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FOR

UPPER CANADA.

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JANUARY, 1862.

ON THE CARBURATION OF ILLUMINATING GAS BY PURIFIED PETROLEUM, AND ON THE MANUFACTURE OF GAS FROM THE CRUDE PETROLEUM OF CANADA AND THE U. S.

The importance of petroleum or rock oil, may be gathered from the following extract which we take from a circular by Mr. Alexander Macrae, oil and produce broker, of Liverpool, dated 16th December:—

"The introduction of petroleum, kerosine, photogene, or rock and well oil, is making tremendous strides, though it does not surpass the prediction in my first circular, namely, that it would be second only in extent to cotton. I will even go a step further, and venture to assert that if the rocks and wells of Pennsylvania, Canada, and other districts continue their exudation at the present rate of supply, the value of the trade in this oil may even equal American cotton. Montreal (internally, and likely externally by this time) is lit with the white refined, and I can see no reason why London and Liverpool should not also be, for the oil gas distilled from the raw petroleum is immensely superior and much more brilliant than our own coal gas. For years we have sent coals to America for gas works, and it will be a singular freak of events if she and Canada should now supply us with a better expedient. Invested interests will perhaps stay it for the moment, but will they ultimately?

"The refined for burning (known in this country as paraffin oil, and of which about 500 tuns a week are sold), has been selling at £30 to £40 per tun (of 252 gallons) for yellow to white, while the crude varies in value from £6 to £25, according to test. The merits of the petroleum will be better understood when importers are informed that beside the uses already named, lubricating oils of every colour and specific gravity can be obtained from it; wax also for the manufacture of paraffin candles, naptha, and consequently benzole (from which the fashionable dyes, magenta, rosenine, aniline, &c., are obtained), pitch, &c., &c., all of them having several other applications. It is reported on the very best authority, that they have discovered from it now, an available substitute for spirits of turpentine for paints, and also a solvent for india-rubber, results, I understand, that they have not effected in America or Canada, and the importance of which cannot be over estimated.

"In my first circular it was stated that some 7,000 barrels of crude and refined were on their way to this country, and the *Times* of the 13th instant, mentions 8,000 barrels on the way to London. There are 10,000 barrels coming to Liverpool, and 2,000 barrels to Glasgow, in all about 20,000 barrels (or £100,000 sterling, and the trade not six months old), a simple tithe of what we want! American hostilities and the ice in the St. Lawrence (although we have still St. John's, New Brunswick) may stop supplies to some extent, but I have no doubt the future will vindicate the expectations I have so frequently expressed."

The London *Engineer* of recent date, says, that—

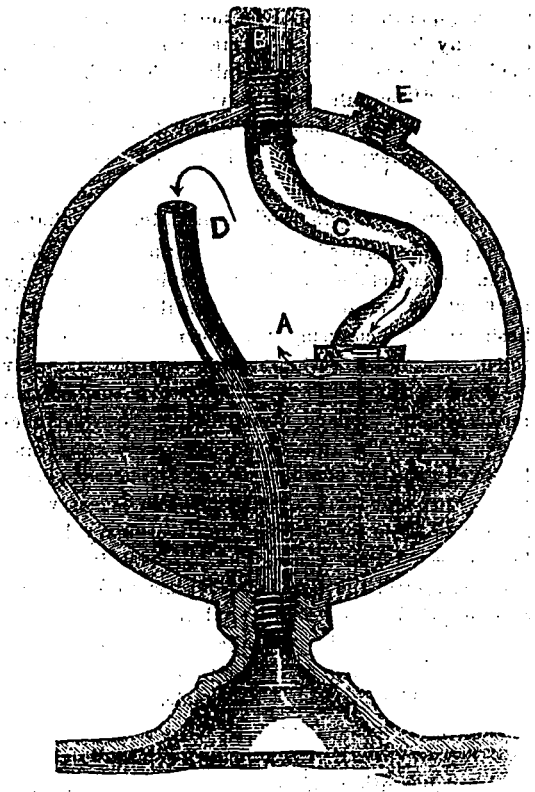
"A prospectus has been issued inviting subscriptions for an increase of the capital of the Asphaltum Company to £200,000, or double its original amount. The business of the company, which is respectably constituted, is to work certain mines of asphaltum near Havana, for the distillation of oil, which commands a ready sale in England at apparently a very remunerative price. The outlay for the property in Havana has been £68,000, of which only £18,000 was in cash, the payment for the remainder being in shares, which are not to rank for dividend until ordinary holders have received 5 per cent. The purchase included a concession from the Spanish Government of the exclusive privilege of making oil from asphaltum in Cuba and Porto Rico for fifteen years, and as the annual consumption of oil in Cuba is estimated at £250,000, this is considered valuable. The directors, engineer, and manager of the company are to be remunerated by a per centage on the profits."

The exportation of rock oil from Canada will probably affect the interests of this Company. As soon as easy and cheap communication with the petroleum springs of Enniskillen is effected the attention of English capitalists will no doubt be directed to the abundant supply of this material which exists in Canada. If the Gaspé springs yield freely great advantages will accrue to that part of the province in consequence of its proximity to the seaboard.

One of the most recent and important applications of Petroleum is the carburation of gas, by its introduction into common coal gas, as ordinarily supplied to consumers. Subjoined is a brief description, from the *American Gas-light Journal*, of 'Gwynne's Gas Carbonizer.'

A hollow globe, A, is introduced into the gas pipe before the burner. This globe is partly filled with naphtha, benzole, or other suitable liquid hydrocarbon, and the illuminating gas is brought into it at the top through the pipe B. The gas passes down through the hollow wick, C, into the liquid, and rising charged with vapour, passes out through the pipe, D, to the burner. The lower end

of the wick, C, is supported by a float resting upon the liquid, and thus follows the surface down as the liquid is consumed. The pipe, D, rises above the level of the filling tube, to prevent all danger of its ever receiving any liquid.



GWYNNE'S GAS CARBONIZER.

The company which manufactures this carbonizor guarantees a saving by its use of 33 per cent. in the gas bills, and the production of a better light than that of the city gas. The inventor says that an article of naphtha is now obtained which is free from any objectionable odour.

The Report of the Engineer to the Commissioners of Sewers of the city of London, on "*The Carburation of Gas*," was referred by that body to Dr. Letheby. The testimony of this distinguished chemist on the mode adopted in England for "carburating gas," is of great value.

"The apparatus consists of a chamber for holding coal naphtha, and of a contrivance for directing the stream of gas over the surface of the naphtha. By this means the gas becomes charged with volatile hydrocarbons, and acquires a higher illuminating power.

"Three sets of experiments were made for the purpose of determining the value of the apparatus. In the first set a naphtha rich in benzole was employed, and the results were, that at first it raised the illuminating power of ordinary twelve-candle gas to twenty-four candles, and in the course of three days the power fell to eighteen candles, the mean of the whole being twenty-one candles. This is an increase of 77 per cent., and it was effected by giving 10·77 grains of naphtha to each cubic foot of gas.

"In both of the other sets of experiments an inferior kind of naphtha was used, and in one case the average increase of illuminating power, during a period of ten days, and after the passage of a thousand cubic feet of gas, was 25 per cent. In the other case, after a duration of five days, the average increase was 30 per cent. The former was effected by the addition of four grains of naphtha vapour to each cubic foot of gas, and the latter by 6·56 grains.

"These data are sufficient to indicate the general capabilities of the apparatus; for they show that with a good naphtha, supplied in proper quantity, and furnishing from ten to eleven grains of vapour to each cubic foot of gas, the illuminating power of an inferior gas may be nearly doubled. A less volatile naphtha, giving only from four to seven grains of vapour per cubic foot, will increase the power of twelve-candle gas from 25 to 30 per cent. I am, therefore, of opinion, that the apparatus is of practical value as a carburetting agent, and that if supplied with good naphtha, in proper quantity, there will be no difficulty in sustaining a power of twenty candles with ordinary coal gas."

Upon receiving this Report and Appendix, the Commissioners of Sewers resolved that it should be referred to the Engineer and Medical Officer of Health, to consider the conditions of the contracts for public lighting; having special reference to the increased illuminating power of the gas to be supplied, and to the possibility of carburating the gas by the process of the Carburating Company.

These gentlemen, Dr. Letheby and Mr. Haywood, have now reported upon this subject in the following terms:—

"Before considering the general conditions of a contract, it is necessary firstly to obtain the determination of your honourable Board to the leading principles upon which the contract should be framed, and it is to those we now specially address ourselves.

"As regards that portion of the reference which relates to the possible reduction of the consumption of gas in the street lamps, we are of opinion that, if the carburating process is not applied, the increase of the illuminating power proposed by the Metropolitan Gas Act of 1861, does not render it expedient to diminish the amount of gas to be supplied at the burners of the public lamps; and that the contract should, therefore, remain as heretofore in this respect, unless the Companies alter the quality of the present supply, and furnish Cannel gas to the public lamps, as the Act of Parliament empowers them to do; under which circumstances it will be necessary to readjust the contract and mode of supply accordingly.

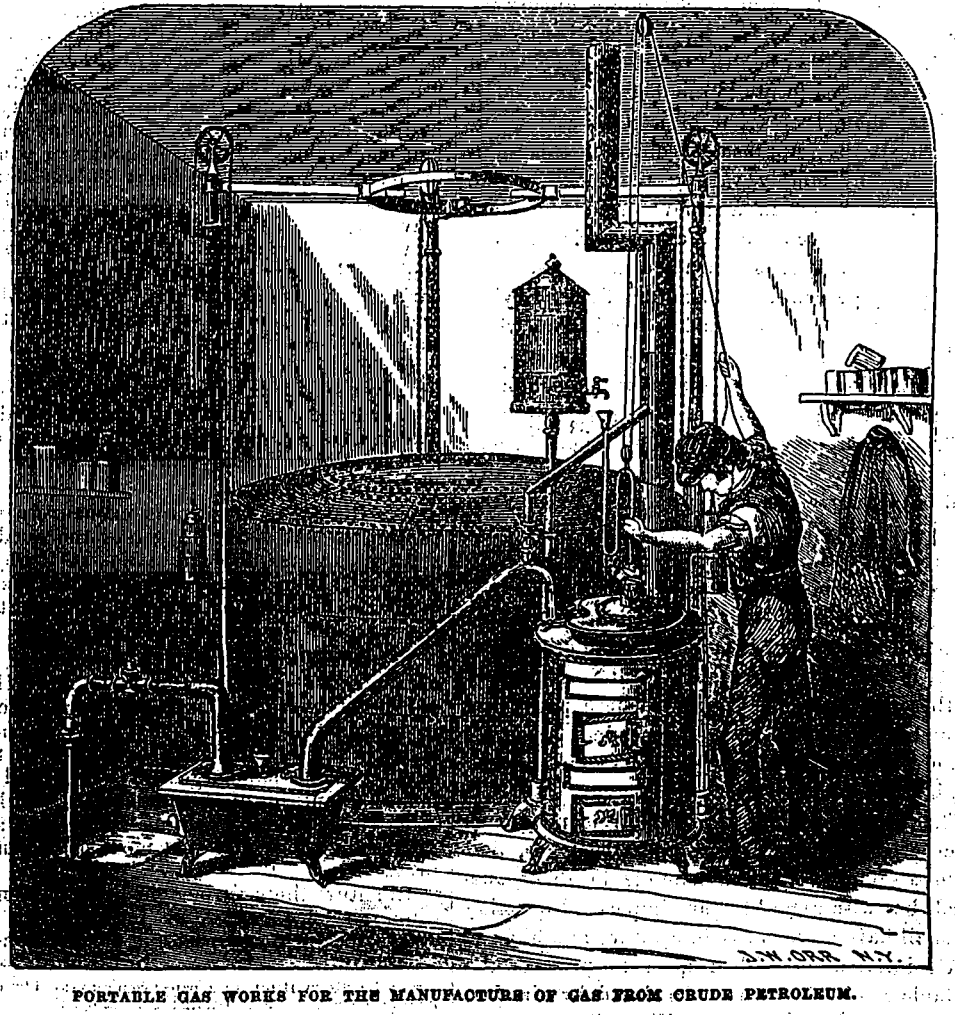
"With regard to the carburating process, we are of opinion, from the data obtained by the laboratory experiments quoted in the report to the Commission of the 30th July last, and the experi-

ments made on the public lamps in Moorgate Street, during the months of June and July last, that the process of carburation appears to be capable of economising the use of gas in the public lamps, to the extent of from 40 to 50 per cent. This conclusion is founded on the assumption that the best quality of naphtha is to be used, namely, a naphtha which will give to the gas continuously a proportion of about ten grains of volatile hydrocarbon to each cubic foot of gas: these being the average results of the laboratory experiments. If an inferior kind of naphtha be employed, the results will be less satisfactory; for the laboratory experiments show that a naphtha yielding four grains of volatile hydrocarbon will increase the illuminating power of the gas to only about from 15 to 20 per cent.

"It is manifest, therefore, that the practical efficacy of these results will be entirely dependent on the perfection of the apparatus and the quality of the naphtha, and we are of opinion that these essential conditions can only be secured during the earlier application of the process by an arrangement with the Carburating Company for the supply of the apparatus and the naphtha, as also for the maintenance of the same in complete working order, according to the terms of a contract founded on the preceding data, namely, that a burner consuming three feet of the naphthalised gas per hour shall give continuously the light of a burner consuming five feet per hour of the same gas not naphthalised; and to secure this, the naphtha should be of such quality as to furnish continuously not less than seven grains of volatile hydrocarbon to each cubic foot of the gas. If the Company is willing to undertake such a contract upon suitable terms, we see no difficulty in the practical application of the system.

"If these suggestions are adopted, it will be necessary to contract both with the Gas Companies and the Carburating Company; the terms under such contracts, which should have due relation to each other, must be a matter for future consideration."

The most recent, and perhaps the most important application of the crude petroleum of this continent to the purposes of practical life is its use for the manufacture of illuminating gas. In various parts of the United States this product has already been applied with success for the above



PORTABLE GAS WORKS FOR THE MANUFACTURE OF GAS FROM CRUDE PETROLEUM.

purpose, and recently in Toronto, Mr. James Thomson announced that he had succeeded in making gas of very superior quality, and at a very low rate, by using the portable rosin oil gas works similar to those figured on the preceding page. No alteration in form is needed, and the petroleum is used quite in the crude state.

These improved portable gas works are manufactured by Mr. Thomson, at his establishment on King Street, Toronto, and are furnished by him complete, with gasometers, which govern the price of the works, of a capacity of one hundred cubic feet to that of one thousand or more. A gasometer of the first-named cubical contents requires one retort; of 600 cubic feet capacity, two retorts, and of 1000 cubic feet capacity, three retorts.

The apparatus is very simple and consists of retort, wash-box or condenser, gas-holder and tank, which are common to all gas-works; but one of the greatest difficulties encountered by inexperienced persons, has been freeing the retorts from an incrustation of carbon which accumulates during the operation of making gas. By the old process, this cleaning was done when the retorts were cold, and the scale adhered firmly to the bottom and sides, requiring the aid of a bar of iron to remove it. Mr. Thomson's improvement obviates this difficulty; for by simply raising the cover of the retort, which is set in a groove of fusible alloy, and admitting a current of atmospheric air, the carbonaceous matter is consumed and passess off through a pipe connected with the flue, carrying with it all the smell and smoke; this is done when the retort is hot, and the cleaning process occupies but a few minutes, leaving the retort in a condition to continue the operation of making gas if required.

The apparatus employed for the manufacture of gas from rosin, oil, &c., has been so successfully used for making it from crude petroleum, without the slightest change in the arrangement for supplying the retorts with the material, and without any difficulties arising from impurities as yet observed, that we have no doubt the application of this abundant material for illuminating and other purposes, is fraught with very important consequences to those parts of the country where petroleum abounds, and to all interests dependent upon the manufacture and use of the products which may be obtained from it.

The illuminating power of petroleum gas is much greater than that of common coal gas, and the expense of production amounts to about one-third, but with regard to this important question we shall have more to say in a future number.

All information with respect to price of the portable gas works, will be furnished by Mr. Jas. E. Thomson, 109 King Street West, Toronto.

NOTE ON THE FORMATION OF PETROLEUM AND ALLIED SUBSTANCES FROM WOODY FIBRE OR ANIMAL TISSUE.*

We have stated in the preceding paper that the different mineral combustibles have been derived from the transformations of vegetable matters, or in some cases of animal tissues analagous to these in composition. The composition of woody fibre or cellulose, in its purest state, may be represented by $C_{24}H_{20}O_{20}$, or as a compound of the elements of water with carbon: the incrusting matter of vegetable cells, to which the name of lignine has been given, contains however a less proportion of oxygen and more carbon and hydrogen than cellulose, so that the mean composition of recent woods, as deduced from numerous analyses of various kinds, may be represented by $C_{24}H_{18\cdot4}O_{16\cdot4}$. We may conceive of four different modes of transformation of woody fibre, all of which probably intervene to a greater or less degree in the production of mineral combustibles; and in considering these changes we shall for greater simplicity adopt for the composition of woody fibre the first named formula, $C_{24}H_{20}O_{20}$.

I. When wood is exposed to the action of moist air, oxygen is absorbed, and carbonic acid and water are evolved in the proportion of one equivalent of the first for two of the last. We may suppose that for H_2 which is oxydised by O_2 from the air, the wood loses CO_2, so that while the carbon increases in amount the proportions of oxygen and hydrogen are unchanged. In this way an equivalent of cellulose, by absorbing sixteen equivalents of oxygen and losing eight of carbonic acid, ($8\ CO_2$) and sixteen of water, (16 HO) would leave $C_{16}H_4O_4$. Such is the nature of the decay of wood when exposed to the air, and the process, could it be carried out, would leave a residue of carbon only. If however the wood is deeply buried and excluded from the oxygen of the air two reactions are conceivable.

II. The whole of the oxygen of the wood may be given off in the form of carbonic acid, while the hydrogen remains with the residual carbon. The abstraction of ten equivalents of carbonic acid from one of woody fibre, would leave a hydrocarbon, $C_{14}H_{20}$.

III. Instead of combining exclusively with the carbon, a part of the oxygen of the wood may be set free as water, in combination of the hydrogen. The abstraction from an equivalent of woody fibre of four equivalents of carbonic acid and twelve of water would leave a hydrocarbon $C_{20}H_8$.

IV. These decompositions are however never so simple as we have supposed in II. and III., for a portion of hydrogen is at the same time evolved in combination with carbon, chiefly as marsh gas, C_2H_4. The amount of this gas evolved from decaying plants submerged in water, and the immense quantities of it condensed in coal beds and other rocky strata, (forming fire damp) shew the great extent to which this mode of decomposition prevails.

In nature these various modes of decomposition often go on together, or intervene at different stages in the decomposition of the same mass;

* By Dr. Sterry Hunt, in a paper communicated by that gentleman to the "Canadian Naturalist and Geologist."

they are besides seldom so complete as we have represented them. The first process results in the formation of vegetable mould, which always retains portions of carbon and hydrogen; while the incomplete operation of the processes II., III. and 14. gives rise to peat, lignite, brown coal, bituminous coal, and pyroschists, in all of which the proportion of the oxygen is much less than the hydrogen, so that their composition may be approximately represented by mixtures of hydrocarbons with vegetable fibre. The following results have been selected from a great number of analyses by various chemists, and are for the most part taken from Bischof's *Chemical Geology*, (Vol. i. cap 15.) The nitrogen, which in most cases was included with the oxygen in the analysis, has been disregarded, and the oxygen and hydrogen, for the sake of comparison, have been calculated for twenty-four equivalents of carbon:—

1. Vegetable fibre or cellulose.....$C_{24}H_{20}O_{20}$
2. Wood, mean composition.....$C_{24}H_{18\cdot4}O_{T6\cdot4}$
3. Peat (Vaux) .....$C_{24}H_{14\cdot4}O_{10}$
4. Do. (Regnault).....$C_{24}H_{14\cdot4}O_{9\cdot6}$
5. Brown coal (Schrötter).....$C_{24}H_{14\cdot3}O_{10\cdot5}$
6. do. do. (Woskresensky)...$C_{24}H_{13}O_{7\cdot6}$
7. Lignite (Vaux).....$C_{24}H_{11\cdot3}O_{6\cdot4}$
8. do. passing into mineral resin (Regnault).....$C_{24}H_{15}O_{3\cdot3}$
9. Bituminous coal (Regnault)....$C_{24}H_{11}O_{3\cdot3}$
10. do. do. do. .....$C_{24}H_{10}O_{1\cdot7}$
11. do. do. do. .....$C_{24}H_{8\cdot4}O_{1\cdot2}$
12. do. do. do. .....$C_{24}H_{8}O_{0\cdot9}$
13. do. do. (Kühnert and Grüger)..... .....$C_{24}H_{7\cdot4}O_{1\cdot3}$
14. do. do., mean composition (Johnston).....$C_{24}H_{9}O_{2}—O_{4}$
15. Albert coal (Wetherell).....$C_{24}H_{15\cdot9}O_{1\cdot6}$
16. Asphalt Auvergne.....$C_{24}H_{17\cdot7}O_{2\cdot2}$
17. do. Naples..... ...$C_{24}H_{14\cdot6}O_{2}$
18. do. Bastennes .....$C_{24}H_{16}O_{0\cdot7}$
19. Elastic bitumen, Derbyshire, (Johnston).....$C_{24}H_{22}O_{0\cdot3}$
20. Bitumen of Idria.....$C_{24}H_{8}$
21. Petroleum and naphtha.....$C_{24}H_{24}$

In the above table we see the transition from peat and brown coal to lignite, and thence to bituminous coal. Professor Johnston, from his experiments in various coals, including cannel from Wigan, splint coal from Workington, and caking coal from Newcastle, deduced the composition given in 14, in which with $C_{24}H_9$ the oxygen varies from two to four equivalents. It will be seen from a comparison of the infusible Albert coal with the bitumens 16, 17 and 18, how gradual is the transitions to the true petroleums and naphthas, from which oxygen is absent. The asphalts also, as will be observed, differ very much in their composition, and though generally much richer in hydrogen than the bituminous coals, the variety from Naples, (17) which is completely fusible at 140° C., contains less hydrogen and more oxygen than the Albert coal analysed by Wetherell; while the idrialine or bitumen found with the mercury ores of Idria, approaches very nearly in composition to the bituminous coals 11, 12 and 13, with which many asphalts may be said to be isomeric. It is however probable that those oxygenized bitumens, unlike the coals, are products of the oxydation of naphtha or petroleum, by a process similar to that by which resins are derived from vegetable hydrocarbons. These formulas must be taken as representing not the true equivalents, but only the proportions of the elements in the bodies in question, which are in most cases mixtures of various substance. This is especially true of naphtha, which may be taken as the representative of pure unoxydised petroleum, and which is separated by distillation into oils of very different boiling points. The late analyses by Uelsmann of the rectified rock oil from Sehnde, near Hanover, gave the formula $C_{18}H_{20}$, and according to De la Rue and Müller the greater part of the Rangoon petroleum consists of hydrocarbons in which the number of equivalents of hydrogen is a little greater than the carbon; one gave $C_{26}H_{28}$. Associated with these are however portions of bodies containing a less proportion of hydrogen, so that we may conceive the mean composition of petroleum to be represented, as in the preceding table, by equal equivalents of hydrogen and carbon; many forms of solid bitumen also, as ozokerite and hatchetine, have the same general composition.

By referring to what has been said above it will be seen that the final result of the third process of decomposition of woody fibre, in which the air being excluded, the oxygen is shared between the carbon and hydrogen, would be $C_{20}H_8$. A similar result would be obtained, with the simultaneous evolution of marsh gas, if we suppose $6\ CO_2+8\ HO+3\ CH_2$ to be removed from an equivalent of woody fibre, leaving $C_{15}H_6 = C_{20}H_8 = C_{24}H_{9\cdot5}$, which approaches the composition of most bituminous coals and of idrialine. A farther elimination of marsh gas would leave a residue of pure carbon, and thus, as Bischof has suggested, vegetable matters may be converted into anthracite without the intervention of a high temperature.

The elimination of the whole of the oxygen in the form of carbonic acid would leave a compound with a large excess of hydrogen, of which it would be necessary to remove a portion in the form of water or marsh gas in order to reduce the residue to the composition of petroleum. We know of no combination of carbon and hydrogen in which the number of atoms of hydrogen surpasses by more than two, those of hydrogen, the general formula being $CnHn+_2$, so that oils like $C_{18}H_{20}$ and $C_{26}H_{28}$ contain nearly the maximum quantity of hydrogen, and a body like $C_{14}H_{20}$, whose formation we have supposed above, could not exist, but must break up into marsh gas and some less hydrogenous oil like petroleum.

We do not know the precise conditions which in certain strata favour the production of petroleum rather than of lignite or coal, but in the fermentation of sugar, to which we may compare the transformations of woody fibre, we find that under different conditions it may yield either alcohol and carbonic acid, or butyric and carbonic acids with hydrogen, and even in certain modified fermentations the acetic, lactic and propionic acids, and the higher alcohols, like $C_{10}H_{12}O_2$. These analogies furnish suggestions which may lead to a satisfactory explanation of the peculiar transformation by which, in certain sedimentary strata, organic matters have been converted into bitumen.

MARTIN'S IMPROVED SUPERHEATER FOR LOCOMOTIVES.

In the Journal of the Board for the year 1861, we noticed the important invention of Mr. Martin, the Locomotive Superintendent of the Western Division of the Grand Trunk Railway of Canada, for economizing fuel in Locomotives. We have now the opportunity of illustrating this invention from stereotyped plates, which first appeared, we believe, in the *Scientific American*, with the subjoined descriptive notice from the same excellent Mechanical Journal.

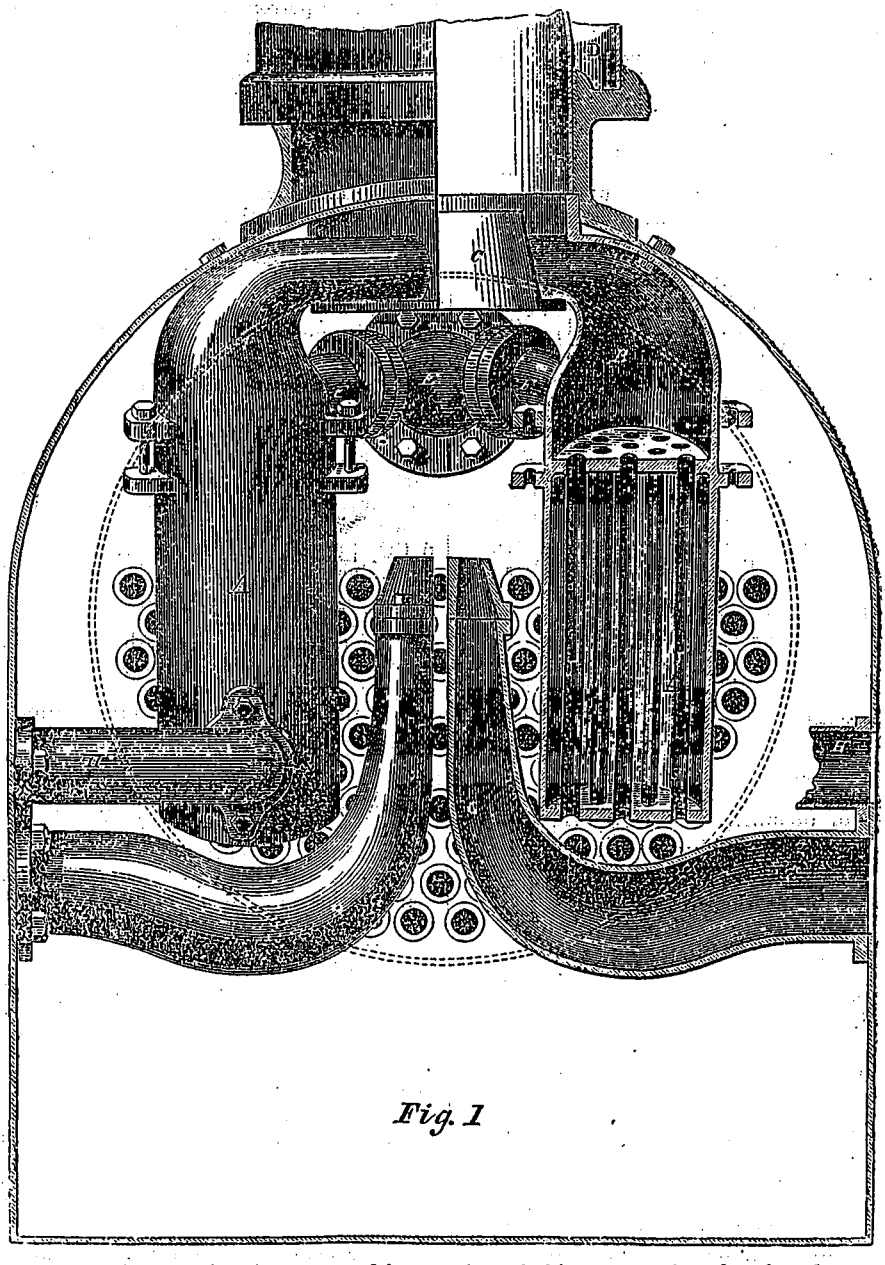


Fig. 1

In boiling water that portion is converted into steam which is nearest to the fire, and as the little globes of steam rise up from the bottom of the boiler through the water, they drive up a portion of water, filling the steam space with spray. As this water is carried into the cylinder it of course does no work there, and thus all the fuel expended in heating it is wasted. To complete the evaporation of this spray, the plan has been adopted of imparting to the steam an additional quantity of heat after it has left the water. This is called superheating; it has attracted a great deal of attention, and many forms of mechanism have been devised to accomplish it. The plan which we here illustrate is designed for locomotive engines only. It is now in use on several locomotives on the

Grand Trunk Railway of Canada, where it is said to have the most satisfactory success.

In the accompanying engravings Fig. 1 is a transverse section of a locomotive smoke box, in which is placed the improved exhaust chamber and steam surcharger, shown partly in elevation. Fig. 2 is a longitudinal section of the same.

Like letters refer to like parts in each of the figures.

A A are tubular chambers arranged within the smoke box, having a number of flues, J, opening at the bottom into the smoke box, and opening at the top into the large flues or pipes, B B. These pipes, B B are connected to the tubular chambers,

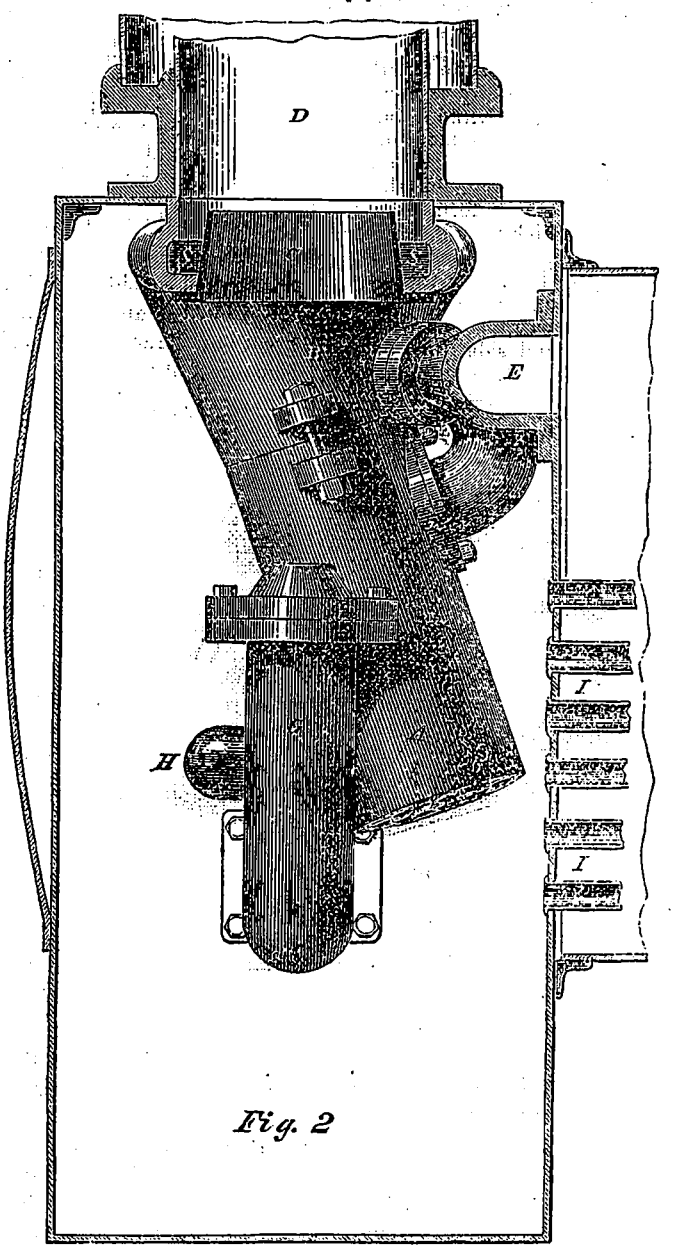


Fig. 2

as shown at S. Their upper ends are bent inwardly toward each other, and flattened and elongated and connected to, and passing nearly around the short cylinder, C, placed within the smoke pipe, and forming by their junction therewith an annular chamber, S, which opens into the smoke pipe, D, and causes a strong draught through the flues, J, and through the lower flues of the boiler.

F F are steam pipes branching from the main steam pipe leading from the boiler, and conveying steam from the boiler into the tubular chambers, A, in which the steam will fill the spaces between the flues, and become superheated by the flues.

From the chambers, A A, it is conveyed to the steam cylinders of the engine by the pipes, H. G are the exhaust pipes opening into the smoke box

in the usual way. H H represent the pipes leading from the superheating apparatus to the steam chest.

The operation of this improvement may be described as follows:—The exhaust steam, as it is discharged from the exhaust pipes, G, will cause a strong draught through the chimney. But this draught, though it will strongly exhaust those flues of the boiler which open into the smoke box near the top and centre, or at the level of the mouths of the exhaust pipes, will only partially exhaust the lower and side flues, and hence, without further improvement, the lower flues become more or less choked up, as is well known. But the strong draught through the chimney, made by the exhaust, will cause a vacuum to be formed in the annular chamber, S, to fill which vacuum a strong draught will be formed through the flues, J, of the chambers, A, and the pipes, B B. As these flues open into the the smoke box near the bottom and sides thereof, the draught through them will thoroughly exhaust the lower and side flues of the boiler, and thereby keep them free from all obstructions and allow the flame a free passage. The smoke and hot gases which pass up these flues, J, will superheat the steam as it circulates in the space around them in the chambers, A, on its way to the steam cylinders, so that, when it passes from the chambers, it will be perfectly dry and free from moisture. It will thus be seen that, by the use of this improvement, is accomplished several great and important advantages: 1st, The increase of the draught through the lower and side flues of the boiler; 2d, The superheating of the steam by the use of waste smoke and hot gases which accumulate in the smoke box or which pass out of the smoke pipe; 3rd, And as a consequence thereof, an increased power of steam and great economy in the use of fuel.

It is needless to say that this admirable invention has created considerable interest in England and the United States, and it promises to become of great importance in economizing fuel, a very serious item of Railway expenditure.

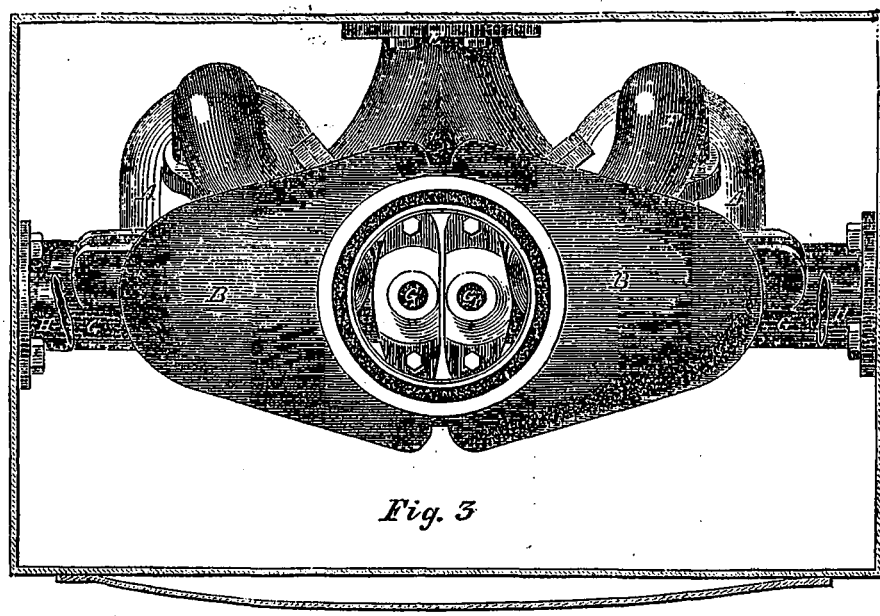


Fig. 3

Board of Arts and Manufactures
FOR UPPER CANADA.

MEETING OF THE SUB-COMMITTEE.

TORONTO, January 14th, 1862.

The Sub-Committee met at 11½ A. M., in the Board Room, Mechanics' Institute; Prof. Hincks, in the absence of the President, in the chair.

After reading of minutes, letters were read from the Secretary of the Board for Lower Canada, in respect to the Journal for 1862; and from Mr. E. A. McNaughton, the appointed agent for the Board east of Toronto, stating that after a short absence on his canvassing tour, he had been called home by illness and death in his family, but that he intended starting again on Monday the 13th instant.

Reports were received from Mr. George E. Pell, Agent for the Board west of Toronto, in reference to manufactures, and to his canvass for specimens for the International Exhibition.

After the transaction of some routine business, the Secretary read a draft of a Report to be submitted to the Annual Meeting of the Board, which was unanimously adopted.

The Secretary stated that in addition to the pianos reported by Mr. Pell, for the International Exhibition, he had received a notification from Messrs. Thomas & Co., of Toronto, of their inten-

tion to prepare a grand piano, on a new and patented principle of construction, for the same purpose.

The meeting then adjourned.

W. EDWARDS, *Secretary.*

Report of George E. Pell, Agent of the Board of Arts and Manufactures for Upper Canada.

January 7th, 1861.

HAMILTON.

Messrs. Bridge, Higby & Co., employ one hundred men and fifty women in the manufacture of felt hats; the wages of the men will average $1.50, the women 75 cents per diem.

They consume wool of the value of twenty-seven thousand dollars per annum; it is imported, Canadian wool not being of sufficient fineness. Skivers, or the leather trimming used inside the hats, they have induced a tanner to manufacture for them; heretofore they were imported. Annual value of skivers, two thousand seven hundred dollars.

Twenty-five of their men emigrated to Canada to enter their employment.

Five hundred persons at least, depend upon the employees in the factory.

The annual value of their manufactures will be seventy-five thousand dollars.

Messrs. Sanford & McInnes, employ from four to five hundred men and women in the manufacture of ready-made clothing. From twenty to twenty-five were induced to come to Canada to enter their employment.

Canadian cloths enter largely into their manufactures.

The business having only recently been established, no estimate was given of the extent or value of their manufactures, excepting what might be gathered from the number of hands employed, together with the fact that sewing machines are used by the employees, they working in gangs and by the piece.

Messrs. Nisbet & Co., boot and shoe manufacturers, employ one hundred men and women, average wages of men, one dollar per diem.

Annual value of sales, fifty thousand dollars (of their own work,) they sell imported goods besides.

They use all the material they can of Canadian manufacture.

P. W. Dayfoot, boot and shoe manufacturer. Particulars same as of Nisbet & Co., in reference to shoe business, but P. W. D. carries on the tanning (in addition) at Georgetown. Imports hides, the supply not being sufficient for the demand in Canada.

Hopkins & Ackland, boot and shoe manufacturers. Same as others. (A. Gordon, one half.)

Wanzer & Co., sewing machine manufacturers, the Wheeler & Wilson & Singer Machines. Employ sixty hands, at an average wage of one dollar and fifty cents per diem. From twenty to thirty were induced to emigrate to Canada to enter their employment. Import nothing that they can procure in Canada. The annual value of their manufactures is about sixty thousand dollars.

In this city there are also three other factories making sewing machines of the Singer, Dale's Excentric and Rogers' Patent. They employ from five to ten hands each. It was not agreeable for them to give further particulars.

F. G. Beckett & Co., steam engine and boiler manufacturers, employ on the average twenty-five men. Average wages one dollar and fifty cents. Manufactures principally agricultural portable engines. (At this establishment they were working night and day to get worms, stills, &c., made for two coal oil refineries.)

Yearly value of their manufactures twenty-five thousand dollars.

Northy & Sons, saw-mill and stationary engine manufacturers. Ten men in good years. Erect few engines to order. Now confined principally to repairs.

At this establishment I was shown a condensing engine, invented by Mr. Thomas Northy, of about five horse power, which consumed no more fuel than a box stove of medium size would. Mr. N. is getting it patented in Canada and the United States, expecting to reap a large amount of money by selling rights to manufacturers.

I also had explained to me "a man guard," that this same person has invented, to protect the persons of sawyers from the terrible consequences of a fall upon the large circular saws now so commonly in use in the lumber districts.

Messrs. L. & P. Sawyer, manufacturers of threshing and mowing and reaping machines, fanning mills, ploughs and stoves. Employ on the average twenty-four men.

Manufacture twenty thousand dollars worth per annum.

Turnbull & Co., stoves, ploughs, &c., &c., employ twenty men. Average wages one dollar and thirty cents. Consume about one hundred and fifty tons of pig iron in the year.

D. Moor & Co., tin and japanned ware, stamped and pressed tin ware; also, stoves and castings. Employ forty-five men at an average wage of one dollar and twenty-five cents per diem.

Import about fifty thousand dollars worth. Manufacture about twenty-five thousand dollars worth. (This Firm collects about twelve to fifteen thousand dollars worth of rags in the course of the year).

N. B. Robbins, coal grates and iron railings. Annual value of manufactures about five thousand dollars.

Imports fire bricks. Does not think the clay exists in Canada suitable for their manufacture.

B. C. Charlton, vinegar manufacturer, employs four men. Average wages one dollar and six cents per diem. Consumes in a year twelve thousand gallons proof spirits, two thousand pounds refined sugar, four hundred bushels barley malt, and some cider. Has not imported any article he uses since alteration in tariff.

C. L. Thomas, pianoforte manufacturer, employs sixteen men at an average wage of one dollar and fifty cents per diem. Eight men left the United States to enter his employment, they with their families numbering thirty persons. Sixty persons derive their support from this manufactory.

Manufactures pianos during the year, to the value of twelve thousand dollars. Experiences no difficulty in selling all he makes. Averages two per week.

(Mr. Thomas was formerly an importer, and then sold as many pianos as now, but owing to the tariff, commenced their manufacture, which is now advantageous to him).

E. & C. Gurney, founders and stove manufacturers, employ sixty-four men. Average wage one dollar and sixty cents. Consumes one thousand tons of pig iron and three hundred tons of coal in a year.

Value of manufactures for the year, about one hundred thousand dollars.

Gurney, Ware & Co., platform and counter scales, employ twelve men. Average amount of wage one dollar and forty cents. Seven men emigrated to Canada to enter their employ.

Annual value of manufactures, about twenty-five thousand dollars.

Bruce & Mugrige—brooms—employ twenty men. Average daily wage, one dollar and seventy-five cents. Consumes one hundred tons of broom corn per annum—value, one hundred dollars per ton.

Annual value of their manufactures, forty thousand dollars.

Import all their material.

In Hamilton I found that many of the manufacturers were indifferent to the object of my visit, and excused themselves from replying to my enquiries on account of reasons best known to themselves, especially was this the case in the smaller concerns. Among the establishments from which I obtained no particulars, is the nail, spike and rivet works of Messrs. R. Juson & Co. They employ about ten or twelve men, and manufacture all kinds of cut nails, railroad spikes and rivets. Young Brothers, coal oil lamps manufacturers; Meakins & Sons, and Green, brushmakers; Stewart & Co., iron founders and stove manufacturers; Main & Co., rope and twine manufacturers.

I have ascertained from Mr. E. Roper, wood engraver, that he had made some experiments with Canadian woods, in order to substitute the same for box, to engrave upon. In his experiments he found *white thorn* answer best, and in fact, so satisfactorily, that he is endeavoring to secure a good supply for his own use. I urged him to get samples engraved, and prepared for the engraver, to send to the International Exhibition. If he can get good specimens seasoned and ready he will contribute them. Messrs. Wanzer & Co. will probably send a sewing machine to London. C. L. Thomas will send a first-class pianoforte, if the arrangement with the Commissioners are satisfactory. The superintendents of the locomotive and car departments have promised to enclose me particulars concerning the works of the Great Western Railroad. I have not received them yet. A rumor was prevalent in Hamilton to the effect that an establishment that has lain unused for some years was about to be converted into a cotton factory. Further particulars I could not gather.

To the Committee of the Board of Arts and Manufactures for Upper Canada.

GENTLEMEN,—The Secretary of the Board having requested me to give the particulars of my success in securing articles for the International Exhibition, I therefore in complying with his request, would state that in Hamilton I met the Board of Directors of the Mechanics' Institute, and they formed a Committee of influential gentlemen in the City, to carry out the objects of the Commissioners in inviting the coöperation of Local Committees.

I canvassed the manufacturers, and endeavored to induce many to prepare articles. In the following instances I received favorable answers, viz.: Mr. C. L. Thomas would have a very superior piano ready by the time the Commissions would be in Hamilton, and if the arrangements of the Commissions in forwarding the articles, were satisfactory, he would send it.

Wanzer & Co. would have a sewing machine ready, Wheeler & Wilson improved, it having the shuttle attached to it.

Other manufacturers would have prepared articles, but the time was not sufficient. In Dundas a Committee was also formed; and in my canvass for articles I obtained the promise of a cracker and biscuit machine from Mr. Gibson, edge tools from Mr. Hourigan, and some lasts, boot trees, &c.,

from Mr. Young. I visited the two woollen mills at Ancaster, but was unable to obtain the promise of anything, they being very busy; in the case of Mr. Crane, who manufactures knitted goods, I think this is much to be regretted as he produces very superior fabrics, specimens of which were shown in London in September last. At Brantford I could hear of nothing. I drove to Port Dover and obtained the promise of some woollen cloths from the new factory just now in operation; they will be forwarded to Isaac Buchanan, Esq., of Hamilton, in time for the Commissioners. If what I have learned is correct, the person who is carrying on this factory is one of the most experienced and able factors that has been engaged in the manufacture of woollen goods in the Eastern States; (Mr. J. N. Pitts), something very excellent may be expected, as it is an establishment of very superior character, the machinery being the best made in New England, and of very recent improvements, and the intention being to manufacture high priced and fine cloths.

At Paris I could learn of nothing. (I spent but a few hours in this place, having to lay over for the train).

In London I was unable to personally meet the Board of the Institute, but I communicated with some of the manufacturers, and then giving a list of the promises I had received from persons who could and would contribute to the Exhibition, I urged the Board by note, to form a Committee, and to still further canvass the City for more articles. I obtained in this City a promise from Mr. M. Anderson to prepare some agricultural implements; from Mr. Brown, the promise of an improved Singer sewing machine, and from Mr. Saunders, a collection of Canadian herbs, (which were exhibited at the last Provincial Exhibition, with the exception of additions since made), extracts and perfumery, if it is possible for him to prepare them in time.

I endeavored to obtain specimens of Canadian woods, but to no purpose; I however, learned of a collection that is in the possession of the Hamilton Scientific Society. I suggested to one of their leading members that they should be sent to England. The collection I believe to be a good and pretty extensive one, although the specimens are not as large as might be desired. Whether my suggestion would be acted upon I know not. I found generally a want of interest in the Exhibition, and every where the excuse was made, there is not sufficient time, and little encouragement. In stating the amount of time I devoted to the work of the Commission, I may say at least half of the nineteen days was spent in serving them. Three days wholly was spent in visiting Ancaster and Port Dover; I thought it proper to do so, as in both places fine qualities of goods are manufactured. I think it unfortunate that Mr. Crain, of the first named place, could not be induced to send specimens of his hosiery and knitted goods, as they are very superior, and such as would favorably compare with the products of other countries.

I am, Gentlemen,
Yours, with respect,
GEORGE E. PELL.

January 9th, 1862.

PROCEEDINGS OF THE BOARD.

Toronto, January 14th, 1861.

The Board met this day, according to adjournment, at two o'clock, P. M.

The members present were:—Professor Hincks University College, Professor Hind Trinity College University, Toronto; W. Craigie, M.D., James Cummings, Thos. Hilton, Samuel Sharp and Richard Bull, delegates from the Hamilton Mechanics' Institute; Rice Lewis, President, and Patrick Freeland, William Edwards, W. H. Sheppard, John McBean and H. E. Clarke, delegates, Toronto Mechanics' Institute.

In the absence of the President, and the Vice-President, Professor Hincks was appointed to the Chair.

The Minutes of the last Annual Meeting were read and confirmed.

The Secretary read Telegrams from the President, Dr. Beatty; and from Mr. Sheldrick, stating that owing to detention of trains they would not be able to attend the Meeting.

The Report of the Sub-Committee for the past year was then read by the Secretary, when it was

Moved by Mr. Freeland

Seconded by Mr. Lewis, and *Resolved*—That the Report of the Sub-committee now read, be adopted.

The Election of Office bearers and Sub-Committee for the ensuing year then took place, when the following Gentlemen were elected:—

President—John Beatty, Jun., M.D.

Vice-President—Wm. Craigie, M.D.

Secretary and Treasurer—Wm. Edwards.

Sub-Committee—Professor Hincks, Professor Hind, Patrick Freeland, W. H. Sheppard, Professor Buckland, Rice Lewis, Alfred Brunel, Richard Bull and Thos. Sheldrick.

Moved by Mr. Bull, seconded by Mr. Hilton, and Resolved—That the thanks of the Board be given to the Office-bearers and Committee of the past year, for the close attention given to their duties during their term of Office.

Moved by Mr. Hilton, seconded by Mr. Clarke, and Resolved—That the Committee be instructed to Memorialize the Government and Legislature to renew the Annual Grants formerly made to the Mechanics' Institutes of Upper Canada.

The Meeting then adjourned.

REPORT.

The Sub-Committee of the Board of Arts and Manufactures for Upper Canada, beg to submit to the Board the following Report of their proceedings for the past year:

Owing to the very limited sum placed at the disposal of your Committee, they have not been able to render the operations of the Board so useful to the public, or so advantageous to the several Institutes connected with it, as they otherwise might have done. They have, however, the satisfaction of reporting that in some departments of the Board's operations, considerable improvements have been made during their year of office.

Nine Mechanics' Institutes have been represented at the Board during the year, either by their respective Presidents, or by accredited Delegates, elected according to the statute, namely: Ayr, Cobourg, Dundas, Hamilton, Newcastle, Paris, Toronto, Whitby and Woodstock.

The withdrawal from the Mechanics' Institutes of all Government aid, has resulted in the total failure of some, and the paralyzing of the efforts of many others of these institutions, and will no doubt in a great measure account for the absence of a more general co-operation on their part with the objects of this Board. Your Committee look upon these institutions as Schools, or Colleges, for the adult mechanical and industrial classes of the community, affording them means of instruction, and of healthful recreation, so essential to their well-being, and such as is not to be obtained by them through any other agencies now in existence; and are therefore justly entitled to legislative aid corresponding to that given to societies for the encouragement of agriculture, and for purposes of general education.

Your Committee are gratified to know that some few of these institutions in the smaller towns, as well as those of the larger towns and cities, are not only self-supporting, but prosperous and progressive in their operation.

FINANCES.

The Treasurer's detailed Statement, herewith submitted, shows total Receipts for the year $4,685 43; Expenditure, $3,048 80; leaving a balance in hand of $1,636 63. Besides this balance, there are assets due on account of the *Journal* of $287 00, which leaves the whole amount in favor of the Board $1,923 63.

FREE LIBRARY OF REFERENCE.

During the year nearly 200 volumes of valuable books have been added to the Library, which now comprises 449 folio and octavo volumes of Plates and Specifications of English, American and Canadian Patents; 100 volumes of Statutes and other Parliamentary publications of Canada; and 268 volumes of the latest Cyclopedias and works on the Fine and Decorative Arts, Manufactures, &c.; making in all about 817 volumes—a classified Catalogue of which has been published in the September number of the *Journal* of the Board for 1861, with the monthly addition in each subsequent number.

Your Committee have already acknowledged in the pages of the *Journal*, a donation from the Hon. the Commissioner of Patents for the United States, of 30 volumes of Reports, embracing drawings and abridged specifications of patents issued in the United States from the year 1850 to 1860, inclusive.

Since the Board took possession of its excellent suite of rooms in the new Hall of the Toronto Mechanics' Institute, in July last, the Library has been consulted by a large number of persons; and it will no doubt become more and more appreciated as it becomes better known, containing as it does so large a number of works—including some of the best British and American periodicals—of the highest practical value to the professional man, the decorator and the mechanic; and being entirely free for consultation, and more readily accessible than any other free library of a similar character in the Province.

MODEL ROOMS.

In consequence of a recent order of the Patent Office, all new models have to be forwarded to Quebec with the applications for patents, so that but few additions have been made in this department since the last annual Report. Your committee would however acknowledge a donation from Messrs. Maw & Co., England, of four large and beautiful frames of examples of their manufacture of tesselated pavements, and three frames of patterns; also some specimens of building and flagging stone by Mr. Pearson, from his quarries in Esquesing.

With a view to establishing a Museum of specimens of Foreign and Canadian Manufactures, your Committee have invited manufacturers to furnish specimens of their various productions, or of any natural products capable of being used in manufactures, for exhibition in the Rooms.

EXAMINATIONS.

In August last, your Committee issued programmes of Examinations of members of the Mechanics' Institutes, similar to the programme of the year previous; and also offered the sum of ten

dollars to "each Institute establishing and keeping in operation for three months a class of not less than six members, for the study of any of the subjects named in the programme, and submitting at least two members of such class as candidates at the final examination by the Board in May next;" and also offering in addition to the certificates, "silver medals to the most successful candidates, in the proportion of one to every five who shall pass such examinations." Your Committee trusts that Institutes intending to submit candidates for examination in May next will at once notify the Board of such their intention.

JOURNAL.

Your Committee have much pleasure in being able to report, that the first volume of the *Journal* of the Board has been completed, and that it has in all respects fulfilled their expectations, with the exception of correspondence from those engaged in the manufactures of the Province, and correspondence and support from the larger number of the Mechanics' Institutes, whose interests it is one of the principal objects of the *Journal* to advocate.

Arrangements have been made for publishing the second volume in an enlarged and improved form, each number to contain four pages more of Reading Matter, be supplied with a cover, and stitched and cut; these improvements your Committee believe will be very acceptable to its readers, and be the means of inducing a large increase to the Subscription list.

It is also intended to publish the Journal on the 15th of each Month, instead of the 1st, as being more convenient for the Publishers.

Your committee would respectfully invite the coöperation of such Institutes as have not yet taken any steps towards sustaining the Journal, either by obtaining Subscribers, or by forwarding information relating to their proceedings, for publication in its pages.

AMENDMENTS TO ACT.

The draft of Bill to amend that portion of the Act constituting this board, and the Management of the Provincial Exhibition, as adopted at the last Annual Meeting and submitted to the Legislature, was published in the April number of the Journal, and the result fully reported upon by your Committee at the July meeting of the Board, as per minutes published in the Journal for August.

At the Annual Meeting of the Provincial Exhibition Association, held in London, in September last, it was Resolved—

"That the Board of Agriculture are hereby requested to give notice to the several Electoral Division Agricultural Societies to send up each one delegate to attend a meeting to be held in Toronto the month preceding the meeting of the Legislature, for the purpose of agreeing upon, and recommending, such alterations as they may deem necessary in the Agricultural Statute, and that the Board of Arts and Manufactures, and the Horticultural Societies be invited to attend; and in order more fully to carry out the spirit of the foregoing resolution, a synopsis of the Bill introduced at the last meeting of the Legislature be published, and a copy thereof sent to each County and Electoral Division Society, in order that the delegates may have a thorough knowledge of the subject under discussion; and that the travelling expenses of such delegates be paid out of the general funds of the Association, and that the President of the Board of Agriculture be authorized to name the day, and place of meeting by circular."

Your Committee therefore recommend that the Board now discuss such amendments as they may deem it desirable to propose; and that the Members of the Board attend the meeting of delegates, which has been called for Thursday the 30th of January instant, at noon, at the Rooms of the Board of Agriculture, King street West, Toronto.

INTERNATIONAL EXHIBITION OF 1862.

In answer to the urgent representations of the Boards of Arts and Manufactures, and the Boards of Agriculture, for Upper and Lower Canada, the Government appointed a Commission—of which the President of this Board is a member—for the purpose of obtaining a representation of this Province at the International Exhibition of 1862.

Your Committee have used every available means, by publishing the official announcements of the Commissioners, and appeals to Manufacturers and others through the pages of the Journal, and the issuing of 3000 extras, urging upon them to prepare and send in their contributions at the time and place named for their reception; and also by instructing their Agents, who have been and are now canvassing for the Journal, specially to canvas for specimens for the Exhibition, and to obtain, if possible, the formation of Committees for the same purpose, in the several localities they may visit.

ESSAY ON MANUFACTURES.

As the result of the offer of two Prizes by the Board, of $150 and $75 respectively, for the best two Essays on "The Manufactures which are best suited to the circumstances and capabilities of Upper Canada," but one production was sent in. The gentlemen who kindly consented to act as Judges thereon, reported that—"They do not find it such as, in their judgment, to warrant their awarding to it either of the Prizes offered, or recommending its publication as likely to subserve the ends, which they presume the Board of Arts and

Manufactures to have had in view, in the appeal made by them to the Country's mind. At the same time, as the Essay affords evidence both of the bestowal of attention on the subject, and of a commendable interest in it, it may be a question for the consideration of the Board whether it might not be advisable to mark in some way their appreciation of these qualities, and how this might best be done."

All which is respectfully submitted,

W. EDWARDS, *Secretary.* JOHN BEATTY, *Junior, President.*

TORONTO MECHANICS' INSTITUTE.

We are much gratified to witness the success attending the extraordinary efforts of the successive Managers of this Institution, for the past few years, in the erection and completion, in all its details, of the noble building which it now occupies; costing, at the lowest calculation, including the land it stands on, not less than fifty thousand dollars; and with a debt remaining upon it of only nineteen thousand.

The last heavy item of expense was that of heating by steam. The contract for this work was taken by Mr. James E. Thompson, of this city, at a cost of something over two thousand dollars, and is guaranteed to heat the entire building (80 feet by 104 feet, and three stories high) to seventy-five degrees.

The whole of the first floor is sufficiently heated in the coldest weather, by a pressure of from three to five pounds of steam, and the upper floor and music hall with from six to ten pounds. We are also informed by the officers in charge, that it is easily managed by the House-keeper of the Institute, is perfectly secure from fire, and is expected to be very economical in the consumption of fuel (anthracite coal), not using one half the quantity that would be required to heat by any of the ordinary methods.

We can speak from personal knowledge of the agreeable heat at all times pervading the building, so different from the atmosphere of rooms heated by ordinary stoves, or hot-air furnaces.

In incurring the expense of these works, the Directors exceeded their available balance by about a thousand dollars; but some few Ladies connected with the Institute, came nobly forward, and got up a Bazaar, which was held during the Christmas holidays, and realized the handsome sum of about four hundred dollars towards relieving the Directors from this difficulty.

Since the Institute took possession of the building, in July last, the membership has nearly doubled, and now numbers about eleven hundred. This is not to be wondered at, when we state that all its privileges—including an excellent Reading Room, and a Library of upwards of five thousand volumes—are secured for the small sum of two dollars a year. The number of members regularly taking books out of the Library is upwards of eight hundred.

Besides the Rooms permanently rented to the Board of Arts and Manufactures, and to Messrs. Roaf and Davis for Law offices, the Institute is deriving a large revenue from its beautiful Music and Lecture Halls, and the various other smaller rooms, for which there is a constant demand.

A Chess Class of about sixty members, and Classes for Mechanical and Free-hand Drawing and Painting, are in operation in connection with the Institute. The number of Classes we hope to see largely increased during another winter session, as we look upon this department of a Mechanics' Institute's operations as one of very great importance.

BOOKS ADDED TO THE FREE LIBRARY OF REFERENCE DURING THE PAST MOMTH.

CLASS II.

Roman and Greek antiquities, with nearly 2000 illustrations; 12mo; 1860..... *A. Rich.*

CLASS VI.

Pictorial Gallery of the Fine and useful Arts; 2 Vols., folio; London, 1847.....

CLASS VII.

Dictionary of Machines, Mechanics, Engine-Work and Engineering, with 4000 Engravings; 2 Vols., 8vo; 1861..... *Appleton & Co*
Dictionary of Roman and Greek Antiquities, with nearly 200 Engravings; 12mo; 1860..... *A. Rich.*
English Dictionary; 12mo; 1845..... *H. Reed.*
French and English Dictionary; 12mo; 1861..... *Spiers & Surenne*
German and English Dictionary; 12mo; 1861..... *G. J. Adler.*
Spanish and English Dictionary; 12 mo; 1861..... *Seoane, Newman & Barretti.*

CLASS XV.

Year Book of Facts in Science and Art, Exhibiting all the most important Discoveries in Mechanics and the useful Arts; Natural Philosophy; Electricity; Chemistry; Zoology and Botany; Geology and Mineralogy; Meteorology and Astronomy; 23 Vols., 12mo; complete from the beginning; 1839 to 1861..... *John Timbs, F. S. A.*

CLASS XVII.

Naval and Mail Steamers of the United States; folio; 1853..... *Charles. B. Stuart.*

THE DEATH OF PRINCE ALBERT.

In respectful memory of the death of one so much endeared, by a singular variety of associations in public life, to all who live under British rule, the death of Prince Albert has been the painful subject of an Address to Her Majesty the Queen by the Society of Arts in England.

The sympathies expressed by the Society will be felt by all kindred institutions in alliance with that body, or working, however humbly, in the same field.

ADDRESS

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

We, your Majesty's most dutiful and loyal subjects, the Society for the Encouragement of Arts, Manufactures, and Commerce, incorporated by Royal Charter, humbly approach your Majesty, with the assurance of our devoted attachment to your throne and person, and of our respectful sympathy with your Majesty in the great affliction which has so unexpectedly befallen your Majesty and the Nation, in the early death of His Royal Highness the Prince Consort.

Whilst the death of a Prince, distinguished by rare intellectual gifts and eminent virtues, is deeply lamented by all classes of your Majesty's subjects, his loss is especially deplored by this Society, which has for many years enjoyed the great advantage of his judicious counsel and support.

His Royal Highness was elected President in 1843.

His high position, his refined tastes, his enlightened judgment and his candour; his great command of general principles and his power of applying them to details; and his special knowledge on a great variety of subjects, extended the influence and greatly promoted the objects of the Society. Science, Art, and Literature, were, by his judicious patronage, constantly introduced to the notice and recommended to the favour of your Majesty.

The great conception of the Exhibition of 1851, with its countless influences on the progress of human industry, was due to His Royal Highness, and in overcoming the difficulties of such a new and gigantic work, he solved the problem of conducting future Exhibitions, and their success will be an ever-recurring memorial of their author.

The Society can never forget the obligations which His Royal Highness has conferred on them, and they humbly express a hope that the recollection of his virtues and of his public services may, with God's help, in some measure soften the intensity of your Majesty's affliction.

That your Majesty may long reign over a loyal and devoted people, is the prayer of your dutiful and loyal subjects and servants.

By order of the Council, sealed with the seal of the Society for the Encouragement of Arts, Manufactures, and Commerce, this twenty-seventh day of December, one thousand eight hundred and sixty-one, in the presence of

P. Le Neve Foster, *Secretary.*

CANADIAN PATENTS.

BUREAU OF AGRICULTURE AND STATISTICS, Quebec, 28th December, 1861:—

Henry Yates, of Brantford, Assignee for the residue of the unexpired period of a certain patent granted to one James McLellan, on 15th December, 1855, for "A new machine for the repairing of iron rails used for cars and carriages to run upon railways."—(Dated 16th February, 1861.)

William Douglas Westman, of the township of King, in the County of York, Machinist, for "An improved screen for Fanning Mills."—Dated 12th March, 1861.

Henry W. Ostrum, Yeoman, and Joseph Sutton, Machinist, both of the township of Sidney, in the County of Hastings, for "An improved Fanning Mill."—(Dated 12th March, 1861.)

Henry W. Ostrum, Yeoman, and Joseph Sutton, Machinist, both of the township of Sydney, in the County of Hastings, for "An improved Churning Gear."—(Dated 12 March, 1861.)

Wm. Douglas Westman, of the township of King, in the County of York, Machinist, for "An improved Lever for Fanning Mills."—(Dated 12th March, 1861.)

Albert O. Fuller, of the township of Erin, in the County of Wellington, Millwright, for "A new and portable Labor Saving Machine for cutting mortices in carriage and all other hubs, by hand."—(Dated 21st March, 1861.)

Calvin Bently, of the township of Pickering, in the County of Ontario, Joiner, for "An Eave Trough and Finish."—(Dated 21st March, 1861.)

William Watson, of the township of Vaughan, in the County of York, Watchmaker, for "An improvement in the Manufacture of Oil Gas."—(Dated 23rd March, 1861.

William Brown and Jesse Weaver, both of the township of Malahide, in the county of Elgin Farmers, for, "An evaporating furnace."—(Dated 23rd March, 1861).

Hubbard Joslyn, of the township of Stanstead, in the county of Stanstead, Mechanic, for "An improved machine for wringing clothes, to be called "Joslyn's improved Clothes Wringer."—(Dated 4th April, 1861.)

John Carter Park, of the town of Brantford, in the County of Brant, Mechanical Engineer, for "A machine for removing snow and ice from railway tracks."—(Dated 9th April 1861.)

Germain M. Cossitt, Newton Cossitt, and Alexander Young, of the village of Smith's Falls, in the county of Lanark, Iron Founders and Machinists, for "An improved Reaper Attachment."—(Dated 10th April, 1861.

George Ives, of the town of Windsor, in the County of Essex, for "An improved Saw Horse."—(Dated 10th April, 1861.)

George Robinson, of Drummondville, in the County of Welland, Miller, for "An improved extension Clothes Horse."—(Dated 10th April, 1861.)

Alexander Fraser Cockburn, of the city of Montreal, Brass Founder and Finisher, for "A compression Swivel Action Water Cock."—(Dated 11th April, 1861.)

Richard Hill, of the town of Port Hope, in the county of Durham, Plough Maker, for "an improved Plough."—(Dated 17th April, 1861."

Henry Lehan, of the township of Reach, in the county of Ontario, Manufacturer, for "The Farmers improved Hay Rake."—(Dated 17th April, 1861.)

David Henri Tetu, of Riviere Ouelle, Trader, for "A fishing apparatus in deep Water."—(Dated 18th April, 1861.)

Jas. P. Davidson, of Belleville, in the County of Hastings, Agricultural Implement Maker, for "An improved Power for Churning, Pumping and Washing."—(Dated 20th April, 1861.)

John Abner Burton Hannum, of the town of Cornwall, in the County of Stormont, for "A Churn Power."—(Dated 25th April, 1861.)

We purpose publishing in each number of the Journal a selection from the London *Mechanics' Magazine* (a valuable periodical, with but limited circulation in this country) of abridged specifications of such English patents as may be deemed useful or interesting to our Canadian readers.

Full specifications of all English patents issued may be obtained on application to Bennet Woodcroft, Esq., Great Seal Patent Office, 25 Southampton Buildings, Holborn, London; the price of which—varying from 3d. to 5s. sterling—must be remitted by Post Office order, made payable at the Post Office, Holborn.

Lists of all specifications may be seen at the Free Library of Reference of the Board of Arts and Manufactures, Toronto, as published in the Commissioner of Patents Journal.

We shall use our best endeavors to obtain for publication abridged specifications of patents issued in Canada, so as to make this department of our Journal as interesting as possible to Canadian manufacturers and inventors.

ABRIDGED SPECIFICATIONS OF ENGLISH PATENTS.

1022. J. RHODES and R. KEMP. *Improvements in rag machines.* Dated April 24, 1861.

This consists in applying a toothed roller or rollers over or above the feed rollers in near contact with the teeth or points of the swift or cylinder for stripping or removing the untorn rags therefrom which rags, by other rollers placed in contact therewith, are carried back to the feed apron, which again passes them through the feed rollers to the swift, to be again operated upon. *Patent completed.*

1029. G. SCOTT. *Improvements in steam engines and their apparatus for generating steam.* Dated April 25, 1861.

This relates to oscillating cylinders, and consists in making the trunnion bearings hollow, with suitable openings in the bearings for the admission to, and withdrawal of the steam from either of the sides of the piston. The bed-plate is made hollow to be used as a steam chest, from whence the steam is admitted to the cylinder through the openings in the bearings. The invention also relates to a mode of exposing the exhaust steam from the cylinder to

the cooling and condensing action of cold water or air, and also to the mode of construction of the condenser. The invention also relates to a means for saturating highly superheated steam. There are other features included. *Patent completed.*

1035. W. HARRIS. *Improvements in treating hides and skins, to render them suitable to be made into straps for driving machinery, and to be used for other purposes for which leather is commonly employed.* Dated April 25, 1861.

Here the hide is first soaked in milk, then drained, and placed in a bath of tar; it is next removed from the tar bath, scraped, dried, and finally dressed with dubbing as usual. *Patent completed.*

1056. J. DELLEGANA. *Improvements in apparatus for embossing and taking casts or matrices for stereotype and other purposes.* Dated April 26, 1861.

This consists in the use of rollers in combination with a table supporting the article to be embossed, such table being geared with a pressure roller, so that the surface speed of the pressure roller shall be the same as that of the table. *Patent completed.*

1057. E. H. JOYNSON. *Improvements in machinery for the manufacture of paper.* Dated April 26, 1861.

This consists, 1, in a machine for washing rags preparatory to converting them into pulp. 2. To an improvement in that part of the paper machine at which the pulp is supplied to the wire. 3. To a novel arrangement of apparatus for the sizing of paper. We cannot here quote the details of the invention. *Patent completed.*

1071. J. MASH. *Improvements in steam engines.* Dated April 29, 1861.

This consists in rendering available for power the impulsive force due to the velocity of steam, by causing steam to act on the ordinary or other pistons of steam engines in jets. *Patent completed.*

1078. G. HULME. *An improvement or improvements in the process of carding wool, cotton, silk, or fibrous materials, and in machinery or apparatus applicable for that purpose.* Dated April 30, 1861.

This consists in imparting certainty and regularity to the motion of the creeper, by making a positive connection between it and its driving roller, by means of interlocking projections and depressions, pins, teeth, or other mechanical means. *Patent completed.*

1079. J. MEYER. *Certain new chemical combinations, and for the application thereof to fixing aniline and pigment colours in printing and dyeing, to tanning, waterproofing and other industrial purposes.* (A communication.) Dated April 30, 1861.

This consists in the combination of certain organic substances, such as albumen, fibrine, glue, animal tissues, and other analogous substances with the oxide or salts of tungsten or niolybdenum. *Patent completed.*

1081. W. HORN. *Improvements in steam and water-tight joints for fixing tubes in plates, such as used for surface condensers, distillers, refrigerators, vessels for heating feed water or tubular boilers.* (A communication.) Dated May 1, 1861.

The novelty here is the use of rings or short tubes of compressed wood for making water and steam-tight connections between tubes and plates, such as are used for surface condensers and other apparatuses. *Patent completed.*

1096. W. SCHOLES. *Improvements in carding engines for carding wool, cotton, silk, or other fibrous stances.* Dated May 2, 1861.

This consists in making the periphery or surface of the "licker in," or in covering the same with portable wood bags, which the patentee sets with steel or other metal pins or points. *Patent completed.*

1097. W. HOYLE. *Certain improvements in machinery for preparing, spinning, and doubling cotton and other fibrous substances.* Dated May 2, 1861.

The patentee claims the application of pressure to top rollers by means of a weight, which remains stationary while the endless band revolves round the top roller, and round a pulley or pulleys to which the weight is suspended or connected as described. *Patent completed.*

1117. W. E. NEWTON. *Improvements in the treatment of copper ores.* (A communication.) Dated May 3, 1861.

Here the pyrites are first pulverized, and then, by ordinary fluxes and sulphur, and chloride of lime, the ore, whether roasted or not, may be operated upon. In the use of roasted ore a certain weight of the ore is to be mixed with variable quantities of sulphur and chloride of lime according to the richness of the ore, and the nature of its gauge. *Patent completed.*

NOTICES OF BOOKS.

The Physical Geography of the Sea, by LIEUTENANT MAURY, *late of the U. S. Navy, and Superintendent of the National Observatory. Sixth edition. 1 vol., 8vo. New York: Harper & Brothers. Toronto: Rollo & Adam.*

In accordance with our design of noticing in this journal books suitable in an especial degree for the Libraries of Mechanics' Institutes, we desire in the present issue to draw the attention of our readers to a work which has been long and favourably known to the public in general, as is testified by its having lately reached a sixth edition, but which, nevertheless, is still replete with much that is novel and interesting to all who have not already made acquaintance with its pages.

Under the title of the "Physical Geography of the Sea," the author includes all that relates to the vast domain of waters upon the earth—the oceans, seas, and lakes, into which they are distributed, with their various depths and temperature; the circulation of the atmosphere, and of the ocean; the phenomena of the tides, and of the winds; the mysterious effects of electric and magnetic forces; the laws of evaporation, and the variations of climate in the different latitudes of the watery world—all, in short, that relates to the economy of the sea and its adaptations. A vast and comprehensive subject truly, and one which embraces within it operations of great importance

not only to the principles and practice of navigation, but also to the general interests of the world.

The Atlantic Ocean is the especial object of our author's labours, and occupies a large portion of his volume; the first two chapters, indeed, are devoted to a single current in it—the Gulf-stream—some of the most peculiar features of which he beautifully describes in the following passage:—

"There is a river in the ocean. In the severest droughts it never fails, and in the mightiest floods it never overflows. Its banks and its bottom are of cold water, while its current is of warm. The Gulf of Mexico is its fountain, and its mouth is in the Arctic Seas. It is the Gulf Stream. There is in the world no other such majestic flow of waters. Its current is more rapid than the Mississippi or the Amazon, and its volume more than a thousand times greater. Its waters, as far out from the Gulf as the Carolina coasts, are of an indigo blue. They are so distinctly marked that their line of junction with the common sea-water may be traced by the eye. Often one half of the vessel may be perceived floating in Gulf Stream water, while the other half is in common water of the sea; so sharp is the line, and such the want of affinity between those waters, and such, too, the reluctance, so to speak, on the part of the Gulf Stream to mingle with the common water of the sea."

There are other features no less striking and peculiar to be observed in this wonderful ocean-stream—features so remarkable that it will not be unprofitable to consider them somewhat in detail. The general aspect of the Gulf-stream is that of a strong and rapid river, as it were, flowing forth from the Mexican Gulf and Carribean Sea, and passing round the southern coast of Florida. It then proceeds to the north-east in a line almost parallel to the coast of the United States, as far as the Grand Banks of Newfoundland; here, being unrestrained, it widens its bounds, and slackens its speed, though such is its impetus that even to the coasts of Great Britain and Ireland, the Norwegian shores, and down to the Bay of Biscay, this mighty marine river continues to roll its wonderful waters. Throughout its course of many thousand miles it preserves its remarkable physical characters—the only change it undergoes being that of degree. As its waters gradually mingle with those of the surrounding ocean, their deep blue tint becomes more faint, their temperature diminishes, and the speed with which they advance declines. When the stream first emerges from the Gulf, and passes through the Channel of Bemini, its velocity is about 4 miles an hour; when it reaches Cape Hateras, having attained a breadth of 75 miles, its speed is reduced to 3 miles an hour; and on its arrival at the Banks, it is still further diminished to 1½ miles an hour. Its temperature also undergoes a corresponding change. In the Straits of Florida it has been observed as high as 88° 52′ Fah.; in latitude 40° its warmth is still about 25° above that of the surrounding ocean. And even when it reaches the coasts of Northern Europe, its heat, though much diminished, is not altogether lost; as far north, indeed, as the polar basin of Spitzbergen its waters are 6 or 7 degrees warmer than those around them. To quote our author's words—"it is the influence of this stream that makes Erin the 'Emerald Isle of the Sea,' and that clothes the shores of Albion in evergreen robes; while in the same latitude on this side, the coasts of Labrador are fast bound in fetters of ice." He declares also, that "the quantity of heat discharged over the Atlantic from the Gulf Stream in a winter's day, would be sufficient to raise the whole column of atmosphere that rests upon France and the British Isles from the freezing point to summer heat."

Many theories have been put forward with regard to the causes that produce this vast and important stream. Some rest upon very insufficient grounds, and others are palpably absurd. It is now, however, generally agreed that one main influence which puts it in motion is "the tendency of the polar and equatorial waters to equalize their temperature by currents flowing at different depths through the ocean." Another cause, which combines with the foregoing, and produces the north-easterly flow of the current, is the daily rotation of the earth upon its axis. In addition to these, there must also be taken into consideration the influence and action of the atmosphere, the tides, and the variations of temperature in different regions. The trade-winds, too, no doubt, perform their share of the task of keeping up the flow of this vast stream, which carries to the northern parts of the eastern hemisphere the warmth derived from the perpetual summer of the equatorial seas.

But our limited space forbids our dwelling any longer upon this very interesting subject; we must be content merely to draw the attention of our readers to some of its most remarkable features, a full account of which can be found in the work itself. Other topics, too, of interest and importance to all, are discussed in the volume before us; foremost among which may be mentioned that of the atmosphere in its various relations to the physical geography of the sea, as displayed in the winds, rains, and fogs, and in the phenomena of evaporation and electrical changes. Next, we have an account of the Salts of the Sea; the Geological Agency of the Winds; the Depths of the Ocean, with a description of the apparatus for determining them; the "Telegraphic Plateau" of the Atlantic; the Winds and Storms; the Climate of the Ocean; its Drift; and the Routes commonly ob-

served in traversing it. Such is a brief enumeration of the various subjects so graphically described by our author; subjects alike interesting and instructive to all who desire to look into "the wonders of the great deep."

We cannot better conclude than by quoting our author's remarks with regard to the design of his work. "No expression," he states, "uttered, nor act performed by the agents of nature upon our planet, is without meaning. The wind and rain, the vapor and the cloud, the tide, the current, the saltness and depth, and warmth, and color of the sea, the shade of the sky, the temperature of the air, the tint and shape of the clouds, the height of the tree on the shore, the size of its leaves, the brilliancy of its flowers—each and all may be regarded as the exponent of certain physical combinations, and therefore as the expression in which nature chooses to announce her own doings, or, if we please, as the language in which she writes down or chooses to make known her own laws. To understand that language and to interpret aright those laws is the object of the undertaking which we have now in hand. No fact gathered in such a field as the one before us can therefore come amiss to those who tread the walks of instructive philosophy; for, in the hand book of nature, every such fact is a syllable; and it is by patiently collecting fact after fact, and by joining syllable after syllable, that we may finally seek to read aright from the great volume which the mariner at sea, as well as the philosopher on the mountain, each sees spread out before him."

The Works of Francis Bacon, Baron of Verulam, Viscount St. Albans, and Lord High Chancellor of England. Collected and Edited by JAMES SPEDDING, M.A., *of Trinity College, Cambridge:* ROBERT LESLIE ELLIS, M.A., *late Fellow of Trinity College, Cambridge; and* DOUGLAS DENON HEATH, *Barrister-at-Law, late Fellow of Trinity College, Cambridge. Volume II. Boston: Brown & Taggard. Toronto: Rollo & Adam.* 12mo. *pp.* 503.

We lately noticed the publication of the first volume of this magnificent edition of Lord Bacon's Works. The second volume, now before us, is a continuation of the first part of his Philosophical Works, and contains the *Parasceve ad Historiam Naturalem et Experimentalem*, and the *De Augmentis Scientiarum*, with a preface to each by Mr. Spedding. In the preface to the *Parasceve*, the editor gives an interesting account of what are, to a great extent, the distinctive peculiarities of Bacon's philosophy, the main foundation of which he himself considered to consist in "the compilation of a natural and experimental history;" in fact, it was for the purpose of obtaining assistance in this design that he published his *Novum Organum* in so imperfect a shape.

We have already alluded, in our former notice, to the typographical excellence and beauty of this edition, and to the credit it reflects upon the enterprising publishers; it only remains for us now to express our sincere hope that in the present state of things on this continent, so unfavourable as it is to all literary undertakings, the publication of this work may not prove to them a source of loss and disappointment.

BRITISH PUBLICATIONS FOR OCTOBER.

	Stg. Prices.			
Abbeys and Attics, by Julian Strickland, 2 vols. cr, 8vo	0	12	0	*Freeman*
Abraham (The Life of): Bible Readings, by A. H. L., fcap. 8vo	0	3	6	*Hogg*
Addison (Julia) Crow's Nest Farm: a True Tale, post 8vo	0	10	6	*Saunders & O.*
Angus (Joseph, M.A.) Handbook of the English Tongue, 12mo.	0	5	0	*Rel. Tr. Soc.*
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Journal of Horticulture (The), Cottage Garden, &c., v. 1, new series, imp. 8vo	0	8	6	*Office*
King Arthur and his Knights of the Round Table, comp. by J. T. K. cr. 8vo.	0	7	0	*Griffith & Far.*
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Manual of Field Artillery Exercises, Horse Guards, August 1, 1861, 8vo.....	0	5	0	*Parker & Son*
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Templeton (Wm.) Millwright and Engineer's Pocket Companion, 13th edit., revised, 12mo.....	0	5	0	*Simpkin*

AMERICAN PUBLICATIONS FOR NOVEMBER.

Brimley.—Essays by the late George Brimley, M.A., Librarian of Trinity College, Cambridge: with an Introduction, by R. H. Stoddard. 12mo, pp. 409.....	$1 25	*Rudd & Carl.*
Jenkins' Vest Pocket Lexicon. An English Dictionary of all except Familiar Words; including the principal Scientific and Technical Terms, and Foreign Moneys, Weights and Measures. Omitting what every body knows, and containing what every body wants to know, and cannot easily find. By Jabez Jenkins. 64mo, pp. 563.....	0 50	*Lippincott & Co*
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Selected Articles.

FLAX CULTIVATION IN CANADA.

In the present aspect of affairs, attention is being turned to other staples than cotton for a supply of fibre suitable for textile fabrics. The soil and climate of Canada are well adapted to the cultivation of flax, and it is to this fibre-producing vegetable that the thoughts of farmers should now be directed. We intend to publish, in successive numbers of this journal, short articles* on the preparation of flax, leaving the details of its cultivation to the pages of the AGRICULTURIST, in which numerous articles on the preparation of the soil necessary for this valuable plant have already appeared, and which should be carefully studied by those who intend to grow it. As there are no other products of the farm which promise so fairly as the one under review, it is not improbable that flax cultivation may become general in Canada.

Sowing.

The seed generally preferred is Riga; it seems adapted to most soils. Dutch is occasionally used with great success; but the American seed does not generally suit well, being apt to produce a coarse, branchy stem, which skilful flax-growers aim against as much as possible. *A tall, tapering, firm stem, with few branches, and those not spreading, are considered good signs in a crop of flax.*

If the American seed be used, it should be sown in a deep, loamy soil. In selecting seed, care should be taken that it is plump, shining, and heavy; and if it be of foreign growth, the character of the merchant from whom it is purchased, and the brand by which its quality is known, ought both to be attended to. Care, as we have just observed, must be taken to have it well sifted, to clear it of the seeds of weeds which are often mixed with it, and which, if not removed, cause a great deal of subsequent labour when the crop is growing. The process of separation is generally effected by fanners and a wire-sieve, which has twelve bars to the inch. Home-saved seed is occasionally used, and produces excellent crops; but it is highly necessary to select a good quality, otherwise the result will be anything but favourable. The time, however, will come, it is to be hoped, when the bulk of home-raised seed can be used for sowing instead of foreign.

The produce of seed averages about twelve bushels the statute acre; so that the seed off one statute acre would sow about five. When flax is thinly sown it produces much seed; it is therefore better to sow thick, which causes, in general, the stem to grow tall and straight, with only one or two seed capsules at the top. The fibre is also much superior, in fineness and length, to that produced from thin sown flax, which grows coarse, branches out, and bears a great quantity of seed. Under good cultivation, after the ground is pulverized and well cleaned, it is rolled and sown; and, if laid without ridges, it is marked off in divisions, eight to ten feet broad, in order to give an equable supply of seed. After sowing, the ground is covered with a seed-harrow, which goes over it three times—once up, once down, and once across, or anglewise, in order that the seed should be equally spread, and the small drills made level by the teeth of the harrow. The ground is finished with a roller, which covers the seed about an inch, the depth generally considered the best for growing freely. When the ridges are too much raised in the centre, at the time of sowing, it is liable to injure the crop, preventing it from growing equally; but when the land is properly drained, no ridges are required. The sowing of clover and grass-seeds along with the flax is rarely considered judicious, and ought, if possible, to be avoided, as those plants injure the root-ends of the flax. Carrots are occasionally sown in drills, in suitable soils, which enables the individual pulling the flax to step over the rows, which are afterwards hoed and cleaned, and receive some liquid manure. In the case, however, of rolling the ground, after sowing, care should be taken not to roll when it is wet, as the mould is liable to stick to the roller.

* Richardson's Rural Handbooks.

Pulling.

The time for pulling the flax is a point of great importance. The fibre is in the best state before the seed is quite ripe. If pulled too soon, though the fibre be fine, there is great waste in scutching and hackling, which renders the crop unprofitable; and if pulled too late, the additional weight of the fibre rarely compensates for its coarseness. The best time for pulling, however, is when the seeds begin to change from a green to a pale brown, and the stalk to a yellow colour, to about two-thirds of its length. When any portion of the crop is lying, and suffering from wet, it should be pulled as soon as possible, and kept separate from the other. Whenever the flax is of unequal length, from the land being imperfectly drained and levelled before sowing, each length should be pulled separately, and steeped in a separate pool, or kept from the other in the same pool. If there be a large second growth, the flax should be caught by the puller just underneath the bolls, so as to leave the short stalks behind; and if there be not many of the latter, it is better to leave them on the ground, as the mixture and discoloration are apt to deteriorate the crop. If the ground has been thoroughly drained, and laid out evenly, the flax in general will be all of the same length; but it is necessary to keep the flax even at the roots, which increases its value both to the spinner and to the grower, and amply repays the trouble bestowed upon it.

Rippling.

The handfuls of flax, when pulled, should be laid across each other diagonally, to facilitate the process of rippling, which should be carried on at the same time, and in the same field. Rippling the flax not only renders it easier to be handled, but saves the seed, which is a valuable portion of the crop. If the seed be sold for the oil, it realizes about £3 to the acre; but if used for feeding purposes, it is worth about £4. The ripple is composed of a row of iron teeth, screwed into a block of wood; when used, it is taken to the field where the flax is pulled, and screwed down to the centre of a nine-feet plank, resting on two stools.

The ripplers may either stand, or sit astride at opposite ends of the plank; but they must be sufficiently near to the comb, to enable them to strike the flax properly and alternately. A winnowing-sheet should be placed under them, to receive the bolls as they are rippled off. The ripplers, moreover, should be sufficiently near to receive the flax as it is pulled and laid down at their right hand in sheaves. When the sheaf is untied the rippler takes up a certain quantity, holding it about six inches from the root with one hand, and near the top with the other. He then spreads the top of the handful like a fan, and draws one-half of it through the comb, the other passing by the side; with a half-turn of the wrist he then performs the same operation upon the remainder. Some ripplers, however, prefer rippling without turning the hand, by giving the flax one or two pulls through the comb; but this depends upon the quantity of the bolls. The straw, when stripped of its bolls, is carefully laid down by the rippler, placing each handful diagonally, after which it is tied up into sheaves and removed. The object of crossing the handfuls, after rippling, is that the buts or sheaves should separate easily when taken out of the steep to spread on the grass for drying. If the weather be dry, the bolls should be kept in the field, spread on the winnow-cloths, and, if turned occasionally, they will soon *win*, or dry. Passing the bolls, however, first through a coarse riddle, and afterwards through fanners, which remove the straws and leaves, will facilitate the drying process. If, on the contrary, the weather be moist, the bolls should be taken in-doors and spread out thinly and evenly on a barn-floor, or loft, and turned twice a day, leaving the windows and doors open, to allow a thorough current of air. When nearly dry, they are removed to a corn-kiln, care being taken not to raise the kiln above summer heat, where they are turned gently until no moisture remains. This slow-drying process enables the seed to imbibe all the juices that remain in the husk, and to become thoroughly ripe. If the bolls be taken direct from the field, and dried in a hurried manner on the kiln, the juices will be absorbed, the seed become shrivelled and parched, and little nutritious matter will remain in them. In fine weather, the bolls should be dried in the open air, the seed thrashed out, and the heaviest and plumpest portion of it reserved for sowing or crushing. The light seed and the chaff contain exceedingly wholesome food for cattle, and can be always profitably applied. Flax, however, ought not to remain in the field, if possible, even the second day, unless the Belgian system, which we shall shortly notice, be adopted. As soon as pulled it ought to be rippled, and then carried to the water to prevent it becoming too hard.

Watering or Steeping.

The operation of steeping requires the greatest care, as it is very critical in its results. River water is the best, and may be let in the pond the day before the flax is steeped; but if spring water is used, the pond should be filled some weeks before the flax is put in, so that the sun and air may soften the water. Water containing any mineral substance must be studiously avoided. The dimensions of the pool are from twelve to eighteen feet broad, and three and a half to four feet deep. The flax is placed in a sloping direction in the pool, the root-end downwards, and in regular rows, forming a single layer. The root of one row of sheaves should reach the tie of the next, and, when thus placed, they are covered with moss-sod, or old lea-sod, cut thin and laid close together. In new ponds, a layer of rushes, or rag-weeds, is generally placed on the flax, with the sods above it; and, where sods are not always available, a light covering of straw is used, which, when pressed with stones, keeps the flax just under the water. In this condition fermentation takes place, and, as it continues, additional weight is applied, which is removed when the fermentation ceases, to prevent the flax sinking too deep in the pool. In this state the flax is neither affected by light or air. A small stream of water, however, if allowed to run through the pool, sometimes improves the colour of the flax. The average time of steeping is from eight to fourteen days; but it varies according to the heat of the weather and the condition of the water; and great nicety is required to ascertain when the flax has received sufficient water, a few hours, more or less, being liable to injure it. The farmers, however, more frequently *under*-water than *over*-water their flax. The usual test to ascertain the condition of the flax is to try a few stalks, of average thickness, by breaking the *shove*, or woody part, in two places, about six or eight inches apart, in the middle of the stalk; the woody part is then taken out, and if it comes freely downwards, without breaking or tearing the fibre, the flax is ready to be taken out of the pool. This test is tried about every six hours after fermentation has ceased, as the change is sometimes rapid. The flax should never be lifted roughly from the pool, either with forks or grapes, but carefully handed out of the drain by men standing in the water; and it is generally an advantage to let the flax drain from twelve to twenty-four hours when taken out of the pool, the bundles being placed on their root-ends close together. Care, however, must be taken not to place the crop in heaps, or it will be injured by heating.

Spreading.

The place selected for this operation is, if at hand, a clean, short, and thick pasture-ground, with the weeds carefully mown down to the level of the sward, or removed altogether. The flax is laid evenly on the grass, in thin but equal layers; and, if care has been taken in the rippling process, the bundles will readily separate without being entangled. While on the grass, it is turned two or three times with a rod, about a foot in length and an inch and a half in diameter, to prevent it being discoloured by the unequal action of the sun upon its surface. When there is a prospect of rain, the flax is turned, in order that it may be beaten down a little, and prevented from being blown about.

Lifting.

When the flax has been upon the grass from six to twelve days, it is considered ready for lifting; and, if the weather be showery, the shorter time will be sufficient to prepare it. The general test of its being ready to lift is, to rub a few stalks from top to bottom; if the wood breaks easily, and separates from the fibre, leaving it sound, it has received a sufficient grassing. The most cer-

tain test, however, is to prove a small quantity with the hand-break, or in a flax-mill. When lifting, the lengths of the flax ought to be kept straight, and the ends even, otherwise there will be considerable loss in the rolling and scutching operations. If not scutched immediately after lifting, it is tied up in small bundles, and placed in stacks, loosely built, with stones or brambles at the bottom, which keep it dry, and allow a free circulation of air. Stacks, however, built on pillars are considered the best.

Drying.

The process of drying by fire is generally condemned, simple exposure to the sun being sufficient to prepare the flax for breaking and scutching. In some parts of Ireland, the flax is placed in a damp state to dry on kilns, and in many instances it is burned by excessive heat before it becomes dry, which impairs its rich oily property. In this state the flax is reduced in value nearly one half.

Breaking and Scutching.

There are two modes of breaking and scutching, the one by hand, and the other by the mill; if the first be adopted, the Belgian mode is the best, as it is not so wasteful as that generally practised in Ireland. If scutched at a mill, the fibre should be sent where the best machinery is in use, and where the mill-owner pays his men by the day, and not by the stone, as the scutchers are more anxious to turn out a large quantity than to produce a good yield from the straw.

(To be continued.)

ART EDUCATION AND SCHOOLS OF ART.

Some time ago in reviewing the rise and progress of Schools of Design in England, and endeavouring to account for their natural development into Schools of Art as at present existing, we gave a promise to our readers of making a further examination, and thus laying before them the present condition and operation of the latter. That we have not already fulfilled this promise has resulted from a conviction, then expressed and since borne out by experience, that, in reality, Schools of Art in the United Kingdom are undergoing great and fundamental changes; and, even at this present time, are in a very embryotic state of existence. What has hitherto been done in them, with reference to their constitution and management, has been necessarily experimental: what is now being accomplished is the result of experiments fairly tried in what is to us an untrodden path; and, though we think Schools of Art, and the means adopted by the State for the advancement of art-education generally, a subject of sufficient importance to interest our readers; yet we can only now refer to the subject as a problem in process of solution,—an experiment which has arrived at a certain stage of its existence,—and which, though by no means a perfectly-developed scheme, is so far matured as to offer itself as a fair subject of criticism. It will be impossible, in the narrow limits of our review, to trace the whole history of Schools of Art since their first assumption of that name, or to detail the many and various changes which have occurred in them. It must suffice if we record some of the results achieved in the ten years of their existence.

The Schools of Design were established in order to give an art education to the designer as a means of influencing those branches of manufacture which required skilled workmen to carry them on successfully. The partial success which resulted from this effort on the part of the Government seemed to indicate that a more comprehensive scheme was necessary to achieve such an end. Accordingly, in the year 1851, overtures were made by the School of Design authorities in London, to the Committee of Privy Council for Education, having as an object the introduction of elementary drawing into the national or parochial schools which were under the Committee of Council on Education. These overtures were favourably received, and it was resolved to initiate the formation of drawing classes in national schools by the gratuitous distribution of books and drawing-copies among those schoolmasters who were apparently able to use them, and manifested a willingness to do so. The head-masters of the Schools of Design were charged with the task of distributing these examples.

This, as might have been expected, was as unsuccessful as that which had already been done by the Schools of Design. The school-masters were also to be allowed to study in the Schools of Design gratuitously. The Privy Council for Trade seemed persistently to shut its eyes to the fact that ordinary people value things at precisely the cost of such things, and that to present books and copies, and give the privileges of study to persons who themselves made no sacrifices or exertion to obtain such advantages, was precisely the method best adapted to cause these persons to undervalue the advantages offered. The same mistake which we noticed as having been made in the appointment of masters to Schools of Design on fixed salaries was again reenacted in this minor matter.

In 1853, on the formation of the Department of Practical Art, the system of grants to Schools of Art was entirely re-organized; the errors of the previous directors of the schools were carefully avoided; a masculine and comprehensive scheme of art education was inaugurated; and the foundation was laid of a sound, business-like management, whereby the benefits of art education should be extended to all alike. We must in candour confess that, though possessing many deficiencies in detail, and though the Department has blundered in some cases, as Government offices will; yet the result of the Department's operations is convincing proof of the soundness of its system. Setting minor matters aside, the Department's career has been one long course of unexampled prosperity, which is, in a great measure, due to the masterly manner in which it is conducted.

The first subject which received the serious attention of the new Department was the cost of maintaining the nineteen Schools of Design already in existence. It was found that it would be impossible to establish new Schools of Art on the principle of subsidizing each school by a direct grant. The nineteen Schools of Design existing in 1852 cost the country £7,750, and, as one of the schemes of the Department was to establish a

School of Art in every considerable town in the United Kingdom, the somewhat novel and startling principle was enunciated, that all new schools would have to be founded on the self-supporting system, as far as this was practicable. Other alterations are so well described in the second Report of the Department of 1855, that a quotation from its pages will give the clearest idea of the new system. Speaking of the Schools of Art the late Schools of Design) receiving direct grants from the Department, the Report states that:—

"It was judged expedient that, while the local expenses should be entirely regulated by the committees, which were best able to control them, Parliamentary grants should be devoted to the proportion of instruction, either in fixed salaries paid direct to the masters, in an increase of masters, especially where necessary for public school teaching, in affording aid by means of examples, and in lectures and scholarships. It was also proposed, as an equitable arrangement, and as an inducement to exertion on the part of the masters, that a proportion of the students' fees should be in future paid to them as part of their income, their fixed salaries being at the same time reduced. Accordingly, throughout the year 1853, the grant schools were conducted under the new arrangement; and the result, as described in last year's Report, showed a marked improvement in the attendance of students, as well as in the amount of fees.

"Although the progress in the improvement of the schools was thus considerable, the establishment of the elementary local Schools of Art, which to the number of sixteen were opened in different towns in the course of the year, indicated the possibility of extending to the public increased advantages from the subsidized schools.

"Being in operation together, the new schools were found, upon comparison, to possess many advantages over the old; as they were not only conducted at less cost to the State, but also enlisted a greater amount of local interest in their success, and extended the facilities for instruction to all classes of the community, while they were founded on a system which stimulated the exertion of the masters by identifying their interest with the extension of the instruction afforded by their schools. A further re-adjustment of the grants to the Schools of Design thus became absolutely necessary. It was felt that the expenditure of £7,750 in maintaining nineteen schools would not be justified to Parliament, when sixteen schools were established and carried on, the greater part in a very satisfactory manner, at an aggregate fixed cost of only £160 per annum, and a further liability of £960 in the shape of guarantees of salaries to masters, which liability a year's experience has shown to be rarely called into operation. It was determined, therefore, no longer to ask Parliament to vote specific sums for each locality, but rather to extend the advantages afforded by Parliamentary aid wherever it might be found to be most required and appreciated.

"A circular, dated March, 1854, was issued, in which the old schools were invited to extend elementary instruction to parish schools, and to assist in the promotion of art-knowledge among the operative classes. It was pointed out to the committees that a better guarantee of efficiency, as respects the teachers, could not be afforded than by the certificates of the Department, obtained under the new system after long study and severe training; and that it was desirable to stimulate the teachers to energy and perseverance, when appointed, by the hope of augmenting their income by a commensurate increase of fees. It was also observed, that instead of the appointment of the masters remaining with the Government, and their control partly with the Government and partly with the committees, as must necessarily be the case on the plan hitherto pursued; the appointment and control of the masters ought rather to be entirely in the hands of the local committees, so as to avoid a divided authority; and it was at the same time explained that, although it was not intended to supersede the master of any subsidized school receiving a salary from the Department, the new system would be extended to all, either on the application of committees, or as favourable opportunities arising out of the retirement of the old masters might occur."

It should have been before remarked, that the Department had wholly discontinued the practice of appointing masters to Schools of Art on the mere exhibition of testimonials, and works executed by themselves. A training class for masters had been established previously to the location of the central school at Marlborough House; and the most promising of the students in it, as well as others who joined for the specific object of becoming art masters, were now required to go through a severe course of study, and present themselves for examination, at stated times, for certificates of competency to give art-instruction. It was determined to appoint no masters who could not take these certificates; and though the Department avowed itself averse to sudden or violent changes in the masterships of schools, fair warning was given to all committees that, upon new appointments, certificated masters would alone be recognized, and the new system of self-support from fees and subscriptions immediately be substituted for direct subsidy. This caused a commotion among the subsidized schools. From Manchester, Macclesfield, Sheffield, Dublin, Belfast, Cork and Limerick, urgent protests and remonstrances were received by the Department. The Cork school and Belfast school were closed: at Stourbridge and York, the masters resigned, and consternation reigned supreme amongst the masters, whilst utter dismay seized upon the committees. These manifestations, however, seem to have had very little effect on the Departmental directors. Birmingham, which came under the same regulations, instead of venting its wrath in pithily worded protests and remonstrances. founded on bad arguments and supported by infamous logic, set itself resolutely to work to try the new system; and the result was seen from the report of the head master, who informed the Department that "the influence of the school has been largely extended, and nearly three times more persons are under a systematic course of instruction in drawing at the present time than in 1851; the cost to the public fund is less, whilst the masters are better paid."

Encouraged by this example, no notice was taken of old schools in the agonies of dissolution; but where it was found practicable, as at Leeds, York, Stourbridge, and Coventry, the new system was introduced, with the acquiescence of the committees, and the teaching re-organized and most successfully carried on by the new-appointed trained masters. Manchester consented to try the experiment for a year, and has never had cause to regret its sensible resolution.

The Department resolved also no longer to pay a new master according to the size of his school, or the importance of the town in which it was placed. Instead of this, allowances were to be made according to a scale, regulated by the number of examinations the masters had passed through in London. The whole curriculum of art-education and study was divided into six groups, having a certain number of branches of art in each. For the successful passing, in both theory and practice, of each group, a master would receive an annual allowance of £10: the maximum aid to be given to each teacher was not to exceed £50. Thus a desire to excel in all branches of art-study was generated amongst the masters, when it was seen that direct pecuniary advantages accrued to them from their superior qualifications. Very business-like arguments were used by the Department in explanation of this arrangement. The advantages of it were stated as being—"That, whereas the vote of £7,550 now promotes the instruction of operatives in only twenty places, by means of less than forty masters, non-certificated, the said sum would provide at least 200 masters certificated; and that by the rules and conditions of the appointment the influence of each master would be more extensively distributed." As before remarked, the Department did not interfere with masters already in receipt of direct grants, or make them subservient to this rule, which only applied to new masters.

The most characteristic feature of the new system was the unconditional demand of the Department, that a certain number of National or poor schools should be instructed by the masters of each School of Art. The minimum number upon which a School of Art would be recognized, and the art-masters' certificates be paid, was three, which was afterwards increased to five. It was sought by this means to extend art-instruction among the mass of the people, instead of confining it as heretofore to a small class of adult artisans. It was suggested that all towns possessing a School of Art should have a minimum of one per cent. of the population under instruction in drawing.

To provide for the teaching of elementary drawing in poor schools, the art-masters were allowed to nominate advanced students of the School of Art to assistantships in it; the Department recognizing them as art-pupil teachers, and paying them £10 per annum, besides giving them the advantage of free instruction in the Schools of Art. The sum allowed to assistants was afterwards increased to £20 per annum, and thus remains. Under the direction of the head master these assistants gave to poor schools one lesson per week of one hour's duration for the sum of £5 per annum; though, in many cases, as at present, the art-master himself gave the lesson, and his assistant a second lesson, in the same week, or in alternate weeks. It was a well considered question whether the time usually devoted to drawing in these National Schools, viz., one hour per week, would be sufficient to give the pupils any practical power in drawing. The department was at some trouble to obtain opinions from a large number of art-masters on this point. These opinions were as various as the temperaments of the authors of them. Some flatly asserted that one hour per week, or for forty hours per year (reckoning vacations), was totally insufficient to give even a smattering knowledge to adults, of any subject, and ridiculously so to impart art-instruction to young children. Others, more sanguine, mantained a directly opposite opinion. The examination of children who had received a year's instruction of one hour per week speedily set at rest the vexed question. By means of exercises in the subjects of free-hand drawing, geometry, perspective, and model drawing, worked in the space of forty minutes for each subject, it was found that a very valuable power of drawing had been acquired. The accurate imitation of a form in outline cleanly executed from a copy; the power of remembering, solving, and working out as many as six geometrical problems selected from a text-book containing sixty or seventy problems; the representation in outline of a geometric model drawn freehand from the model itself; and the working out of simple perspective exercises,—all these were found to be executed with facility by children of from ten to fourteen years of age, who had received a year's instruction of forty hours. A method of teaching drawing in these subjects, by means of copies drawn by the teacher on the black board, enabled large classes to be taught simultaneously,—accurate proportions, carefully pointed out to the children,—simple constructional lines used in drawing symmetrical objects, familiar subjects being chosen as examples, through explanation of the terms used in geometrical figures, with test of the accuracy of the problems given, these being attended to by the teachers,—were found to give great interest to the drawing lesson. More than one case has come to our knowledge where a school which has been irregularly attended during the week has been crowded on the occasion of the drawing lesson,—a gratifying testimony to the interest awakened by the new lesson.

Among other reforms introduced by the Department, the re-adjustment of the conditions on which grants of copies for teaching drawing in parochial schools and Schools of Art are given deserves to be mentioned. Instead of presenting such copies gratuitously to poor schools, all schools were required to pay a proportion towards the cost of such examples. Thus Schools of Art and parochial and national schools obtained books, examples, and casts, through the appointed agents, paying the usual price for them, upon which the Department and the agent together allowed a discount of nearly fifty per cent., whilst private middle class schools received a discount of fifteen per cent.; and this arrangement is still in operation with admirable effect. The only drawback to the arrangement is the existence of only one agency in London for the supply of examples, and the consequent prevention of requisitions being made for small supplies of examples, on account of the great delay arising in complying with the demands, and the proportionate important cost of carriage for small parcels. We have no hesitation in predicting the doubling or trebling of the demand for these copies if the Department would make arrangements for the supply of them through local agents in all large towns where a School of Art exists. This would dispense with the cost of carriage and the terrible delay of passing the

copies through the London agent alone. No difficulties seem to have been experienced in inducing Messrs. Chapman & Hall to undertake the agency for casts and examples in London; and we see no reason why respectable publishing or bookselling firms in provincial towns should not be appointed as local agents. Whether appointed by the Department, or by Messrs. Chapman & Hall, is a matter of no moment; for in either case the increased facilities of obtaining the examples would materially extend the demand for them. This is a point we earnestly recommend to the serious attention of the Department's officers, and feel assured it will repay any amount of trouble taken in bringing the suggestion into operation.

The completion of our review, and touching one or two points in the management with which we may be less contented, must form another article. —*Mechanics' Magazine.*

PROGRESS OF THE INTERNATIONAL EXHIBITION.

Notwithstanding the number of days in the last week on which no work was done, partly on account of the national mourning, and partly in consequence of the Christmas holidays, the progress made is very apparent, and may be pronounced to be highly satisfactory. So far has the building now advanced, that it is beginning to assume an air of completeness, which promises well for the easy fulfilment of the contract within the appointed time.

The eastern dome is no longer a cause of anxiety; all the ribs are in their places; three of them are entirely finished, and the others only want the top jointings; in a short period it may be expected to be ready for the glaziers. All the wood-work of the lower portion is fixed, and only waits to be boarded to be protected from the weather. The brickwork of the great arch over the entrance, which has a span of about 80 feet, is completed.

It may be seen that the dome scaffold at the western end of the nave has a somewhat different appearance to its fellow before the raising of the ribs. This is owing to the arrangements which have been made to fix the ribs, which are different from those on the opposite scaffold, and promise an easier and more speedy accomplishment of that object. The brick arch over the western end is also finished, and the arrangements for fixing the ribs being completed, the task itself will soon commence.

The flooring has been carried over the whole of the south-eastern and south central courts; this portion of the work proceeds with a rapidity which is truly marvellous. Visitors can now walk on dry plank flooring over the whole of the southern courts, as well as the long corridors underneath the picture galleries. The offices underneath the smaller or water-colour galleries are also fast approaching completion, so that the staff of her Majesty's Commissioners will soon be enabled to transact business in the building itself when it may be determined to be more convenient to do so.

The brickwork of the refreshment courts has been executed in cement, and will not be affected by the frost. It is nearly finished. The joiners and carpenters works are also in a forward state, and there seems no reason why the structural portions should not be completed with the rest of the building, although such a condition does not form part of the contract of Messrs. Kelk and Lucas. The plastering and decorations will take some longer time. A suggestion has been made that Messrs. Minton should floor the part which forms the entrance to the horticultural gardens with tiles, for the making of which they have obtained so deservedly high and wide-spread a reputation.

Some experiments have been commenced in the nave for colouring the interior, and are still in progress. They are under the direction of Mr. Octavius Hudson, who has obtained so much credit for his works in Salisbury, Ely and Chester Cathedrals, and who is known for his great learning on coloured decoration. It is obvious that as there are large surfaces in the present building which did not exist in the building of 1851, a very different system of colouring will be required, as great quantities of the primitve colours, suitable enough for thin lines, would be inappropriate here.

The acceptances of space are being fast returned from British exhibitors; no less than 2,500 have been received since Saturday last. It is expected that the total number will reach 8,000.

The method adopted for the production of the Illustrated Catalogue appears to be received with favour; many pages have already been taken by exhibitors for the more detailed descriptions and illustrations of their goods.

The Imperial Commission at Paris has issued its 24th bulletin by which it appears that the detailed plans for the arrangement of space are completed. Exhibitors are requested to act, as far as possible, in concert, in order to render the whole exhibition as harmonious and effective as possible. Many of the French exhibitors, after complaining of the smallness of the space allotted to them, and after obtaining twice that allotment, now state that they will be unable to fill even the space originally placed at their disposal. Such a course of conduct threatens to disarrange entirely the plans of the Imperial Commission, who may be put to great inconvenience to induce fresh exhibitors to come forward and fill the vacant spaces. French goods are to be delivered at the railway stations by the 10th of March under the penalty of having the space destined for them transferred to others.—*Journal of the Society of Arts.*

THE LIME LIGHT AT THE SOUTH FORELAND.

Five-and-thirty years ago Lieutenant Drummond brought into notice the oxyhydrogen light, and applied it to a practical purpose. Having been appointed to conduct the Ordnance survey in Scotland and Ireland, he used this light in focus of a parabolic reflector on lofty eminences, where the stations were usually placed, as it was of the greatest importance in those operations to have certain and determinate signals, which could be seen, under any circumstances as to weather, at great distances. Thus he succeeded in connecting the shores in England and Ireland, near Holyhead, a distance of 65 miles, and afterwards, in Scotland, the summit of Ben Lomond with that of Knock Layd, no less than 95 miles apart. It did not escape the comprehensive mind of Drummond to perceive that such a light, if capable of

practical application, would be invaluable for lighthouse purposes. With the means he devised however, he failed to obtain anything approaching practical command over the continuity of the light; and as a light that is liable to go out is inadmissible for lighthouse purposes, it is not surprising that it was condemned

Since Drummond's time, until quite recently, the oxyhydrogen, or lime light, has been used only for the purposes of the microscope, or to produce scenic effects; not that the value of a light of such power and intensity has been lost sight of, but because all attempts to render it practically available in a commercial sense had failed.

The impossibility of turning it to a useful purpose seems to have so taken possession of the public mind, scientific as well as general, that although within the last two or three years, exhibition after exhibition, varying in duration from hours to months, have given the most incontestable proofs that with Bartable's apparatus the lime light can be burned as easily and certainly as a wax candle, yet, with a single but notable exception, not one eminent man of science has been found who has not scouted the idea of its practical utility. Upon almost every occasion of late when our men of science have condescended to mention the lime light, it has been condemned by them as impracticable, and the idea of its applicability to any useful purposes contemptuously dismissed; whilst the assumption that it can be used for ordinary domestic purposes has met with most positive contradiction, interspersed, upon one or two occasions, with assertions as to the available sources and expense of oxygen gas, which, although valueless in themselves, are useful as indicating the amount and accuracy of information upon the subject possessed by some of those who have pronounced the severest condemnations of it. It has been the fashion in scientific circles to condemn the lime light, and there are few amongst those who have not compromised themselves more or less by decrying it; and experience will have taught us that from such we can expect but a tardy recognition of even a fact that is subversive of a long cherished dogma. This prejudice, which has seriously impeded the general introduction of the lime light, is traceable to its usual source—want of accurate information on the subject; for although the means were at hand, not one of those who ridiculed the idea that the lime light had been brought to a state of perfection, rendering its practical application to illuminating purposes easy and certain, took any trouble to make such an investigation as to the alleged fact as could justify the expression of any opinion at all. The public at large took the view of the *savans*, whose opinions were readily adopted and disseminated by those who are interested in the continuance of the present methods of producing artificial light; whilst the verdict of gas engineers, scientific advisers to Gas Companies, and other vested interests, upon the lime light was such as a notorious poacher might expect at the hands of a jury composed of cock-pheasants.

In the mean time, however, whilst the learned condemn it, and capital fought shy of it, the light went on burning steadily—carefully watched, examined, and, in course of time, appreciated by one, at whose hands truth never suffers, imposture is never spared, and whose opinions are ever formed for himself by patient and careful investigation, and not expressed until all doubt has been removed. Without having been made aware of the exact conclusions arrived at by this investigation, it must be supposed to have been favourable, as it led to a decision on the part of the Trinity Board to give the light a fair trial in a first order lighthouse, for which its peculiar qualities are preëminently fitted. To this end a contract was entered into with the Universal Lime Light Company by the Elder Brethern for the exhibition of the light in the South Foreland Lighthouse for three months, and upon its success will in all probability, depend its extensive adoption for the purposes of coast lighting The light was introduced on the 26th of August, and has continued to burn steadily and brilliantly every night since its substitution for the oil light. Indeed, after the report of Mr. Page, the engineer of Westminster bridge, upon the success of the lime light which for two months illuminated the finished part of that structure, no doubt can exist as to the facility with which it can be maintained for no case of failure occurred there in maintaining regularly eighteen lights in nine different lamps where the operation of making the gases had to be conducted upon temporary platforms, suspended between wind and water, and the whole arrangements necessarily of an incomplete and temporary character, added very largely to the ordinary risk of a failure occurring. The lamp at the South Foreland is fitted with eight burners, to meet the requirements of the Fresnel apparatus, which is composed of eight panels: only six out of the eight burners, however, are required, as the two panels towards the land are darkened. The manipulation of the lamp is perfectly simple, not necessitating an amount of intelligence greater than is required in the case of an ordinary Argand lamp. When the time for lighting comes the lime wicks are inserted, the clock which moves them wound up, and the gases turned on, and no further attention is required until the hour arrives for putting out the light, when the gases are turned off, and the clock is stopped; the lime wicks are then removed, and nothing further remains to be done. The brilliancy of the light has not escaped the notice of our friends on the other side of the Channel, many of whom have been over to visit it. It is but fair to state that the present apparatus in which the lamp is exhibited is not calculated to give the maximum effect, having been especially adjusted for the usual Argand oil lamp, which differs from the lime light in the essential particular of focal distance, which is measured from the centre of the former, but from the surface of the latter; the lime light, therefore, although of the same diameter as the oil flame, is too near the lenses by half its diameter—in this case by 1¾ inches. It is to be hoped that this light will be tried both in a French apparatus, specially adjusted, and in the focus of a paraboloid, for it appears to possess every element, rendering it by far the best light for coast purposes ever introduced.

Amongst other attributes of the lime light is another of the very last importance. It is not effected by wind, even though unprotected by glass. At Liverpool, where the lime light was exhibited for

two months upon the landing stage where the Birkenhead ferry boats ply, this property was most severely tested. One night a gale of wind came on, and increased in violence until the glasses of the lanterns were dashed in, and the light was exposed to its full power. No apparent effect was produced upon them, for they continued to burn as steadily and brightly as before. It has happened not so unfrequently as might be imagined, that the glass of our lighthouses has been broken, in violent gales, and the light blown out.

THE RUSSIAN PACIFIC TELEGRAPH.

The plan for establishing a telegraph line connecting Europe through Siberia with the Pacific Ocean has, during four years, had time to take shape and form, so that, at the commencement of the present year, the supreme sanction was given to the project for constructing a telegraphic line in the counties bordering on the Amoor and Oussouri, from Nikolaiewsk by Kabarovka to the port of Novgorod, (1,900 versts,) the most important point of the possessions recently annexed to Russia on the sea of Japan. The establishment of this line is undertaken by the Ministry of Marine, at its cost and under its direction; and at the same time the superior direction of the means of communication (Board of Works) has commenced the construction of a line starting from Kasan in the direction of Siberia, which proposes opening at the end of the present year a telegraphic communication from Kasan to Omsk, (1,900 versts) and continue it afterwards to Irkutsk, a distance of 2,475 versts from Omsk. Thus, probably within two or three years, on the one side there will be telegraphic communication between Europe and Asia to Irkutsk, and, on the other hand, our new colonies on the Amoor and Oussouri will be connected with each other, and with our principal ports on the Japanese waters. Thus of the extent of 10,000 versts, which the Siberian telegraph will embrace, there only remains the central portion, that of Irkutsk by Kyachta to Kabarovka, about 3,500 versts, where as yet nothing had been settled; but it is beyond a doubt that as soon as the works actually projected shall have been successfully completed, this intermediate line will be constructed, and thus, within four or five years at the latest, the gigantic project of a telegraph from Europe to the distant lands on the shores of the Pacific Ocean will be realized. The year 1861 promises to be a memorable one, if we consider the great questions which will receive a solution. Among those questions we must place the commencement of a durable connection and the establishment of rapid communication between Siberia and civilized Europe, and the apparatus of the electric telegraph on the virgin shores of the Amoor and Sea of Japan. It seems needless to point out the importance and usefulness of so vast an extension of improved communication by the promoters of civilization and commerce.—*St. Petersburgh Gazette.*

Colonel Romanoff, of the imperial Russian engineers, was introduced to the members of the New York Chamber of Commerce, October 11th, to lay before them the project of a telegraphic line to run from St. Petersburgh to some point on the eastern shore of Siberia, and from thence to the Russian possessions on this continent.

The great overland telegraph to be erected, will, when completed, form a direct chain of communication throughout the world. It was first started in accordance with an ukase from the Emperor of Russia, issued in 1858, since which time three thousand miles of it have been laid from St. Petersburgh to Omsk, in Eastern Siberia. Moscow, three thousand five hundred miles from that point, will be the principal station. The wires will go over Behring's Straits, a distance of forty miles, the currents of which depend on the winds, and are never beyond three miles. The widest gap in the Straits is eight miles. The line will cross from Omsk to Orkutsk, thence to Kyachta— the great *entrepôt* of commerce from Siberia to China; from that point it will be continued to the Altai Mountains to Cheta, and thence to Nicoleisk, at the mouth of the Amoor River. This will end the Russian project which has been guaranteed by the government. The propriety of continuing the line to the United States is now under advisement, and the project is considered easily practicable, involving only an additional outlay of $1,000,000 or $3,000,000, according to the route taken, The following table shows the number of miles to be embraced by the whole line:

	Miles.
St. Louis to San Francisco, (1,800 miles finished,)	2,000
San Francisco to Prince of Wales' Cape,	2,600
Behring's Straits (submerged,)	40
East Cape to mouth of Amoor River,	2,400
Amoor River to Moscow, (1,200 miles finished,)	7,000
Total	13,940

Count Romanoff states that the line will be completed to Irkutsk in about a year, which will enable the merchants of London to communicate with Pekin in fourteen days. It has been proposed to extend it from the mouth of the Amoor to Jeddo, Japan, which will involve but three submerges— one of six miles, one of eight and another of twelve. Count Romanoff also stated that the cable sunk in the Red Sea by the British government, to communicate with India, was eaten by insects, with which the water abounds, after it had successfully operated for about three months, and it is now considered impracticable to renew the enterprise at that point. The British government had appointed a commission to inquire into the causes of the failure.

American vessels frequently sail to the Amoor with spices, tea, coffee, iron, &c., and the establishment of telegraphic communication between the United States and that point, and Russia in general, must tend to increase the trade between both countries.

Col. Romanoff will prosecute his inquries in the United States for about two months, and then return to Russia. Mr. Collins, in the mean time, will give him many of the facilities necessary to his mission.

The proposed line will unite all the telegraphs in the world, without crossing the Atlantic Ocean, so that the great "cable" enterprise need not be resuscitated. The cost is set down for two wires at $3,000,000. To maintain this line, one thousand men, at $300 each per annum, would become

necessary, making a total of $300,000. To this force it is proposed to add one hundred stations, at $1,000 per annum; two supply vessels at $40,000; interest on capital at 7½ per cent. per annum, $210,000; contingencies, $100,000. Total, $750,000. It is calculated that 300,000 messages, at $5 each, would be received, making a total of $1,500,000 revenue.

THE DELETERIOUS EFFECT OF LIGHT ON POTATOES.

The influence of light on vegetation is now regarded as a matter of the utmost importance, and although the precise mode of action may not be always understood, yet powerful effects of it are everywhere perceptible. In its absence leaves become blanched that would otherwise be green. Roots that are white underground become green when exposed. Turnips, white beneath, are green or perhaps red above, and many kinds of fruit, naturally pale, color under bright sunlight. By the action of light on leaves, the different secretions peculiar to plants are formed, such as gum, sugar, starch, oils, and even, in certain kinds of plants, deadly poisons. In some plants, too, the secretions due to the action of light are in certain portions harmless and nutritious, whilst in other parts of the same plant, through the same agency, highly deleterious principles are formed. The potato offers an example. Everybody knows that its tubers contain wholesome food, and it is also generally known that the stems, and especially the apples or seed vessels, are deleterious. But the treatment to which the potato is sometimes subjected is calculated to develope the poisonous quality in the tubes themselves, a change which can only take place during exposure to light. The poison found in the green parts of potatoes is called "solanine." This exists in several species of Solanum, and is found in considerable quantity in the shoots of potatoes. To obtain it the shoots are bruised and acted on by water acidulated with sulphuric acid. It is very poisonous. (Turner's "Elements of Chemistry.") Liebig says it is a powerful poison.

Although the stems of potatoes, according to the authorities just quoted, contain in notable quantity the noxious and easily-extracted principle, so dangerous in its concentrated form, yet the tubers grown underground and kept in the dark are floury and white when cooked, if the variety of potato is good, and quite free from acrid taste, which is one of the characteristics of solanine, and a sure indication of its presence. But the potato tuber is in reality a sort of stem; for it is furnished with buds, which, under favourable circumstances, push into shoots, as buds do on stems above ground. It is therefore, highly susceptible of the influence of light; for although both its skin and flesh are white, they soon become green by exposure; and the continued presence of light renders them as green as stems above ground. It is said that pigs have been killed by giving them potatoes greened to this extent. Such, of course could not be sold for human food. For this purpose potatoes exposed to light must be housed or otherwise shaded before the green tinge is apparent, at least to the naked eye. But under the impression that the tubers keep better after having well basked in the sun, many cultivators are in the habit of turning them up, and spreading them out on the surface of the ground in bright sunny weather. This has the effect of greatly deteriorating their quality. Notwithstanding disease, really good potatoes can be found; but even slightly diseased ones, with the infected portions cut away, are infinitely better than quantities of others which, though they have a goodly appearance, have been greened. Instead of being white and floury when cooked, they are yellow, and have a disagreeable acrid taste, which can scarcely be disguised, or, if it should, there is no proof that the deleterious effects of the acrid principle are counteracted. At all events, it would certainly be very desirable that such means should be adopted as would prevent that principle being generated, or in other words, the tubers should be kept as much as possible in the dark instead of exposing them to light. The advantage of exposure as regards better keeping is doubtful, whereas the deterioration it occasions in the quality of the tubers as an article of food is certain. I have thus endeavoured to draw attention to the subject, and it is the duty of every one who is aware of the deleterious effects of light on the potato to explain it to those who are not; for a knowledge of it, if acted upon, would prove beneficial to both rich and poor.—*The Gardener's Chronicle and Agricultural Gazette.*

THE GOLD MINES OF NOVA SCOTIA.

A paper was lately read on the above subject by Principal J. W. Dawson, of McGill College, before the Natural History Society of Montreal. He says, "There is little room to doubt that gold will be found throughout the entire coast metamorphic district of Nova Scotia. Careful examination may show that the gold occurs chiefly or entirely in the veins traversing certain bands of the thick beds of slate and quartz rock in these districts; and these may be recognized by their mineral character, especially if defined in their relation to the other beds by a detailed survey of the productive localities."

In the last number of *Silliman's Journal* there is an article on this subject by O. C. Marsh, A.B., of the Scientific School, Yale College. He states that there is a belt of metamorphic rocks extending the whole length of the province of Nova Scotia, varying in width from ten to fifty miles, and that it is composed mainly of clay slate and quartzite, replaced by mica slate, gneiss and granite in some sections. This coast range, according to Prof. Dawson, probably belongs to the old silurian. Mr. Marsh has visited the Tangier mines, situated sixty-seven miles east of Halifax. The strata which contain the gold consist of clay slate, traversed with compact veins of quartz.

The strata is much disturbed, and an examination for fossils was unsuccessful, the igneous action so evident in this region had probably obliterated all traces of such. Perfect fossils, however, have lately been discovered near St. John, New Brunswick, in clay slate. The gold at Tangier occurs mainly in the quartz veins, which are about one foot in width. Gold, in no small quantity, has also been found in the soil and in the bed of a small stream near the mines.

Among the specimens of gold obtained, Mr. Marsh noticed three isolated crystals which resembled in general appearance those brought from California. The mines at Tangier are on government lands; a claim of 30 by 33 feet is rented at $20 per annum, and during last August 700 men were working on the claims, and a large amount of gold had been taken, but at least one-third was lost by the rude mechanism used for its extraction. One apparatus used consisted of two large granite boulders attached by short ropes to a horizontal beam on either side of an upright shaft, and two horses dragged them round about, as in the old horse gin. The quartz was put on a paved floor, and kept wet, and was crushed by the two boulders as they were dragged over it.

At Lunenburgh, about seventy miles west of Halifax, and about one hundred and thirty from Tangier, the gold also occurs in quartz veins, traversing the clay slate. This locality has yielded large quantities of gold with very little labor. These mines are upon the sea shore. Mispickel is abundant, and its presence makes gold washing among sand very troublesome. "While at Lunenburg," says Mr. Marsh, "I was informed of a circumstance connected with the discovery of gold, which illustrates the utility of even a little scientific knowledge, and the need of its more general diffusion. Some years since, a farmer living in the neighborhood of Chester, thought he had discovered a valuable copper mine on his land, and at great expense he sunk a shaft about 80 feet in depth. Finding little copper to repay his labor, and having exhausted all his means, the work was finally abandoned. In his exertions he had cut through a large quartz vein richly stored with gold, which he had noticed, but supposed it was merely copper pyrites. The present owner works this copper mine for gold."

The Tangier gold of 18.95 specific gravity, as analyzed by Mr. Marsh, contains, gold, 98,13 parts; silver, 1.76; copper, .05; iron, a trace. The Lunenburg gold is very similar in composition. The metamorphic strata of Nova Scotia are similar to the gold-bearing rocks of other countries, and are of vast extent. The extraction of the gold at these mines by quicksilver had not been commenced hence all the finest gold was lost in the washing The total amount of gold hitherto obtained has not been ascertained.—*Scientific American.*

INKS.

Black Permanent Ink.—Nitrate of silver 2 parts; distilled water 28 parts; sap green 1 part. Dissolve.

For the Mordant.—Common soda 2 parts; gum arabic 1 part; soft water 8 parts. Mix, and moisten the linen with this fluid, and well dry before using the ink.

Yellow Ink.—1. French berries 1 pound; alum 2 ounces; water 1 gallon. Boil and strain, then add gumarabic 4 ounces.

2. Water 30 parts; Avignon berries 7 parts; gum and alum each 5 parts. Boil for one hour, and strain.

Blue Ink for Ruling.—Take 4 ounces of vitrol, best quality, to 1 ounce of Indigo; pulverize the indigo very fine; put the indigo on the vitrol, let them stand exposed to the air for six days, or until dissolved; then fill the pot with chalk, and add half a gill of fresh gall, boiling it before use.

Black Ink for Ruling.—Take good black ink, and add gall as for blue; do not cork it, as it will pre vent it from turning black.

Red Ink for Ruling.—One pound of Brazil wood to one gallon of the best vinegar; let the vinegar simmer before you add the wood, then let them simmer together for half an hour, then add three quarters of a pound of alum to set the color; strain it through a woolen or cotton cloth, cork it tight in a stone or glass bottle. For ruling, add half a gill of fresh gall to 1 quart of red ink, then cork it up in a bottle for use.

Indian Ink.—1. Take finest lamp-black, and make it into a thick paste with thin isinglass; size, then mould it; attach the gold leaf, and scent with a little essence of musk.

Carbon Ink.—Dissolve real India Ink in common black ink; or add a small quantity of lamp-black, previously heated to redness, and ground perfectly smooth with a small portion of the ink.

Gold and Silver Ink.—Fine bronze powder, or gold or silver leaf, ground with a little sulphate of potash, and washed from the salt, is mixed with water and a sufficient quantity of gum.

Gluten Ink.—Dissolve wheaten gluten, free from starch, in weak acetic acid of the strength of common vinegar; mix 10 gr. of lamp-black and 2 gr. of indigo with 5 oz. of the solution, and a drop or two of oil of cloves.

Ink for writing on Zinc Labels—Horticultural Ink.—1. Dissolve 100 gr. of chloride of platina in a pint of water. A little mucilage and lamp-black may be added.

2. Sal-ammoniac 1½ dr., verdigris 1 dr., lamp-black 1 dr., water 10 dr. Mix.

Chrome Ink.—Extract of logwood ½ oz; gum ½ oz; water a pint. Dissolve also in 12 oz. of water ½ oz. of yellow chromate of potash (or ¼ oz. each of bichromate of potash). Mix the two solutions. The ink is ready for immediate use.

Ink for writing on Steel, Tin Plate, or Sheet Zinc.—Mix 1 ounce of powdered sulphate of copper and ½ ounce of powdered sal-ammoniac, with 2 ounces of diluted acetic acid; adding lamp-black or vermillion.

Indelible Ink for Marking Linen.—1. The juice of sloes 1 pint; gum ½ ounce. This requires no mordant, and is very durable.

2. Nitrate of silver 1 part; water 6 parts: gum 1 part. Dissolve. If too thick dilute with warm soft water.

Autographic Ink for Lithographers.—White soap 25 parts; white wax 25 parts; mutton suet 6 parts; lamp-black 6 parts; shell-lac 10 parts; mastic 10 parts. Mix with heat, and proceed as for lithographic ink.

To restore writing effaced with Chlorine—1. Expose it to the vapour of sulphuret of ammonia, or dip it into a solution of the sulphuret.

2. Ferrocyanide of potass 5 parts; water 85 parts Dissolve, and immerse the paper in the fluid, then slightly acidulate the solution with sulphuric acid.

Miscellaneous.

British Newspapers.

There are 210 newspapers of all descriptions, published in London and the metropolitan districts. of these twenty are published daily; five of them being devoted exclusively to commercial and shipping affairs. Of the religious class, nine are conservative, advocating the opinions of the Church of England; seven are liberals, and advocate the various opinions of dissenters; and four defend the Roman Catholic creed. Seventeen journals are exclusively dedicated to various branches of commerce; nine papers attend to the concerns of railways, engineering, mining, and building. Agriculture is attended to by eight papers: and the turf, the prize ring, and what the French term *Le Sport*, by seven. Law supports four journals, and medicine the same number. Rifle volunteers and military subjects in general, are attended to by six. Musical matters and the theatre each occupy two journals. Three weekly papers criticise new books. The Pawnbrokers and the police have each one journal; court and fashionable matters have two.

In the thirty-nine counties of England (excluding Middlesex) there are about 580 journals, published at various prices, ranging from 1d. to 5d., nearly one-half the number being sold at 1d.; 230 of these support liberal political and religious views; 110 are conservative, or liberal conservative: 47 call themselves independent, and 193 are avowedly neutral.

The increase in the number of newspapers within the last twenty years may be counted by hundreds, and the circulation by hundreds of thousands. One of the penny dailies has a circulation of seventy thousand, and one of the cheap weekly more than three times as many. The political influence of a newspaper is not always in proportion to its circulation. The *Times* does not circulate sixty thousand copies daily, yet its influence, both on government and throughout the country, is incomparably greater than that of any other journal.

Wales publishes 32 papers; 28 printed in English, 4 in Welsh; of these, one third is liberal, another third neutral, and the remainder various shades.

Scotland publishes 160 papers; of which 90 are liberal, 17 conservative, 14 independent, and the remainder style themselves neutral.

Ireland numbers 138 newspapers; of which 38 are liberal and 38 conservative, 11 independent, and the remainder neutral.

There are 32 papers published in the Isle of Man, and the Channel Islands.

The brief summary is 1,142 in number; of which 464 are liberal papers, 190 conservative and liberal conservative, 83 independent, and the remainder neutral.—*Scientific American.*

Important Telegraph Discovery.

An English paper makes public the discovery of a "telegraphic cable" and a mode of working it, that renders distance and the media through which such cable is laid, an auxilliary instead of an obstruction, obtaining supplies of power from a hitherto unsuspected source. The invention is the product of William P. Piggott, of London, an eminent medical electrician. The peculiarity of the cable is that instead of requiring an enormous electrical charge to be forced through the whole length of a line by powerful batteries, at each successive transmission of a signal, as at present, in long sea and land routes, the wire continues statically charged as it is laid, whilst the least disturbance of the equilibrium of this passive electric charge—inoperative and uninfluenced until called into action by the operator—answers through all its length to the slightest transmitted influence, and so serves every practical purpose. The enormous tension that electric cables now undergo, arising from the great power of the electric current required for long distances, and which is believed to have caused the failure of all marine cables more than three hundred and fifty miles long hitherto laid, is thus obviated. The earth currents, which have previously been great obstacles, are absorbed and utilized. The cable depends for its supplies, either on the voltaic current created by bringing together wires of different electric property in its construction, or by self-acting generators placed at any desired distances throughout its length, as so many relays of power absorbing from the moisture of surrounding media, whether air, or earth, or sea, enough electricity to become statically charged; and so, at the slightest impulse, is capable of conveying communication to any conceivable distance. The invention is in the hands of the British government. Not its least merit is the probability that it will reduce the cost of telegraphic communication to a fifth of the present rates.

Manufactures from Human Hair.

In the Zoology section of the British Association Mr. Danson offered a few observations on the manufacture of human hair as an article of consumption and general use. He submitted for inspection specimens of articles manufactured from human hair, and which appeared to be of a very massive and heavy character. The paper ran thus: Truth goes further than fiction; therefore I can say my sister conceived the idea, and caused the collection of about 3,500 pounds of human hair, in a few months in Liverpool, by one female, who was merely assisted by her husband and son in carrying it out, received £1 to £2 per week.—We had two shawls made from it—cotton warp, (exhibited to the section.) It is extremely warm and durable clothing; and with care and attention any quantity of the stuff can be obtained, It would appear fabulous to say that 100.000 or 200.000 bales might be obtained perhaps 500.000 or 1,000, 000, could be obtained, even within twenty-one years, that is, annually, and of all sorts, both long and short, and of all which is at present wasted and not enumerated in the articles of commerce or of general consumption. I am authorised to state that this has been in the possession of Messrs. R. W. Ronald and Son, of Liverpool, for some years, who will forward 100lb weight to any consumer on receipt of a post-office order for £2 15s. (The items making up this sum, commission, &c., were enumerated.) The article is as collected; and heavy foreign sheep's wool, in dirt and grease,

being 6d. to 14d. per lb., shows its cheapness for consumption generally. The Manchester goods are exchanged in Germany for long hair, which is sold in London. There are 3,500lbs. in seven bales, and insured in the Manchester Fire Office for £200; so any one can test their existence by policy 180, 631. The manufactured goods can be shown at the Great Exhibition in 1862! and if it were collected in factories the value would be quarterly-divided, and added to the saving's bank deposit. At the conclusion Mr. Danson suggested that specimens of these works should be placed in every museum in the kingdom, and trusted that the Smithsonian Institution would give the question their ablest support. Dr. Lankester observed that he thought the adoption of that manufacture would be a source of profitable industry. The girls in Germany and France looked forward every year regularly for pocket money by the sale of their hair, considering it as a harvest. The French girls, with their dark hair, usually got from 30s. to 40s., whilst the lighter hair of the Germans realised less. Mr. Danson said the human hair was capable of being made into the finest fabrics for ladies' wear.

British Railway Statistics.

Returns just issued cover two years—1859 and 1860—and show the annual traffic of all kinds, and the annual working expenditure, in the bulk and in detail. There were at the end of 1860, 10,433 miles of railway in use, or 431 miles more than in the previous year. The total passenger traffic over these lines was 163,435,678, or 13,678,384 more than in 1859.

The total returns from all sources of traffic in 1859 was £25.743.502, and in 1860 this was increased to £27,766,662. If we turn to the table showing the working expenditure, we find some striking figures. The actual cost of working 10,433 miles of railway in the United Kingdom is £13,-189,368. In this item are included £2,437,362 for maintenance of way; £3,801,282 for locomotive power; £3,699,708 for traffic charges, (coaching and merchandise;) and no less than £181,170 for "compensation," a charge alone of 1.37 per cent. The great items of expense are thus:—maintenance of way, locomotive power and traffic charges; but repairs and renewals of carriages and waggons swallow up the £1,118,784, and there is a comprehensive item for our old acquaintance, "sundries." Thus it comes about that the proportion per cent. of expenditure to the total revenue is, in England, 48, in Scotland, 44, in Ireland, 45, per cent. Scotland, therefore, seems to have the most cheaply managed lines, and Ireland where railways pay no government duty, exceeds by one per cent the Scottish cost of management. These enormous figures explain the comparatively low dividends of railway companies; for the £14,561,118 available for division has to be distributed among the shareholders who have contributed the £330,000,000 of capital sunk in our railways.

A Canadian Flax Mill.

The Paris *Star* contains an account of a visit to the flax mill of Mr. J. Brown, situated in Warsaw, township of Bleinheim, near the Richwood Station of the Buffalo and Lake Huron Railroad. The *Star* says: Mr. Brown has cultivated 180 acres of flax this year, and two hundred and twenty acres more; so that when the season's operation are complete, he will have prepared for market the product of four hundred acres. The Wolverton Mill is in charge of Mr. William Armour. The flax-straw comes to the mill in small bundles or sheaves, denuded of the seed, and with the pith so much decomposed as to be easily separated from the fibre. In this state it looks very much like hay tied up in small bunches. The first process through which it is put is one designed to break the pith into fragments. This is done by passing the straw repeatedly through heavy-fluted iron rollers. When the pith is sufficiently broken, the straw is taken to another machine, consisting of a series of knives about two feet long, made to revolve rapidly, each knife striking the straw as it passes and pulling out the pith from the fibre. This has to be done repeatedly, handful by handful till the whole is reduced to a bunch of soft silky fibres. In the last mentioned process a quantity of short fibre is pulled out with the refuse pith, this is tow and is used in the manufacture of coarse cloth.—*Essex Journal*, December 14th, 1861.

TO INVENTORS AND PATENTEES IN CANADA.

Inventors and Patentees are requested to transmit to the Secretary of the Board short descriptive accounts of their respective inventions, with illustrative wood-cuts, for insertion in this Journal. It is essential that the description should be concise and exact. Attention is invited to the continually increasing value which a descriptive public record of all Canadian inventions can scarcely fail to secure: but it must also be borne in mind, that the Editor will exercise his judgment in curtailing descriptions, if too long or not strictly appropriate; and such notices only will be inserted as are likely to be of value to the public.

TO CORRESPONDENTS.

Correspondents sending communications for insertion are particularly requested to write on one side only of half sheets or slips of paper. All communications relating to industry and Manufactures will receive careful attention and reply, and it is confidently hoped that this department will become one of the most valuable in the Journal.

TO MANUFACTURES AND MECHANICS IN CANADA.

Statistics, hints, facts, and even theories are respectfully solicited. Manufacturers and Mechanics can afford useful coöperation by transmitting descriptive accounts of Local Industry, and suggestions as to the introduction of new branches, or the improvement and extension of old, in the localities where they reside.

TO PUBLISHERS AND AUTHORS.

Short reviews and notices of books suitable to Mechanics' Institutes will always have a place in the Journal, and the attention of publishers and authors is called to the excellent advertising medium it presents for works suitable to Public Libraries. A copy of a work it is desired should be noticed can be sent to the Secretary of the Board.