, potash or phosphoric acid.

Placing the total quantity yearly removed by crops at an average of 50 pounds per acre a soil need only contain say, half of one per cent. to supply all that could be demanded of it during several hundred years.

Its true agricultural value must consequently be attributed to its qualities as an *amendment* rather than a fertilizer.

The term "amendment" has been given to substances which, when they are applied to a soil, effect a change in its general constitution, and thus lime, when mixed into strong, stiff and unworkable clays in the proportion of from ten to fifteen tons to the acre, induces in them a far-reaching chemical decomposition, which, in addition to partially transforming them into the more porous silicates and aluminates of lime, sets free large quantities of alkaline salts that were previously unable to co-operate in the phenomena of vegetation because bound up in insoluble combinations.

This marvellous effect would of itself create for lime a very high place in the estimation of farmers; but it by no means represents the total scope of its usefulness, as will be clear to those who recall its properties as a generator and promotor of combustion. The accumulation of vegetable remains in various stages of decay and putrefaction, left in the ground by the crops or intentionally plowed under for the purpose, results in the production of a body known as humus. If left to itself this body would so acidify the soil as to destroy its normal basic or alkaline reaction. It could consequently no longer afford nourishment to any of those plants which generate the elements of animal food. In order to successfully cultivate such lands it is therefore necessary to neutralize their acidity; render them alkaline, and remove the excess of these organic matters.

All these conditions are perfectly fulfilled by burnt lime. The word "combustion" designates that process by which an organic body principally composed of carbon and hydrogen, with traces of nitrogen, unites with the oxygen of the air to form oxides. Thus, coal, coke, wood and vegetable refuse, although burnt to create heat, and apparently thereby destroyed, in reality merely undergo a chemical change, arising out of that scheme of nature which has provided for the restoration of all their constituents to the atmosphere and the soil.

The carbon continues with the oxygen of the air to form carbonic acid gas; the hydrogen and nitrogen, momentarily set free by this action, unite themselves together to form ammonia; while the ash consists of oxidized mineral matters.

With the exception of fluorine, every element combines with oxygen to form oxides, and in doing so develops more or less heat. The warmth of the animal body is created and sustained by the oxidation of the starchy or fatty or carbonaceous elements of food; and, hence, while animals breathe in oxygen, they breathe out carbonic acid, gas and steam. When this natural chemical process is stopped, the animal dies; or, to speak more forcibly, when no more food is provided, or no more oxygen inhaled, the internal fire ceases to burn, and everything grows cold.

This is but a brief definition of combustion. It, however, suffices to establish that oxygen is the promoter of the phenomenon, and hence to explain that, if great masses of decaying humiferous matters sometimes linger in soils, it is because the latter are cold and wet and have become so choked up and cohesive as to preclude a proper circulation of air.

Oxygen is thus unable to reach them until they have been warmed, dried and made porous. Burnt lime, when properly administered, accomplishes all these objects.

By its great affinity for water and the intense heat of its combination, all moisture is absorbed. The rapidly drying soil cracks and opens up in every direction, and free ingress being thus afforded to the air, a vigorous and permanent combustion sets in.

Attacked in its turn by the carbonic acid gas resulting from the combustion process, it is converted into carbonate of lime, and, alkalinity being thus gradually restored, the plough completes the conquest, and barren wildernesses become fertile plains.

Reviewing these effects and briefly summing up its advantages, it will be seen that, independently of its power to impart porosity and to facilitate combustion, lime sets free various alkaline salts from useless combinations, and renders them available as plant-food. It also decomposes certain injurious salts of iron, magnesium and manganese, counteracts the evil influences of all kinds of sulphurous emanations, and, before being transformed into carbonate, destroys, by its causticity, vast quantities of ravaging insects and their eggs.

Despite these great advantages, it must be noted that the indiscriminate use of this powerful oxidizing agent on good ordinary cultivated soils would be productive of disaster.

Lest this statement be regarded as conflicting, it is explained that a good soil is what has been described as a mixture containing all the elements required for plant-food, in a proper physical condition, and with a due proportion of humus or organic matter. This humus is of the utmost importance.

First. Because, by its very slow oxidation or combustion it helps to maintain the warmth of the soil.

Second. Because it contains a considerable quantity of nitrogen, which is gradually transformed by this slow combustion into ammonia or nitric acid and nitrates.

Third. Because it has the invaluable property of always retaining moisture, and thus can enable plants to withstand periods of drought which would otherwise kill them.

However rich it may otherwise be, it has been demonstrated, by experiment, that no soil is perfect which contains less than two per cent. of humiferous matter.

This is why scientists untiringly urge upon farmers to provide for its maintenance by using

in addition to artificial fertilizers all the farmyard manure they can scrape together and to carefully plough under, instead of burning, as they are so prone to do, all the refuse from their crops.

The imperative necessity of this duty is intimately connected with the most complicated problem yet remaining to be solved by agriculturalists, (i.e.) whence to obtain sufficient assimilable nitrogen to integrally replace what is taken from the soil by the crops, and exported with them to foreign countries every year, without having recourse to any of the costly commercial substances already enumerated.

The pet theory—so beautiful as a theory—of obtaining it directly from the air, in a suitable form, and at a fabulously cheap price, continues to occupy many clever brains in many scientific laboratories, but is still as far as ever from a practical solution; on the other hand since it has been proved that nitrification chiefly results from the extremely slow oxidation of organic matter in alkaline soils, it naturally follows that so long as there exists a sufficiency of humus under favourable conditions, no dearth of available nitrogenous plant food need be apprehended.

Unfortunately, the immense amount of exportation, combined with misconceived notions of sanitation, prohibit all hope of restoring to the lands the whole of the required nitrogen in an organic form. It is consequently all the more necessary to manipulate what remains in a spirit of economy; to handle the soil with delicacy, care and intelligence, and above all things, to avoid introducing into them any substance which may interfere with their normal, regular, and natural functions.

The White's Asbestos Company.

A meeting of White's Asbestos company was held in London on 1st inst., in opening which the chairman, Mr. W. M. Borradaile, said :—"Our company was registered on April 9, and our prospectus was issued on April 13. Before issuing the prospectus the board decided that they would not go to allotment unless 16,000 shares were applied for, as they considered that it was advisable that the working capital should be £10,000, and the cash payment to the vendors was £6,000. As a matter of fact, only 15,000 shares were applied for, but, on the vendors' agreement to take up a further 1,000 shares in the event of the directors calling upon them to do so, the board had no hesitation in going to allotment. The company having been formed, the engineer sailed for Quebec on April 25, arriving there on May 5. It took him about a fortnight to purchase his supplies and make the necessary preparations for commencing work, and on May 20 he arrived on the property. It will take a little time to develop this property to an extent which will yield large returns; but Mr. Boyd already reports a good show of asbestos on the face of his working, and we have every reason to be satisfied with the prospects which the work done so far holds out. In the last days of June Mr. Boyd made arrangements to commence work on a second property in Coloraine. In this mine, also, there is a good show of asbestos of good quality, and Mr. Boyd also reports a rich vein of soapstone ready for market. I am pleased to inform you, gentlemen, that the properties described in the prospectus have been duly conveyed to the company, Mr. Stuart, the Government Solicitor, having been our attorney in the matter. I may also mention that before coming home Mr. Boyd had selected several other properties, to the extent of about 500 acres, which will no doubt be secured for the company at the Government price, which will probably not exceed £1 per acre. And now, gentlemen, I do not know that I have more to add; but as I have said, I shall be most happy to answer any question that may be asked. The asbestos mining, as regards Canada, is a comparatively new industry, having only become of importance within the last few years. It seems to be generally admitted that Canadian asbestos is superior in quality to that found anywhere else, and the demand for it is increasing rapidly, and is now in excess of the supply, as is evinced by the steady advance in price. Further developments will undoubtedly take place, but, so far as can be seen at present, good mines will continue to yield very handsome returns. These properties, gentlemen, were not selected in a haphazard way. Mr. Boyd has spent a considerable time over the matter, and made openings over 20,000 acres of ground before he bought the property."

The new Foxton Mining Company in Court.

Recently, in the Chancery Division of the High Court, before Mr. Justice Kay, Mr Renshaw, Q.C. (with him Mr. Alexander) moved on behalf of the plaintiffs, Möller, Hunter and Lomer and the Foxton Phosphate Mining Company, Limited, for an injunction restraining the defendants, Maclean, Gay, Mew, Adams, Bingham and Langridge, from holding any meeting having for its object the removal of the plaintiffs from the directorate of the plaintiff company. The company was registered on April 18, with a memorandum of association, but no articles, so that Table A of the Companies Act applied. On the same, April 18, in accordance with Section 52 of the Act, the subscribers to the memorandum appointed the three plaintiffs to be directors. All the defendants, except Gay, were subscribers to the memorandum; Maclean and Mew were clerks in the office of the solicitors of the company, Adams was the secretary, and Bingham and Langridge were clerks in his office. The only suggestion made in the affidavits filed on the part of the defendants as to why the plaintiffs were not properly appointed was that the appointment was made before the actual registration of the memorandum and articles. The plaintiffs had allotted shares and notices had been sent out, but since the defendants had taken upon themselves to act as directors the allotments had been cancelled.

Mr. Justice Kay: Until the memorandum was registered there was no incorporation. There can be no directors before the company exists.

Mr. Renshaw said that after the incorporation the election of directors was confirmed.

Mr. Justice Kay said that until the company was incorporated the subscribers to the memorandum were merely promoters, and could not appoint directors.

Mr. Renshaw pointed out that Table A provided that the names of the first directors should be determined by the subscribers to the memorandum.

Mr. Justice Kay repeated that until they became a corporation they had no power to appoint directors. If the names of the directors were put in the articles, it was just as though every subscriber had put his hand and seal to the deed appointing those persons directors.

Mr. Renshaw observed that here every subscriber had concurred in appointing the directors. According to the minutes, it appeared that after the incorporation of the company the subscribers to the memorandum met and appointed the plaintiffs as directors, and this was a good appointment.

Mr. Justice Kay suggested that a meeting of the company should be held and directors appointed.

Mr. Renshaw said there was a difficulty about this, as it was not known to what extent particular individuals were or were not shareholders, as the defendants had cancelled the allotments. On June 5, at a meeting of the subscribers, additional directors were appointed, and the election of those before nominated was confirmed.

Mr. Martin, Q.C. (with him Mr. Farwell), for the defendants, contended that the plaintiffs had not been validly appointed, as the notice did not state the object of the meeting; next, that a majority of the subscribers was not present, and proper notice of the meeting was not given. He was quite ready to call another meeting of the subscribers if what had been already done was not sufficient.

Mr. Justice Kay said he had seldom seen such a series of blunders committed in connection with any joint-stock company. The notice of motion asked that the defendants might be restrained from holding any meeting having for its object the removal of the plaintiffs (other than the company) from the directorate, and from in any way interfering with the plaintiffs in their position as directors, and from appointing any other directors until the trial of the action. It was the first time he had ever heard such an application brought before the court. It was said that the plaintiffs were appointed directors by the subscriber to the memorandum before the company was registered; but this could not be so, as table A had no relation to a joint-stock company until it was registered. The plaintiffs were never appointed directors alone by any proceeding after the company was registered. According to the first minute, the plaintiffs and a Mr. Curzon were appointed directors, but the date of this appointment was uncertain, as there appeared to have been an alteration made in the book, though no one could say by whom it was made. On June 4, a notice was issued by the secretary to the effect that in consequence of the irregularity in appointing directors, a meeting for that purpose would be held on the following day, and from the minutes it appeared that six of the subscribers attended, when it was proposed that the plaintiffs should be appointed. To this an amendment was made, adding two other names, and the amendment was carried. The plaintiffs in their affidavit stated that the subscribers met on June 5, and "effected to appoint additional directors, although we have refused to recognise any such appointment." So that the plaintiffs maintained that the only valid appointment of directors was before the company was registered. It was not necessary to go further, but he might observe that on April 23 the plaintiffs purported to allot shares, though, upon looking at the minutes, he found they had not been signed, as they ought to have been. Then, on July 5, the first meeting of shareholders was called; but to this no one but the subscribers were summoned. The proposition on which the motion was based—viz., that the plaintiffs were the only directors of the company—depended upon their having been appointed before the company was registered, and he was of opinion that this was an invalid appointment. Therefore, the people who were really the directors were all the subscribers to the memorandum. Whether anything had been done since binding upon any human being he did not now decide. The motion would be refused with costs.

Sinking Appliances at Llanbradach.

An Interesting Paper Descriptive of a Plant in which the Author has Applied Successfully a Number of Original and Useful Ideas.

BY W. GALLOWAY.

(From Proceedings of the South Wales Institute of Engineers.)

(Continued from July issue.)

The water from the bottom of the shaft has hitherto been raised by means of an arrangement imagined and carried out by the author in January last. He had long regarded the laborious and expensive method of bailing the water by hand into a barrel with open top (occupying the whole attention of three, four, or more men, when the quantity to be removed amounted to between 2,000 and 3,000 gallons an hour, and limited in its application to that amount) as a reproach to the art of mining. Having considered various methods of effecting the same object by mechanical means, he at length decided to fill the water-barrel by means of a vacuum, making it air-tight at the top, and providing it with a valve opening inwards at the bottom Figs. 8, 9, 10, 11 and 12 represent this arrangement, and its principal details, as applied at Llanbradach. The *pneumatic water-barrel* consists of a cylindrical vessel of sheet-iron, 4 feet 2 inches in diameter, and 8 feet high, closed at the top, in which there is a door, *a*, bolted to the cover, and serving as a means of access to the interior when removed. The bottom, *c*, *d*, is 5 inches above the bottom of the cylinder. It consists of a steel plate $\frac{5}{8}$ inches, with a central opening 18 inches in diameter. The valve-seat was turned in a lathe, so as to secure perfect trueness. The valve, *b*, consists of a block of cast-iron, *e* (Fig. 12), having its lower face and vertical sides turned quite true. Over this turned face a sheet of leather is tightly *cupped*, and held in place by a tightly fitting wrought-iron hoop, *f* (Fig. 12). The hoop is secured by three tapping bolts, *g* (Fig. 11). A circular plate of iron, 16 inches in diameter, is bolted to the bottom of the valve, as shown, by means of six bolts with counter sunk heads. A spindle *h* (Fig. 9), working through two guides, and having a turned ball at its lower end, is held loosely in a socket in the valve, as shown in Figs. 9 and 12. In this manner the vertical movement of the valve is secured, while the ball and socket joint enable it to accommodate itself to the seat in any position into which it may be turned. At *k* (Figs. 8 and 9), one-half of an instantaneous coupling, identical with those used by the Vacuum Brake Co., and supplied by the same makers, constitutes the outside termination of the pipe *l*, which, passing through the side of the cylinder, rises to within an inch of the top in its interior. A glass guage at *m* shows the height of the water in the interior when it rises to that elevation. The instantaneous coupling and the water-gauge are both protected by a strong angle-iron rib, *n* (Figs. 8 and 9), which projects from the side of the cylinder, as shown, and serves to guard them from the blow given by any large body such as a bucket. Care must be taken not to allow the point of a leg of a drilling-machine, which is being let down by the winding-rope, to enter between the angle-irons. The author has known of one guage-glass being broken in this manner, and giving rise to a loss of time amounting to half an hour, while it was being replaced, but he does not know of any other instance of such an accident. This one could have been quite easily avoided by the exercise of the slightest degree of foresight on the part of the man in charge of the shift.

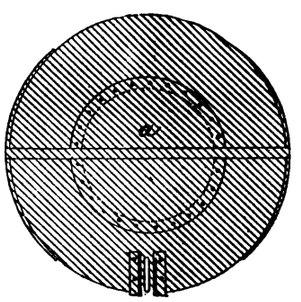

Fig. 10. Pneumatic Water-Barrel. Scale, $\frac{3}{8}$ in.=1 ft.

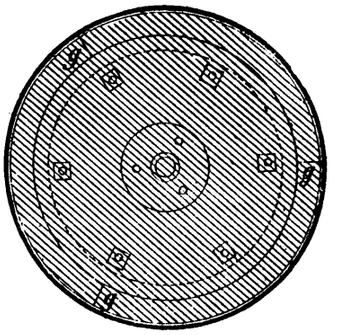

Fig. 11. Pneumatic Water-Barrel. Scale, 1 in.=1 ft.

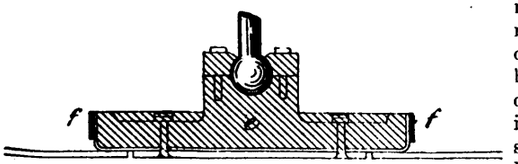

Fig. 12. Pneumatic Water-Barrel. Scale, 1 in.=1 ft.

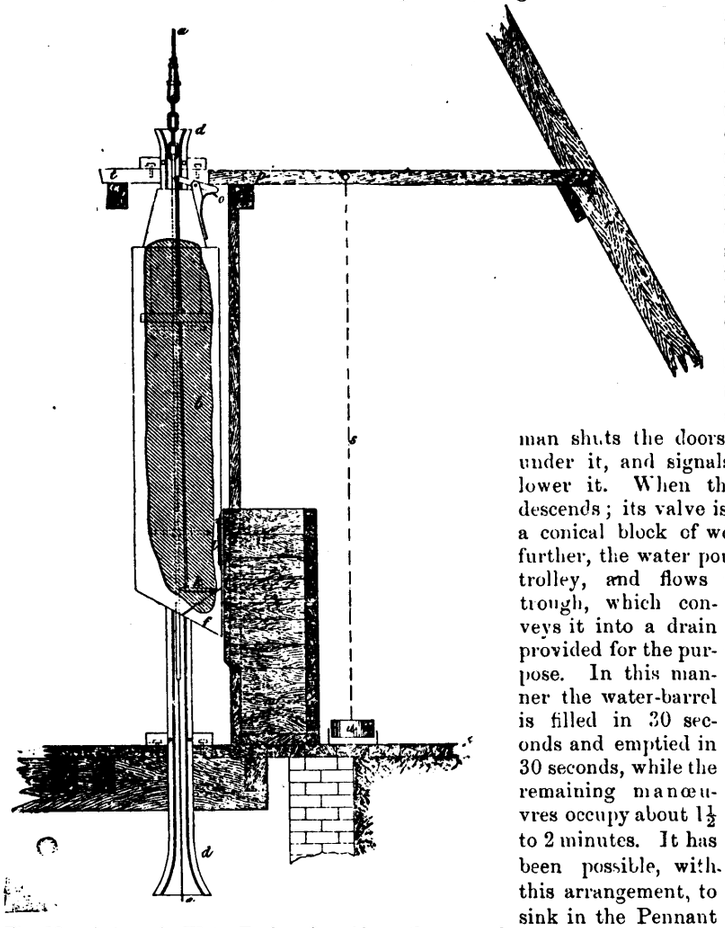

Fig. 13. Automatic Water-Tank. One side partly removed. Scale, $\frac{1}{4}$ in.=1 ft.

The vacuum is created by means of an ordinary air-pump condenser constantly working at the surface. The steam-cylinder of this air-pump is 10 inches in diameter by 20 inches stroke, and steam is cut off at one-fifth of the stroke by means of adjustable hand-gear. The vacuum pump is 14 inches in diameter by 20 inches stroke, coupled tandem-fashion to the piston-rod of the steam-cylinder. This engine produces a vacuum equivalent to a column of mercury from 20 to 22 inches high, both in a receiver near the top of the shaft, consisting of an old egg-end boiler 24 feet 8 inches long by 5 feet in diameter, and in a system of pipes of 3 inches in diameter, communicating with it, one of which descends to the bottom of the shaft. It is there connected with a flexible hose 30 feet long by $2\frac{1}{2}$ inches in diameter, provided with a stop-cock, and terminated in one-half of an instantaneous coupling corresponding to the other half, which is affixed to the pipe *l* of the water-cylinder, in the manner already described.

When it is desired to fill the pneumatic water-barrel, it is lowered to the bottom of the shaft, and rests with its hollow end under water. One man then attaches the instantaneous coupling of the flexible hose at *k*, opens the stop-cock, and observes with a light at *m*, when the water rises in the gauge-glass. As soon as he notices the water rising to the desired height, he shuts the stop-cock, detaches the instantaneous coupling, and apprises the man in charge of the signal that all is in readiness. The latter then signals to the winding engine-man, who thereupon raises the water-barrel with its contents to the surface. On its arrival there the bankman shuts the doors, draws a water-trolley under it, and signals to the engine-man to lower it. When this is done, the barrel descends; its valve is arrested on the top of a conical block of wood; and, as it descends further, the water pours out into the water-trolley, and flows thence into a wooden trough, which conveys it into a drain provided for the purpose. In this manner the water-barrel is filled in 30 seconds and emptied in 30 seconds, while the remaining manœuvres occupy about $1\frac{1}{2}$ to 2 minutes. It has been possible, with this arrangement, to sink in the Pennant sandstone, with 5,000 gallons an hour in the bottom of the shaft, at the rate of 5 and $5\frac{1}{2}$ yards a week; the highest rate of progress in the same ground with only 500 gallons an hour, having been $6\frac{1}{2}$ yards a week. At one time, when the quantity of water in the bottom rose to 7,000 or 7,500 gallons an hour, the rate of progress attained was rather under 4 yards a week, the rock being at the same time exceed-

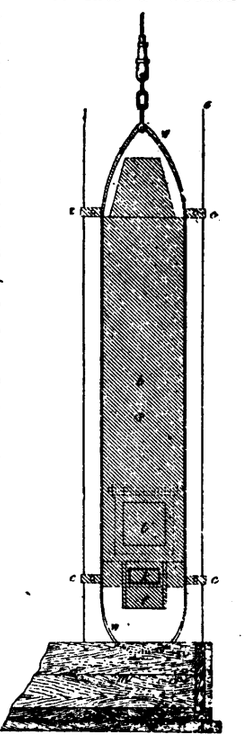

Fig. 14. Scale, $\frac{1}{4}$ in.=1 ft.

ingly hard and compact. Although these quantities of water are, comparatively speaking, insignificant when pumps can be applied to elevate them, they are sufficient to render sinking impossible by the system of bailing. The establishment of pumps in this shaft was a question that could not very well be solved at the commencement of the operations, as it was impossible to determine what quantities of water were likely to be met with; and even as the sinking progressed from day to day, the uncertainty continued the same, so long as the bottom of the Pennant sandstone had not been reached, and the Shale series entered upon. All the Collieries surrounding Llanbradach except Albion—namely, Harris's Navigation, Newport Abercarn, Abercarn, Risca, and Caerphilly Collieries—are provided with heavy pumping machinery and powerful engines, all of the Cornish type except the one at Caerphilly Colliery, which is one of Barclay's patent engines. At Albion Colliery, on the other hand, there are two or more direct-acting steam-pumps established in lodgments made in the side of the shaft.

The shaft at Llanbradach is situate about equidistant from Albion, Caerphilly, Risca, and the two Abercarn Collieries. Under these circumstances, the author did not feel justified in advising the owners to establish either light or heavy pumping machinery. If he had advised heavy pumping machinery at the commencement, the cost would have been very great; and if he had advised light pumping machinery, there was a possibility that his advice might have been stultified by the result, and that the light machinery would require to have been removed, and to have been replaced by more expensive appliances. The specification under which the shaft is being sunk defines 4,000 gallons an hour in the bottom, as the maximum quantity with which the contractor has to deal; and that when the quantity exceeds this amount, whether pumps have been provided or not, he is to receive certain allowances, which are left to the discretion of the engineer. The allowances for extra water to a depth of 193 yards have amounted to £498, or an average of about £2 12*s*. per yard over the contract price. But the aggregate quantity of water met with down to a depth of 135 yards from the surface amounted to 9,000 gallons an hour—namely, 5,500 gallons above 95 yards, and 3,500 gallons between 95 and 135 yards. Of these two quantities, 5,000 gallons an hour were walled out by means of brick and cement walling, leaving only 500 gallons an hour in the bottom at 95 yards. Below 95 yards the water gradually increased up to 3,500 gallons an hour at 135 yards. At the last-named point a piece of an old boiler, 5 feet in diameter and 10 feet 6 inches long, with one end open and the other closed, was fixed on a beam, with its centre directly below the rope of the small winding-engine, and that engine was employed in raising the whole of the water running into the shaft, except some 500 gallons an hour which escaped from the sides between the bottom and the collecting curb.

As the shaft was deepened still further, the quantity of water issuing from the rock below the collecting curb gradually increased, until at length it amounted to 5,000 gallons an hour between 135 and 190 yards. But in the meantime the springs between 135 and 95 yards had decreased to about 1,800 gallons an hour. The cistern was then lengthened to 14 feet 6 inches, and fixed at a depth of 190 yards, a collecting curb having been put in, as in the former case, and the 1,800 gallons an hour collected at the higher curb was also run down into it in 3-inch pipes. Another stronger engine was then put to work to raise the water from this cistern, and easily raises 5,000 gallons an hour by means of the following apparatus, of which the principal details are represented in Figs. 13 and 14:—*a* is the winding-rope of the auxiliary winding-engine, and *e e* (Figs. 13 and 14) the guide-ropes; the two latter ropes are fixed in the bottom of the cistern at 190 yards, pass over two pulleys, *f* (Fig. 1), above the winding-pulley, and are wound upon two small hand-crabs standing on the surface at some distance from the shaft, on which there is sufficient rope to reach to a depth of 500 yards if required. The tank, *b*, is 2 feet square inside; has parallel sides for 8 feet of its length; terminates upwards in a pyramidical frustrum-shaped top, which is bolted to its square part and can be removed when desired; and has a bottom sloping from front and back towards the centre, as shown. Four projecting studs, *c c*, one on each side, at top and bottom, clasp the guide-ropes loosely. The tank is guided by these ropes in ascending and descending the shaft, but when it reaches the top the studs on each side pass between fixed guides, *d d*, each consisting of two bars of angle-iron riveted to a long plate of sheet-iron and made fast to the woodwork.

A valve, *k*, in the bottom serves both as a means of filling and as an outlet for the water which escapes into a sloping adjutage, *f*, and precipitates itself thence into a wooden trough, *m*, whence it runs into the drain mentioned in connection with the *pneumatic water-barrel*. The valve *k* is raised by means of the lever *o*, which comes in contact with a movable wooden bar, *p*, working between two iron guiding-bars, not shown in the drawing. A weight, *u*, suspended from the bar *p* by means of a chain, *s*, can be regulated so as to open the valve. The bar *p* turns upon an iron bolt at *q*, which serves as a hinge to the system. The upper ends of the fixed iron guides are attached to two wooden beams, *t*, one vertically above each side of the opening through which the tank reaches the surface, and their lower ends are secured at *v* in a similar manner to the sides of the opening just named. The suspending bow, *w*, of the tank passes down each side and under the bottom, as shown, the latter part being curved in the form of a semicircle, and serving as a protection to the bottom of the tank when it is lowered to the bottom of the collecting cistern, where it comes to rest on a sheet of india-rubber 1¼ inch thick. The filling and emptying of the tank are purely automatic, and only one man is required to attend the engine. This tank can be easily filled and emptied twenty-four times an hour from a depth of 190 yards; and as its capacity is about 212 gallons, it brings, as previously stated, about 5,000 gallons of water to the surface during every hour it is at work.

The author may state, in concluding, that he has had the intention from the first, provided circumstances were favorable, to recommend the owners to apply a direct-acting steam-pump to raise the water met with in sinking so soon as a point was reached at which most of it could be collected. He has now advised them to put in a compound Worthington pump capable of dealing with 10,000 to 12,000 gallons an hour, at the nearest point below 200 yards at which a lodgment can be conveniently formed, and preparations are being made to carry out his suggestions. He hopes also that at an early date he may have the honor of presenting some further details of the same subject to the members of the Institute.

PHOSPHATE.

In General.

Following up our comment upon the commercial future of our immense area of phosphate lands and the existing demands for such from outside sources, the *Trade Review*, in a recent issue, makes the following pointed and well-timed reference:—"The speculator has, it must be admitted, too hard a grip upon our phosphate land, while the 'promoters' upon the other side of the Atlantic only care for the money they can make by floating a company, since it matters not to them whether the enterprise is a paying one or is a miserable failure. If we once get a bad name in this respect, then woe be to us! Moreover, over-capitalization is a stumbling block which is ever in the way of joint stock enterprises. It takes no argument to show that the smaller the amount of capital embarked, consistent with effective and enterprising work, the more certain the chances are of paying a respectable and satisfactory dividend, while the better pleased will the stockholders be, and the better disposed to take an interest in other Canadian undertakings. If we are careful with respect to the properties we place upon the market and the amount at which we capitalize them, there can be no question as to the long life and prosperity of the already important Canadian phosphate interest."

Two very important phosphate suits have just been terminated in South Carolina after going through the highest courts for ten years. The State discovered in 1887 that certain parties were working phosphate properties belonging to the commonwealth, but which were claimed by those in possession and who declined to negotiate for a release of the same. Their aggressive attitude was continued throughout the progress of the cases in court, and a large array of legal talent was employed on both sides to fight the issue. The contest was one of the most exciting and interesting ever known in the State, and the outcome has an important bearing on other phosphate interests, as the successful litigation will no doubt encourage similar attempts to seize disputed mining property in the State from which no royalty is received on leases. The State won both cases, and the net result may be summed up as follows:—

First, the acquirement by the State of the title to the Morgan Island marshes, embracing over 5,000 acres of phosphate marsh lands. Second, the establishment of the title of the State to the Chisolm's Island creeks, containing also a valuable phosphate deposit. Third, the payment into the State treasury, as a net balance after defraying the expenses of all these cases, of nearly $32,000, being a reduction of $44,000 from the original verdict of the court, on account of the assignment of the company against whom the judgment was obtained for damages.

This has put a quietus on phosphate land speculation which started out with great enthusiasm about three months ago, as prospective buyers are satisfied to wait until the State has finished the investigation of other claims. The result of the suit is, of course, gratifying to mining companies who are working property leased from the State, as it removes formidable competition and may maintain market values for phosphate rock.

The attention of our readers is directed to the following extract from a letter received from Messrs. Dambmann Bros. & Co., Chemical and Super-Phosphate Manufacturers, Baltimore:—

"As holders of the Canadian Patent No. 31,114, we are in possession of an improved process for converting to soluble form the Phosphoric acid of Phosphatic rocks, which has special advantages applied to Apatite, and being desirous of entering into communication and forming a connection with such parties in Canada as would find an interest in this process, we are led to lay the matter before you, hoping for your good assistance toward that end.

We ask your attention to the following fact: Our process enables us (as experimentally proved) to produce from Canadian apatite a Phosphate containing about *40 per cent.* "*available*" Phosphoric acid, of which nearly all is "*soluble.*" In view of the controlling importance of *freight charges* in the distribution of Fertilizer material, it is easy to see the value of a process that minimizes these changes, by giving a concentrated product apart from the increased intrinsic value of that product for manurial purposes. Manufactured near the mines such a phosphate ought to reach the consumer with less than one half the usual freight on ordinary goods for a shipment of equal value.

Again our process obviates one great objection to the use of Canadian apatite, which has stood much in its way with manufacturers in the United States, viz: the disengagement of Hydro-fluoric acid and Chlorine by the ordinary treatment with Sulphuric acid. In manufacture by our process the fluorides and chlorides are not perceptibly attacked and remain inert. The two points to which we have asked your attention, are the main advantages of our new process, which, as you will at once perceive are of especial value to *Canadian Manufacturers* and *Miners.*

Ocean Shipments.

The following are the ocean shipments from Montreal to Europe, to date:—

Date.	Vessel.	Destination.	Shipper.	Tons.
July 5.	S.S. Fremona.....	London	Lomer, Rohr&Co	600
" 8.	" Vesta.....	Liverpool....	" "	160
" 12.	" Erl King....	London	Millar & Co.....	235
" 16.	" Lauderdale...	W. Hartlep'l.	Lomer, Rohr&Co	200
" 16.	" Canadian....	London	Wilson & Green.	444
" 18.	" Circe.....	Glasgow.....	" "	212
" 19.	" Fort William..	B'l'g Glasgow	Lomer, Rohr&Co	225
" 23.	Bark. Parejero....	Glasgow.....	Wilson & Green.	150
" 23.	S.S. British Queen.	Liverpool....	Lomer, Rohr&Co	305
" 23.	" Canopus	"	" "	190
" 23.	"	"	Millar & Co.....	185
" 26.	" Michigan.....	London	Lomer, Rohr&Co	220
" 29.	" Lake Huron..	Liverpool....	" "	375
" 30.	" Hilaria.....	London	" "	440
" 31.	" Montreal.....	Liverpool....	" "	375
Aug. 3.	" Bonnington...	London	" "	300
" 2.	" Grecian.....	"	Millar & Co.....	300
" 2.	" "	"	Lomer, Rohr&Co	180
" 2.	" "	"	Wilson & Green.	387
" 6.	" Kehrweider...	Hamburg.....	" "	256
" 6.	" Merch't Prince	London	Lomer, Rohr&Co	300
" 6.	" Vancouver....	Liverpool....	Millar & Co.....	130
" 9.	" Earl of Zetland	"	Lomer, Rohr&Co	350
" 10.	Bark Skjald.....	W Hartlepool	" "	100
" 14.	S.S. Steinhoft....	Hamburg.....	" "	240
" 15.	" Gordon Castle	London	Lomer, Rohr&Co	385
" 15.	" "Acuba"	"	" "	110
" 15.	Bark "Elsiva".....	"	" "	100
" 17.	S.S. Assyrian	"	Wilson & Green.	258
" 19.	" Circe.....	Glasgow.....	" "	185
	Total... ...	.....	.....	7897

RECAPITULATION.

London...	4259	Tons.
Liverpool.....	2070	"
Hamburg.....	496	"
Glasgow.....	772	"
West Hartlepool-.....	300	"
Total.....	7897	
Lomer, Rohr & Co.....	5155	Tons.
Wilson & Green.....	1892	"
Millar & Co.....	850	"
Total.....	7897	

English Fertilizer Market.

We are indebted to Messrs. Couper, Millar & Co., London, for the following report of the English fertilizer market, dated 16th instant:—

We have to report a continuance of the firmness of prices of all raw materials and a somewhat larger volume of business than is usual at this time of year.

Mineral phosphates.—Although shipments of Canadian have been coming forward with fair regularity, there still remains a large quantity to be shipped, and the rise in price is counterbalanced by the increased rates of freight; 80 per cent. is quoted at 12¼d. to 12¾d., according to port, and 70 per cent. finds a ready market at 10¼d., both with ⅛th rise. South Carolina is quoted 10½d., but even at this figure, the raisers do better by selling it to U.S.A., where the increase in the consumption of super-phosphates is still going on. Very few fresh sales are reported in the high grades of Somme phosphate, and prices show signs of rising still further when the autumn season sets in. There is a good demand for 50, 55 and 60 per cent qualities. Belgian 40 to 45, and 45 to 50 per cent. we can offer at the usual prices, both for this year and next.

Templeton District.

We are glad to see that all the talk about a line of railway into the Templeton district is at last beginning to assume some definite form, for the last issue of the *Official Gazette* contains a notice of application for incorporation by the Templeton Phosphate Railway Company. The proposed line is to have its starting point from the Ottawa River, near East Templeton, and will run as far as the Gore of the Township, or a distance of some sixteen miles. It is also proposed to build another line starting at the 8th or 10th Range of Templeton, near Perkins' mills, running in a westerly direction about 15 miles. The offices are to be in Montreal. The capital stock is placed at $50,000. The names of the applicants, all of whom are to be first directors of the road, are the Honorable Alexander W. Ogilvie, senator; Raymond Prefontaine, M.P., advocate; Azro B. Chaffee, gentleman; George G. Foster, advocate and Arthur Gagnon, gentleman, all of the city of Montreal; Hugh McMillan, M.P., Rigaud; Louis N. Champagne, advocate, Hull; Alphonse Lemieux, Quebec; and Robert Hargrave Martin, New York. There can be little doubt that the construction of such a railway as this is highly desirable, and that numerous benefits to the phosphate interests would ultimately result from it. Whether the promoters really mean business is a question which time only will tell.

Mr. Robert Blackburn is equipping his mine with heavier machinery than that formerly in use. Work goes along briskly, as usual, and a good output of phosphate is being produced.

Lievre River.

Mr. O. M. Harris, Montreal, representing the Canadian Phosphate Company (Limited), under date of 24th of August, writes:—"You will be pleased to learn that both our Crown Hill and Star Hill mines are at present looking very favorable, and last week's output averaged about 195 tons, which is very satisfactory. Pits Nos. 2, 3 and 9 at Star Hill, and 6 and 8 at Crown Hill, are looking splendid for future working, there being a large quantity of rich phosphate in sight there. Our improvements at Crown Hill are almost all completed, and when they are, both our Crown Hill and Star Hill will undoubtedly equal the best equipped mines in this country. We have everything ready to handle a large output, with the exception of a tram-road from our Star Hill mines to Landing, but hope the time will soon come when the output from this mine will permit of our going to this expense."

We regret to have to record a couple of accidents—one of them unfortunately resulting fatally—at these mines. While a car loaded with rock was being hauled up the tramway, on 17th inst., a lad named Gleeson, employed as a driver, fell in front of the wheels, which passed over him and caused instantaneous death. No blame is attributable to anyone, as the accident was entirely due to the lad's thoughtlessness. In the other casualty, Mr. Tom Lyons, mine foreman, sustained a severe shaking up and several bruises by a fall of some 25 feet while in No. 5 pit. We are pleased to learn that Lyons will soon be about again.

The output of phosphate from the High Rock pits is again up to the old standard. The vein, which had pinched out somewhat in No. 11, has come to the fore again, and is yielding as abundantly as ever. The management have been, however, again unfortunate enough to lose another loaded scow, which upset a few days ago in the Rapids.

Kingston District.

"It has been observed that the 'note' of quickened interest in phosphate mining near Kingston does not take the direction of intelligent efforts for the improvement of roads and the erection of a grinding mill. Men who are bent on mere speculation obtain the "chance" or "option" of buying property in order to sell out. If they can find a buyer the owner of the land gets his money, and if not the farmer is left with a registered document affecting the title to his land and a job for a conveyancer when the boom is over. No permanent good to the country is likely to come from this kind of speculation. No wonder that money and men seek other countries, where intelligence and activity go hand in hand to reduce the friction of tedious transportation and expedite business.."

Edison Prospecting for Iron Ore.—

A report from Reading, Pa, states that Thos. A. Edison, Samuel Insull and Mr. Kennally, of the London Electric Light Company, after eight days hard work, completed on the 17th inst. the survey of vast magnetic iron ore leases in this country and returned home, after seeing their new plant for separating ore by electricity in operation. During the survey their work frequently extended until 2 o'clock in the morning. Each carried a cylindrical brass box fitted with a magnetic needle. The dipping of the needle indicated the depth of the ore and thickness of the vein. The new magnetic ore separator is located on Gilbert's Hill, on a ten-acre tract near Bechtelsville. Iron stone is found here in large quantities. The stone and ore that hitherto was handled at heavy cost is now utilized at greatly reduced figures. The plant just erected to experiment with, cost $35,000. It is 120 feet long, 34 feet wide, and is divided into three sections. Immense engines, ore crushers and dynamos do the work. The iron ore is crushed into fine sand. It is then carried along on belts and up into the third story, where it drops into a hopper. The crushed ore is then shaken out and dropped some eight feet, where it comes in contact with a powerful magnet, which draws all the iron ore to one side, swerving its falling course into a trough leading to a large bin, while the particles of matter containing no ore descend perpendicular and drop into a refuse bin. The magnet draws the crushed particles of iron completely out of the sand and dirt as it falls from its height, and it is very interesting to watch the stream of iron being swerved from its course by the magnet. The refuse sand is run past the magnet a second time to secure all the iron that remains in it. Where the "separator" is located, the dust is so fine and profuse that every person who goes into that portion of the building, which is 20 by 30 feet

and three stories in height, wears a patent rubber mask over his mouth and nose and breathes through a wet sponge. Rock ore is being taken out which yields fifty per cent. of ore. This invention can only be applied to magnetic ore. At the present time 150 tons of rock are on an average mined and separated per day of fifteen hours. One ton of prepared ore ready for the furnace is obtained from seven to nine tons of rock. It is said that ore prepared by this separator requires about one-third less fuel than the ordinary ore to smelt. No. 1 pig metal is the result of the smelting of this magnetic separated ore. The refuse sand is said to be worth about $1 a ton, and the intention is to use it in the manufacture of an artificial stone for monuments, paving blocks, etc.

MINING NOTES.

We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

At the Annual Meeting of the Gold Miners' Association of Nova Scotia, held at Halifax, on 6th March, a resolution was passed adopting the "Canadian Mining Review" as the official organ of this Association. Our readers may therefore rely upon the accuracy of all information published in these columns bearing on the gold mining industry of the Province.

Nova Scotia.

Pictou and other Districts.

At the Albion, the bottom of the Foord shaft has been reached, and on the exploration of the mine, everything looked favourable.

The Drummond colliery—owned by the Intercolonial Coal Company—is being worked night and day, and shipments steadily maintained.

We regret that, by some unforeseen circumstance, our usual interesting budget of items from the gold mines should not have reached us in time for publication in this issue.

The Acadia colliery has been idle for three weeks, owing to a break down of the hoisting engine, but so soon as the necessary repairs are completed, a night shift will be started in addition to the day shift. The engines will for a time be run at a reduced speed, until the bearings be worn down to place. This is done for the purpose of g ting out and maintaining the usual output.

Nova Scotia Gold Yield for Half Year Ended 30th June.

We are indebted to the extreme courtesy of that admirable institution at Halifax, the Department of Works and Mines, for the following full and complete statement of the gold yield for half year ended 30th June last, from the various districts at present in active operation throughout the Province:—

Sherbrooke District.

1889.	Rock Crushed. Tons.	Cwts.	Gold Yield. Oz.	Dwts.	Grs.
January...	276	..	45	8	12
March....	280	..	46	9	..
April.....	36	..	5	8	..
May.....	200	..	29	1	..
June.....	221	..	32	9	..
Salmon River.					
January...	210	..	66	..	..
February..	620	..	255	..	..
March....	674	..	159	..	..
April.....	520	..	198	..	..
May.....	650	..	252	..	..
June.....	550	..	160	10	..
Lake Catcha.					
January...	138	..	89	1	..
February .	99	..	44	..	..
March....	96	..	32	2	..
May.....	35	..	68	12	..
June.....	27	..	31	12	..
Whiteburn.					
January...	98	..	125	16	10
February .	53	..	105	10	3
March....	72	..	157	3	19
April.....	135	..	255	6	5
May.....	161	..	252	9	14
June.....	147	..	193	14	15
Caribou.					
January...	826	..	278	9	16
February .	418	..	142	13	7
March....	590	..	219	17	15
April.....	540	6	143	10	18
May.....	583	..	109	12	..
June.....	536	..	93	6	..
Uniacke District.					
January...	148	..	99	5	..
February .	273	..	99	5	20
March....	154	..	122	9	15
April.....	30	..	121	8	..
May.....	76	..	5	17	..
June.....	116	..	177	18	15
Malaga.					
January...	475	..	387	17	..
February .	395	..	171	5	..
March....	344	..	302	17	..
April.....	167	..	118	..	..
May.....	140	..	46	10	..
June.....	157	..	59	3	..
Ecum Secum.					
March....	100	..	103	15	..
April.....	188	.	33	5	..
May.....	45	..	38	4	..
June.....	50	..	80	10	..
Central Rawdon.					
January...	60	..	139	..	..
February .	90	..	179	..	..
March....	100	..	211	..	..
April.....	120	..	255	..	..
May.....	120	..	350	..	..
June.....	100	..	394	..	..
Montague.					
January...	25	..	36	10	..
February .	52	..	71	8	..
March ...	46	..	65	10	..
April.....	70	..	168	5	..
May.....	81	..	155	9	..
June.....	82	..	87	14	..
"	...	..	4	..	..
			91	14	

Kempt.

1889.	Rock Crushed. Tons.	Cwts.	Gold Yield. Oz.	Dwts.	Grs.
January...	5	..	3	..	..
February .	24	..	21	..	..
March....	37	..	37	..	..
April.....	15	..	13	10	..
May.....	30	..	28	10	..
June.....	30	..	16	10	..
Renfrew.					
March....	85	..	77	16	..
April.....	251	..	101	11	14
May	58	..	160	5	..
June.....	204	..	139	15	1
Leipsigate.					
February .	4	..	12	..	..
March....	10	..	4	..	..
April.....	3	..	10	1	4
June.....	15	..	15	17	13
Wine Harbor.					
February .	90	..	49	9	..
March....	92	12	59	7	..
April.....	40	16	7	15	..
May.....	3	..	3	..	..
Oldham.					
January...	175	..	149	2	18
February .	149	..	134	18	6
March....	139	..	298	8	..
April.....	144	2	804	14	12
May.....	132	..	503	7	10
June.....	104	..	35	8	..
Moose Head.					
April.....	97	..	37	15	..
May.....	17	..	4	4	..
June&July	65	..	17	9	..
Lochaber.					
January...	25	..	19	17	..
February .	45	..	29	4	..
March....	17	..	10	4	..
Chezzetcook.					
Reported to 30th June	80	..	7	9	..
Killag.					
March....	5	..	10	11	10
Gold River.					
Reported to 30th June	384	..	112	2	..
Tangier.					
March....	35	..	12	10	..
April.....	14	..	3	2	..
May.....	35	..	14	3	..
June.....	20	..	15	7	12
Brookfield.					
January...	105	..	184	..	16
February .	109	..	215	11	2
March....	220	..	303	..	..
April.....	176	..	251	..	..
May.....	111	..	139	..	..
June.....	99	..	125	..	..
Fifteen Mile Stream.					
March....	96	..	47	..	..
April.....	110	..	43	15	..
May.....	108	..	50	10	..
June.....	160	..	88	..	..
Stormont.					
January...	491	..	283	..	..
March....	274	..	170	10	..
April.....	247	..	175	10	..
May.....	280	..	148	5	..
June.....	238	..	188	2	..

At the Black Diamond colliery work is progressing slowly.

We notice that incorporation has been sought for by the "East River Gold Mining Company, Limited." The capital is placed at $2,700 in $100 shares. The names of the applicants are: William A. Malling, 110 Barrington street, Halifax; Charles W. Outhit, 112 Barrington street, Halifax; Jacob Withrow, 104 Barrington street, Halifax; Silas Hubley, 12 Bedford Row, Halifax; A. C. Layton, 37 Argyle street, Halifax; John F. Outhit, 112 Barrington street, Halifax; W. H. Teas, 151 Hollis street, Halifax; Thomas Hanson, Windsor; Cyrus Hubley, 11 John street, Halifax; Geo. L. Flawn, Granville street, Halifax; Thomas A. Hubley, 35 John street Halifax; Benjamin J. Hubley, 35 John street, Halifax; Edwin Hubley, 12 Bedford Row, Halifax; George B. Maling, 191 Brunswick street Halifax, and George Maling, Windsor street, Halifax.

The contracts for the supply of coal for the Intercolonial railway for the year ending 30th June, 1890, are reported to have been as follows: Cumberland Railway and Coal Co., Spring Hill, 92,000 tons; Phœnix Coal Co., Maccan, 23,000 tons; Cumberland Coal Mining Co., Maccan, 10,000 tons; Acadia Coal Co., from Yale and Albion Collieries, 30,000 tons; Intercolonial Coal Mining Co., Westville, 20,000 tons; Black Diamond Coal Co., Westville, 10,000 tons. The prices are said to range from $1.90 to $2.20 per ton.

The New Glasgow Coal and Iron Company has sunk a prospecting shaft on their property at Springville, and at a depth of 45 feet drifting is being carried on. Mr. Chambers and a small force had just commenced operations at the time of our visit, but the indications of a good body of rich brown Hematite ore were very apparent.

New Brunswick.

Application for Letters Patent for incorporation is made by the Northern New Brunswick Mining Company, with a capital of $200,000, in $1 shares. The offices of the company are to be at Woodstock. The names of the shareholders are as follows, of whom the three first named are to be the first or Provincial Directors of the company under the proposed incorporation: John A. Shea, Grafton; Solomon Perley, Upper Woodstock; John Graham, Woodstock; Albert Brewer, Upper Woodstock; Frederick H. Hale, Grafton; Samuel T. Baker, Woodstock; G. Randolph Ketchum, Upper Woodstock.

Quebec.

The Montreal *Gazette* publishes a statement announcing that the Coleraine Mining company, composed of Hon. J. A. Chapleau, A. N. Montpetit, C. A. Dansereau, A. Desjardins, M.P., and others, have taken an action for $20,000 against the Megantic Mining company. This procedure is to compel the defendants to sign a bill of sale of these mines to pay the purchase price, $17,000, besides damages to the amount of $3,000.

The directors of the Bell's Asbestos Co., Limited, have declared an interim dividend of 12s. 6d. per share, free of income-tax, for the half-year ending June 30th last, being at the rate of 25 per cent., per annum.

Cable announcements state that the Anglo-Canadian Asbestos company, has been registered in London, with a capital of £20,000, to carry out an agreement between the Anglo-Canadian Asbestos Co, in liquidation, and W. H. Irwin to acquire and work asbestos properties in Canada. Mr. Irwin is the London representative of the firm of Irwin & Hopper, Montreal.

We are advised that Messrs. King Bros., extensively engaged in asbestos mining in the Thetford district, have opened offices at Liverpool, under the management of Mr. C. Stuart King, for facilitating the transaction of their large mineral, timber and general business with the United Kingdom and the Continent. Mr. King, who is a nephew of the Kings, of Thetford, has been associated for eight years with Messrs. Duncan Ewing & Co., wood brokers, of Liverpool.

Mr. Thomas Mackintosh and several other Eastern Townships' gentlemen are opening up a most promising deposit of copper on Lot 22, 1st Range North of Garthby, about four miles from Garthby Station, on the line of the Quebec Central Railway. Your correspondent is informed that Mr. C. C. Colby, M.P. for Stanstead, is one of the interested parties

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Great activity is prevalent at the various asbestos mines. The demand continues strong, and satisfactory outputs are maintained. An offer of $100 per ton for No. 1 quality was recently refused, the market price for this quality having increased to $115 per ton, and even higher prices are obtained. Whilst the area from which this precious mineral is got is very limited, the demand continues to rapidly increase, so much so that orders cannot be executed. The Italian asbestos cannot compare with the Canadian product in quality of fibre, and as a consequence buyers are looking to this country entirely for their supplies. We are told that there is a great and growing demand for the mineral all over the continent—even in Russia.

Ontario.

The Sudbury District.

One of our Sudbury correspondents writes us that everything about the place has a quiet business-like air. There is no excitement such as formerly. Very little exploration is going on in the surrounding country, but new finds are occasionally reported. The Copper-cliff mine is now down between 450 and 500 feet. The Evans is working steadily in a good body of ore. This mine is the richest in nickel. The open workings at the Stobie were resumed as soon as the weather became mild enough in spring, and have been pushed on ever since. The total output is in excess of the smelting capacity of one furnace. The second smelter, with buildings, etc., is well advanced, and the machinery connected with it is being placed in position. The first smelter has run without a hitch and without perceptible deterioration since it started last December. Its average consumption of ore has exceeded 100 tons a day. The matte produced contains 40 per cent. and upwards of metal, 15 per cent. nickel, and 25 of iron. It is allowed to cool in the pots, and is turned out in hemispherical masses of 500 pounds each. These are broken up and barrelled for export. The roasting of the ore, under the skilful management of Dr. Peters, has been very successful and economical. The smelting has also been a marvel of cheapness, not exceeding $2 a ton, including cost of coke. The cost at most furnaces is over $5 a ton.

A despatch from Sudbury, under date of 16th inst., advises:—"A special train arrived here on the 13th inst, containing the following gentlemen, who are connected with the Dominion Mining Company, of Sudbury, and whose mineral property is very extensive, both north and south of this town. There were in the party Mr. Duncan McIntyre, Mr. H. McDougall, Mr. Duncan McIntyre, Jr., Mr. John McIntyre, president, Montreal; Prof. Ferguson, Prof. Simpson, Glasgow, Scotland; Dr. Graham, Edinburgh, Scotland; Mr. George Attwood, M.E., London, Eng.; Mr. John Ferguson, North Bay, Ont. Mr. Attwood is consulting engineer in the business, and Mr. John Ferguson, of North Bay, a large property owner there, and a nephew of Mr. Duncan McIntyre, is at present residing in Sudbury, where he superintends the company's office and mining business. The whole party, on their arrival, went north to the mine now being worked in Blezard, and spent some time inspecting the property. They were highly satisfied with the results so far attained, and evidently found things looking better than they expected. The party are to have a meeting here, but will first proceed to their mines on the Algoma branch. A large building for offices, etc., is being erected."

We are favored with some excellent samples of nickeliferous chalcopyrite and argentiferous galena from the Straight Lake locations owned by Mr. Isaac Moore and other Ottawa people. A most favorable report has been made on the extent and richness of these properties by Mr. C. C. Boyd, M.E., who has also made analysis of the ores as follows:—

NICKELIFEROUS CHALCOPYRITE.

Nickel....	$25 60	per ton,	2,000 lbs.
Gold.....	28 00	"	"
Silver.....	0 45	"	"
Total ...	$54 05	"	"

ARGENTIFEROUS GALENA.

Gold.....	$14 00	per ton,	2,000 lbs.
Silver.....	17 00	"	"

"These samples," Mr. Boyd says, "were selected from the shaft at a few feet below the surface, and without a doubt will increase in quality, as it is fully demonstrated by the vast width of the lode that there exists inexhaustible quantities."

Simpson Bros. are down 35 to 40 feet in two shafts. At last cleaning up they got 8 pounds of platinum and considerable gold and silver. A short time ago a piece of quartz was taken out 25 pounds in weight and thickly speckled with free gold.

The Murray mine, 4 miles northwest of Sudbury, is being tested by Vivian & Co., Swansea, Wales, and their assayer is said to be well satisfied with the results.

Port Arthur District.

At Crown Point prospects are good. The Pioneer is producing rich native, and solid black silver, from the Adit. The ore is now barrelled for shipment to Nebraska. The Cumings and Montgomery mines are in good shape.

The Dawson property, eastward of Crown Point, is doing well. This property embraces R 83 and R 64. Several strong veins traverse through it, including Crown Point.

The Beaver mine, which is down 539 feet, still continues to put out a uniform quantity and quality of ore.

The Black Fox property, on location 146 T is now being worked; prospects good.

The Elgin mine is 14 feet deep, with drifts E and W, each about 140 feet long. The ore resembles the Beaver mine, and gives satisfaction in uniformity of value.

At the Lone Pine mine, miners are engaged opening up this new lode. It is situated on the Government road from Murillo to the Beaver, and about three miles from the latter place. This lode is in the Animikie series of the Cambrian formation, and gives good promise upon further development.

The Badger mine and mill are working vigorously night and day. Another shipment of this rich ore is being made, consigned to Denver, Colorado.

The Silver Star Mine operated by Mr. E. Watts, Buckingham. Drift in 90 feet—vein strong, carrying leaf and black silver.

The Mink Mountain Mine is being developed under the superintendence of Mr. Hulbert, of Duluth. The prospects are most encouraging, and when machinery is in place and the mine opened there is every reason to believe it will prove of much value.

The Silver Glance Mine is identical with Mink Mountain, and developing very encouragingly.

On the Queen Mine drifting is being actively pushed on in a strong defined lode.

The Silver Wolverine Mine has its plant of hoisting and pumping machinery now in place. Work will be at once resumed in sinking No. 1 shaft (which is now 100 feet deep) and also No. 2 shaft which is down 33 feet. The prospects are good as rich silver has already been found on the location.

The West End Mine shews a strong and well defined fissure vein for 1,500 feet on surface, which has been somewhat developed with encouraging results.

The Shuniah Weachu or East End Silver Mountain, is busy hoisting good "pay rock" from No. 3 shaft. From No. 4 shaft ore of great value is being brought to surface. The ore is consigned to England for treatment.

North-West Territories.

The Canada Northwest Coal and Lumber Syndicate has been registered with a capital of £70,000, in order to purchase the Coal Creek and Bow River mines and other property near Calgary, and work the same. Lord Norbury, Viscount Grimston, M.P., and Sir George Baden-Powell, M.P., are among the first subscribers.

The following interesting particulars of a new and evidently rich find of oil in the North-West are from a private letter to a gentleman in Ottawa:—For eleven weeks we have been prospecting among the mountains for coal oil deposits. I am happy to say we have been eminently successful. We have located a considerable quantity of oil land, some on the Eastern slope, and some on the British Columbia side. So soon as we felt perfectly certain as to the importance of our find, we had several samples assayed. The result gave 91 per cent. lubricating oil, 5 per cent. heavy oil, 1 per cent. water, and 3 per cent. foreign matter. This is the best oil ever discovered, and far ahead of the Pennsylvania oil fields. There is plenty of head, the flow being about 4,500 feet above the sea level, and the crude oil can be run off in pipes any distance. It is the greatest find ever known. All the oil lands are within easy distance of the railway." The letter further states that arrangements are being made for developing the find, which, if correctly reported, adds immensely to the treasure to be expected from the North-West.

The Stair Coal Mining & Manufacturing Co. have about 12 men repairing their property, and in the autumn a sufficient number of miners will be employed to give a daily output of 150 tons. This mine was first opened in 1883 by the Saskatchewan Coal Mining and Transportation Company, and is located on the north side of the South Saskatchewan river, about nine miles above Medicine Hat. The property is connected with Stair Station, on the C. P. Railway by a spur track about two miles in length. After carrying on mining operations for two seasons, this company became insolvent, and the mine was closed down, to be opened again by the lessees—Messrs. Moore & Hunter, of Winnipeg—during the winter of '86-'87. Since then nothing has been done until the present season, when this property was secured by the first named company.

There is also another company making preparations to carry on coal mining near Medicine Hat, viz: The Medicine Hat Coal Mining and Railway Company, who have secured lands on the south side of the South Saskatchewan river, and about seven miles above the town. This company have about twenty men on the ground. They commenced sinking the shaft in the latter part of April, and have now reached the depth of about two hundred feet. The coal seam, it is expected, will be found about 270 feet below the surface of the prairie. The company afterwards propose connecting their property by the spur track with the C. P. R'y at Medicine Hat.

The Galt Company are busily engaged at Lethbridge in placing hoisting machinery and other plant in connection with their first shaft in position, after which a certain proportion of the output will be taken out thereby.

Various rumors are afloat concerning the Petroleum Springs discovered within the last two months in the Kootenay district. Report has it that samples have been analysed giving from 91 to 95 % of pure oil, and free from that strong odor so objectionable in Canadian oils. A surveyor is now in that section locating claims of which some seventy are reported as being staked out.

British Columbia.

The stamps and concentrator at the Barkerville reduction works are now in full operation. The Jack Quartz Company have shipped to the works nearly twenty tons of concentrates, assaying from $40 to $50 per ton. It is the intention of the Government assayer to put these through as one lot, and if successfully amalgamated it will have a tendency to encourage quartz mining. The same company have already caught $300 in free gold on the plates. The twenty tons of concentrates and the free gold were saved from seventy tons of ore.

We understand that Mr. Moore, Inspector of Mines for Scotland, has accompanied Mr. McLeod Stewart and others interested in the Canadian Anthracite Coal Co. to Banff, with the object of reporting fully upon the present appearance and capacity of the mines to the English capitalists who propose to invest in the concern. Should the experts' report be favorable to the enterprise, it is stated that the stock of the new company will be increased to $5,000,000, and that the mines will be worked to their fullest capacity.

The Laura Hydraulic Mining Company (limited) is seeking incorporation, with a capital of $20,000, for the purposes of alluvial and quartz mining in the province. The trustees mentioned in the application are John Grant, Morris Moss and Alexander Gilmore McCandless, who are to manage the concern for the first three months. The chief place of business will be at Victoria.

Another new company will be the "Kootenay No. 1 Mining Company" (foreign), with a capital of $600,000 in 120,000 shares of $500 each. The place of business is Ainsworth, Kootenay district. The properties to be acquired and operated are located in Oregon, Washington, Idaho, and also in British Columbia.

The Cariboo Creek Mining Co. is also seeking incorporation with a capital of $10,000 in $10 shares. The trustees nominated are David Woolsey, Andrew J. Smith and Thos. Forrest. The chief place of business is stated to be at Donald.

Canadian Mines on the English Market.

	Price Per Share.	
General Mining, Limited £219,752 fully-paid shares of £8	4¼	4¾
Low Point, Barrasois and Lingan, $309,100 fully-paid shares of $100	—	
Ditto, $200,000 vendors fully-paid shares of $100	—	
North Western Coal and Navigation, Limited, £160,500 6 per cent. debentures; coupons June 30 and Dec. 31; principal 1904	—	
Ditto £149,500 fully-paid ordinary shares of £10	—	
Ditto £900 fully-paid deferred shares of £100	—	
Sydney and Louisburg Coal and Railway, Limited, £50,000 cumulative 10 per cent. first preference shares of £10, £6 paid	7½	8½
Ditto, £14,560 fully-paid non cumulative 6 per cent. second pref. of £10	3	
Ditto, £250,000 fully-paid ordinary shares of £10	1	
New Vancouver Coal Mining and Land Co., Limited, £185,000 fully paid shares of £1	⅝	⅞
Excelsior Copper, Limited, fully-paid shares of £1	—	
Ditto, shares of £1, 17s, 6d. paid	—	
Shuniah Weachu, Limited, £99,888 fully-paid shares of £1	—	
Silver Wolverine, Ltd., £68,465 fully-paid shares of £1	—	
Anglo-Canadian Asbestos, Limited, £39,132 fully-paid shares of £2	—	
Anglo-Canadian Phosphate, Limited, £46,340 fully-paid pref. shares of £10	—	
Ditto, £15,050 fully-paid deferred shares of £10	—	
British Columbia Smelting, Ld., £25,000 preference shares of £1, 10s. pd	—	
Ditto £10,000 fully paid ordinary shares of £1	—	
Canadian Phosphate, Ld.. £100,000 fully paid shares of £1	¼	½
Bell's Asbestos, Limited, £100,000 fully paid shares of £5	17	17¼
White's Asbestos, Limited, £20,000 fully paid shares of £1		
Ditto shares £1 paid	—	
Jackson Rae Phosphate Co., Limited, $25,000 fully paid shares of £1	—	
Western of Canada Oil, Limited, £200,000 fully-paid shares of £100	—	
Ditto £99,850 fully-paid shares of £50	—	
Ditto £199,700 12 per cent. debentures of £100	—	

General Mining.—Accounts to December 31 submited in April, but an interim meeting is held in November. Dividend for 1884, 5 per cent; for 1885 and 1886, 3⅛ each year; and for 1887, £4 13s. 9d. per cent. Reserve fund, £29,850.

Low Point.—The vendors' shares, up to the end of 1888, do not rank for dividend until 7 per cent. per annum dividends have been paid on ordinary. Accounts to Dec. 31. For 1887, 5 per cent. was paid on the ordinay shares other than those held by the General Mining Assoc., that Company foregoing their dividend rights.

North-Western Coal.—The deferred shares receive on dividend until 15 per cent. per annum (cumulative) has been paid on the ordinary. Accounts to June 30. Dividend for 1887-8, 5 per cent.

Sydney and Louisburg Coal.—Accounts to Dec. 31 submitted about May. Out of the profits of 1884 one half-year's dividend on the first preference shares was paid. No dividend since. Debit to Dec. 31, 1887, £1,574.

Vancouver Coal.—Accounts to June 30 and December 31 submitted in November and May. In the half-year to June, 1888, there was a net profit of nearly £11,000. Debentures, £57,200. Reconstruction has been decided on.

Excelsior Copper.—Registered September 26, 1888. Authorized capital, £450,000; purchase consideration, £400,000, in cash or shares. Fully-paid shares issued to the vendor; partly paid to the public.

Shuniah Weachu.—Accounts to Nov. 20 submitted in February. No dividend yet.

Silver Wolverine.—Registered October 19, 1888, with a capital of £100,000, of which £80,000 was the first issue. Most of the shares were issued to the vendor.

Anglo-Canadian Asbestos.—The Company was registered in November, 1885. Accounts to October 31 submitted in March. No dividend yet. Debentures, £3,450. Reports are not obtainable, but this information is official.

Anglo-Canadian Phosphate.—The preference shares rank first for 7 per cent., and after a like rate has been paid on the deferred shares, both classes rank equally.

British Columbia Smelting.—The company was registered May 9, 1888. The ordinary shares were issued to the vendor, and they do not rank for dividend until the preference shares have received dividends amounting to 100 per cent.

Canadian Phosphate.—Accounts to November 30 submitted in February. Eleven months to Nov. 30, 1888, resulted in a profit of £2,576, which was carried forward.

White's Asbestos.—Registered April 9th, 1889. the authorised capital is £100,000; first issue, £60,000, of which £20,000, fully paid. was issued to the vendor.

Jackson Rae Phosphate.—Registered May 9, 1889.

Western of Canada Oil.—Accounts to March 31 submitted in May. Debenture interest is not paid. In 1886-7 there was a profit on working of £256; in 1887-8 of £690; and in 1888-9 of £1,279. Debit balance on March 31, 1889, £900. A loan of £8,400 has been obtained on the security of £30,000 B debentures.

England's New Boiler-Inspection Bill.

—A steam boilers bill has been introduced by Mr. Provand, Mr. O. V. Morgan, Mr. William Abraham (Mahon), and Mr. Howell, into the House of Commons. The bill provides for the compulsory periodical inspection, at the cost of, and on the responsibility of, the boiler user, of all boilers to which the Act applies; and also for registration in a Government Department of all such boilers, at a small fee, deemed sufficient to cover the expense of administering the Act. Any person working a boiler, for which he cannot produce a certificate from a duly qualified engineer, as defined in the Act, is subject to certain penalties, but the boiler user is at liberty to select any engineer he chooses, to furnish the certificate. The Act repeals the Boiler Explosion Act, 1882, but re-enacts the same modified in several particulars. The investigation of explosions of land boilers is to be dealt with by the Home Secretary's Department, as the inspector of mines, and also of factories, who are to assist in carrying out the provisions of the Act, are attached to the Home Office. Both preliminary inquiries and formal investigations must be conducted in open court. No insurance company is allowed to grant a policy of insurance or a certificate for any boiler without proper inspection, und a policy becomes void on the expiration of cancellation of the certificate granted by such company.

Incrustation of Steam Boilers.

—The incrustation of steam boilers has always been a matter of pressing importance to engineers, and many remedies have been proposed to remedy what is not only an inconvenience, but often a source of danger. The incrustation is due to the mineral matter, chiefly lime, which is contained in all hard waters and which is deposited on boiling, as we can see by looking at a tea-kettle that has been in use for only a short time. According to *Chambers' Journal*, a simple remedy has been tried by an Italian engineer, Colonel Potte, and, it is said, with complete success, in a boiler of twenty horse-power, containing 126 tubes. He introduced into the boiler every week two kelos (about four and one-quarter pounds) of sugar, with the result that, after four months' continuous working only a very thin film of incrustation was formed, and this was easily removed by simple washing. Without the treatment with sugar, the same boiler had previously become incrusted in a period of six weeks. The method has the merit of simplicity and cheapness, and many will therefore be disposed to test its efficacy.

DEPARTMENT
OF
Inland Revenue.

AN ACT RESPECTING AGRICULTURAL FERTILIZERS.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentionod in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one *per centum* of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "*An Act to prevent fraud in the manufacture and sale of agricultural fertilizers*," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

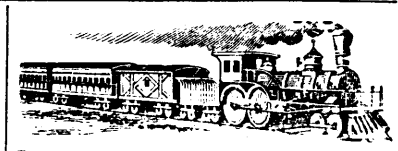
A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

E. MIALL,
Commissioner.

January, 1889.

PROPERTIES FOR SALE.

Parties having developed or undeveloped mineral lands for sale will find the REVIEW an admirable medium for bringing them before the notice of CAPITALISTS and INVESTORS in GREAT BRITAIN and the UNITED STATES.



Intercolonial Railway
OF CANADA.

The direct route between the West and all points on the St. Lawrence and Baie des Chaleur, Province of Quebec; also for New Brunswick, Nova Scotia, Prince Edward, Cape Breton and the Magdalene Islands, Newfoundland and St. Pierre.

EXPRESS TRAINS leave Montreal and Halifax daily (Sunday excepted) and run through without change between these points in 30 hours.

The Through Express Train cars of the Intercolonial Railway are brilliantly lighted by electricity and heated by steam from the locomotive.

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The popular Summer Sea Bathing and Fishing Resorts of Canada are along the Intercolonial, or are reached by that route.

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AND PASSENGER ROUTE.

Passengers for Great Britain or the Continent by leaving Montreal on Thursday morning wil join Outward Mail Steamer at Rimouski the same evening.

The attention of shippers is directed to the superior facilities offered by this route for the transport of flour and general merchandise intended for the Eastern Provinces and Newfoundland; also for shipments of grain and produce intended for the European market.

Tickets may be obtained and all information about the route, also Freight and Passenger rates, on application to

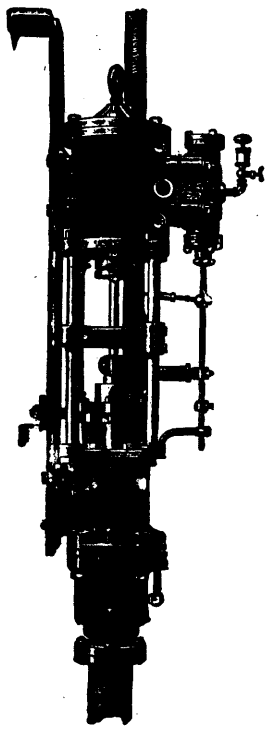
G. W. ROBINSON,
Eastern Freight and Passenger Agent,
137½ St. James St., MONTREAL.

E. KING,
27 Sparks Street,
OTTAWA.

D. POTTINGER,
Chief Superintendent.

Railway Offices, Moncton, N.B
2nd July, 1889.

The Polson Iron Works Co'y
TORONTO, ONT.



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Office and Works, Esplanade E.; Warehouse, 38 Yonge St., - - TORONTO.

Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal it length. Provided that should any person making an application purporting to be for the purpose of mining iron thus obtain, whether in good faith or fradulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may by acquired for milling purposes reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry bench creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

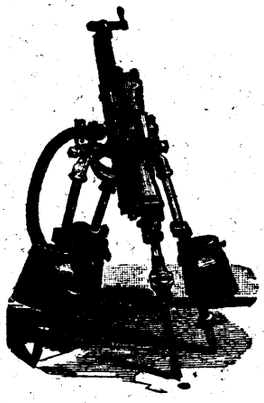
THE SCHEDULE OF MINING REGULATIONS

Contains the *forms* to be observed in the drawing up of all documents such as:—"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominian Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,
Deputy Minister of the Interior.



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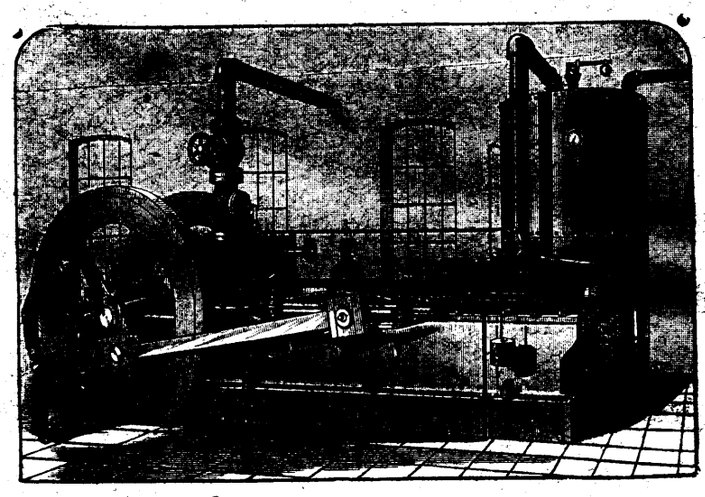

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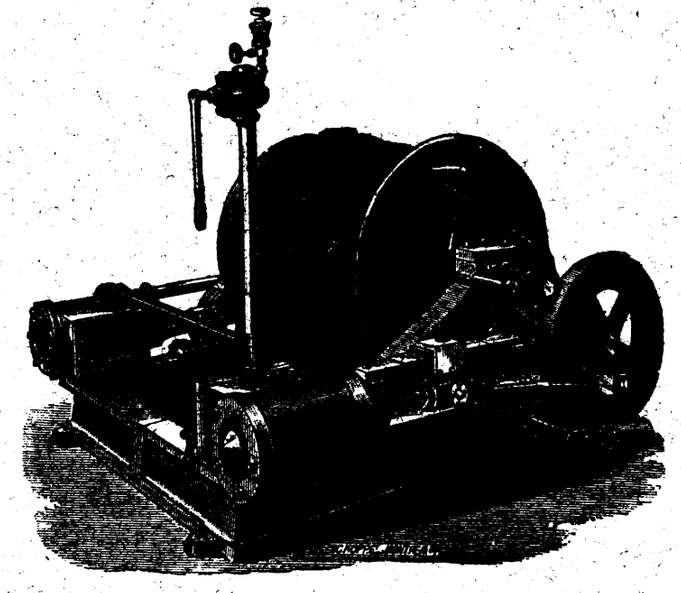

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