

THE JOURNAL  
OF THE  
**Board of Arts and Manufactures**  
FOR UPPER CANADA.

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MAY, 1862.

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THE INTERNATIONAL EXHIBITION.

From the *London Mechanics' Magazine* of the 9th of May, we copy the following extracts relating to the WESTERN ANNEXE, or Machinery Department, of the International Exhibition. This is the first of a series of articles we shall from time to time publish from this and other similar journals, which we doubt not will be of great interest to our machinists and practical men, and may be the means of inducing some amongst them—who might otherwise have been indifferent to the subject—to put forth all their energies and skill to make a suitable display in the corresponding department of our own Provincial Exhibition, to be held in this City in September next.

“The Western Annexe is undoubtedly the point of attraction to mechanical men. It is impossible, indeed, for any one who has been accustomed to the music of machinery in motion to pass along what Mr. Robert Hunt designates ‘the fine perspective arcades’ of the Western Annexe without being himself moved. The amount of thought and labour (to say nothing of money) which have been expended in preparing that show can be fully appreciated by those alone who have been engaged in the fitting up of engines and machinery, and who are conversant with the duties of the drawing office, the pattern shop, the foundry, and the erecting department. There is not a point of minutest detail in the whole of the varied and ingenious mechanical appliances which fill the Western Annexe which has not demanded careful calculation, and the exertion of great practical skill. The curious may find an ample field for study in the peculiarities of workmanship exhibited in the machinery and tools of different manufacturers; little crotchets and quirks reveal themselves to the close observer which by the general looker-on are unnoticed. Indeed, some makers of machinery, although ever engaged in devising machines for accomplishing new purposes, or superseding hand labour, yet have their individualities so strongly stamped on their productions, that it needs no brass plate nor ‘spirit from the grave’ to tell us whence those productions came. As the botanist does not fail to decide to what family or genus a plant belongs by an examination of its petals or its stamens, so does the initiated mechanist at once declare from whose factory came the engine, the planing machine, or the steam hammer which may be brought under his notice. We have long been aware of this mechanical idiosyncrasy, so to speak, but the idea was strengthened by our examination of the thousand and one specimens of engines and engineers’ tools which fill the Western Annexe.

“The steam-power which gives motion to the whole of these—or at least to those which are intended to be put in motion—is derived from a nest of boilers placed in a boiler-house beyond the Annex, and in the rear of the conservatory of the Horticultural Gardens. The arrangement and the construction of the boilers somewhat pleased us, and it may be well to give a few particulars in reference to them. There are in the whole six boilers; these are cylindrical, and of the high pressure kind. They are each thirty feet in length, six feet six inches in diameter, and they all have double fire-places within their flues.

“Ranged side by side, horizontally, at convenient distances from each other, and placed high enough and not too high for the stoker’s convenience, they form a model of good boiler setting. There are no abominable stoke-holes, the temperature and dust of which stifle and choke their unhappy occupants, but all is above ground and accessible. Messrs. Hick, of Bolton, were the makers of the Exhibition boilers, and they have no reason to be ashamed of their work. So extensive is the demand made upon the steam mains—two of which traverse longitudinally each of the ‘fine perspective arcades’ of the Annex, in trenches made for their reception—so great is the demand made upon these for keeping the machinery moving, that the whole of the boilers have to be in use at the same time, and a pressure of not less than 70 lbs. on the square inch maintained.

“Smoke-consuming fire-doors are attached to the furnaces of the boilers, but these, we believe, effect but partially the object sought. The flues communicate with a chimney of large diameter, but of low elevation at the back of the boiler-house, and the whole of the building containing the boilers with the chimney itself were completed, under the superintendance of Mr. Jacobs, in the short space of nineteen days.

“This, then, is the source of power for moving the masses of machinery within the Annex, and it would have been unwise to have omitted describing it. Of course, from the main steam arteries, in their subterranean but easily accessible beds, branch veins diverge to, and connect them with, the various engines to be put in motion, and these branches again are fitted with stop-valves, under control of the respective attendants.

“It was our intention to have spoken, in the first instance, of the foreign machinery in the Western Annexe, for it would be far more gracious and graceful to do so than to bemoan our own inordinately, and have no words of kindness for the inventions of our neighbours. It is a fact, however, that much remains to be done to make the foreign mechanical branch complete, and possibly it may be well to defer remarking thereon until it be so. There are some excellent tools displayed by Zimmerman, of Chemnitz, Saxony. These are put in motion by two or three lines of light shafting, supported on columns, and fitted with drums and straps, and each machine has its price affixed. From the excellence of the workmanship about these contrivances, which, generally, are for the fittings of an engineer’s shop, and their low price, we much question whether our English toolmakers will not find it difficult to compete with the Chemnitz work.

"Near to Zimmerman's allotted space a locomotive of excellent construction is to be seen, and this is the work of Hartmann, also a Saxon, and located at Chemnitz. Opposite to these are portable sawing machines, invaluable to the emigrant in a wooded colony, and these are from Paris, as are some cranes in close proximity to the sawing machines.

"The classification of machinery in this part of the Exhibition is well calculated for the purposes of instruction to mechanical students, and, naturally marine engines stand at the head of the list. For compactness and neat arrangement of parts, the palm must be yielded to Humphry's and Tennant's specimens, by whom engines were supplied to the British, the Brazillian, and other Governments. This firm have evidently studied with success two of the most important points in connection with engines for war steamers and screw propulsion; they have compressed the greatest amount of power into the least possible compass, and contrived so that they shall be placed out of harm's way in the depths of the hold. The pair of 400 H.P. engines by Maudslay, sons, & Field, for H.M.S. Valiant, again, is another proof of the talent of the eminent firm in question. We believe that the Messrs. Maudslay had not the slightest idea, up to within a short time of the opening of the International Exhibition, that these engines were to be placed within it. They were being prepared for the ship for which they were intended, and by no means got up for a show at Kensington. Whatever of merit, therefore, may pertain to the workmanship of the Valiant's engines, is the genuine and legitimate result of Messrs. Maudslay's usual excellence in this branch.

"Todd and MacGregor's direct acting inverted cylinder marine engines have many striking and excellent points about them, as well as some of a peculiar character. Of the last description, is that arrangement by which the two cylinders are made to work vertically over the crank shaft. This firm is remarkable for the general finish and beauty of the work leaving its hands, and the pair of engines now referred to constitute a gem in these respects.

Messrs. George Rennie & Sons, of London and Greenwich, exhibit a pair of marine screw engines for H. M. S. Reindeer. These are of 200 H.P. nominal, and are precisely similar to those of H. M. S. Perseus, a sister vessel. They may be denominated single trunk engines, and for compactness of arrangement rival any in the Exhibition. The projecting trunk, objected to by many, is absent in Rennie's engines, while they have the advantage of a long connecting rod, which one misses in those of Humphrys and Tennant, before referred to. The cylinders are placed close to the condensers, and thus a good vacuum is likely to be ensured. The bottom bearing of the connecting rod, too, is easy of access—a practical point, which those who are acquainted with the working of marine engines will know how to appreciate. The slide valves are double ported, and the pressure of steam at the back is relieved by an arrangement first introduced into marine engines by Messrs. Rennie. These engines are simple in construction, and at the same time possess great strength. They are, therefore, apparently well calculated for the hard work contingent on constant steaming in long

voyages. Similar engines are in actual use, we believe, in H. M. Navy, as well as in those of the Russian, Mexican, Chilian, and Italian governments. The only war steamer as yet possessed by the British colonies—the Australian steamer Victoria—has a pair of similar engines. The same firm are engaged in the construction of a large pair of engines for the Peninsular and Oriental Company. These are on the combined, or high and low pressure principle, and are to have a superheating apparatus and boilers on Lamb's patent plan. It is unfortunate that these engines, which combine the very latest improvements in marine engineering, are not in the Exhibition.

"One of the great objects of this display is to lead us on to suggestions of a practical nature, and which may tend to the public advantage. If the courts and aisles of the palace of industry and art, with their rich and varied contents, are to be regarded only as a show, why then there is little use in their having been prepared at all, and the money and labour lavished in furnishing them had better have been expended in some other way.

"Next in order of disposition in the Western Annex are to be found machine tools of every kind, and wood-working machinery of very ingenious construction. Perhaps, in the first rank of tool-makers may be placed Whitworth, of Manchester, and in that of machinery for performing operations upon wood for building and other purposes, Worsam, of Chelsea. The ingenuity displayed in the construction of machines for morticing, turning, planing, and dressing wood generally, is, indeed, something marvellous. It is true that Bentham and Brunel were the pioneers in this direction, but it is equally true that they have not found many followers until Mr. Worsam stepped into the field, and, no doubt, he will "marshal others in the way that they should go." The machines for dealing with metals in the Exhibition represent most fairly and completely those employed in the engineering establishments of the United Kingdom, and they undoubtedly display an amazing amount of ingenuity.

"If such men as Smeaton and Rennie, and others of the same school, could only look into a modern engineer's shop, they would, indeed, be astonished at the progress which has been made since their day in the tool department. The hammer, the chisel, and the file constituted the main appliances for carrying on work when they flourished, but now we have changed all that, and machines are made which do all but think and speak, and that, perhaps, is beyond their capabilities. Cotton spinning machinery of the most exquisite delicacy figures largely in the Western Annex; while, by way of contrast, we have sugar mill work of the most massive description. All alike testify to the skill of the artisans of Britain, and demonstrate that nothing is too minute, nothing too ponderous to be dealt with, and successfully dealt with, by them. Where so many exhibitors have excelled, it seems almost invidious to particularise, and the feeling engendered by a view of the machinery in the Western Annex is simply one of pride, strongly mingled with admiration. The rapid strides made in mechanical science since this magazine came into being—now some forty years since—is immense. What would a "western annex" have

been filled with in 1820, for example? And what an interesting thing would it not be if it were possible to establish a department in the Exhibition in which the steam engines, machines, tools, and general mechanical appliances of that time could be shown by way of contrast with the present magnificent display! Then, again, if a road wagon, a stage-coach, and a locomotive, were placed side by side, how eloquently would they not speak of progress and improvement! It is, perhaps, a misfortune as regards the International Exhibition, that none of these startling comparisons were tangibly instituted. They are more instructive to young minds than any other mode of inculcating knowledge. If Stephenson's "Rocket" were placed beside the locomotive of Sharp, Stewart & Co., or that of the North Western Railway Company, or of Sir William Armstrong, how unmistakably would it tell of what thirty odd years of railways have done for us, in a mechanical sense! Such were some of the reflections which passed through our mind while going through the "fine perspective arcades" of Mr. Hunt, and gazing on the mechanical treasures stored within them. It is possible that some day the suggestions we venture to throw out with regard to *Comparative Exhibitions of Mechanical Science*, may be realised. When this season shall have passed away, and the vast building which has challenged and obtained so much hostile criticism shall remain as a casket whence the jewels have been abstracted, it may come to be a consideration as to how it may thereafter be employed, and then may comparative schools be opened therein.

"Occupying a very small space in the Western Annexe are some machines which are the precursors of a revolution in one extensive branch of tool manufacturing, and these are the file-cutting machines of the Manchester File Making Company. It has been maintained obstinately for many years past that the manufacture of files was beyond the machinist's art. Hand labour alone could produce them, it was said, and in Sheffield it was stoutly declared that hand labour alone should produce files. At length the problem seems to be solved—the delusion dissipated; and from what we see of the file-cutting machines in the Exhibition, and know of their performances in Manchester, we are bold to say that the days of hand file-cutting are numbered. The importance of this change can scarcely be over-estimated, as the price of files will be reduced enormously by it. The Sheffield workers will have to succumb to the giant might of automatic machinery, as other classes of workers have been compelled to do, and the sooner they accept the alteration of system the better will it be for themselves.

"We have left ourselves little space to touch a hundred other topics which crowd upon our attention and claim notices at our hands. It is embarrassing thus to find so rich a mine of mechanical wealth as the Exhibition affords, and not be able to work it at once more effectually; but again and again shall we return to the task, nor leave it until justice has been done to those who have created it."

The largest steam whistle in the world is said to be the one at the Rolling Mills, Toronto. The bell of the whistle is 14 in. diameter.—*Artisan*.

## PROGRESS OF GEOLOGY.

(Continued from page 103.)

*Geological Survey and Government School of Mines, Mineral Statistics and Colonial Surveys.*—As I preside for the first time over this Section since I was placed at the head of the Geological Survey of Britain, I may be excused for making an allusion to that national establishment, by stating that the public now take a lively interest in it, as proved by a largely increased demand for our maps and their illustrations—a demand which will, I doubt not, be much augmented by the translation at an early day of many of our field-surveyors from the southeastern and central parts of England, where they are now chiefly employed, to those northern districts where they will be instrumental in developing the superior mineral wealth of the region.

The Government School of Mines, an off-shoot of the Geological Survey, is primarily intended to furnish miners, metallurgists, and geological surveyors with the scientific training necessary for the successful pursuit and progressive advancement of the callings which they respectively pursue: but at the same time, the lectures and the laboratories are open to all those who seek instruction in physical science for its own sake, by reason of its important application to manufactures and the arts. The experience of ten years has led the Professors to introduce various modifications into their original programme—with the views adapting the school as closely as possible to the wants of those two classes of students; and at present, while a definite curriculum, with special rewards for excellence is provided for those who desire to become mining, metallurgical and geological associates of the school, every student who attends a single course of lectures may by the new rules compete, in the final examination, for the prizes which attach to it only.

Throughout the whole period of the existence of the school, the Professors have, as a part of their regular duty, given annual courses of evening lectures to working-men, which are always fully attended; and during the past year several of them have delivered voluntarily courses of evening lectures, at a fee so small as to put them within the reach of working men, teachers and schoolmasters of primary schools. The Professors thus hope to support to the utmost the great impulse towards the diffusion of a knowledge of physical science through all classes of the community, which has been given through the Department of Science and Art by the Minute of the Committee of Privy Council of the 2nd June, 1859. \* \* \*

As I can trace no record of the teachings of the Government School of Mines in the volumes of the British Association, and as I am convinced that the establishment only requires to be more widely known, in order to extend sound physical knowledge not merely to miners and geologists, but also to chemists, metallurgists, and naturalists, I have only to remind my audience that this School of Mines which, owing its origin to Sir Henry De la Beche, has furnished our Colonies with some of the most accomplished geological and mining surveyors, and many a manufacturer at home with good chemists and metallurgists, has now for its

lecturers men of such eminence, that the names of Hoffman, Percy, Warrington Smyth, Willis, Ramsay, Huxley, and Tyndall are alone an earnest of our future success.

In terminating these few allusions to the Geological Survey, and its applications, I gladly seize the opportunity of recording that in the days of our founder, Sir Henry De la Beche, our institution was greatly benefitted in possessing, for some years, as one of its leading surveyors, such an accomplished naturalist and skilful geologist, as the beloved Assistant General Secretary of the British Association, Professor Phillips, who by his labors threw much new light on the palæontology of Devonshire, who, in the Memoirs of the Survey, has contributed an admirable Monograph on the Silurian and other rocks around the Malvern Hills and who, by his lectures and writings, is now constantly advancing geological science in the oldest of our British Universities.

There is yet one subject connected with the Geological Survey to which I must also call your attention, viz., the Mineral Statistics of the United Kingdom, as compiled with great care and ability by Mr. Robert Hunt, the Keeper of the Mining Records, and published annually in the Memoirs of our establishment.

These returns made a deep impression on the statist of foreign countries who were assembled last year in London at the International Congress. The Government and members of the legislature are now regularly furnished with reliable information as to our mineral produce, which, until very recently, was not obtainable. By the labors of Mr. Robert Hunt, in sedulously collecting data from all quarters, we now become aware of the fact that we are consuming and exporting about 80 millions of tons of Coals annually (a prodigious recent increase, and daily augmenting). Of Iron-ore we raise and smelt upwards of 8 millions of tons, producing 3,826,000 tons of pig iron. Of Copper-ore we raise from our own mines 236,696 tons, which yield 15,968 tons of metallic copper; and from our native metallic minerals we obtain of Tin 6,695 tons; of Lead, 63,525 tons; and of Zinc, 4,357 tons. The total annual value of our Minerals and Coals is estimated at £26,993,573, and that of Metals (the produce of the above minerals) and Coals at £37,121,318 l

When we turn from the consideration of the home survey to that of the Geological Surveys in the numerous colonies of Great Britain, I may well reflect with pleasure on the fact that nearly all the leaders of the latter have been connected with, or have gone out from, our home Geological Survey and the Government School of Mines.

Such were the relations to us of Sir William Logan in Canada; of Professor Oldham in India, with several of his assistants; of Selwyn in Victoria; of my young friend Gould in Tasmania, as well as of Wall in Trinidad; whilst Barrett, in Jamaica, is a worthy pupil of Professor Sedgwick. Passing over the many interesting results which have arisen out of the examination of these distant lands, we cannot but be struck with the fact, that whilst Hindostan (with the exception of the Higher Himalayan mountains) differs so materially in its structure and fossil contents from Europe, Australia (particularly Victoria) presents, in its Palæo-

zoic rocks at least, a close analogy to Britain. Thanks to the ability and zeal of Mr. Selwyn, a large portion of this great auriferous colony has been already surveyed and mapped out in the clearest manner. In doing this he has demonstrated that the productive quartzose veinstones, which are the chief matrix of gold, are merely subordinate to the Lower Silurian slaty rocks, charged with Trilobites and Graptolites, and penetrated by granite, syenite, and volcanic rocks,—occupying vast regions.\* Mr. Selwyn, aided in the palæontology of his large subject by Prof. M'Coy, has also shown how these original auriferous rocks have been worn down at successive periods, one of which abrasions is of Pliocene age, another of Post-Pliocene, and a third the result of existing causes. All these distinctions, as well as the demarkation of the Carboniferous, Oolitic, and other rocks, are clearly set forth. Looking with admiration at the execution of these geological maps, it was with exceeding pain I learnt that some members of the Legislature of Victoria had threatened to curtail their cost, if not to stop their production. As such ill-timed economy would occasion serious regret among all men of science, and would, I know, be also deeply lamented by the enlightened Governor, Sir Henry Barkley, it would at the same time be of lasting disservice to the material advancement of knowledge among the mining classes of the State, let us earnestly hope that the young House of Parliament, at Melbourne, may not be led to enact such a measure.

Whilst upon the great subject of Australian geology, I cannot avoid touching on a *questio vexata* which has arisen in respect to the age of the coalfields of that vast mass of land. Judging by the fossil plants from some of the carboniferous deposits of Victoria, Prof. M'Coy has considered these coal deposits to be of the Oolitic or Jurassic age, while the experienced geologist of New South Wales, the Rev. W. B. Clarke, seeing that where he has examined these deposits, some of their plants are like those of the old coal, and that the beds repose conformably upon and pass down into strata with true Mountain limestone fossils, holds the opinion that the coal is of Palæozoic age. As Mr. Clarke after citing a case where the coal-seams and plants were reached below Mountain-limestone fossils, expresses a hope that Mr. Gould may detect in Tasmania some data to aid in determining this question, I take this opportunity of stating that I will lay before this meeting a communication I have just received from Mr. Gould, in which he says that in the coal-field of the rivers Mersey and Don, one of the very few which is worked in Tasmania, he has convinced himself that the coal underlies beds containing specimens of true old Carboniferous fossils. Remarking that these relations are so far unlike those which he observed on the eastern coast of the island where the coal over-

\* While this sheet is passing through the press, we are in receipt of a letter from Walter Mantell, Esq., of New Zealand, dated Auckland, Aug. 30. In which he confirms the discovery of new gold fields in New Zealand. "This discovery," he adds, "is important rather in a political than in a scientific light. In my last conversation with Sir Roderick Murchison, he declared his conviction of its existence, and now no one doubts it. By the last news, we hear of a man and a boy getting five lbs. in seven days, &c. Our natives had no metal nor any knowledge of metals despite the quantities of gold now turning up. The non-utilization of this by so observing and ingenious a race is a strange fact."—Edg.

lies, yet is conformable to, the Carboniferous limestone, he adds, that in Tasmania, at least, the coal most worked is unquestionably of Palæozoic age.

Now, as Australia is so vast a region, may not much of the coal within it be of the age assigned to it by Mr. Clarke; and yet may not Professor M'Coy be also right in assigning some of this mineral to the same Oolitic age as the coal of Brora and the eastern moorlands of Yorkshire? In his surveys of Tasmania, Mr. Gould has also made the important discovery of a resinous shale, termed Dysodile, and which, like the Torbane mineral of Scotland, promises to be turned to great account in the production of paraffine.

There are, indeed, other grounds for believing that coal, both of the Mesozoic as well as of the old Carboniferous age may exist in Australia. Thus, putting aside the fossil evidences collected in Victoria by M'Coy and Selwyn, we learn from the researches of Mr. Frank Gregory in Western Australia, that Mesozoic fossils (probably Cretaceous and Oolitic) occur in that region; whilst the Rev. W. B. Clarke informs me in a letter just received, that he is in possession of a group of fossils transmitted from Queensland, 700 or 800 miles north of Sydney, which he is disposed to refer to the age of the Chalk; there being among the fossils Belemnites, Pentacrinites, Pectines, Mytili, Modiol, &c. Again, the same persevering geologist has procured from New Zealand the remains of a fossil Saurian, which, he thinks, is allied to the Plesiosaurus.†

It would therefore appear that in the southern hemisphere, there is not merely a close analogy between the rocks of Palæozoic age and our own, but further, that as far as the Mesozoic formations have been developed, they also seem to be equivalents of our typical Secondary deposits.

This existence of groups of animals during the Silurian, Devonian, Carboniferous, and even in Mesozoic periods in Australia and New Zealand, similar to those which characterise these formations in Europe, is strongly in contrast with the state of nature which began to prevail in the younger Tertiary period. We know from the writings of Owen that at that time the great continent at our Antipodes was already characterised by the presence of those marsupial forms which still distinguish its fauna from that of any other part of the world.

\* Prof. Dana in his Geology of the United States Exploring Expedition under Captain Wilkes (Philad., 1849), expresses the conclusion as the result of his examination of the coal fields of New South Wales (in 1840) that they are either upper Carboniferous or Permian. "White the coal plants point to the upper Carboniferous or still higher, the fossils below the coal seem to correspond most perfectly with the lower Carboniferous epoch. The conformity and continuity of the series of beds, the frequent occurrence of Coniferous logs, like those of the coal beds, in the sandstone at different localities, together with the characters of the fossil fish, leave little doubt that the whole is one prolonged age, referable to the upper Carboniferous, or partly to the lower Permian era." (Geology p. 495.) The fish referred to is a true heterocercal form, indicating according to Agassiz, the upper Carboniferous or a transition to the Permian. This fish (*Urasthenes Australis*) is figured on Plate 1, Dana's Australian Fossils, in the folio Atlas accompanying the Report. There is sufficient evidence in the forms of Mollusca figured on the following plates, of the continuation of Palæozoic types beyond their usual limits, indicating a fauna as abnormal for the early age of that most peculiar of continents as now seen in its characteristic types.—Ems.

† Whilst this is passing through the press, Professor Owen has described this interesting fossil, before this Section, as *Plesiosaurus Australis*.

In relation to our Australian colonies, I must also announce that I have recently been gratified in receiving from Messrs. Chambers & Finke, of Adelaide, a collection of the specimens collected by McDouall Stuart, in his celebrated traverse (the first one ever made) from South Australia to the watershed of North Australia. \* \* \*

These specimens are soft, white, chalky rocks, with flints, agates, saline and ferruginous incrustations, tufas, breccias, and white quartz rocks, and a few specimens of quasi-volcanic rock, but with scarce a fragment that can be referred to the older stages of Lower Silurian age like those of Victoria.\* Again, the only fossil shells collected by Mr. Stuart (though the precise latitude is unknown to me) are Mytiloid and Mya-like forms, seemingly indicating a Tertiary age, and thus we may be disposed provisionally to infer that large tracts of the low interior between East and West Australia have in very recent geological periods been occupied by the sea. \* \* \*

## Board of Arts and Manufactures FOR UPPER CANADA.

### PROCEEDINGS OF THE SUB-COMMITTEE.

At the Monthly Meeting of the Sub-Committee, held on the 24th of April, a special committee was appointed to memorialise the three branches of the Legislature to pass an Act amending the Patent Laws of this Province, so as to allow citizens of the United States, and other countries, to obtain Letters Patent in Canada on the same terms as her own citizens.

Such an amendment to our Patent Laws, by doing away with the restrictions now placed upon all but British subjects actual residents in Canada in the obtaining of patents in this Province, would enable our citizens to avail themselves of the provisions of an Act passed by the Congress of the United States, in March, 1861, section 10 of which is as follows:

"That all laws now in force fixing the rates of the Patent Office fees to be paid, and discriminating between the inhabitants of the United States and those of other countries, which shall not discriminate against the inhabitants of the United States, are hereby repealed, and in their stead the following rates are established:

- "On filing each caveat, ten dollars.
- "On filing each original application for a patent, except for a design, fifteen dollars.
- "On issuing each original patent, twenty dollars.
- "On every appeal from the examiners-in-chief to the Commissioner, twenty dollars.
- "On every application for the re-issue of a patent, thirty dollars.
- "On every application for the extension of a patent, fifty dollars; and fifty dollars, in addition, on the granting of every extension.

\* It must, however, be noted that the collection sent to me consists of small specimens of rock forming an imperfect series.

“On filing each disclaimer, ten dollars.  
 “For certified copies of patents and other papers, ten cents per hundred words.  
 “For recording every assignment, agreement, power of attorney, and other papers, of three hundred words or under, one dollar.  
 “For recording every assignment and other papers over three hundred and under one thousand words, two dollars.  
 “For recording every assignment or other writing, if over one thousand words, three dollars.

“For copies of drawings, the reasonable cost of making the same.”

The valuable LIBRARY OF REFERENCE of works of a practical and useful character, is now open from 10 to 12 and from 1 to 4 o'clock each day; and on Tuesday and Friday evenings from 7 to 10 o'clock.

Admission FREE to all.

W. EDWARDS, Sec'ry.

BOOKS ADDED TO THE LIBRARY OF REFERENCE DURING THE MONTH.

CLASS V.

- Official Catalogue of the Industrial Department of the International Exhibition of 1862, 12mo., pp. 380.
- Official Illustrated Catalogue of the International Exhibition of 1862, parts I. to VI.
- Part I. Class I.—Mining, Quarrying, Metallurgy and Mineral Products.
- “ II.—Chemical Substances and Products, and Pharmaceutical Processes.
- “ III.—Substances used for Food, including Wines.
- “ IV.—Animal and Vegetable Substances used in Manufactures.
- Part II. Class V.—Railway Plant, including Locomotive Engines and Carriages.
- “ VI.—Carriages not connected with Rail or Tram Roads.
- Part III. Class VII.—Manufacturing Machines and Tools.
- Part IV. Class VIII.—Machinery in general.
- Part V. Class IX.—Agricultural and Horticultural Machines and Implements.
- Part VI. Class X.—Civil Engineering, Architectural and Building Contrivances.
- “ XI.—Military Engineering, Armour and Accoutrements, Ordnance, and Small Arms.
- “ XII.—Naval Architecture and Ship's Tackle.

CLASS VI.

Universal Decorator, second series, 1 vol. 4to., 1860..... *Thompson.*

CLASS XV.

- International Exhibition of 1862, a Concise History of its Rise and Progress, its Building and Features, and a Summary of all Former Exhibitions, 1 vol. 8vo..... *John Hollingshead.*
- Canadian Parliamentary Companion, 12mo., 1862..... *H. J. Morgan.*
- Overland Route to British Columbia, 12mo., 1862..... *H. Y. Hind.*

CLASS XIX.

Parliamentary Papers received daily.

CLASS XX.

- Scientific American, from commencement of new series, 1859.
- American Gas Light Journal, from the commencement, 1859.

DRAFT OF A MEMORIAL OF THE BOARD OF ARTS AND MANUFACTURES FOR UPPER CANADA, PRAYING FOR CERTAIN AMENDMENTS TO THE PATENT LAWS OF THIS PROVINCE.

*To the Honourable the Legislative Assembly of Canada, in Provincial Parliament assembled.*

The Petition of the Board of Arts and Manufactures for Upper Canada, humbly sheweth :

That in the present state of the Patent Laws of this Province, none but *British subjects who are actual residents* in Canada, can obtain protection for any invention or discovery they may produce :

That your petitioners consider this unjust towards British subjects non-resident of Canada ; and more especially towards such as are subject to the Patent Laws of the Imperial Government,

which makes no distinction as to the country to which the applicant or inventor may belong, in the granting of Patent Rights :

That in respect to the Inventions of Foreigners, the Patent Laws of this Province are not based on those principles on which the Patent Laws of almost all other countries are established, that is, the absence of prohibitions and discriminating fees in the granting of Letters Patent :

That the Patent Laws of the United States have recently been so modified as to do away with all discriminating fees, on the condition set forth in section 10 of an enactment of the American Congress, of the 2nd of March, 1861, as follows :—

“That all laws now in force fixing the rates of the Patent Office fees to be paid, and discriminating between the inhabitants of the United States and

“those of other countries, which shall not discriminate against the inhabitants of the United States, are hereby repealed.”

That under the said enactment of the American Congress, citizens of Canada are, in consequence of the prohibitory laws of this Province, altogether excluded from the benefit of taking out Patents in the United States:

That your petitioners believe such prohibitions to be detrimental to the interests of this Province, and especially so as to its inventors and artizans:

Wherefore your petitioners humbly pray, that your Honourable House will be pleased to pass the act prepared and submitted by the Board of Arts and Manufactures for Lower Canada, or such other act as to your Honourable House may seem best adapted to carry out the views of your petitioners, in doing away with all prohibitory or discriminating laws for the granting of Letters Patent in this Province:

And your petitioners will ever pray, &c., &c.

REPORT OF MR. E. A. McNAUGHTON.

(Continued from page 114.)

PETERBOROUGH.—Although I personally visited the different Manufacturers of this place, and received every information from them relative to their business operations, yet there are other places within the same County which I could not conveniently visit. Through the courtesy of Messrs. T. & R. White, of the *Peterborough Review*, I am enabled to give the different Manufactures within the County; they have published a pamphlet, based upon the census of 1861, showing the Progress, Position, and Resources thereof, a copy of which has been handed to me, and from which I take such extracts as are necessary.

The principal manufacture of the County is that of sawed lumber. The immense water privileges which it possesses, and the fine timber which grows in its forests, will easily account for this.

There are 37 saw mills, cutting 68,821,000 feet of lumber per annum; this will shew, to each mill, an average of 1,860,027 feet. But although this shews the average, yet it by no means gives a correct return of some of the larger mills in the vicinity of Peterborough; for instance, this last year—and for lumberers a very bad one—the mill of William Snyder cut six million feet, while the capacity is double that; Hughson’s six million, M. Boyd three million, Dixon’s six million, Shaw & Waight four million, Ludgate six million, and others varying from three to four million. The capacity of these mills, however, is in most cases double the quantity here given. The number of men employed in the 37 mills is 537, and the cost

per month of their labour is \$13,940, or a little over \$20 per month to each man. There have been shipped from Peterborough for the United States this year thirty million feet.

Next in importance to lumber manufacturing is the Flouring and Oat Meal mills. There are 12 flouring mills which have ground 345,000 bushels wheat, at a value of \$340,786. The capital invested in these mills is \$149,082; the number of hands employed are 28, and the labour per month \$1061.

There are but two Oat Meal mills, and they are not of any great importance. The number of hands employed are only four, at a cost per month of \$92. They consume 18,080 bushels of grain, valued at \$5,735, and turn out 618 tons 850 lbs. of oat meal, valued at \$12,548.

WOOL CARDING AND CLOTH DRESSING FACTORIES.

Of these there are four, the capital invested in which is \$19,900—the number of hands employed being 26, 19 males and 7 females—the monthly cost of labour \$377. The produce of the mills is as follows:—

|                                |  |
|--------------------------------|--|
| 22,000 yards cloth manufact'd, | } The value of the produce being \$14,656. |
| 5,800 “ “ fulled,              |  |
| 2,000 “ flannel “              |  |
| 24,300 lbs. wool carded,       |  |

There is, however, another large Woollen Factory going up in Peterborough; it is the property of A. Robertson, Esq., of Montreal. He has taken a lease of the property for 99 years. It is his intention to put in all the latest improvements in machinery, so as to make it a first-class mill.

FOUNDRIES AND MACHINE SHOPS.

The number of such establishments are five—four of which are in Peterborough. The capital invested is \$45,900. The value of the produce of these is \$56,075. The quantity of raw material used is estimated at 192 tons of iron, and 46,000 feet of lumber—valued together at \$5,584. The number of hands employed is 54, receiving an aggregate monthly return for their labour of \$1,412.

TANNERIES.

The number are 8, and one about finished. The capital invested in these eight is \$22,685. The raw material consumed is valued at \$17,190. The number of hands employed is 21, and the monthly wages amount to \$401. The products are 2,196 calfskins and 6,478 sides of leather, valued together at \$34,173.

SASH AND DOOR FACTORIES, PLANING AND SHINGLE MACHINES.

These are combined under one head, as in several cases these articles are all manufactured under the one roof. There are 1 shingle machines, 3 planing machines, and 2 sash, door and blind fac-

ories, having an aggregate of capital invested of \$7,100. The value of the raw material consumed is \$6,651; the number of hands employed 34; the monthly wages \$998; the return of produce 2,200,000 shingles, 327,500 feet lumber planed, 500 doors and blinds and 6,000 lights of sash—valued together at \$11,000. But this by no means represents the value of labour performed. In the case of the sash and blind factory, the proprietors are general carpenters and builders as well; and the labour which they return is in great part occupied with this work, which is not included in the above returns.

#### AXE FACTORIES.

The principle Axe Factory is that of Mr. Mockett. He turns out about 800 axes per week. He has 26 men employed, wages \$1 50 per day, but some of them make as high as \$2 50. They are employed by the day.

The capital invested in the business is \$8,000, and the raw material employed annually may be valued at \$10,000. The products may be set down at \$25,000. Peterborough is about to meet with a loss in this gentleman, who is going to remove to Montreal. I saw him on his return, and he informed me that he had taken a place in that city, and would remove his whole business there. His reason for doing so he explained—that it would be the saving of a large per centage to him; as the principal part of his stock was sold in Montreal, he would save the freight of the raw material and also the same on the manufactured article—these going over two lines of railroad.

The other factory is that of Mr. Ayer. He has, however, not been doing much during the past year; he employs only 3 hands, at a cost of \$1,000 per year, and turns out axes to the value of \$3,000.

**BELLEVILLE.**—There are a good many factories of various kinds in this place, such as foundries, axe factories, pail and tub factories, paper mill, wool carding and cloth dressing, saw mills, &c.

The principal Foundry is that of Messrs. Paterson & Bros. This is one of the largest Agricultural Implement manufactories in the Province. They turned out during the year 200 Reapers and Mowers, 200 Threshing Machines, 1500 Plows of various kinds (the steel plow, however, is in greatest demand), 200 Cultivators, 150 Straw Cutters, 100 Fanning Mills, 50 Grain Mills for grinding chop, besides general work. They employ from 50 to 60 men, the wages averaging \$1 25—the operations during the year about \$75,000.

A. E. Proctor, Axe and Edge Tool maker. His capacity when in full order is 6 fires, the daily work of which is 20 axes to each fire—making

120 per day. It takes 2 men to each fire. The total men employed from 15 to 20. As is generally the case in this line of business, the men are employed by the day, and average from \$1 50 to \$2 00 per day.

John Walton, Sash, Door, Blind and Moulding factory, is under the same roof as the above, which is a very fine shop. He is, however, just starting operations.

The Saw Mills of Messrs. Billa Flint and D. Boggart are the two largest; the former is capable of cutting 80,000 feet of lumber per day, and the latter 60,000. At this season of the year, however, there is nothing doing in the saw mills; all hands are engaged in getting out logs for the spring and summer operations. A fair estimate of the number of hands employed to run these mills cannot be given at this time.

**KINGSTON.**—In this city there are several large Mechanical Establishments. The first in importance is that of P. Morton's Locomotive Works. The average number of men employed is 80, and average of wages, both men and boys, is 6s. 8d. Some of these men, however, make as high as \$2 50 per day. Their work is altogether heavy work, railway locomotives, marine engines and heavy machinery. They have some locomotives under way just now; these, when completed, are worth \$11,000. The English locomotives cost \$15,000, and they do not suit so well for this country; at all events they have been proved so, as they give out much sooner.

The value of work turned out in 1861 is estimated at about \$70,000.

Chewitt & Co., Founders and Manufacturers of Bar Iron from scrap. They are also manufacturing patent Axles. They do a very extensive business. It was not, however, convenient to have the estimate. They employ men and boys from 30 to 40, the wages of whom are from 75c. to \$2 50 per day.

Davidson, Bruce & Doran, Founders. They are manufacturers of Marine Engines and general work. As their establishment is a first-class one, it is necessary to have men of the same class. They employ 45, the wages of whom will average from \$2 50 to \$2 75 per day. During the past year—and it was a dull one—they turned out about \$40,000 worth of property. At present they are busily engaged in fitting up steamers, which are out of repair.

Ross & Strange, Boot and Shoe Manufacturers. They have the labour of the Penitentiary engaged. They pay 40c. per day for each man. They turn out as high as 500 pairs per day. It is now a number of years since this firm first started en-



gaging such labour; at first it was a losing concern, but after the first year or two they got the men broken in so as it at present pays them for their experiment. They have large tanneries, and supply all or most of their own material.

Mr. Drenan, Cabinet Ware, has his hands employed as the above. The number is 50. He manufactures upon the average about \$30,000 worth per annum.

PRESCOTT.—There are two Foundries. At present business is very dull, and consequently most of the hands are discharged.

Mr. S. Hulburt manufactures Plows and Stoves. He at present manufactures 500 per year, but if he had command of capital he could dispose of from 800 to 1000 per year. He is a thorough mechanic; he has patented 3 plows; he sent one to the Exhibition in 1851, and succeeded in taking a prize.

S. Bertrand, Axe Manufacturer. There are 5 hands employed. His business is altogether local. In this shop I saw two machines invented by Mr. Bertrand, which I think worthy of notice, and would, to Blacksmiths and others who have not the advantage of any motive power, prove very economical machines.

The one is called a "Hand-power Nut-punching and Cutting Machine." The other is a "Bolt and Nut Cutting Machine." The first is worked upon Eccentric Lever principle. In working it the punch is placed in front; the bar of iron is pushed through under it, and the pressure is applied by hand. The hole is punched with the greatest of ease, and as quickly as if done by machinery. In cutting the nut through, or breaking them off as it is termed, the lever works on the back part of the machine; the bars are shoved through, and regulated by a spring; the pressure is applied, when the nut is instantly cut off; the edges are as smooth as if filed. The second machine is for putting the threads upon the bolts and nuts. The nuts are strung upon a piece of iron and placed into the machine, which is self-adjusting; the tap is sufficiently long to hold a dozen nuts; it is turned with a crank, when it runs right through them. The bolts are also placed in the same machine, when the threads are cut with dies made suitable to the size.

The first machine, complete with all the necessary dies, punches, &c., &c., from the very finest washer to the thickness of a  $\frac{1}{2}$  nut and 2 inches square, will be sold for \$80.

The other machine, with the dies and taps for making threads of any size, \$30. These machines are calculated to do the work of 10 men.

OTTAWA CITY.—In this city there are a number of machine shops, factories, &c.

N. S. Blasdill & Co., Foundry and Machinists. The principal work is heavy mill work. They are at present engaged in making machinery for a woollen mill; they are also making planing mills. This planing mill is a new machine, differing from anything of the kind either made in Canada or the United States. It is calculated to do the work of 200 men at a fair rate of work. It was the intention of this firm, if time had permitted, to have sent one of these mills to the International Exhibition, where we are quite sure they would have carried off a medal. They employ 30 men, the average wages of whom will be \$1 25 per day.

Messrs. Tongue & Brown, Axe and Edge Tool Manufacturers, do a large trade. They have a very extensive local retail trade as well as wholesale. The capacity of the factory is equal to 1800 boxes per month, but of course they do not turn out this quantity at present.

There is perhaps no establishment in the Province where so many variety of Tools are turned out as in this. They had a beautiful case of tools—166 pieces—exhibited in the Montreal Fair; I hope they may have such an one at the World's Fair. Mr. Tongue is a thorough practical man. They employ 12 men—wages average \$1 55 per day.

Mr. Burret, Woollen Factory, manufactures during the year 110,000 yards; this includes flannel and blankets as well as cloth. He manufactures a beautiful article of light summer Tweed, also heavy Tweeds for winter. His blankets are coloured for the lumber shanties.

There are two sets of Carders and 570 spindles in the mill.

The coarse wool is bought in the counties adjoining, and the fine wool is imported from New York.

He employs 50 hands. The average wages of men \$1, women 45c.

E. B. Eddy, Tub, Pail, Match Manufacturer, &c., &c. This Establishment is the largest of the kind in the Province, and if we take the different departments combined, it is the largest on the continent of America. The number of hands employed exclusive of those getting out the raw material, is 175; these are working in the establishment, but there are besides these some 20 or 30 families who are engaged in preparing paper boxes, &c., for the works. I could not arrive at the exact number of individuals who were in this way engaged, the jobs being set to them by the gross. This, like most of the establishments where Americans are proprietors, the articles are made by the dozen or gross;

each person is bound to turn out so much each day; if they fail in this they are discharged. By this means not only is the cost price of each article known, but when an order is sent forward they can tell to an hour when the goods can be shipped.

In visiting an establishment of this kind, not only does one derive much pleasure, but some profit.

They turn out per day 800 pails, 200 wash tubs, 100 zinc wash boards, 60 gross clothes pins, 100 dozen broom handles, 150 gross matches, besides many other things in the wooden ware line. In making a pail it goes through a good many operations, and at each time by a separate individual. The staves are first cut to the proper length; they are then placed into a machine, which hollows out the inside and rounds the outside; they are then jointed, passed from that to be tongued and grooved; they are now ready to be put up, which is done in quick style; as the staves are all cut the same width, there is no time lost in picking out the proper size. They are formed upon an iron cylinder, and turned off on the outside; the hoops, being already prepared by another person, are run on tight by a small machine. They are then passed to another who turns out the inside; they are then passed to have the bottom put in; this is the principal part of the work, although they have to get the ears and bails put on, and painted and varnished, before they are ready for the market.

In the match department it is principally girls that are employed. Although the occupants seem to be both lively and healthy enough, yet few visitors would like to remain long, especially if he is at all asthmatic, for the place is perfectly impregnated with sulphur—in fact there is a complete haze, which is rather ominous.

Wright & Fairchurch, Wooden Ware Manufacturers. They make nothing but round butter bowls. They make 30 nests per day, 4, 5 and 6 in a nest, according to the size of the stick. These they sell at 10c. per foot.

There are 5 Gristing and Flouring Mills in Ottawa, having in all 22 run of stone. They all do a good business, and altogether home consumption.

Messrs. McKay & Co., whose mill is the largest, last year ground for themselves 74,000 bushels of wheat; at the same time they did gristing for farmers, 17,200 bushels, but as they had made up their returns for the month of January of this year, I will give that statement, which is altogether for local consumption. Of course the principal part were for lumberers—2,400 barrels flour. Ground 3,679 bushels wheat, 262 barrels oat meal,

6,500 bushels oats, 15 tons provender, and 60 tons of bran.

The Messrs. McKay have put up a very large stone mill, of 5 run of stone. It was just completed and about to start.

The Lumber and Timber trade is the most important branch of manufacturing in Ottawa. Parties who are not acquainted with this branch of industry have no conception of the quantity of lumber and deals which are yearly turned out from these mills.

The quantity of lumber manufactured last year—and it is not near to the quantity which is generally done—is 65 million feet, which is divided under the following:—

|                           |             |
|---------------------------|-------------|
| Gilmour & Co.....         | 20 million. |
| J. M. Currier & Co.....   | 12 “        |
| Harris, Bronson & Co..... | 10 “        |
| Perley, Pattie & Co.....  | 8 “         |
| Young & Co.....           | 6 “         |
| Baldwin.....              | 5 “         |
| Booth & Soaper.....       | 4 “         |

65 million feet.

Besides that quantity there is taken out at Buckingham, about 18 miles northeast of Ottawa City, from G. W. Eaton's mill, 16 million; Thomson & Co.'s 16 million; and at Hawkesbury, a little further down, Hamilton's mill 25 million—making in these 10 mills alone the immense quantity of 122 million feet. A third of that quantity is manufactured into lumber for the American market; the balance in *deals* for the English market. Although under the quantity set down to Gilmour & Co. is 20 million, that gives no idea of the quantity manufactured by them at their various establishments, that quantity being Ottawa City alone. The whole quantity may be set down at nearly 50 million feet, besides 1½ million feet of square timber.

J. M. Currier & Co., whose name is given, also has in connection with his saw mill, a planing mill, sash and door factory, &c., &c.

The capacity of his mill during six to seven months in the year is 70,000 logs; these logs are floated down the Cavana River, which empties into the Ottawa. Some of the logs are brought as much as 75 miles from the mill. They employ about 150 hands in the summer season; they are engaged principally by the month at from \$10 to \$16, and those who are engaged by the day are paid, in the mill 4s. 9d., in the sash factory 6s. per day. The whole of the sash, doors, blinds, &c., are for local consumption. Doors can be obtained from them 2 feet 6 by 6 feet 6 for \$1, and 3 feet wide by 7 feet high, panneled, moulded, complete, \$2.75. They manufacture a Clapboard, for which a patent

has been granted. It is so dressed that it is bevelled off at one end, and at the other a groove is made with a rabbit; the bevelled end fits into the groove and overlaps the same as an ordinary one, but the back of it becomes a plane surface, so that they lie perfectly close to the studs. In this way it obviates the old system of having an open space at each lap.

Mr. Skead is employed in the timber trade; he employs about 200 men in the woods, besides 75 team of horses and 15 yoke of oxen. He takes out about 600,000 cubic feet of red and white pine.

The quantity of timber which is expected to be taken out this year in Ottawa is estimated at 20 million feet of pine; out of that quantity there will be about 3½ millions of red pine; the balance is white. There has been for years back a prejudice against the Canadian red pine, the Baltic being taken in preference. This, however, was not because the latter was better than ours, for upon a comparison being made, the Canadian is rather the better of the two. The great reason is traceable to architects and contractors, who, in giving in their estimates, generally put down the Baltic, without knowing or perhaps caring anything about the other. By this means the contract had to be carried out to the letter. We hope, however, that at the World's Fair this year they may stand side by side, and that a fair and unbiased decision may be given.

As to my success in securing the promise of Manufacturers to prepare articles for the International Exhibition.

The general plan which I formed was, wherever there was a Mechanics' Institute, to put myself in communication with some of the officers of it, most generally the Secretary. Although their coöperation was solicited—and some cases had—yet I found it more practicable and to the purpose to

personally wait upon manufacturers. By this method I secured promises from many who had no intention of doing anything, and this was only effected by pointing out the special benefits the Province at large would receive therefrom. There were, however—and to the credit of the Province be it said they are few—some so exceedingly selfish that they could not see beyond themselves—"they were not going to receive any benefit therefrom, and therefore were not going to the trouble and expense of putting up goods for the benefit of others."

The great drawback, I find, has been the shortness of time allowed after the Commission had been appointed. I found, in almost every instance, that they had received circulars, and therefore no blame could be attached to them.

Another drawback, however, I found in the uncertainty of the goods going forward, after the final selection in Montreal. There is necessary much time and extra expense attached to the getting up of heavy machinery so as to make a creditable appearance at such an Exhibition. Many of our manufacturers, therefore, would not run the risk of having their goods returned after going to such extra expense. I fear, therefore, that although there will be many branches of industry represented, yet there will be a good many that will not; and even those which will go forward cannot be said that they are a fair representation of what Canada can do.

To the gentlemen of Ottawa, and especially those engaged in the lumber and timber trade, I am much indebted for kindness, not only personally, but for information relating to their operations, and for the hearty manner in which they came forward to offer their several contributions, which I am certain will be well represented.

E. A. McNAUGHTON.

BRITISH PUBLICATIONS FOR MARCH.

|   |    |   |   |                          |
|---|----|---|---|--------------------------|
| Alison (A.) Improvement of Society and Public Opinion, 8vo. ....  | £0 | 3 | 6 | <i>G. H. Nicholls.</i>   |
| Allshorn (Geo. Edw.) Handy Book of Domestic Homœopathic Practice, cr. 8vo. ....                                 | 0  | 3 | 0 | <i>Houlston.</i>         |
| Ammianus Marcellinus' Roman History, translated by C. D. Young, post 8vo. ....                                  | 0  | 7 | 6 | <i>Bohn.</i>             |
| Appia (P. L.) Ambulance Surgeon, edited by T. W. Nunn and A. M. Edwards, p. 8vo. ....                           | 0  | 6 | 0 | <i>Black.</i>            |
| Arrivabene (Count John) An Epoch of my Life, trans. by C. Arrivabene, post 8vo. .                               | 0  | 7 | 6 | <i>Booth.</i>            |
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| Biographies of Good Women, chiefly by Contrib. to "The Monthly Packet," fp. 8vo. .                              | 0  | 6 | 0 | <i>Mozley.</i>           |
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| Bohn's English Gentleman's Library, Maxwell's Life of Duke of Wellington, Vol. 1, 8vo. ....                     | 0  | 9 | 0 | <i>Bohn.</i>             |
| Book and its Story (The), by L. N. R., 85th thousand, 16th edit., cr. 8vo, stiff, 2s. . .                       | 0  | 2 | 6 | <i>Kent.</i>             |
| Burn (Robt. Scott) Lessons of my Farm, a book for Amateur Agriculturists, fp. 8vo. .                            | 0  | 6 | 0 | <i>Lockwood.</i>         |
| Year-Book of Agricultural Facts, for 1861, sn. cr. 8vo. ....  | 0  | 3 | 6 | <i>Blackwoods.</i>       |
| Bush Wanderings of a Naturalist, Notes on the Fauna, &c., of Australia, new edit., illustrated, fcap. 8vo. .... | 0  | 3 | 6 | <i>Routledge.</i>        |
| Carson (James C. L.) Form of the Horse, 2nd edit., fcap. 8vo. ....  | 0  | 3 | 6 | <i>Simpkin.</i>          |

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| Chronicles, &c., of Great Britain, Munimenta Gildhallæ Londouensis, v. 3, roy. 8vo.                        | 0 | 8  | 6 | <i>Longman.</i>          |
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| Young (Sir George) On the History of Greek Literature in England, cr. 8vo. ....                            | 0 | 2  | 0 | <i>Macmillan.</i>        |

## RULES AND REGULATIONS FOR THE NEXT PROVINCIAL EXHIBITION.

In our last issue we announced, in connection with the Prize List then published, that September the 30th to October the 3rd had been fixed upon for holding the next Provincial Show; but in consequence of its having been since ascertained that the Show for the State of New York has been advertised for the same days, the Association has determined to hold their Exhibition in Toronto one week earlier, so that parties desirous of attending both may have an opportunity of doing so.

SEVENTEENTH ANNUAL EXHIBITION OF THE PROVINCIAL AGRICULTURAL ASSOCIATION, TO BE HELD AT TORONTO, ON SEPTEMBER 22ND, 23RD, 24TH, 25TH AND 26TH, 1862.

## RULES AND REGULATIONS.

## Membership.

1. The members of the Agricultural Societies of the several Townships within the County, or Electoral Division or United Counties, wherein the Annual Exhibition may be held, and the members of the county or Electoral Division Society, shall be also members of the Association for that year,

and have members tickets accordingly; provided the Agricultural Societies of the said Townships, or the Society of the said County or Electoral Division or United Counties, shall devote their whole funds for the year, including the Government Grant, in aid of the Association, and shall pay over the same to the Treasurer of the Association two weeks previous to the Exhibition.

2. The Members of the Board of Agriculture, and of the Board of Arts and Manufactures, the Presidents and Vice-Presidents of all lawfully organized County Agricultural Societies, and of all Horticultural Societies, are members of the Agricultural Association for Upper Canada, *ex officio*. The payment of \$1 and upwards constitutes a person a member of the Association for one year; and \$10 for life, when given for that specific object, and not as a contribution to the local funds.

3. Members can enter articles for competition in every department of the Exhibition, at any time previous to the dates below mentioned, and all who become members previous to or on the Saturday preceding the show will be furnished with tickets admitting them to the grounds during the whole time of the show, without additional charge.

## Entries.

4. No one but a member shall be allowed to compete for prizes except in class, 41, sections 9 to 15 of 47, and 54.

5. All entries must be made on printed forms, which may be obtained of the Secretaries of Agricultural Societies, or of Mechanics' Institutes, free of charge. These forms are to be filled up and signed by the exhibitor, enclosing a dollar for membership, and sent to the Secretary of the Association, Board of Agriculture, Toronto, previous to or on the following named dates:—

6. *Horses, Cattle, Sheep, Swine, Poultry.* Entries in these classes must be made, by forwarding the entry form, as above mentioned, filled up, and member's subscription enclosed, on or before Saturday, five weeks preceding the show.

7. In the classes of Blood Horses and pure bred cattle, full pedigrees, properly certified, must accompany the entry. No animals will be allowed to compete as pure bred, unless they possess regular Stud or Herd Book pedigrees, or satisfactory evidence be produced that they are directly descended from such stock. In the class of Durham cattle particularly, no animal will be entered for competition, unless the pedigree of the same be first inserted in the English or American Herd Book, or in the Upper Canada Stock Register, kept at the office of the Board of Agriculture.

8. *Grain, Field Roots, and other Farm Products, Agricultural Implements, Machinery, and Manufactures generally,* must be entered previous to, or on Saturday, three weeks preceding the show.

9. *Horticultural Products, Ladies' Work, the Fine Arts, &c.,* may be entered up to Saturday, one clear week preceding the show.

10. After these dates for the respective classes, no entry will be received. The entry paper and subscription money will be returned to any person forwarding them.

11. In the live stock classes, the entry must in every instance be made in the name of the *bona fide* owner; and unless this rule be observed no premium will be awarded, or if awarded will be withheld.

12. In all the other classes entries must be made in the names of the producers or manufacturers only.

13. In the Agricultural department the competition is open to exhibitors from any part of the world.

14. In the Arts and Manufactures department, no article can be entered for competition unless it be the growth, product, or manufacture of Canada; and no money premium will be awarded except in accordance with this rule; articles of foreign manufacture, however, may be entered for exhibition only, and will be reported upon by the judges, according to their merits, or certificates awarded them, if deserving. Manufacturers are requested to furnish with their articles exhibited, the quantity they can produce, or supply, and the price, for the information of the Judges; whose decision will be based on the combination of quality, style, and price, and the adaptation of the article to the purpose or purposes for which it is intended..

15. No person shall be allowed to enter for exhibition more than one specimen in any section of a class, unless the additional article be of a distinct named variety, or pattern, from the first. This rule not to apply to animals, but to apply to all kinds of grain, vegetable products, fruit, manufactured articles, &c., in which each additional specimen would necessarily be precisely similar to the first.

16. On the entry of each animal or article, a card will be furnished the exhibitor specifying the class, the section, and the number of the entry, which card must remain attached to such animal or article during the exhibition.

**Transport of Articles, placing them on Exhibition and charge of them while there.**

17. All articles for Exhibition must be on the grounds on Monday, of the show week, except live stock, which must be there not later than Tuesday at noon. Exhibitors of machinery and other heavy articles, are requested to have them on the ground as far as possible during the week preceding the show.

18. Exhibitors must provide for the delivery of their articles upon the show ground.—The Association cannot in any case make provision for their transportation, or be subjected to any expense therefor, either in their delivery at or return from the grounds; all the expenses connected therewith must be provided for by the Exhibitors themselves.

19. Articles not accompanied by their owners may be addressed to the care of the superintendent of the exhibition, who will receive them, on their being delivered at the grounds; but in no case will such articles be brought on the grounds and placed on exhibition, except by and at the expense of the owners, or their authorised agents.

20. Exhibitors on arriving with their articles will apply to the superintendent of the grounds, who will be stationed within the entry gate, and will inform them where the articles are to be placed.

21. Exhibitors will at all times give the necessary personal attention to whatever they may have on exhibition, and at the close of the show take entire charge of the same.

22. No articles or stock exhibited will be allowed to be removed from the grounds, till the close of the exhibition, upon the delivery of the President's address, on Friday afternoon, under the penalty of losing the premiums.

23. While the Directors will take every possible precaution, under the circumstances, to insure the safety of articles sent to the exhibition, yet they wish it to be distinctly understood that the owners must themselves take the risk of exhibiting them; and that should any article be accidentally injured, lost, or stolen, the Directors will give all the assistance in their power towards the recovery of the same, but will not make any payment for the value thereof.

**Steamboats, Railroads, Customs.**

24. The Association will make arrangements with Steamboat and Railroad proprietors for carrying articles and passengers at reduced rates.

25. Arrangements will be made with the Customs department for the free entry of articles for competition.

**Admission to the Grounds.**

26. Tickets from the Secretary's Office will be furnished each person becoming a member previous to or on Saturday, preceding the Show, which will admit himself only, free to every department of the exhibition, during the Show. Life members admitted free throughout the Exhibition.

27. No members' tickets will be issued after the above last mentioned Saturday evening, but those issued up to that time will be good till the close of the show.

28. Necessary attendants upon stock and articles belonging to exhibitors, will be furnished with admission tickets with their names written upon them, which ticket will be good at the *Exhibitors' gate only*, during the show.

29. The admission fees to non-members, on Tuesday and Wednesday, will be half-a-dollar, and on Thursday and Friday, a quarter dollar, each time of entering through the gates.

30. Tickets of admission to those who are not members, will be issued on and after Tuesday morning, at 25 cents each—two such tickets to be given up at the gates each time of admission, on Tuesday and Wednesday, and one such ticket on Thursday and Friday, in accordance with the above rates. Children under fourteen years of age, half price. Carriages to pay one dollar each admission; each occupant, except the driver, to be also provided with the usual admission ticket. Horsemen half-a-dollar.

#### Judges and their Duties.

31. The judges will be appointed by the council of the Association previous to the Exhibition, and will receive a circular informing them of the fact and inviting them to act.

32. The judges are invited to report themselves at the Secretary's office, presenting their circular of appointment, immediately on their arrival at the grounds.

33. The judges will meet, at the committee room on the grounds, on Tuesday, at 10 o'clock, A. M., to make arrangements for entering upon their duties, and will then be furnished with the committee books containing the numbers of the entries in each class.

34. No person shall act as a judge in any class in which he may be an exhibitor.

35. In addition to the stated premiums offered for articles enumerated in the list, the judges will have the power to award discretionary premiums for such articles, not enumerated, as they may consider worthy, and the Directors will determine the amount of premium.

36. In the Fine Arts and Mechanical Department, Diplomas will be awarded—in addition to the money prizes—to any specimen evincing great skill in its production, or deemed otherwise worthy of such a distinction, on its being recommended by the Judges and approved of by the Committee to whom all such matters shall be referred.

37. In the absence of competition in any of the Classes, or if the Stock or articles exhibited be of inferior quality, the Judges will exercise their discretion as to the value of the premiums they recommend.

38. Each award must be written in a plain, careful manner, on the blank page opposite the number of the entry; and the reasons for the award should be stated when convenient.

39. No person will be allowed to interfere with the judges while in the discharge of their duties. *Exhibitors so interfering will forfeit their rights to any premium to which they might otherwise be entitled.*

#### Delegates, the Annual Meeting, &c.

40. Delegates and members of the Press are requested and expected to report themselves at the Secretary's office immediately on their arrival.

41. The Annual Meeting of the Directors of the Association will take place on the grounds on Friday morning at 10 o'clock.

42. Delegates from County Societies desiring to obtain a portion of the Canada Company Prize Wheat for their Counties, will please apply for it before leaving the exhibition, and take it with them from thence.

#### The General Superintendent.

43. A General Superintendent will be appointed, who will have the entire supervision of the grounds and the arrangements of the Exhibition. He will have an office upon the ground, where all persons having inquiries to make in relation to the arrangements will apply.

#### Paying the Premiums.

44. The Treasurer will be prepared to commence paying the premiums on Saturday, at 9 A. M., and parties who shall have prizes awarded them are particularly requested to apply for them before leaving Toronto, or leave a written order with some person to receive them, stating the articles for which prizes are claimed.

45. Persons entitled to cash premiums must apply for them at the Secretary's office, who will give *Orders on the Treasurer* for the amount.

46. These orders must be endorsed, as they will be payable to *order*, not to *bearer*, and on presentation to the Treasurer, properly endorsed, will be paid, either in cash, or by cheque on the Bank.

47. Orders for premiums not applied for on Saturday, as above, will be given by the Secretary, and the amount forwarded by the Treasurer, on receipt of proper instructions.

#### Miscellaneous.

48. Provender will be provided by the Association for live stock at cost price. For information Exhibitors will apply to the Superintendent of the grain and fodder department at his office.

49. An auctioneer will be on the ground after the premiums are announced, for the purpose of selling any animal or article which the owner may wish to dispose of, and every facility will be afforded for the transaction of business.

50. In case the Directors shall require any particular information in reference to animals or articles taking first prizes, the owners will be expected to transmit it when requested to do so.

#### Programme for the Week.

1. **MONDAY** will be devoted to the final receiving of articles for exhibition, and their proper arrangement. None but officers and members of the Association, judges, exhibitors, and necessary attendants will be admitted.

2. **TUESDAY**.—The judges will meet in the Committee Room at 10 A. M., and will commence their duties as soon as possible afterwards. As soon as they have made their awards, they will report to the Secretary, and will then be furnished with the prize tickets, which they are requested to place on the proper articles before dispersing. Non-members admitted this day on payment of 50 cents each time.

3. **WEDNESDAY**.—The judges of the various classes will complete their awards, and will place all of the prize tickets if possible. Admission this day the same as yesterday.

4. THURSDAY.—All the remaining prize tickets not yet distributed by the judges will be placed upon the proper articles this morning, before 9 o'clock, if possible. The public will be admitted this day on payment of 25 cents by each person, each time of entering. The amateur bands of music in competition for prizes will play upon the grounds.

5. FRIDAY.—The annual meeting of the Directors of the Association will take place at 10 A. M., in the Committee Room. The bands will continue to play upon the grounds. The President will deliver the Annual Address at 2 P. M., after which the Exhibition will be considered officially closed, and exhibitors may commence to take away their property. Admission to-day the same as yesterday.

6. SATURDAY.—The Treasurer will commence paying the premiums at 9 A. M. Exhibitors will remove all their property from the grounds and buildings. The gates will be kept closed as long as necessary, and none will be admitted except those who can show that they have business to attend to.

## Proceedings of Societies.

### THE TORONTO MECHANICS' INSTITUTE.

The Annual Meeting of this Institution was held on the evening of Monday, the 12th instant, for the purpose of receiving the Report of the retiring Directors, and to elect office-bearers and Directors for the ensuing year.

The President, Rice Lewis, Esq., occupied the Chair.

The Minutes of the previous meeting having been read and approved of, the Secretary read the thirty-first Annual Report, from which we take the following extracts:—

"The Directors have much pleasure in congratulating the members on the great prosperity which has attended the affairs of the Institute during the year just closed.

#### The New Building.

"Since last annual meeting the new building has been entirely completed; the handsome and commodious Music Hall and Lecture Room have been opened to the public; the various departments specially for the use of the Institute have been elegantly and comfortably furnished, while the several spare rooms throughout the edifice have been rented.

"The Board desires to congratulate the members on the prospect that is presented of a large annual income from the permanent and casual rent of the Music Hall and Lecture Room, and the various minor apartments. Since the building was opened in July, the large sum of nearly two thousand dollars has been received for rents alone. The Music Hall is now the largest and handsomest public room in Toronto, and every way the best fitted and most suited for public entertainments. There were a few acoustic defects in the Hall for some time, but such alterations have been made as have rendered it as nearly perfect in this respect as possible. The Lecture Room has attained much popularity.

### Membership.

"For three or four preceding years it has been the disagreeable duty of the Directors to record a gradual decline in the membership, but they are happy in being able to state that since last annual meeting there has been in this respect a large increase.

"The number of members at the date of last annual report was—

|                       |     |
|-----------------------|-----|
| Honorary members..... | 18  |
| Life members.....     | 86  |
| Members.....          | 449 |
| Of subscribers.....   | 67  |

|  |     |
|--|-----|
| Making a total of.....                                     | 620 |
| From which deduct by deaths, removals and withdrawals..... | 159 |

|                                       |       |
|---------------------------------------|-------|
| Leaving.....                          | 461   |
| New members admitted during the year, | 351   |
| New subscribers.....                  | 177   |
|                                       | — 528 |

Total number at date..... 989  
Being an increase of no less than 369 in a single year.

### Finances.

"The total Receipts for the year, from all sources, amount to \$13,684 69; the Expenditure to \$13,591 64; leaving a balance in hand of \$93 05; an analyzed statement of which will be found in Appendix A to this Report.

"A full statement of all monies received and payments made, on account of the Building fund, is found in Appendix B. Appendix C furnishes a complete statement of the Assets and Liabilities of the Institute.

"An estimate of probable Revenue and current expenditure for each year, based upon past experience, is submitted in Appendix D.

"The Directors recommend that the subscriptions for life membership be reduced to \$20, and that monies derivable from this source be invested in a sinking fund for the liquidation or reduction of the debt.

### The Library.

"The Board, fully aware of the absolute necessity that existed for the immediate purchase of new books, at once appropriated a large sum for that purpose, and in a very short time not less than 500 vols. of the latest and most interesting works were placed on the shelves. A large number of lost and worn-out books, also, were replaced, and the Library generally overhauled and renewed.

|   |       |
|---|-------|
| "The total number of books, according to last annual report, was..... | 4,035 |
| Added by purchase during the year.....                                | 967   |
| Bound up from Reading Room.....                                       | 43    |
| Donations.....  | 22    |

Making a total of.....5,067

"The Library has been so greatly increased that a new catalogue was deemed absolutely necessary. The Directors accordingly made arrangements for an improved classification of the books, and the issue of a catalogue, the matter for which is in the hands of the printer, and will be completed in the course of a few weeks.

"The demand for books has been so great that the Directors considered it would be to the interest of the Institute to have the Library kept open daily from 9 A. M. to 10 P. M., or for 13 hours, instead of 7 hours, as heretofore. This change has no doubt proved of much convenience to the members.

"The greater attendance consequently required, and the extension of the general business of the Institute, necessitated the appointment of an Assistant Librarian.

**Reading Room.**

"The Reading Room, the next department in importance, has also been much improved, by the introduction of several additional publications, as well as by the greater regularity with which the periodicals are supplied.

"The systematic arrangement of this department and the numerous appliances which have been obtained, cannot fail to afford the members much comfort and convenience."

Here follows a list of 31 British; 43 Canadian, and 17 American Publications received in the Reading Room; 37 of which are furnished gratuitously by their publishers and others.

The Directors also report that so much time and attention had been required in completing and furnishing the building, and in other important departments, that no arrangements had been made for lectures, and only one class had been organized during the year.

**The Chess Club.**

"Since the last annual meeting a new feature has been added to the Institution. Several members frequently urged on the Directors the advisability of establishing a club for practice in the scientific game of Chess, and proposed to co-operate in its formation. The Directors agreed to their proposals on stipulated conditions, providing the Institute against loss in case the enterprise should not succeed. The club was accordingly established and styled the 'Mechanics' Institute Chess Club.' The Directors have pleasure in reporting that so far the Club has succeeded, and they have no doubt, that with a little exertion on the part of its members (who at present number between fifty and sixty), it will continue to prosper."

**The Inauguration.**

The Directors, after referring to an opening Soiree, which, owing to the intense war excitement prevailing at the time, was a practical failure, report that a Bazaar on the succeeding day and evening, under the sole management of a Committee of Ladies, "who, with most praiseworthy alacrity" offered their services on the occasion, was entirely successful, and resulted in a profit to the Institute of nearly four hundred dollars.

**The Exhibition.**

"The Board of Directors for the preceding year entered into an arrangement with the 'Toronto Electoral Division Society,' to hold a joint Exhibition of Arts, Manufactures, and Agricultural and

Horticultural productions, on the basis of an agreement adopted by both bodies.

"In accordance with this agreement, the exhibition was opened in the Music Hall and adjoining rooms on the 7th of October, and continued open for two weeks. The result, however, did not meet the reasonable anticipations of the Board, either in a financial point of view, or as an exposition of the arts and manufactures of this city.

"Of the 614 entries made by exhibitors, but 77 were for manufactured articles, 143 fine arts, and 62 ladies' work. The remaining 332 entries were for agricultural and horticultural products. The total amount offered in prizes was nearly \$1,000, of which upwards of \$600 was in the department of arts and manufactures. The total receipts were \$952.07; expenditure \$927.75; balance to divide between the two societies \$24.32.

"The Directors cannot but express their surprise at the little interest the manufacturers of Toronto, especially those who were members of the Institute, manifested in the exhibition, where so favorable an opportunity was afforded for displaying their various productions, and at the same time indirectly contributing to the funds for the liquidation of the debt on the building. Were it not for the kindness of the Educational Department of Upper Canada, in contributing a very superior and extensive collection of mathematical and school apparatus, of Toronto manufacture, the exhibition would have been anything but creditable to our artizans.

**The Heating Apparatus.**

"The building has been furnished, at considerable cost, with an excellent steam heating apparatus from the establishment of Mr. James E. Thompson, of this city, which has given the greatest satisfaction, affording as it does a sufficient and agreeable heat, and being, in the opinion of the Board, much more economical than any of the ordinary systems of heating.

"RICE LEWIS, *President.*

"GEO. LONGMAN, *Secretary.*"

The Report was adopted, and ordered to be printed for the use of members.

**Appendices to the Report.**

Appendix A is an analyzed statement of Receipts and Expenditure.

Appendix B is a statement of the Building account, shewing the cost of Building and Furnishing, including cost of Site, to have been \$48,380 78. This sum does not include the amount expended by the Government in preparing the Building for the Crown Lands and Post Office Departments.

Appendix C shews the Assets and Liabilities, as follows:—

| ASSETS.                              |             |
|--------------------------------------|-------------|
| Balance cash in hand.....            | \$93 05     |
| Members' subscription due...         | 160 00      |
| Rents due .....                      | 116 50      |
| Value of building and ground         | 50,000 00   |
| Value of Library and Furniture ..... | 5,700 00    |
|                                      | \$56,069 55 |



LIABILITIES.

|                                       |             |             |
|---------------------------------------|-------------|-------------|
| Loan on building & ground,            | \$18,400 00 |             |
| Due on contracts and extra work ..... | 1,064 02    |             |
| Due on General account.....           | 306 58      |             |
| Discount at Bank.....                 | 400 00      |             |
|                                       |             | \$20,170 60 |
| Balance.....                          |             | \$35,980 95 |

Appendix D is an estimate of Annual Revenue and expenditure, and may be interesting to other Institutes; we therefore give it in full:—

REVENUE.

|   |            |
|---|------------|
| Permanent and casual Rents...   | \$2,740 00 |
| Subscription of 900 members @ \$2 00, being an increase of 155 on present paying membership ..... | 1,800 00   |
| Yearly and Quarterly Subscribers .....  | 400 00     |
|   | \$4,940 00 |

EXPENDITURE.

|   |            |
|---|------------|
| Interest on loan to Building fund .....       | \$1,104 00 |
| Insurance on Building.....                    | 120 00     |
| Library and Furniture.....                    | 16 00      |
| Printing and advertising.....                 | 50 00      |
| Binding Library Books.....                    | 200 00     |
| Gas .....                                     | 670 00     |
| Coal and Wood.....                            | 250 00     |
| Stationery and Blank Books...                 | 50 00      |
| Postage.....                                  | 84 00      |
| Subscription to Society of Arts, England..... | 10 50      |
| Secretary & Librarian's Salary .....          | 700 00     |
| “ “ Assistant .....                           | 200 00     |
| Housekeeper's Salary .....                    | 400 00     |
| Repairs to Hall .....                         | 200 00     |
| Water Rate .....                              | 40 00      |
| Newspapers and Periodicals...                 | 300 00     |
| Contingencies.....                            | 100 00     |
|   | \$4,494 50 |

Leaving a balance for purchase of new Books ..... \$445 50

The following is a list of Office-bearers and Directors elected for the ensuing year:—

- President*..... Rice Lewis.
  - First Vice President*..... Wm. Edwards.
  - Second Vice President*..... Walter S. Lee.
  - Treasurer*..... John Paterson.
- Directors*—R. A. Harrison, Robert J. Griffith, C. W. Bunting, W. H. Sheppard, John Cowan, John J. Withrow, H. E. Clarke, D. G. Carnegie, Wm. Halley, Thos. H. Lee, F. W. Coate and Wm. Hamilton, Jr.

It was resolved on motion of Mr. C. Pearson, “That the Directors be instructed to institute a series of meetings for the discussion of topics of practical interest to mechanics.”

Mr. D. G. Carnegie gave notice that, at the next quarterly meeting, he would move the following resolutions:—

1. That the subscription of members be raised to \$2 50.
2. That a sinking fund be at once established for the payment of the debt on the building.
3. That the Secretary be instructed to keep a book, to be called “Voluntary Subscriptions to the Reading Room.”
4. That steps be taken for permanently establishing certain classes.

After votes of thanks had been passed to the retiring Directors, to the Auditors, to the Ladies who had contributed to and conducted the Bazaar, to the gentlemen who contribute their publications gratuitously to the Institute, and to the Scrutineers of the ballot, the meeting adjourned.

INSTITUTE OF RUPERT'S LAND.

On the 12th February, of the present year, the “Institute of Rupert's Land” was organized at Fort Garry, Red River Settlement. The opening address was delivered by the Lord Bishop of Rupert's Land, who was subsequently elected President.

We hail this formation of the Society with much pleasure, and believe that it will be found a very advantageous medium, through which much valuable information respecting the natural history, physical features and resources of the Northwest Territory will be made public. Subjoined is the OPENING ADDRESS, which will explain the objects of the Institute, and show its claims to the sympathies and coöperation of sister societies in Canada:—

OPENING ADDRESS.

In assuming the position, which your kindness has assigned to me, I would venture to offer a very few remarks on the nature and object of the Institution we are met together to organise to-day. And before I proceed, I must at once disclaim any exact acquaintance with the higher branches of science: all that I can honestly lay claim to would be a deep and lively interest in the cause, and an extreme veneration for the humblest enquirer in any of its diversified fields. My own University indeed, that of Oxford, has been sometimes considered to be less favorable to scientific pursuits, and it may perhaps be readily allowed, that her highest honors are rather bestowed on distinction in the Ancient Languages and Mental philosophy. But I always recollect with pleasure, that the nobleman, who, at so large an expenditure of skill, toil, and means, has completed the most powerful instrument, ever yet made, for piercing into the depths of space—an instrument which parts and resolves the distant nebulae, and almost reveals to us new worlds—that nobleman, the Earl of Rosse, is of the University of Oxford. I remember too, that, in the earlier stages of the Royal Society, it was in measure cradled in the same University,\* and that a large portion of

\* See Hallam's Literature of Europe, p. 575. Its charter of incorporation came a few years later, bearing date July 15th, 1662—exactly two hundred years ago.

its meetings for some years was held within its walls. On more than one occasion also, has the University welcomed the British Association for the advancement of science, so that we may surely infer, that she is ever ready when called upon, to do homage to the cause of science, and give to it all due and suitable encouragement. But this you may feel inclined to acknowledge as natural, thinking that the Universities, and Colleges of the olden countries, are the appropriate nurseries of science, its very guardians and keepers. Have we however, you may still ask, any field for such pursuits—does *our* land, in its present state, offer scope and opportunity for anything of the kind proposed? To this our reply is, others think so. It was only the summer before last, that some passed through the Settlement and proceeded northward—not lured by prospect of gain—not attracted by any dazzling commercial speculation—yet fired, as was obvious to all who met them, with as ardent an enthusiasm, and eager to overcome every obstacle with this one object at heart. They wished, as you will recollect, to gain a spot from which, as they had calculated, they might obtain the best view of a marvellous phenomenon in the heavens\* Though ultimately somewhat disappointed in their expectations, theirs was surely a praiseworthy ambition, and you saw in them, that science has her devoted followers, ready to encounter on her behalf any difficulties. The very same summer, I found on my arrival at Moose, that a traveller had preceded me,† and gone along the shores of the East Main, sent chiefly as an Oologist or collector of the eggs of wild birds, by the well known Smithsonian Institution. And we have yet another‡ in our territory on the Mackenzie River, the Youcan, or the shores of the Arctic Sea, who has spent two or three winters in those solitary regions, gathering specimens of the insects of the land for the same scientific body. Besides these, there have been the two fully organised exploratory expeditions—that of the British Government under Capts. Pallisser and Blakiston, with its Naturalist, Geologist and Astronomer, and that of the Canadian Government under Mr. Dawson and Professor Hind, with its reports carefully drawn up and digested, and the detailed results submitted to the observation of the public. Such is apparently the judgment of others: they survey the land and look into its treasures and find something to reward their labors.

Shall we however think only of strangers—have we no spirit of research among ourselves? There is one present on my right,|| who in the midst of a laborious life, has often stolen hours from rest, looking with curious eye into the minuter secrets of the mysteries of nature, scrutinizing the beautiful texture of the insect's wing, or analyzing and examining the wild flower of the Prairie or the Bay. Another too there is holding the same rank in the Hon. Company's service, whose best energies have been given to the cause for many a long year, who has pursued it unintermittingly whether at Martin's Falls, at Nor-

\* Messrs. Ferrill, Newcome, Scudder, of Cambridge University, Massachusetts, went to a spot near Cumberland House on the Saskatchewan, to take observations of the total eclipse of the sun, July 18th, 1860.

† Mr. Dressler.

‡ Mr. Kennicott.

|| W. McTavish, Esq., Governor of Assiniboia, whose valuable collections of Natural History received the thanks and acknowledgements of the Smithsonian Institution in 1861.

way House, or as I last saw him, full of the one topic, on the shores of Lake Superior. His name, for I allude to Mr. Barnston, is not unknown in Britain as that of a scientific collector, and his contribution of insects from this country may be seen by any in the Entomological department of the British Museum. And we have one more recently come among us, who, accustomed to Societies of this description in Canada, has not ceased to press the subject upon us here. It is to the persevering and indefatigable efforts of Dr. Schultz that we are indebted for the present meeting, and I only hope that our zeal may correspond with his warmest anticipations. Let these be sufficient proofs to us that in the busiest life moments may be seized for high and elevated studies—studies which in the solitude of the wilderness carry with them their own recompense.

But may we not gain by combination, and find that union is strength may we not by contagion catch something of this ardour, may we not stimulate others by pointing out to what has already been achieved? Such would be something of our design in laying the foundation of a Scientific Institute. Our object would be threefold: to encourage: study—to communicate and diffuse information—and to collect results. To enlarge upon these objects would be unnecessary, and an unwarrantable encroachment upon your time. The casual walk, the tedious journey over land, or the monotonous trip by canoe, might be clothed with interest, if the eye were occupied like the bee, in gathering treasure "from every opening flower," and if each rock overhanging the Lake or lying in the bed of the Rapid, were made to tell its tale. It would be something to learn to use the eye to become the feeder of the mind. The knowledge so acquired in the summer ramble would be the store to be digested, to be shared and diffused abroad during the winter. There would be matter enough for the Lecture to occupy its long evenings, and the desire for information would grow, as the supply become more plentiful and of a better quality. And definite progress would be marked by the accumulation of specimens: and when strangers visited us, we should be able to exhibit to them, in something of shape and order, the vast variety of fowl to be found on our lakes and rivers, and of insects which flutter in the air, as well as some of those minerals (of which we now hear more) to be dug out of the bosom of the earth. In all of these departments too a system of interchange would soon become established: we should act on the principle of giving and taking, and, while sending off some of the products of our own land, we should receive in return some gifts from abroad. My own wish would be to make the basis of our Institute as broad as possible. What a large number of societies effect elsewhere, a single society must, for a time at least, do here. We must, therefore, embrace an extended range of subjects. Natural History would of course occupy a leading place with its almost undefined limits: Botany and Geology would follow, which have now obtained for themselves an independent position,\*

\* For some curious remarks on the connection and distinction between Natural History, Botany and Geology, as taught in the Universities of England and Scotland, see an introductory lecture by the Professor of Natural History, Edinburgh, 1855.

and Astronomy would surely present some attractions with our pure and bright atmosphere, and with the still unsolved problem of the Aurora Borealis, inviting a continuance of patient and accurately registered observations.\* But we are not inclined to confine ourselves within these boundaries, wide though they may at first appear. With the Indian tribes and all their ramifications and subdivisions we should invite discussion on Ethnology, with the diversified tongues and dialects which these tribes speak, Philology and comparative Grammar would claim attention; while with the vast and varied surface of the continent, and its only partially explored northern boundary, Physical Geography would be naturally a subject of absorbing interest to all. And, if science is to be studied, surely its application to the Arts would be to us of infinite importance, what has been called Technology, and raised to a Professorial chair in one University.† What questions of greater moment can be imagined, than whether the clay of our land cannot be turned to account in the formation of useful ware or of bricks, and whether some native manufactures cannot be introduced and localised among us? To carry out these projects with any success, there are wants which must strike every mind. A Museum would be necessary in which to deposit specimens, preserve them in an enduring form—classify and arrange them. Although this might be done at the commencement in temporary quarters, a permanent building would soon be required. It would, however, be a gain to the whole Settlement for other purposes, and be available for public meetings of different kinds and lectures on general subjects. Curators would be wanted to assort and prepare specimens and to undertake the labour of overlooking the whole collection. I am much mistaken if we cannot find among ourselves one if not more, who has already considerable aptitude and experience in this province. But even the Museum with curators would be comparatively powerless without some of those instruments, by which science carries out her efforts and effects her greatest triumphs. And here I ask your indulgence, while I throw out a suggestion, which I do with the greatest delicacy, yet in the hope that it may not be without some fruit. Might not our Institute furnish a natural and suitable method of commemorating those taken from us—a method beneficial to survivors and likely to carry down the name of the departed to many a distant generation! We have lately lost a Governor, the traces of whose administrative power are unquestionably imprinted on the remotest corners of the land—one who, when the achievement was neither common nor easy, was among the first to effect, at a very high latitude, the journey round the world. What more appropriate memorial of him can we imagine than a Telescope of some power to be placed in the midst of us, through which many

\* Regular observations on the Aurora were kept for a number of years at many H. B. Co's posts all over the country, and the Reports transmitted to Col. Lefroy, R.A., then of the Magnetical Observatory, Torquato, under whose direction they were conducted: we do not feel sure if they are still continued.

† In Edinburgh. The first appointment to the chair was that of the lamented Professor George Wilson, M.D., who had succeeded in interesting the subject with a peculiar interest and fascination, when cut off by an early death. His services to science are well known.

might obtain an insight into the wonders of the heavenly orbs? Such a Telescope, to be known as the Simpson Telescope, would surely very appropriately perpetuate the name of the Governor and Traveller, and convey profitable and elevating instruction to many yet to come. And we have since lost another, whose presence we miss to-day, and who would have encouraged us on such an occasion as the present—one ever ready to relieve suffering, and to assist in every way in promoting the public welfare. I was once asked whether we could not have some public memorial of Dr. Bunn, soon after his lamented death, and I expressed my personal willingness to join in any such plan. Now without at all wishing to interfere with those more sacred monuments which affection prompts, I can picture to myself few more successful methods of effecting the desired object, than if his many friends united in presenting to our projected Museum a Microscope of nice and delicate mechanism, as a memorial gift to be inscribed with his name, to reveal to each fresh beholder some of the marvels of Divine power. For these are, after all, the two mightiest agents in discovery, and I see that in this way Sir David Brewster, in his last opening address as Principal to the University of Edinburgh, places them far above the Electric Telegraph or any of the greatest boasts of modern days. This by some may be viewed as practical and personal enthusiasm, on the part of one whose fame rests on Optical Discoveries, but on reflection it would appear to be only the truth. In a similar spirit his accomplished successor at St. Andrew's, Professor (now Principal) J. D. Forbes, had noticed some years before, that "the obscure and doubtful inventors of the compass and thermometer have acquired a firmer title to the gratitude of posterity than even the most gifted improvers in practical science among their successors."\* These, then, are the more necessary instruments: others of a smaller size and less costly description would probably be presented by individual well-wishers, so that our apparatus for the prosecution of physical science would gradually grow upon our heads.

Such is a rapid outline of our design submitted for your approval and support. I cannot forbear to add that there could scarcely be a more favourable season than the present for its commencement.

In the Governor of Assiniboia we have one who has himself given abundant proof of devotion to scientific pursuits. More gladly would I have yielded this place to him to-day, as he could have addressed you from his personal experience, while I can only speak as an admirer of science from without. It is, however, no little matter to secure such hearty coöperation and such ready counsel from one in high position and authority.

We are expecting too, within a few days, the newly-appointed Governor of Rupert's Land. May we not entertain the hope that, if invited, he may kindly consent to accept the office of Patron of our infant Institute. We should thus gain his additional weight and influence, and be able through his assistance to obtain observations and contribution from the remotest posts of the Company's service.†

\* The Danger of Superficial Knowledge, 1849.

† Since the above was delivered, a letter has been received from Bernard Ross, Esq., H. B. Co., which shows how much may be

May I add that the very year would stand out as marked by the Great Exhibition of the industry of all nations to take place in May. Though bereft in the mysterious providence of God of its great promoter and originator, in the death of his Royal Highness the Prince Consort, himself the noblest patron both of science and art, it will, when opened under painfully changed circumstances, serve to show to Britain, to Europe, and the world, that that which is for the benefit of mankind continues long after the mind which planned and designed it may be removed by death. Is it not then, I ask you, a singularly auspicious year for us to commence our humble effort to bring to a focus and centre what the bounteous hand of God has scattered over our land.

Nor have I, in the sacred office which I hold, any fear for the cause of religion from the onward progress of science. A little and superficial knowledge may, as has often been observed, tend to unsettle the mind and leave it a prey to doubt, but a deeper acquaintance with science will ever be found to bring it back again and to bow the soul in adoring wonder before God. We need only point to Newton and Bacon, and among the living, to Heschel and Whewell, to Brewster and Forbes, as examples that the highest attainments in science may be coupled with the reverence and humility of the Christian. A more beautiful prayer we cannot have than the Student's Prayer of Lord Bacon, very suitably quoted before students by one already referred to.\* "To God the Father, God the Word, and God the Spirit, we pour forth our most humble and hearty supplications, that He, remembering the calamities of mankind, and the pilgrimage of this our life in which we wear out our days, few and evil, would please to open to us new refreshments out of the fountains of His goodness for the alleviating of our miseries. This also we humbly beg, that human things may not prejudice such as are divine; neither that, from the unlocking of the gates of sense, and the kindling of a greater natural light, anything of incredulity or intellectual night may arise in our minds towards Divine mysteries. But rather that by our mind, thoroughly cleansed and purged from fancy and vanities, and yet subject and perfectly given up to the Divine Oracles, there may be given unto faith the things that are faith's. Amen." Thus would man's highest wisdom echo back the confession of the ancient Patriarch, "Lo, these are parts of His ways, but how little a portion is heard of Him"—or the declaration of the great Apostle, "If any

done on the Mackenzie River, and how pleasant is the retrospect of time so spent. Coming at a time when we are so much interested in the subject, Mr. Ross will, I hope, pardon me for venturing to give an extract from a private letter.

Mr. Ross says:—"As the time approaches for leaving this district, I feel rather sorry for my departure from a place where I have spent so many happy years, but I feel that my life has not been passed away uselessly even here. I have contributed in some small degree towards opening up the Natural History and Ethnology of these wild regions, by collection of specimens and by papers published in Scientific Journals. My diploma as member of the Natural History Society of Montreal, I pride above all things, as it evinces that I have not allowed my intellect or amusements to descend to the level of Arctic life in general.

"The Fauna of this district is far larger than any would suppose from its position: the Mammalia comprise about fifty species, all of which are of course residents: the Aves nearly two hundred, of which not above forty remain during the winter. Several rare and a few new species have been discovered."

May such a spirit be found in every post.

\* Professor J. D. Forbes.

man think that he knoweth anything, he knoweth nothing yet as he ought to know."\*

In this spirit and with these feelings we launch our little scheme, with more than a trembling hope, with something even of a confidence of success. In the history of the past, adventure and enterprise have generally characterised our land; they are indeed essentially necessary, where the severities of climate interpose so many checks, and where all must for the most part depend on individual exertion. In the northern extremities of the continent, perils of no common kind have been encountered, and the boldest fortitude exhibited, in pursuit of one grand object of search; and in the annals of fame the names of Parry, Franklin and Ross occupy a deathless place. It may be, that as years roll on, and as our country grows in population and wealth and importance, some mead of praise may be accorded to those raised up to gain other triumphs, to increase the social happiness of the community, to add to its stores of intellectual knowledge, and to develop the natural resources of this vast and wide-spread territory.

Our mite towards such a consummation we gladly contribute to-day.

The following officers were then elected:

*President.*—The Right Reverend Lord Bishop of Rupert's Land.

*Vice-Presidents.*—Ven. Archdeacon Cochrane, Portage la Prairie; Ven. Archdeacon Hunter, M.A.; Rev. John Black; James Ross, Esq., M.A., Sheriff of Assiniboia.

*Council.*—Curtis J. Bird, Esq., M.R.C.S., Eng.; Francis Bruneau, Esq., Member of Council of Assiniboia; Thomas Bunn, Esq., Mapleton; Wm. Coldwell, Esq., Editor of the *Nor-Western*; Rev. A. Cowley, St. Clement's; W. G. Fonseca, Esq., Point Douglas; Donald Gunn, Esq., Cor. Smithsonian Institution; John Harriott, Esq., Chief Factor, Mem. Council of Assiniboia; Hector Mackenzie, Esq., late Arctic Expedition; T. Sinclair, Esq., Mem. Council of Assiniboia; Rev. W. H. Taylor, St. James'; John Inkster, Esq., Member Council of Assiniboia.

*Treasurer.*—Andrew McDermott, Esq.

*Librarian.*—W. R. Smith, Esq., Clerk Council of Assiniboia.

*Curators.*—A. G. B. Bannatyne, Esq., late H. B. Company; Joseph Hargrave, Esq., C.E.; E. L. Barber, Esq., Point Douglas; F. L. Hunt, Esq., White Horse Plains.

*Secretaries.*—Wm. McTavish, Esq., F. B. S. C., Chief Factor, Governor of Assiniboia; J. Schültz, M.D., F.B.S.C., Fellow Medico Physical Society.

His Lordship, the President, then gave notice of the following Papers for next evening:—

On the grammatical construction of the Cree language, by Ven. Archdeacon Hunter, M. A.

\* We add the following apposite quotation, which has since met our eye as a proof that scientific pursuit is compatible with the highest missionary zeal. "Missionaries ought to be the pioneers, and promoters of science, hand in hand with the Gospel throughout the world. In fact they have been so. And we believe it will be found on close inquiry, that the most efficient labourers in the purely spiritual field, have been on the whole, or on the average of numbers, those who also have done most to shed a brilliant lustre upon the Missionary character and name, in the fields of natural and scientific inquiries, and studies." Review of 'The Chinese classics by Dr. Legge. Evangelical Christendom, Jan. 7th, 1862.'

On some of the more interesting entomological specimens collected at Fort Garry, illustrated by specimens and diagrams, by Gov. MacTavish.

On the nature, extent, and probable value of the upper Saskatchewan, and Peace River gold-fields, (illustrated by specimens), by Timolean Love Esq.

Sanitary statistics for 1861, with observations on the principal diseases of this Settlement, by John Schültz, M. D.

On the Indian Tribes of Rupert's Land, by James Ross, M.A., Sheriff of Assiniboia.

Mr. Sheriff Ross, seconded by Rev. John Black, moved that the following gentlemen be honorary members: Prof. Wilson, Univ. College, Toronto; Prof. Hind, Trinity College, Toronto; Principal Dawson, McGill College, Montreal; Prof. Lawson, Queen's College, Kingston; George Barnston, Esq., Chief Factor, H. B. Co.; John Rae, M.D., late Chief Factor, H. B. Co.—Carried.

#### THE ROYAL INSTITUTION AND ITS LECTURERS.

In 1813 Mr. Faraday was appointed Assistant in the Laboratory at 25s. per week, with two rooms. At that time the Royal Institution was renowned throughout Europe for Davy's electro-chemical discoveries.

In 1816 Mr. Faraday's salary was raised to 100l. per annum.

In 1825, he was appointed Director of the Laboratory; the funds of the Institution could not admit of an increase of his salary.

In 1833 he was chosen for the Fullerman Professorship of Chemistry by Mr. Fuller. This was endowed with 100l. per annum.

In 1853, the amount he received was 300l. per annum as Superintendent of the House and Director of the Laboratory.

The electrical discoveries which have been made by Mr. Faraday in the Institution began to be published in 1831, and are not yet ended. His first chemical paper was published in 1816. He has worked long and much for the love of the Institution, and little for its money. For forty years, from 1813 to 1853, his fixed income from the Institution was not more than 200l. per annum.

In 1853, Professor Tyndall was elected to lecture on Natural Philosophy for 200l. per annum.

In 1859, he received 300l. per annum.

Thus the Royal Institution, from being a Society for the promotion of useful knowledge by instruction, became and remains a Society for the promotion of the progress of science by experiment. The amount it has been able to give its professors for either object has been the same. And after sixty years of grand discoveries, including the laws of electro-chemical decomposition; the decomposition of the fixed alkalies; the establishment of the nature of chlorine; the philosophy of flame; the condensibility of many gases; definite electrolytic action; the science of magneto-electricity; the twofold magnetism of matter; the magnetism of gasses; the action of magnetism and electricity on polarised light; and the radiation and absorption of heat by gases and vapours; but little more can be done for the discoverers than was done at the beginning of the century.

## Correspondence.

COMMUNICATION FROM MR. WM. WAGNER, AGENT FOR THE CANADIAN GOVERNMENT IN GERMANY.

(ADDRESSED TO W. EDWARDS, SEC. OF B. OF A. & M.)

Cologne, 12th April, 1862.

DEAR SIR,—I renew my thanks for sending to me your Journal regularly, and were it not for your kindness I should be kept here as ignorant of Canadian affairs as the remainder of Germany.

But that you may have a proof that I think of the interests of Canada, I have shipped to your order by the German barque "Mathilde," Captain Rahtgens, from Hamburg, and may be at Quebec about the end of April or beginning of May, a German Stove for your next exhibition. It is a stove made of strong sheet iron and clad with Chine (Kachelor). The top may be easily taken off, and you will see the inner construction. Between the "Kachelor" and the sheet iron is a filling of fire-brick clay. The stove which you receive is for coal fire. At the same time I have sent another to Ottawa, addressed to George Hay, Esq., Ironmonger. The one sent to Ottawa is for wood.

These stoves cost here at Berlin near \$17 50. To import them would be nonsense, but I have no doubt we could import the "Kachelor," or should the stoves be received favourably, then a man could easily be brought to Canada to make the "Kachelor," and set the stoves. I have already received an offer from such a mechanic.

The advantages of these stoves are that they are easily heated, and the heat is kept longer than by our Canadian stoves, and no fear of burning clothing when you come too near them; and it has a better appearance than a blank box stove.

I take the pleasure of making this stove a present to the Board of Arts and Manufactures. Should you like it, and some one would wish to have a stove sent out to Canada, please write to me and it shall be done immediately.

To secure to the oilmen of Upper Canada a place to send it to, I have spoken to different firms, amongst which is one Mr. Waltjen of Bremen, who has used Boghead coal, and was last year in Pennsylvania—but no person has said anything about Canadian wells. He has received 5,000 barrels from Pennsylvania, and now he sends out a relative of his to the oil springs of Enniskillen, either to buy a well or make a contract. Mr. Waltjen, who has a very large establishment, says he will be able to use from 100,000 barrels per annum and more.

He was very happy that I could give him information, and I had to write down all the extracts

from your Journal. This company intends to go up with a vessel to Hamilton.

The question is now, "How deep are the canals between Montreal and Hamilton? What are the expenses to bring a ship through the canals, that is for towing and for lockage, or is this free?" And also please let me know what are the expenses from Wyoming Station to Hamilton, or is it cheaper to go up to Lake St. Clair? All these questions must be understood well to give more information.

To-night I will, at the Mechanics' Institute, give a lecture on Canadian Agriculture, and the Oil Wells of Canada especially. After Easter I will try to bring it before the Berlin public, and also try Holland.

I enclose you a piece of silk dyed by Mr. Waltjen at Bremen.

The sooner I can get an answer from you, the better it will enable me, during the summer, to bring it before this public.

I also believe that I have opened a market for our timber on the Rhine.

From Bremen two ships will load timber, and when I succeed large orders will be given for next winter's work.

The English Consul at Cologne has promised to me his assistance, and I have the best hopes. Emigration will be very good this year. I hear from all quarters that parties are starting—many who have money, some just sufficient with which to reach Quebec.

Is there not a Geography for Canada in existence? If so please send it to me. When you have anything of interest be good enough to send it to me—perhaps your Member of Parliament will send me some pamphlets which shews the developement of Canada.

Please give my card to the Journal, saying that I am willing to transact, or see it done, any business which persons may trust to me, viz., sale of oil, &c., or should any one like to import anything, I will give the information which may be wanted, as long as I am here to take care of Canadian interests.

W. WAGNER.

## Patent Laws, &c.

### BRITISH PATENT LAWS.

FROM "SYNOPSIS OF THE PATENT LAWS OF GREAT BRITAIN AND IRELAND." Published by the Commissioners of Patents.

"LAW, DATE, AND WHERE RECORDED.—Acts 15 & 16 Vict., cap. 83; 16 Vict., cap. 5; 16 and 17 Vict.,

cap. 115. In operation since 1st October, 1852. See Patent Law Amendment Act, 1852. Great Seal Patent Office, 25 Southampton Buildings, Holborn, London. Price 6d.

"KINDS OF PATENTS.—Letters Patent granted to Natives and Foreigners residing or represented in the United Kingdom. Provisional Protection during six months.

"PREVIOUS EXAMINATION.—None as to novelty or utility.

"DURATION.—Patents granted for fourteen years, but expiring at the end of the third or seventh year, if the requisite payments are not made.

"GOVERNMENT FEES.—£25 for the first three years, £50 for the next four years, and £100 for the last seven years. Provisional Protection converted into Letters Patent at or before the expiration of six months: *Petition*, £5 stamp; *Notice to proceed*, (eight weeks clear before the expiration of six months,) £5; *Warrant and Great Seal* (fourteen days before the expiration of six months), £10; *Complete specification*, £5 stamp.

"DOCUMENTS REQUIRED, AND WHERE TO BE LEFT.\*—A *petition* to the Queen by the inventor or his agent. A *declaration* of the inventor or his agent, made before a magistrate, or a British Consul abroad. A *Provisional* or *complete specification* (two copies), together with the necessary drawings (two copies). The whole to be left at the Great Seal Patent Office, where also the notice to proceed is to be given, the Warrant and Great Seal are to be applied for, and the final (complete) Specification (in case of Provisional Protection) is to be filed.

"WORKING AND EXTENSION.—Extended by special grant of the Privy Council.

"ASSIGNMENTS.—Registered at the Great Seal Patent Office. Fee, 5s.

"SPECIFICATIONS, INSPECTION AND COPIES OF.—At the Public Free Library of the Great Seal Patent Office, where also most foreign works on inventions may be consulted, or manuscript translations be had. At the free libraries throughout the country; likewise at the public libraries of the chief continental States, the British Colonies and America.

"LISTS OF PATENTS DELIVERED.—In the Commissioners of Patents' Journal, within a fortnight of the application, within eight days of the notice to proceed, and a fortnight of the sealing of Patents; also in the daily Register at the Public Free Library.

"SPECIFICATIONS PUBLISHED.—By the Commissioners at cost price, at the Great Seal Patent Office, within a month of the delivery of the Letters Patent. Old specifications published likewise at cost price. In course of publication: Abridgments

\* See Rules and Regulations, page 117, of this Journal.

(in classes and chronologically arranged) of all Specifications of Patented Inventions, from the earliest enrolled to those published under the Act of 1852.

“ORIGINALS OF SPECIFICATIGNS (Models).—At the Great Seal Patent Office models are not required, but when presented or lent they are deposited in the Museum of the Commissioners of Patents, which is open daily to the public, free of charge.”

There is in course of publication, by order of the Commissioners of British Patents, Abridgments (in classes and chronologically arranged) of all SPECIFICATIONS of PATENTED INVENTIONS, from the earliest enrolled, to those published under the Act of 1852.

These books are of 12mo. size, and each is limited to inventions of one class only, so as to enable inventors readily to ascertain if their discoveries have been previously patented or not. At the foot of each abstract are given references to notices of the inventions in scientific and other works, and to the reports of law proceedings for infringements, &c. &c.

The classes already published, and in the FREE LIBRARY OF REFERENCE of the BOARD OF ARTS AND MANUFACTURES FOR U. C., are:

1. Drain Tiles and Pipes.
2. Sewing and Embroidering.
3. Manures.
4. Preservation of Food.
5. Marine Propulsion.
6. Manufacture of Iron and Steel.
7. Aids to Locomotion.
8. Steam Culture.
9. Watches, Clocks, and other Time-keepers.
10. Fire-arms and other weapons, Ammunition and Accoutrements.
11. Papers—Part I. Manufacture of Paper, Paste Board, and Papier Mâché.
13. Typographic, Lithographic, and Plate Printing.
14. Bleaching, Dyeing, and Printing Yarns and Fabrics.
15. Electricity and Magnetism; their Generation and Applications.
16. Manufacture and Applications of India Rubber, Gutta Percha, &c., including Air, Fire, and Water Proofing.
17. Production and application of Gas.
18. Metals and Alloys.

All the above works, with others as they are published, can be obtained at the Great Seal Patent Office; the prices varying from 6d. to about 15s. sterling.

ABRIDGED SPECIFICATIONS OF ENGLISH PATENTS.

2130. H. ATTWOOD. *Improvements in cleaning and in feeding boilers.* Dated August 26, 1861.

These improvements in cleansing boilers, consist in placing one, two, or more conduits at about the water level; the conduits are dished on their upper surface, and are perforated at intervals, while curv-

ed flanges are adapted to the sides. Similar conduits are placed at the bottom of the boiler. The improvements in feeding-boilers consist in supplying them from below, through perforated pipes extending along the length, or nearly so, of the boilers. This arrangement is for the purpose of keeping the sediment in a state of agitation, thereby causing the impurities contained in the water to rise to the surface, when it may be drawn off by the scum plate and cock. For some waters chemical agents are used, together with the above mechanical appliances.

2156. R. SHAW. *Improvements in windlasses, capstans, and other machinery for hoisting and lowering weights.* Dated August 30, 1861.

This invention consists in so constructing and arranging the several parts forming the break that it is in operation while the weight is being hoisted, and when it is raised, consequently, if the man at the handle should let it go, the weight remains suspended until the break is released; and by this means the injury and accidents resulting from the man at the handle being overpowered by the weight, or the handle breaking or coming off, are avoided. One mode of performing the invention is by applying one or more palls to the wheel on the drum or other shaft; these palls take into an internal ratchet wheel formed in the break pulley, which is surrounded by a friction clip. The details of construction may, however, be considerably varied and modified.

2171. P. TAYLOR. *Improvements in apparatus for removing the sediment from, and preventing the incrustation in, steam boilers.* Dated Aug. 31, 1861.

This consists in applying a pipe to the interior of a steam boiler, which pipe is made with a longitudinal slot or slots extending the whole or the greater part of the length of the boiler, and communicating with an off pipe in which is a discharge valve, capable of being opened and closed rapidly. The valve is of the usual mushroom shape, and in the boss or on the spindle of the valve is a fixed stud; the groove is of such an inclination that, by turning the spindle about one-half round, the valve is opened sufficiently to discharge the sediment, which enters the pipe through the slot or slots above referred to.

2195. E. SUCKOW and E. HABEL. *Improvements in machinery or apparatus for producing a strong blast or current of air.* Dated Sept. 3, 1861.

Here the patentees enclose an Archimedean screw in a cylinder, and give it a rapid rotatory motion. The screw is composed of any number of blades, which are fixed to a conical disc, and have their outer edges revolving nearly at a right angle to projections or catch-rings, fixed to, or forming part of the cylinder. When motion is given to the screw, a strong blast or current of air is produced, similar to that of an ordinary fan, but with a much more powerful effect. They also apply antifriction rollers, when desired, to work against the prepared surface or collar of the shafts in order to lessen the friction.

2298. T. MORRIS, R. WEARE and E. H. C. MONCKTON. *Improvements in batteries, for obtaining electric currents and the products therefrom.* Dated Sept. 14, 1861.

This consists in an arrangement of battery cells, whereby the plates or cells are not immersed, as is

ordinarily the case, in a trough, and whereby the intensity of electricity is obtained more readily, and the electric current is less likely to escape. Also in the mode of producing the chemicals or excitants for the batteries; and also in the mode of making the cells and the divisions thereof; and also of the general arrangement of earth or mineral batteries, and the useful results obtained therefrom.

2328. C. PARTINGTON. *Certain improvements in machinery or apparatus employed in the manufacture of paper.* Dated Sept. 18, 1861.

The object here is the separation of the superfluous liquid from "half stuff in order to prepare it for the willow and washing machine." The improvement consists in the employment of one or more pairs of bowls or rollers, supported in a framing, between which rollers the material in the state of half stuff passes, and is pressed until sufficiently solidified for the next operation. The material is fed to the rollers by means of an endless travelling cloth. The upper roller is formed or composed of large discs placed side by side and loose upon the central shaft.

2362. C. BOARD. *Improvements in veneering presses.* Dated Sept. 21, 1861.

This invention consists in constructing veneering presses in the following manner:—Upon a strong wood or metal frame the patentee lays and secures a sheet or plate of zinc or other metal, on the upper surface of which he fixes metal bars, in such manner that series of chambers or passages extending from end to end of the plate are formed. He places strips of wood or other suitable material at the ends and sides, and he covers the whole with another sheet of metal similar to the first, in order to obtain a smooth and hollow bed on which to perform the veneering. Having formed the hollow bed, he places pipes below it in communication with the end of each of the passages, at one end of which he admits steam, hot air, or hot water, which, travelling along the passages, passes off at the other end. Clamps are fitted to the press, which for convenience, he hinges at one end to the frame.

2363. H. & F. C. COCK. *Improvements in apparatus employed in the manufacture of gas.* Dated Sept. 21, 1861.

This relates to the dip pipe and hydraulic main, the object being to allow for the contraction and expansion, or rise and fall of the ascension pipe, and thereby to prevent the strain upon the joints of those pipes, and mouth-pieces of the retorts.

#### PATENT LAWS OF CANADA.

We have received the following copy of a Bill to amend the Patent Laws of this Province, as introduced by the Hon. Mr. Moore, on Tuesday, the 6th of May, and set down for a second reading on Wednesday, the 14th of May. Should this Bill become law it will secure many of the benefits asked for in the Memorial of this Board, presented during the present Session, a copy of which is published in this number of the *Journal*.

#### BILL.

*An Act for the Protection of British and Foreign Patentees of Inventions, and the encouragement of Arts and Manufactures.*

Whereas it is highly desirable that the inhabitants of this Province should be placed in a position to derive advantage from discoveries in the useful Arts and Manufactures made in other parts of the British Empire, and in the United States and other foreign countries, so far as may be consistent with justice to the parties making such discoveries; Therefore, Her Majesty, &c.:

1. Any person, or the assignee of any person, who has obtained, in Great Britain, or in any of the British Colonies, or in the United States of America or other foreign country, Letters Patent of Invention for any new and useful art, manufacture or machine, or composition of matter, may secure to himself all the privileges conferred by Letters Patent of Invention, issued in this Province under the now existing laws, by causing such Letters Patent so as aforesaid obtained to be enregistered at full length in the office of the Registrar of the Province, within six months from and after the passing of this Act; and any person, or the assignee of any person, who may hereafter obtain in Great Britain, or in any of the British Colonies, or in the United States of America, or in any other foreign country, Letters Patent of Invention for any new and useful art, manufacture, machine, or composition of matter, or any new and useful improvement upon any art, machine, manufacture or composition of matter, may, by causing such Letters so as last aforesaid obtained, to be enregistered at full length in the said office of the Registrar of the Province, within six months from and after the date of such last mentioned Letters Patent, secure to himself all the privileges conferred by Letters Patent of Invention issued in this Province, under the now existing laws.

2. Every such patentee, or assignee of a patentee, for the purpose of causing such Letters Patent to be enregistered in this Province, shall make a written application, signed by himself, or by his duly appointed attorney, to the Minister of Agriculture, and shall transmit to him duly authenticated copies in duplicate of such Letters Patent, and of the specifications, descriptions and drawings attached, or belonging thereto, and shall at the time of his application for such enregistration, pay to the said Minister of Agriculture the following fees, that is to say, the sum of thirty dollars.

3. Letters Patent so enregistered shall be and remain in force in this Province until the expiration of the period for which they have been or may be granted; and such enregistration shall secure to the patentee, or his assignee, during such period, all the rights and privileges that could be secured to him by Letters Patent obtained in this Province under the existing laws, all the provisions of which shall extend to such Letters Patent in as full and ample a manner as if such Letters Patent were granted in this Province under and in virtue of the same; Provided always, that any person who has or shall have purchased, acquired, constructed, or used any machine, manufacture or composition of matter included in such Letters Patent, so as aforesaid enregistered, previously to the enregistration thereof in this Province, shall



be held to possess the right to use, or to vend to others to be used, the identical machine, manufacture, or composition of matter so actually purchased, acquired, constructed, or used by him before such enregistration as aforesaid, without liability to the patentee or, other person interested in the invention for which Letter Patent so enregistered were, or may have been obtained.

4 The importation into this Province of any machine, manufacture, or composition of matter for which Letters Patent shall have been obtained or enregistered in this Province, shall be deemed an infringement on the rights of the patentee, or his assignee, and if caused and procured by the patentee or assignee himself, shall *ipso facto* have the effect of annulling such Letters Patent so far as regards this Province; Provided always, that nothing herein contained shall be construed so as to apply to the importation by any such patentee or his assignees of one such machine, or sample of such manufacture, or composition of matter to serve as a model or specimen for the making of such machine, manufacture, or composition of matter in this Province.

5. So much of the Act passed in the twelfth year of Her Majesty's reign, intituled "An Act to consolidate and amend the laws of Patents for Inventions in this Province," and of the Act passed in the Session held in the fourteenth and fifteenth years of Her Majesty's reign, intituled, "An Act to enable parties holding Patents for Inventions confined to one section of this Province to obtain the extension of the same to the other section thereof, and for other purposes therein mentioned," as may be inconsistent with the provisions of this Act, is hereby repealed.

6. All patents for inventions which shall be issued in this Province from and after the passing of this Act, shall be for the term of seventeen years; and no renewal thereof shall in any case be granted; and the fees payable thereon shall be for each such patent thirty dollars.

Since the above was in type, we have received a copy of the Bill referred to in the Memorial of this Board, as prepared by the Board of Arts and Manufactures for Lower Canada, and introduced by Mr. Dunkin, entitled, "An Act to repeal certain Acts therein mentioned, and to make other provisions respecting Inventions, Trade Marks and Designs."

The principal features of this Act are, that it provides for the establishment of a Patent Bureau to be attached to the Department of the *President of the Council*, the chief officer of which shall be called the *Commissioner of Patents*; places the citizen of Canada and all other countries on an equality so far as obtaining Patent Rights in Canada; provides that copies of all Specifications, Indices, and Letters Patent, be deposited with the Boards of Arts and Manufactures, respectively, for the inspection of the public; and fixes a tariff of fees slightly in advance of the present charges. Having received the Bill just before going to press,

we are unable to give a more lengthy notice in this number; but from the careful consideration it has had by the Lower Canada Board, and the approval heretofore given to it by the Board for Upper Canada, we have every confidence in its being a great improvement on the present Law.

#### PATENTS OF INVENTION.

BUREAU OF AGRICULTURE AND STATISTICS, Quebec,  
19th April, 1862.

His Excellency the Governor General has been pleased to grant Letters Patent of Invention for a period of fourteen years, from the dates thereof, to the following persons, viz.:—

George Munro, of the Town of Peterborough, Miller, "Munro's Patent Model Grist Mill."—(Dated 29th November, 1861.)

Harry Seymour, of the City of Montreal, Gentleman.—A new mode of preserving wood from the effects of damp or rot to be called "Seymour's system of preserving wood."—(Dated 26th December, 1861.)

Alexander Daniel McKenzie, of Augusta, County of Grenville, Accountant, and Ives Wallingford McGaffey, of the City of Hamilton, County Wentworth, Machinist, "Improvements in Gas Generators and Burners."—(Dated 4th January, 1862.)

Charles Gode Rich, of the Town of St. Thomas, in the County of Elgin, Druggist, "An anti-friction Railroad-Car Box."—(Dated 8th January, 1862.)

Isaac Thompson Pells, of the City of Toronto, in the County of York, Trader, An article known and described as "Baking Powder."—(Dated 9th January, 1862.)

William Arnold Young, of the Town of Dundas, in the County of Wentworth, Last and Peg Manufacturer, "A Boot Treasing Machine."—(Dated 15th January, 1862.)

David Fleming, of the City of Toronto, in the County of York, Contractor, "A new kind of Farm Fence."—(Dated 15th January, 1862.)

William Arnold Young, of Dundas, in the County of Wentworth, Last and Peg Manufacturer, "An improvement on a Boston Patented Boot Crimping Machine."—(Dated 15th January, 1862.)

Israel Kinney, of the Town of Simcoe, in the County of Norfolk, Waggon Maker, "An improved Churn Attachment."—(Dated 28th January, 1862.)

Arthur Fisher, of the City of Montreal, physician and Surgeon, "A Hollow Brick."—(Dated 7th February, 1862.)

Henry L. Weagant, of Morrisburg, in the County of Dundas, Cabinet Maker, "A Tripod Churning Machine."—(Dated 8th February, 1862.)

John Austin, of the Village of Fergus, in the County of Wellington, Miller, "The Mill Stone Assistant."—(Dated 19th February, 1862.)

Christopher Lockman, of the City of Hamilton, in the County of Wentworth, Machinist, An improvement in Shuttle Sewing Machines, termed "The Family Shuttle Sewing Machine."—(Dated 19th February, 1862.)

William Myers, of the Township of Williamsburg, in the County of Dundas, Mechanic, "A new and Improved Fanning Mill and Machine for separating oats, cockle and other seeds from Wheat."—(Dated 19th February, 1862.)

George Arthur Manneer, of the Township of Innisfil, in the County of Simcoe, Farmer, "A double Lever Power or an improvement to the Lever Power on Bull Wheels."—(Dated 28th February, 1862.)

Robert Kerr, of the Township of Waterloo, in the County of Waterloo, Yeoman, "An improved grain and seed broad-cast Sower."—(Dated 28th February, 1863.)

Austin Adams, of the City of Montreal, Match Manufacturer, "A new and useful machine for splitting sticks for matches."—(Dated 4th March, 1862.)

William Clouston Robertson, of Belleville, in the County of Hastings, Tailor, "An improved Garment Delineator."—(Dated 8th March, 1862.)

John Wedderburn Dunbar Moodie, of Belleville, in the County of Hastings, Sheriff, "A Rotary Interest Indicator."—(Dated 8th March, 1862.)

James Tomlinson, of the Township of Pickering, in the County of Ontario, Mechanic, "A Steam Coiled Hoop for all kinds of Coopers' work."—(Dated 8th March, 1862.)

Isaac Mills, of the Township of Flamboro' West, in the County of Wentworth, Farmer, "A double and single dash, hinge and crank Churn called 'Mills' Victoria Churn."—(Dated 8th March, 1862.)

Philip Cady Van Brocklin, of the Township of Brantford, in the County of Brant, Iron Founder, "A new and useful implement called 'Van Brocklin's two horse Wheel Cultivator.'"—(Dated 11th March, 1862.)

James W. Millar and John F. Millar of the Village of Morrisburg, in the County of Dundas, Iron Founders, "An improved Moulding Flask for making the Mould Boards of Ploughs without Sand."—(Dated 12th March, 1862.)

Reuben Watson, Carpenter, and John Overton, Blacksmith, both of the Township of Moore, County Lambton, An improved Plough called the "Lincolnshire Plough Boy."—(Dated 14th March, 1862.)

Jarret Smith Clendening, of the Township of Malahide, in the County of Elgin, Waggon Maker, "A portable Clothes Drier."—(Dated 17th March, 1862.)

Charles Boeckh, of the City of Toronto, in the County of York, Brush Manufacturer, "A Lamp Chimney Cleaner."—(Dated 17th March, 1862.)

Edward Trenholm, of Trenholmvile, in the Township of Kingsey, in the County of Drummond, Farmer and Miller, "An improved Snow Plough and Flange Cleaner."—(Dated 20th March, 1862.)

Alba Faunce, of the Town of Sherbrooke, in the District of St. Francis, Carpenter and Joiner, "A Vegetable Root Cutter."—(Dated 21st March, 1862.)

Edson York, of the Township of Stanstead, in the County of Stanstead, Carpenter and Joiner, A new and improved Vegetable Cutter called "York's Vegetable Cutter."—(Dated 2nd April, 1862.)

Edson York, of the Township of Stanstead, in the County of Stanstead, Carpenter and Joiner, A new and improved Churn called "York's Rotary Churn."—(Dated 2nd April, 1862.)

Common plumbago, according to recent researches of Dr. Calvert, is composed of 91 per cent. of a suboxide of iron, 8½ per cent. of a nitride of silicium, with traces of phosphorus and sulphur.

## Selected Articles.

### GREAT CANDLE MANUFACTORY—DESCRIPTION OF THE OPERATIONS.

A correspondent of the London *Chemist and Druggist* describes the Sherwood Works, at Battersea, England, belonging to the celebrated Price Patent Candle Company. We have condensed the most instructive and interesting portion of this description for the benefit of our readers:—

The manufacture of candles upon an enlarged scale embraces a range of high scientific information. The art has been completely revolutionised within the past thirty years, and for this the world is chiefly indebted to the French chemist, Chevreul, who has now charge of the Royal Dye Works, at the Gobelin manufactory of tapestry carpets, in Paris. Chevreul patiently investigated the nature of fatty bodies, with the view of determining their relative value for illuminating purposes. He found that every natural fat contained substances which ought not to be present in candles, because such substances reduced their illuminating power. Thus tallow is composed of at least two distinct solid bodies, namely, stearic and margaric acids; also a liquid oil—oleic acid and glycerine—a sirupy body, which serves as a base to the three acids. Each of these acids, when burned in the wick of a candle or lamp, gives a more brilliant flame than the tallow from which they are derived, but the glycerine gives a flame which is exceedingly feeble. To obtain a good candle material the latter body must be removed from the fat; and as the presence of oleic acid renders the material soft and greasy, this substance must also be got rid of. Chevreul, in the year 1823, described a process by which the hard acids might be separated. From that time candle making has advanced with rapid strides, and what was once a rude and noisome trade has become a first-class chemical manufacture. To appreciate the difference between the two phases of the art, we need only compare the common parlor candle of twenty years ago with that which now takes its place. The snuffy, guttering, feeble-flamed mold, formed of simple tallow, represents the mechanical stage of candle making, and is rapidly becoming a relic of the dark ages. Instead of it we find in general use, a hard, clean, polished cylinder, composed of beautiful chemical products, which burn away brightly by a slender and snuffless wick. Wax and sperm are still used as formerly, but to a limited extent. A new material, paraffine, has nearly superseded them.

At Price's Candle Works palm oil, cocoa-nut oil, and Rangoon petroleum are used extensively for candles. The palm oil is solid, and comes in casks from Africa. These are emptied in a most expeditious and simple manner. The casks are rolled to a large shed, the floor of which is traversed from end to end with an opening about a foot wide, which is in communication with an underground tank. Over this opening the bung-hole of each successive cask is brought, and a jet of steam is made to play upon the solid mass. The heat of the jet speedily melts the oil, which flows out of the bung-hole into the tank, whence it is pumped by steam

power to a large pipe, which conveys it to the distilling rooms.

The works cover eleven acres of ground; the distilling rooms are large one-storied buildings, with roofs of corrugated galvanized iron; no furnaces are used; no offensive smell is noticed, and all things look neat and clean, and very different from the filthy fetid candle works that formerly existed. Throughout the factory, steam, either at the common temperature or superheated, is employed as the source of heat in all operations connected with the separation and purification of candle material. The steam is conveyed to the different rooms by suitable pipes, and the smoke, dust and danger of the furnaces are thus kept at a respectful distance.

When the stearic candle manufacture was in its infancy the fat acids were separated from the glycerine by the process called lime saponification. The tallow was first boiled up with thin cream of lime, which seized upon the fat acids and caused them to forsake the glycerine; the soap of lime thus formed was then treated with sulphuric acid, which, by uniting with the lime, set free the fat acids. This was an expensive process, as to each cwt. of tallow 14 to 16 lbs. of lime, and 28 to 32 lbs. of sulphuric acid were employed; moreover, in the candle material, stearic acid, when obtained, was only in the proportion of two parts to five of the tallow employed, and the other product, oleic acid, had little commercial value.

The process of sulphuric acid purification, introduced into the manufacture about twenty years ago, was an immense improvement upon the lime process. It is still employed in these works, though to a comparatively small extent. The quantity of sulphuric acid now employed to decompose 1 cwt. of fat, in some cases is reduced to 4 lbs. and even 3 lbs. Six tons of the raw material, usually palm oil, are exposed to the combined action of concentrated sulphuric acid and a temperature of 350° Fah. The result of this action is very striking. The glycerine is decomposed, and the fat is changed into a mixture of fat acids of a very dark color, with a very high melting point. This is washed to free it from charred matter and adhering sulphuric acid, and is then transferred to a still. When it is exposed to the action of steam the palm oil passes over from the still in a limpid stream, and the product is collected in clean cans, from which it is transferred to tubs. The acid action and the distilling operations separate a dark, bituminous-looking residuum from the pure fatty acids. The sulphuric acid process involves the loss of glycerine and a waste of material, owing to the decomposition of part of the fat acids. These defects induced the chemists of this manufactory to seek for a still more perfect process, and in 1854 such was discovered. This consists in passing superheated steam directly into the neutral fat, by which means it is resolved into glycerine and fat acids; the glycerine distilling over in company, but no longer combined with them. Glycerine, which was formerly looked upon as a nuisance, as something to be got rid of at a great expense, is now valued, and sells at a higher rate than stearic acid. The presence of this body in the tallow candle gives rise to the offensive odor of the snuff when the flame is extinguished.

To obtain the pure stearic acid which forms the beautiful white adamantine candles, the distilled oil is cooled in tubs. When it congeals it is placed in bags of cocoa-nut fiber, and subjected to hydraulic pressure in a room at common atmospheric temperature. In another building is a long line of heated chambers, in which the process of heating is completed. To these the piles of solid acid which have undergone cold pressure are carried, and by a second squeezing, together with the action of heat, every trace of oleic acid is removed from the material. The hard cakes of stearic acid are now removed to large wooden vats, in which they are liquified by steam heat, and the candle material is ready to be run into the molds. Cocoa-nut oils and all solid fats receive the same treatment for making pure stearic acid candles. Common candles are made from the product of distillation before it is subjected to pressure.

Paraffine is obtained for making candles from Rangoon (East India) petroleum, which is similar to that of the oil well of America. This source of paraffine is much cheaper than the heavy oil obtained by distilling cannel coal. The Rangoon petroleum is a natural product of Burmah. It flows out from the ground like the Pennsylvania oil. It is treated to distillation in the Price Candle Works, and separated into different products, according to the temperature at which it is distilled. The most volatile liquid that passes over from the still at 160° Fah. is called Sherwood oil, and is really the benzine, so called, obtained in distilling American well oil. It is used for cleaning kid gloves, and for removing grease from silk and other fabrics. Oil for burning in lamps comes over, when distilled, at a higher temperature, then heavy oil for lubrication, at a temperature of about 550° Fah., and lastly paraffine, at 620° Fah. When cooled and solidified, by its temperature being reduced with ice, it forms the most beautiful known material for candles except white wax. In distilling this substance from petroleum, superheated steam is employed in order to elevate the retort to the proper temperature. Paraffine is subjected to pressure in the same manner as the solid fatty acid, obtained from palm oil and tallow. It is a beautiful white substance, and has a silvery luster. It is melted with steam heat, and run into molds in the usual way. In many cases great trouble has been experienced in removing stearic acid and paraffine candles, after they had become solidified, from their molds. In this manufactory a most convenient and ingenious method of removing them is employed. It is simply the force of compressed air. There are several large iron tanks, in which compressed air is forced by a steam engine; and these tanks connect with the machine in which the candles are molded. The candle molds are arranged in benches. Along the top of each bench there is a little railway, on which runs the "filler"—a car containing hot candle material. The wicks having been adjusted truly in the molds, the filler advances and drops in each mold the requisite amount of material. After a sufficient time has been allowed for solidifying and cooling, the boys who attend the machines proceed to remove the candles from the molds. It is in this operation that the compressed air is made use of. Each mold is connected with the reservoir, and on merely

opening a tap, pop goes the candle, which is dexterously caught by the boy.

The candle molds and air pump constitute an immense air gun, containing a stock of several thousands of barrels, each loaded with a candle. The turning of a cock by boys in attendance lets off these guns, and eject the candles with a slight hissing noise. This fusillade is going on all over the room, throughout the entire day, and in the course of ten hours no less than 188,160 candle projectiles, weighing upwards of 14 tons, have been shot forth.

Innumerable contrivances for drawing candles have been attempted, but none equal this, as the compressed air does not injure the fine polish of the molds on which the beauty of the candles greatly depends. The tops of the candles are downward when molded.

Eight hundred operatives, consisting of men and boys, are employed in this establishment. The wicks for the candles, and the cocoa-nut fiber bags are woven on the premises. There is a school for the boys, and a large space of ground allotted for them as a gymnasium. There is also a large swimming bath and an excellent library.—*Scientific American*

#### SPEED OF TRANSMISSIONS IN LONG TELEGRAPHIC CABLES.

Three elements are concerned in producing the retardation of telegraphic signals, the copper conductor, the insulating sheath, and the earth.

The copper conductor, if constant throughout its whole length, possesses a power of conducting the electric force in simple proportion to its thickness, and in inverse proportion to its length.

This conductor, when surrounded by a substance of a comparatively non-conducting or insulating quality like gutta-percha, becomes a leyden jar; and in this state Professor Thomson has shown that the capacity of the copper for receiving what is called the charge, or in other words, its electro-static capacity, by which the rate of signalling is effected, depends on the *ratio* of the diameter of the gutta-percha, to the *ratio* of the diameter of the copper, being at the same time independent of the *absolute* diameter of either.

This electro-static or retarding influence, however, only manifests itself while the insulating sheath of the conductor is in contact with the earth, shewing that the loss of speed in transmission arises simply from the increased induction derived from that contact, owing to the inductive capacity possessed in a superior degree by gutta-percha over the same capacity in air, which is the surrounding medium of the conductor in the case of land telegraphs. This is shewn by the fact, that if a copper wire insulated along its whole length with gutta percha, be suspended in the air, it will be found to have lost nearly all its inductive tendency, which, however, will be rapidly restored to it when laid again in earth or immersed in water.

This, then, being the state of facts as regards the conducting power of the copper, the inductive capacity of the insulator, and the influence of contact with earth or water, it is manifest that the rate of charging and discharging a cable—which is the main circumstance affecting its speed of

transmitting messages—must depend, first, upon the size of the conductor, by which is determined the quantity of electric force that can be thrown into the line with advantage at one blow; and, second, to the ratio of insulation applicable to the diameter of that conductor, so as to reduce to a minimum the influence of inductive absorption.

It will thus be apparent that whatever the length of cable required to be laid, the speed at which it shall work may be determined to a nicety; indeed, the whole thing has been tabulated in a most convenient form by Mr. Varley, shewing from practical results the capacities of gutta-percha for inductive absorption from one to 350 layers, and it is clear that within comparatively reasonable limits, as to expense of materials, the induction may be decreased and the speed increased to any useful extent.

It is true that by increasing the circumference of the copper wire, the surface for inductive action is increased also; but inasmuch as the induction is merely superficial, and increases only as the circumference of the copper, while the conducting power of the latter increases as the square of its diameter, it is manifest that the gain to conduction goes on increasing with the size of the copper in an enormous ratio, and as stated by Mr. Varley, "if the wire so increased in size be coated with insulating material to such a thickness as shall give the same induction as the former or smaller wire, the result will be that four times the speed will be obtained."

Nor must it be supposed that in order to attain a comparatively high speed along a cable 2,000 miles in length, it would be necessary to increase the quantity of material and consequent expense beyond what would be equally desirable and economical in a line divided into sections, varying from 300 to 900 miles each. The quantity of copper and gutta-percha employed in making the core of the cable, now suggested by Glass, Elliot & Co., to the directors of the Atlantic Telegraph Company, to be laid between Ireland and Newfoundland, is to be 510 pounds of the former to 550 pounds of the latter. This cable has been certified by electricians, whose opinions are unquestionable, to be capable of working at the rate of eight to twelve words per minute. If we take the mean at ten words, and refer to Mr. Varley's evidence before the Board of Trade Committee, we shall find that if the Atlantic cable can be made to speak at that rate, it will not, in speed at least, be very far behind even the land telegraphs of this country. Mr. Varley, who is at the head of the Electrical and Engineering Department of the Electric and International Telegraph Co., says, respecting the working of land lines:—"In practice, we seldom work on the English lines at a higher rate than twenty-two words per minute. An entire hour's work will seldom shew a higher speed than twelve or fifteen words per minute."

If this be so, and if the direct Atlantic Telegraph line be able to work at 8 words per minute, how is it possible that a line of upwards of 3,000 miles in length, from London to the confines of Labrador, working in four sea sections, whose lengths of cable are respectively 270, 360, 720, and 960 miles, with the retardation due to these sections, and the impossibility of using relays, at all events, on the

longer sections, can transmit messages at the rate of nine times faster, or, indeed, any faster than the direct Ireland to Newfoundland cable. The fact is, that a very large staff would have to be kept at the terminus of each section, and every message would at each terminus have to be read off, and re-transmitted to the terminus of the next section, and thus every message and signal would have to be repeated eight or nine times at least during its transit from London to New York, and the result would be that, with all its apparent advantages of short circuits, it is very problematical whether intelligence could be sent to America by the northern route even at as good a speed as by the direct Atlantic cable properly constructed and laid.—*London Mech. Magazine.*

GOVERNMENT AID TO SCIENCE IN ENGLAND.

The following statement of the sums paid for scientific objects, or to scientific men, by the government, is taken from the "Civil Service List" for March, 1860:

|  |       |
|--|-------|
| Royal Mint—Master and Worker .....   | £1500 |
| Science and Art Department—Secretary and Superintendent .....                                  | 1200  |
| "    "    Assistant Secretary.....   | 775   |
| Queen's College, Cork—President and Director of Irish Museum .....                             | 1200  |
| Director General Geological Survey, and Director of Geological Museum .....                    | 1100  |
| Astronomer Royal .....   | 1000  |
| "    "    House and  |       |
| British Museum—Superintendent of Nat. Hist. Department .....                                   | 800   |
| "    "    Keeper of Zoology .....  | 500   |
| "    "    Keeper of Mineralogy.....  | 500   |
| "    "    Keeper of Botany .....   | 500   |
| "    "    Keeper of Geology .....  | 500   |
| Director of Kew Botanic Gardens .....  | 800   |
| Registrar of London University .....   | 800   |
| Superintendent of Coining .....  | 700   |
| Woolwich Arsenal—Chemist .....   | 700   |
| "    "    Assistant .....  | 280   |
| Inland Revenue Laboratory—Principal .....  | 600   |
| "    "    Assistant .....  | 300   |
| Queen's College, Belfast—Vice President .....  | 600   |
| Superintendent of Nautical Almanack .....  | 500   |
| School of Mines—Lecturer on Chemistry and Chemist .....  | 300   |
| "    "    Lecturer on Physics.....   | 200   |
| India Office—Reporter on the Products of India .....   | 500   |
| School of Mines—Lecturer on Natural History, and Naturalist to Geological Survey.....          | 625?  |
| School of Mines—Lecturer on Geology, Local Director of Geological Survey .....                 | 550?  |
| Geological Survey, Ireland—Local Director, Lecturer on Geology, Museum of Irish Industry ..... | 650?  |

The following summary of the sums required for the Department of Science and Art for the years ending March 31, 1861 and 1862, shows well what the Government now does as compared (not with the time when the Royal Institution was founded, but) with the year 1843, when the Grant commenced with £2,008 for the Museum of Economic Geology:

|  |               |               |
|--|---------------|---------------|
|  | 1861-2.       | 1860-1.       |
| For General Management in London .....   | £4,705 0 0    | £4,560 0 0    |
| For Schools of Art and Science in the United Kingdom, South Kensington Museum, Library, &c ..... | 76,405 0 0    | 77,415 0 0    |
| For School of Mines, and the Geological Museum, Jermyn St. London .....                          | 6,337 2 6     | 6,417 2 6     |
| For Geological Survey of the United Kingdom .....  | 10,708 1 6    | 10,317 19 6   |
| For Industrial Museum for Scotland, including the Natural History Museum, Edinburgh .....        | 1,931 12 0    | 1,943 16 0    |
| For Royal Dublin Society .....   | 6,000 0 0     | 6,000 0 0     |
| For Museum of Irish Industry and Provincial Lectures in Ireland.....                             | 4,956 16 0    | 4,096 16 0    |
| Royal Hibernian Academy .....  | 300 0 0       | 300 0 0       |
|  | £111,483 12 0 | £111,950 14 0 |

The sums actually expended in the year ending March 31, 1861, for Scientific Education and connected matters, and National Collections, were £221,851:—

|                                       |         |
|---------------------------------------|---------|
| British Museum .....                  | £92,800 |
| National Gallery .....                | 10,348  |
| Scientific Works and Experiments..... | 3,438   |
| Science and Art Department.....       | 97,472  |
| Museum of Practical Geology.....      | 6,705   |
| * Royal Society .....                 | 1,000   |
| Geographical Society .....            | 500     |
| Portrait Gallery .....                | 1,538   |

The extension of education in Natural knowledge, since the founding of the Royal Institution, is also shown by the changes which are taking place in the Universities and Schools quite independently of the Government.

In the University of London degrees have been granted in Natural Knowledge since 1860.

At Oxford there are Professors of Chemistry, Physics, and Geology, receiving now a fixed income of £310 each, which it is proposed to increase to £400 yearly.

There is a Professorship of Natural Knowledge at Magdalen College, which soon will receive £600 yearly.

The Linacre Professor of Physiology will soon be paid, by Merton College, £800 yearly.

At Cambridge, a Chemical Laboratory has been opened at St. John's College; £150, with the fees are given to the Director, who is a Fellow of the College.

And the Professorships of Chemistry, Anatomy, Botany, Geology, Mineralogy, and Mechanics, have recently been raised to £300 a year each, besides fees for lectures, the amount of which varies.

COMMERCE AND TRADE OF THE LAKES.

Statement of the tonnage of the North-Western Lakes and the St. Lawrence River, as compiled from the Marine Register of the Board of Lake Underwriters.

| UNITED STATES TONNAGE.          |         |          |              |        |
|---------------------------------|---------|----------|--------------|--------|
| Description.                    | Number. | Tonnage. | Value.       | Men'   |
| Steamers ...                    | 71      | 40,125   | \$1,493,300  | 1,775  |
| Propellers...                   | 182     | 66,503   | 2,507,100    | 3,640  |
| Barques.....                    | 44      | 18,331   | 447,300      | 528    |
| Briggs.....                     | 70      | 20,613   | 407,600      | 770    |
| Schooners ..                    | 789     | 174,015  | 4,496,800    | 7,890  |
| Sloops.....                     | 10      | 345      | 6,750        | 40     |
| Total...                        | 1,166   | 309,632  | \$9,447,850  | 14,346 |
| CANADIAN TONNAGE.               |         |          |              |        |
| Steamers ...                    | 76      | 24,544   | \$1,175,600  | 1,900  |
| Propellers ..                   | 21      | 4,748    | 207,800      | 420    |
| Barques.....                    | 18      | 6,787    | 189,500      | 216    |
| Briggs.....                     | 16      | 4,288    | 93,500       | 176    |
| Schooners ..                    | 200     | 30,885   | 752,100      | 2,000  |
| Sloops.....                     | 5       | 283      | 6,100        | 20     |
| Total.....                      | 336     | 71,505   | \$2,414,600  | 3,732  |
| TOTAL U. S. AND CANADA TONNAGE. |         |          |              |        |
| Number of vessels.....          |         |          | 1,502        |        |
| Total Tonnage.....              |         |          | 381,137      |        |
| Total value.....                |         |          | \$11,862,450 |        |
| Total number of men .....       |         |          | 18,976       |        |

It will be seen by the above that the United States tonnage exceeds that of Canada as follows:—

|                                       |             |
|---------------------------------------|-------------|
| Excess in the number of vessels ..... | 830         |
| Excess in the amount of tonnage ..... | 238,127     |
| Excess in value .....                 | \$7,033,250 |
| Excess in number of men .....         | 10,911      |

VESSELS BUILDING IN 1862.

Below we give the number of United States and Canada vessels now building on the North-Western Lakes and the St. Lawrence River:—

| UNITED STATES VESSELS BUILDING. |         |          |             |
|---------------------------------|---------|----------|-------------|
| Rig.                            | Number. | Tonnage. | Value.      |
| Steamers .....                  | 3       | 1,700    | \$119,000   |
| Propellers.....                 | 22      | 8,210    | 674,700     |
| Sail .....                      | 32      | 21,049   | 947,205     |
|                                 | 57      | 30,960   | \$1,640,905 |

\* See subsequent Note.

| CANADA VESSELS BUILDING.           |       |         |          |       |              |
|------------------------------------|-------|---------|----------|-------|--------------|
| Steamers .....                     | 1     | .....   | 410      | ..... | \$28,700     |
| Sail.....                          | 7     | .....   | 3,450    | ..... | 136,800      |
| Total.....                         | 8     | .....   | 3,860    | ..... | \$165,500    |
|                                    |       | Number. | Tonnage. |       | Value.       |
| Present United States tonnage..... | 1,165 | ...     | 309,652  | ...   | \$9,447,850  |
| Vessels building.....              | 57    | ...     | 30,959   | ...   | 1,640,905    |
| Present Canada tonnage.....        | 336   | ...     | 71,505   | ...   | 2,414,000    |
| Vessels building.....              | 8     | ...     | 3,150    | ...   | 165,500      |
| Total of all kinds.....            | 1,567 | ...     | 415,546  | ...   | \$13,668,808 |

### EXPORTS OF THE PRODUCE OF CANADA IN 1861.

|                                 | Great Britain. | D. N. A. | U. S.   | Total.     |
|---------------------------------|----------------|----------|---------|------------|
| Produce of the mine.....        | £400           | —        | —       | £400       |
| Produce of the fisheries.....   | 1,310          | —        | £5,728  | 7,038      |
| Produce of the forest.....      | 762,178        | £2,169   | 75,867  | 840,214    |
| Animals, their products....     | 631,091        | 54,103   | 292,448 | 978,810    |
| Agricultural products.....      | 7,877,959      | 335,728  | 284,507 | 8,502,063  |
| Manufactures .....              | 58,496         | 7,003    | 18,189  | 83,688     |
| Other articles.....             | 2,008          | —        | 1,526   | 3,534      |
| Total value of exports, '61.... | 9,333,442      | 399,003  | 678,265 | 10,415,738 |
| “ “ “ “ ‘60....                 | 4,868,893      | 202,440  | 943,552 | 6,020,715  |

These figures show an increase in the aggregate of the value of the exports of nearly 100 per cent. over 1860, and this, too, notwithstanding the falling off in the exports to the United States, and which, compared with the previous year, shows a decrease of about 40 per cent.

### PETROLEUM.

Nothing has given us more satisfaction for some months past than to record from time to time the additional sources of petroleum which have been discovered in Canada and elsewhere. It appears after all that the importation and distribution of this substance in this country is not an unmixed blessing. Petroleum cannot be transported, bonded and handled, unaccompanied with danger. On Friday last a deputation from some of the principal fire insurance companies in the metropolis waited, by appointment, upon the Lord Mayor, at the Justice-room of the Mansion-house, with the view of bringing under his notice this subject. The gentlemen composing the deputation were Mr. Lovell, secretary of the Phoenix; Mr. Sidney J. Fletcher, secretary of the Sun; Mr. Thomas B. Bateman, representing the London; Mr. John B. Johnston, secretary to the Royal; and Mr. John Atkins, of the Liverpool and London Fire and Life Insurance Companies. Mr. Lovell said they had sought the interview to call particular attention to this new product, which was being very largely imported into this country, and particularly the metropolis, which was likely to be still more largely imported, and which contained an element of danger unknown to any other substance. Petroleum was in the highest degree combustible, and threw off an inflammable explosive vapour at ordinary temperature, and even at a very low temperature. On Thursday, which was a cold wet day, it ignited on a light being held to it an inch from the surface. It floated upon, and would not mix with water, and therefore water would not extinguish it. It was exceedingly volatile, and spread rapidly over the surface of water, burning fiercely when ignited. From statistics in possession of the fire-offices, it appeared that there were now lying at one wharf alone on the Thames, 7,000 casks, containing 210,000 gallons of this extremely inflammable oil; at

another place 3,000 barrels, each barrel containing 46 gallons. These had been landed from one single ship, and if any fire should approach this mass of inflammable and explosive fluid, shipping on the river and property along its banks and in the docks would be placed in jeopardy, and the most disastrous results might occur.

Mr. Lovell said the deputation had taken the opinions of Dr. Letheby, Mr. Miller, of King's College, and Mr. Warrington, of Apothecaries'-hall, with regard to the substance in question. Dr. Letheby reported to them that:—"The raw petroleum gives off inflammable vapour at ordinary temperature, and this is explosive when mixed with atmospheric air, and will fire at a distance of an inch and a half from the surface of the liquid. The specific gravity of the liquid is 808.6, water being 1,000" and it boils at 212, rising to 266 of Fahrenheit." Mr. Miller stated that:—"The brown sample labelled 'crude' when poured into a shallow dish, of a temperature of 60 Fahrenheit, takes fire on the approach of a light, the vapour taking fire at an inch or more from the surface of the liquid. This crude oil is somewhat lighter than water, and consequently floats upon it. When poured upon water at 60°, it takes fire on the approach of a light to within about an inch of the surface and burns with great violence. If a teaspoonful of the oil be poured upon a saucer full of water five inches across, on setting fire to it the heat evolved as it burns is sufficient to make the water boil briskly at the surface. I have no hesitation in saying that I do consider such storage in the highest degree dangerous for the causes above-mentioned, and I think that stringent measures should be at once taken to prevent it." Again, Mr. Warrington reported that:—"Raw petroleum has a specific gravity 812 and gives off inflammable vapour continuously at the ordinary temperature of the atmosphere—58 to 60°. In these experiments the lighted match was held about half an inch above the surface of the liquid under trial. As both fluids are lighter than water, and are not mixable with it, they will necessarily float upon its surface without any modification of their properties." Mr. Lovell added, that about a quarter of a million of gallons was stored in the Isle of Dogs in the crude state, which, as had been shown, was highly inflammable. Mr. Lovell enquired of the Lord Mayor whether he could not interfere in the matter. The Lord Mayor said, as chairman of the Board of Conservators of the Thames he had no judicial functions, but as chief magistrate of the city of London, if they brought before him a case where there was any great quantity of this material deposited within his jurisdiction, it would probably be competent for him to interfere in the public interest, because there could be no doubt whatever, if what Mr. Lovell had said was an accurate representation of the facts, that the knowledge of such great quantities of inflammable matter being stored in any particular place would naturally excite terror in the minds of the people whenever the circumstance became known, and that on the authority of Lord Campbell in "the Queen v. Lister and Biggs" (Crown Cases Reserved), the law would justify a prosecution. It appeared to him that some law might be enacted, prohibiting its being accumulated together in large quantities in casks, and

generally regulating its care and stowage. The storing of gunpowder, materials for fireworks and the like, except under particular conditions and at certain prescribed distances from inhabited places, was especially prohibited by statute; and although petroleum, being until recently an unknown substance, could not be included within the prohibition, yet, as he was advised, the common law would interpose, as in the case of naphtha, to prevent its being deposited in such quantities or in such circumstances as to endanger life or property. It seemed to him that it would not be desirable to put any law into execution, which might discourage the importation of this article. It appeared to be a gift of Nature, and we ought gladly to avail ourselves of its introduction; but it would be for the Legislature to regulate its introduction and use, accompanied as these were with a great element of danger.—*Mechanics' Magazine.*

#### THE ATLANTIC TELEGRAPH COMPANY.

The following is a description of the cable just submitted by Messrs. Glass, Elliot and Company to the Atlantic Telegraph Company as the one they would propose to lay, and to a considerable extent to guarantee, as to working efficiency, between Ireland and Newfoundland, requiring a length of 1900 nautical miles.

The electrical conductor is composed of seven copper wires, each  $\frac{1}{8}$  inch diameter and laid into a strand rendered perfectly solid by the six outer wires being embedded in Chatterton's Compound upon the centre wire. The conductor weighs 510 pounds per nautical mile, and is calculated to transmit under the *old* system of working 22 letters equal to  $4\frac{1}{2}$  words per minute, but is certified by Mr. C. F. Varley to be capable of being worked by means of recent improvements at the rate of 60 letters, or 12 words per minute, between Ireland and Newfoundland.

The conductor is insulated by eight coatings, four of the purest gutta-percha, and four of Chatterton's compound, laid on in alternate layers, forming together a thickness of  $\frac{1}{2}$  of an inch from the centre; the external diameter of the whole cable being  $\frac{3}{4}$  of an inch, weighing with conductor 1060 pounds per nautical mile.

It is proposed to do away with the tarred hemp hitherto surrounding telegraphic cores, and as a protection to the core, to use strands consisting each of three best charcoal iron wires, gauge, .055 each strand being separately covered with Chatterton's compound and gutta-percha to prevent decay. These coated strands, thirteen in number are then laid around the core spirally by the usual machinery, and the finished cable passes out of the covering machine into tanks filled with water, there to wait till the whole length required is ready for shipment, water tanks will also be provided on board ships so that from the very infancy of the cable to its final submersion, it will be continuously every moment under tests of the most certain and delicate description.

The dispensing with the tarred yarn hitherto in use, renders the instant detection of any flaw in the gutta-percha core, an absolute certainty. These were often temporarily concealed by the wrapping of tar which is to some extent an insulator, and

only broke out after the cable had been laid and worked through for some short period. Every part of the external surface of the cable being thus also of a nature quite indestructible in and impervious to water, there is no fear of deterioration either before or after submersion and none of the original strength being lost by decay, it would be possible to lift this cable if required even from very deep water.

## Miscellaneous.

#### Red Sea Telegraph.

So much has been said about the instability of submarine lines laid in comparatively shallow water that the raising of this wire, was looked forward to with considerable interest; yet, when brought to the surface, even after having been subjected to the action of the waves over the coral rocks for three years, it was found to be but slightly altered in outward appearance.

A close examination showed that in some places the wires were corroded slightly, but still the black coating of mud and oxide with which it was covered so closely resembled tar that it seemed at the first glance impossible to believe that the wire had been down more than a few months. The Gabari then continued to underrun the line till within a mile and a half of Jubal Island, and the accounts state that it is difficult to imagine anything more beautiful than the mass of zoophytes, of every tint and colour, which had cased round the whole cable to the thickness of several inches. These being mostly of a soft tenacious nature would tend most materially to preserve the outside iron wires from decay. On the 26th the Gabari underran the shore end of the cable to Cosseir, in order to remove it and lay it to Jubal Island. Though the portion of this line had only been down some 14 months, yet it was found on raising to be completely encased in a protecting sheath of coral and zoophytes.

#### Rock Oil in Shropshire.

Mr. G. Shepherd, C. E., is of opinion we have an abundant supply of paraffine in England, which can be obtained at a cheap rate. In the Shropshire iron districts, he says there is a rock known to the miners as the "stinking rock;" this rock yields a great deal of mineral tar; it is found in sinking to the coal and ironstone, and it is many feet thick.

#### Safety Matches.

The consumption of lucifer matches in this country, at a moderate estimate, exceeds fifty millions daily. This fact alone sufficiently indicates the importance of an invention by Messrs. Bryant and May, of the Safety Match Works, Fairfield Middlesex, the primary effect of which is to lessen the danger of fire—arising from the use of an article indispensable requisite in every household—whilst it also protects the health of thousands, chiefly children, employed in this branch of industry. The "special safety" of the patent match is that it cannot be ignited by friction, except on the prepared surface of the box, whilst (as is well known) all other lucifer matches not only can be ignited on any hard surface, but combustion frequently occurs

from accidental and apparently trifling causes. It has been said that those employed in making ordinary lucifers, are liable to a frightful and inveterate disease, known as "necrosis" caused by the fumes of the phosphorus used in their manufacture, which attacks the jaw-bones—the lower being sometimes entirely destroyed. As the safety match contains no phosphorus, all risk of this distressing malady in its manufacture is effectually prevented. A source of fires (attributable to the use of lucifers) arises from the number of matches, which, not readily lighting, are thrown away, whilst in most cases their combustable properties remain, and, by being trodden on, and in various other ways, the latent fire is evolved, possibly causing a conflagration. This cannot happen with the "safety match," which affords an instantaneous light, as readily as those in common use, whilst all danger of accidental fire is avoided.

#### Modern Projectiles.

Comte de Latour, says that the opinions now generally held regarding the power of the new firearms are vastly exaggerated, and shows that many more men were lost in the great battles of the empire than in the last Italian campaign. At Austerlitz, the Russians lost 30 per cent., the Austrians, 44 per cent. of their army; the French lost 14 per cent. At Wagram the loss of the Austrians was 14, that of the French 13 per cent. At La Moskowa, the Russians lost 44 per cent.; at Waterloo, the allies lost 31 per cent.; the French 36 per cent. At Magenta, on the contrary, the Austrian loss was not more than 8 per cent., that of the French only 7; at Solferino, the Austrians sustained a similar loss, and the Franco-Sardinians only lost one-tenth. This may be explained by the fact that a long range obliges the projectile to describe a curve; thus, according to M' d' Azemar, if the column of the Place Vendome were placed between the gun and the mark, the latter being at a distance of 2,500 yards, the projectile would pass clean over the monument without touching it.

#### Water converted into Fire

There have been speculations as to the possibility of such a transformation for a long time. But in a recent number of the *Cosmos*—a scientific journal, of a high character, published in Paris—the Abbé Moigno, the editor, informs his readers that he has seen this at the workshop of the discoverer, M. Festud de Beauregard, in the Rue Lafayette, and that the action and the effects are truly admirable. It has long been known that when oxygen and hydrogen gases unite and form steam, as they do by their union, a most intense heat is produced. In this case, in fact, we have the oxyhydrogen blowpipe, which though very small, is yet a furnace of the most intense heat. It is now found that by exposing steam in its turn to a very high temperature, the atom of oxygen and the atom of hydrogen (of both of which in union with each other, an atom of steam consists) tend to separate again, and in fact may be actually separated merely by presenting to the very hot steam some substance with which one of the elements of the steam, either the oxygen or the hydrogen, tends to unite rather than the other. But no sooner are the oxygen and the hydrogen separated than they tend to rush together again, producing in the act of union the heat of the oxyhydrogen blowpipe. In or-

der to obtain this wonderful power of heat all that is necessary, as now appears, is to raise steam to a very high temperature, and then to let it loose when very hot upon some body which tends to unite with one of its elements, its oxygen for instance, as is the case with common fuel. The hot steam immediately sets the fuel on fire. M. Moigno mentions that in the apparatus which he saw, a jet of hot steam from a tube, which was only one millimetre (about 1-25th of an inch) in diameter, when made to play upon a mass of charcoal in a furnace, lighted it up into a most vivid fire. The only point that is staggering is the immense heat which requires to be imparted to the superheated steam. Thus, for the full effect, 1000 deg. cent. is named,—that is, 1832 deg. Fahr.—that is, a heat at which silver and almost copper melts. And this said to be produced by having the steam-heater immersed in a bath of melted tin. As there is no need of great pressure however, and no risk of explosion (for no water at all is admitted to the steam-heater), it may be found possible both to command and to control steam at this temperature with economy upon the whole. And if so, there can be no doubt that not only in the laboratory of the chemist, but in the reducing of metals and in the arts generally, on a great scale, the application of superheated steam will form an epoch.

#### Deleterious effects of Copper.

Dr. Perron, of Besancon, where there are more than 3,000 persons engaged in the manufacture of watches, in his paper adverts to the mischief which accrues from the constant manipulation of copper. His conclusions are as follows:—1. The molecular absorption of the salts and oxides of copper give rise to gastric irritation, diarrhoea, fever, &c.—in fact, to the symptoms of poison all but in degree. 2. Successive slow poisonings of this kind derange the health of the workman, and powerfully predisposes him to phthisis (a disease of frequent occurrence among the Besancon watchmakers). 3. They require him to take corporeal exercise, carried even to fatigue, and justify the frequent employment of evacuants and sudorifics. 4. Manipulations of copper or other metals should be interdicted to thin and excitable persons of a dry bilious temperament, and who have any congenital or acquired disposition to phthisis. 5. This affection is best prevented by the use of succulent aliments, and tonic drinks, the thorough ventilation of the workshops, great cleanliness, frequent tepid bath, and wearing the moustache.

#### Native Woods at the Great Exhibition.

Among the articles to be sent to the Exhibition from the island of Dominica, in the West Indies, are no less than 170 varieties of native woods, principally hard and susceptible of a fine polish. Indeed the specimens of wood from our various colonies, manufactured and in the rough, will form to a large and influential body of the British community one of the most interesting sections of the palace of arts and industry.

#### Drift of the Sea.

A bottle has been picked up at sea, off the Azores Islands, which, from a memorandum it enclosed, had drifted 1,417 miles in 243 days, equal to 5.83 miles per day.