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

MAY, 1865.

FLAX: A STUDY FOR THE POLITICAL ECONOMIST.

The writer of this, and of the article in the last number of the Journal, "On the Commercial Interest in Flax," after upwards of 20 years' practical experience in the cultivation of that crop in the north of Ireland, coupled with a study of its manufacture and the attention he has bestowed on it as a scientific subject, has, in his sojourn in Canada during the past year, been led to inquire minutely into the subject in relation to this Province; and by careful inquiry into what has been here done in the matter, and by personal inspection of the crop growing, as well as of its produce in its various stages of preparation and manufacture throughout the Upper Province, he has placed himself in a position to form an impartial and decided opinion, not hastily arrived at, on the subject.

Feeling as he does a peculiar interest in promoting and encouraging it, and convinced of its being adapted to the wants of Canada, he cannot conceal from himself the fact that the material produced here at present will only be profitable to the farmers so long as the present high prices are maintained; and that flax must soon cease to be extensively grown in Canada, unless prompt steps be taken to secure it as a staple crop and trade, by improving its quality. This is to be done by the importation of foreign seed—sowing a greater quantity of seed to the acre—and more skilfully preparing the fibre than can possibly be done by the process of dew rotting, now almost universally practised in this Province. Farmers and preparers of flax must learn to improve their mode of operations, else the cultivation of the plant will be unprofitable, and will be abandoned by the farmers. Private enterprize alone is not sufficient to attain the object—the government of Canada should give aid, as other governments have done in the matter.

The article on "the Commercial Interest in Flax" may be said to be merely an introductory chapter, on a subject of much interest, which involves the consideration of how it should be dealt with by the political economists of the Province. They have duties to fulfill with regard to it of which they do not seem to be fully aware, simply because the importance of it has not presented itself to them in its true light. No doubt the subject was agitated several years ago, and led to enquiries being set on foot through Commissioners sent specially for the purpose to the British Islands and other European countries, and to the United States. The reports made by the Commissioners were not, at the time, deemed to attach such importance to the subject as to justify the interference of the Government; though subsequent experience has proved that had some expense been then gone to, the country would have derived at least some profit to remunerate them for the expense of their Commissioners in search of information. Since that time, more especially within the last few years, further enquiries have been made by Committees of the Legislative bodies, and information has been elicited which it is to be hoped may ultimately lead to the result of something substantial and practically useful being done by the Government of the Province. The Farmer looks to the Agricultural Societies; they lack means and appeal for them to the Government which approves of the object for which the aid is asked, but which, being composed of faithful trustees of the people, must ask the advice of the people's representatives before they consent to appropriate any of the public funds. Enquiries are made of Committees; dissolutions of Parliament—Recesses—and adjournments in their turn cause delays, but it is not likely that the matter can remain neglected much longer; its merits have been admitted by the Ministers of Agriculture in their reports of 1863 and 1864, and it only remains to be discussed whether it is entitled to any aid, and what the nature of that aid should be. It may be said that this is a matter in which farmers and commercial men should be left to themselves—that their own interest will cause them to do all that is necessary in the case. This might be so, were the benefit to be derived from it to extend no further than the merchant and farmer; but the advantages to be gained from the success of Flax cultivation and its manufacture would be a national profit. It is not merely that the failure of the wheat crop in Canada renders absolutely necessary the substitution of some other crop in its stead; it is not because flax is the most profitable crop that a farmer can grow, that gives it a claim on the interference and aid of the Government. It is because it is a means of developing the resources of the country, and of increasing the national wealth and prosperity by the profitable employment of its soil, climate, and existing population, and by attracting to the Pro-

vince additional population and capital. To the Political Economist belongs "the science of the laws which regulate the production, accumulation, distribution and consumption of those articles or products that are necessary, useful or agreeable to man, or possess an exchangeable value; its object is to point out the means by which the industry of man may be rendered most productive of wealth, and to ascertain the circumstances most favorable to its accumulation, &c."

A general desire for wealth seems natural to men in a civilized state. The wants of man impel him to labour to create a supply, and this supply is procured, as is wealth, by the application of labour to the matter which nature supplies. The combination of labour and matter is the means of production of not only the actual necessaries and luxuries of life, but of that wealth which all individuals and nations are in pursuit of.

In Canada, the nature of the climate is such as to drive out of work numbers of persons during the winter months, and to provide employment for such would be a sure way of adding to the national wealth. Matter to be acted on profitably by labour is abundant. The soil forms part of such matter; but not only does the soil contribute to it, but the very atmosphere is a bountiful giver. In no production is this so well exemplified as in flax fibre; it is solely the production of that element. The soil contribute the various materials of which the "boon" or shave, and also the seed, is formed; but the fibre, which is the valuable portion of the plant, is only composed of or created by air and water. Burn it and it leaves nothing behind; but burn the seed or the shove, and ashes are produced, which contain all the solid mineral matter extracted from the soil. To develope such resources is surely a work not unworthy of the Political Economist and Legislator—he will not be required to descend into the detailed operations; but let him devise a system and provide the means necessary to aid it. Of the importance of the various branches of this trade so much has been already presented, that it is almost needless to allude to that part of the subject.

The object of the writer of this article is to demonstrate the amount of wealth which may be realized out of this business in Canada, by showing what it has done for other countries, by pointing out the circumstances and exertions which led to the successful establishment of the linen trade in Ireland—in order to prompt to reflection some of the legislative wisdom of the Province, to devise plans to aid in forwarding and encouraging the cultivation of flax, and the manufacture of its products here. There is no part of this plant but is convertible into some use. It consists of the boon, shove or straw, the fibre, the rezinous gum which binds the straw and fibre together, &c. The seed producing oil, mucilage, food and medicine. The fibre is the most valuable of all the constituent parts, and the greatest amount of money is made by those countries where the fibre alone is made the object. The straw, boon or shove, separated from the fibre produces fuel, which is found a useful and economical means of raising steam at factories where the flax is prepared, whilst the ashes left from it, containing all the matter extracted from the soil, is capable of restoring again to it much of the fertilizing qualities of which it has been robbed by the production of the crop. The rezinous gum which bound the straw and fibre together, has been carefully collected and utilized as food; and the water in which flax is prepared by decomposition, has been found to be a most valuable liquid manure. The seed-bolls afford the husks which can be made useful as food for cattle, and also contain a gummy mucilage. The seed produces oil, meal, and cake for food, and mucilage. The use of Linseed for outward and inward applications, is well known to medical men. None of the parts of the plant are useless—though, owing to want of economical means of preparation, some of them may not be found worth the labour they would cost.

The writer has not at hand statistics as complete as he would desire, to enable him to detail the particulars of the money value of Linseed, within the last few years; and it has increased greatly from what it was at the time of the returns he is obliged now to content himself with. The oil cake imported into the United Kingdom of Great Britain and Ireland, was in 1849, 59,462 tons; 1850, 65,051 tons; 1851, 55,076 tons; 1852, 53,616 tons.

In 1849, oil cake to the value of $111,000 was exported from the one port of Shanghai, in China.

In 1856 England imported about $16,000,000 worth of flax seed for sowing and oil crushing, and in the same year nearly $2,000,000 worth of the same kind of seed was imported into Boston. In that year the United States imported linseed oil from England alone, to the value of $700,000; and in 1859 of the seed itself to the amount of nearly $2,500,000, chiefly from the East Indies. In 1850 the flax mills of the United Kingdom "were able to spare for foreign countries between three and four millions of yards of linen, besides lace, thread and yarn, to the value of about a million and a quarter sterling" (Dodd's Curiosities of Industry). The same author writes that—"the value of the seed wasted in Ireland in 1851

was $1,500,000." Mr. Kirkwood (from the Parliamentary returns) computed that in 1853, Great Britain imported 70,113 tons of flax valued at £60 per ton, or £4,206,780; and if we add to this the quantity that year produced by Ireland (about 40,000 tons), at the same rate, £2,400,000, would make a total of $34,000,000 and upwards in one year. Mr. Kirkwood gave, in his report made in 1854, a detailed account of the estimated quantities of flax then produced in one year in Russia, Austria, the Zollverein States, France, Holland, Great Britain and Ireland, Egypt, Belgium, Scandinavia, Spain, Portugal, the Italian States, Turkey, and North America, in the whole amounting to 452,000 tons, valued at £60 per ton, or a total of £27,000,000 stg.; and computed that it would occupy 1,800,000 acres to produce that quantity.

In the year 1859, the total exports of flax seed from Belgium, France, Ireland, Rotterdam, Lubeck, Stetten and Russia, is estimated at about 11,000,000 bushels.

In 1861 there were in Great Britain and Ireland nearly six thousand factories, employing directly and indirectly 4,568,082 persons, or 6 per cent. of the population, in manufactures of cotton, wool, worsted, flax and silk; and of these there were employed in the manufacture of flax 417 factories of 18,322 horse-power, driving 1,288,043 spindles and 7,689 power looms, employing 80,264 persons directly, and estimated to be the means of supporting upwards of 300,000.

Many years ago it was thought that in the United Kingdom there was a capital of $500,000,000 embarked in the various branches of flax, cotton, wool, and silk manufactures.

In the factories of Dunbar, McMaster & Co., at Guilford, and Richardson, Sons, & Owden, near to Newry, in the north of Ireland, are two factories exclusively devoted to the manufacture of flax, the buildings and machinery of which is of the most perfect kind—each of these give employment daily to upwards of 2,000 hands, and a capital of above $1,000,000; and have given rise to the erection of buildings, in extent, equal to no inconsiderable towns. But all this immense trade did not settle in Ireland without exertion: it did not happen by chance, or by reason of that country being better adapted for it than many other countries. It was not its water powers which encouraged this trade, for most of these manufactures are worked by steam. The climate and soil of Ireland, as in Canada, were adapted for the cultivation of the plant; the advantages of it were seen by a few energetic wise men, who made exertions by which they procured the coöperation of the inhabitants, and aid from the Government, and public associations to promote it. There is no data by which to estimate, with any degree of accuracy, the population of Ireland at the time flax began first to be extensively cultivated.

The Hon. T. Darcy McGee, in his history of Ireland, informs us that "the Session of 1785 (of the Irish Parliament) was first occupied with debates relating to what might be called the cross channel trade between England and Ireland. The question of trade brought with it the question of revenue, of the duties levied in both Kingdoms, of the conflicts of the commercial law and the necessity of their assimilation;" but "No definite commercial treaty between the Kingdoms was entered into until the Union." England made laws for the protection of her British subjects, however detrimental they might be to the Irish trade. The first attempts in Ireland to promote the linen trade, were only intended to supply the domestic wants of the country; and it was not until much later times, that she became a great producer and exporter.

Any estimate which may be made of the entire value of the linen manufactures of Great Britain and Ireland, cannot have pretensions to accuracy, though we may for example sake, take the amount given a few years ago by Mr. William Charley—a gentleman who took much pains to arrive at a correct estimate. He gave the Home and Foreign trade of Great Britain and Ireland, at eleven million pounds stg., annually, and allowed two thirds of it to Ireland, which nearly corresponds with other returns. The trade has much increased since that. However, it will answer the present purpose to set down the annual Irish linen trade here, at eight million of pounds, stg.; ($40,000,000) which is undoubtedly under the mark. In apportioning the entire trade, those who have given much attention to this, have allowed, say 30 per cent. for raw material; 30 per cent. for profits, wages, superintendence, wear and tear of machinery, interest of capital, coal, &c., and allow the remaining 40 per cent. to divide amongst those employed in the manufacture; and estimating $80 per year as the average wages of each, would give us 200,000 persons receiving $16,000,000 yearly wages for their manual labor employed in the linen manufacture of Ireland.

Then, supposing Upper Canada to produce this year 50,000 acres of flax, at 300 lbs. per acre, or a total of 15,000,000 lbs. of fibre at 10 cents per lb.; and calculating at the same rate we have done for Ireland, this would be worth, when manufactured, $5,000,000—of which, $1,500,000 would be for raw material, $1,500,000 for profits—use of capital and wages of superintendence, $2,000,000

for wages for labor; which would give $80 a year each to 25,000 boys, girls, women and men, who at present have no employment during the winter in many of the cities and towns of Upper Canada. But this is not the only advantage to be derived from the introduction of growing and manufacturing flax in Canada. Hand-spinning and weaving would give much more employment than what is here calculated. Half a dollar per head for linen for the present population of the Upper and Lower Provinces, would amount to $1,500,000, annually. In addition to what was produced by home manufacture, there was imported into Canada of linen in 1861, $341,942; in 1862, $332,844; in 1863, $446,676; and of cotton in 1861, $5,600,777; in 1862, $4,453,085; and in 1863, $4,264,025; much of which no doubt would be dispensed with by home manufactured linens. In addition to the imports of linen are cordage, sails, hemp, cables, flax hemp and tow, cotton and flax waste, sail cloths, rags, paper and paper hangings, all of which might be supplied by home produced materials. The total value of these commodities imported in 1863, amounted to upwards of $5,400,000, for which cash was sent out of the country, and upon which was paid a duty of upwards of $200,000.

No doubt there was opposite this exported in 1863 flax $12,807, and flax seed $3,012; but that is scarcely worth notice out of such an amount paid for imported goods of the same class. In order to suggest a remedy for this let us review the history of flax generally, taking the cases of Ireland and Canada in particular for contrast.

(To be continued.)

BUREAU OF AGRICULTURE & STATISTICS.

From the Report of the Hon. the Minister of Agriculture, we learn that the Department, under the able supervision of the newly-appointed deputy head, J. C. Tache, Esq., is being rapidly re-organized. The Minister says, "I am satisfied that none of the political heads of the Department ever realized an adequate idea of the extent of the disorganization which existed, because the other duties of a minister of the Crown do not admit of the necessary detailed supervision."

A complete inventory has now been taken of all the property—discipline has been restored and abuses checked—the documents have gone through a preliminary classification, preparatory to a final arrangement and indexing—the schedules of the two censuses have been permanently classified—and the process of arranging the records, and making indexes of all the documents and register books, from the date of the creation of the Bureau, in 1852, is rapidly progressing. The library of the department has also been re-arranged, and efforts are being made to collect departmental reports necessary for statistical operations intended to be performed.

A complete new set of register and index books were commenced with this year, under an uniform and improved system. The old books are to be re-arranged and indexed at leisure, without being in any way entangled with the new administration.

"The business of the Department of Agriculture embraces six different branches, all very important in themselves, namely: Agriculture, Arts and Manufactures, Colonization, Immigration, Patents and Copy-rights, and Statistics. These different subjects are regulated by a number of statutes, amongst which, the principal are the laws respecting Agriculture and Arts, embodied in chap. 32 of Consolidated Statutes; the several laws, embodied in chapter 33 of same Statutes, on Statistics in general and especially the taking of the Census; the Acts, collected in chapter 40 of the same Consolidated Statutes on Immigration and Quarantine; the 24th Victoria, chapter 21, on Trade Marks and Copy-rights; the 25th Victoria, chapter 7, by which the Bureau of Agriculture is finally constituted a separate Department."

Arts and Manufactures.

Referring to the Boards of Arts and Manufactures for Upper and Lower Canada, the Report says:—

"Since the beginning of the reorganization of the Bureau of Agriculture there has been a little more intimacy established, and the two Boards have been made participants of informations received, such as, for instance, documents received from the Imperial Government on the new trade open to colonies by the want, now scantily supplied, of large quantities of resin and turpentine; two articles, the price of which has risen to an enormous figure, compared to what it was before the American war.

"Once on this subject, it is as well to say that some manufactures of resin and turpentine have taken place both in Upper and Lower Canada, not, however, to a very great extent yet; but really superb specimens of both can be seen in the Bureau, some deposited by Mr. Richard, of Princeville, in Lower Canada, the others forwarded by the Upper Canada Board of Arts and Manufactures."

As to the efficiency of these Boards:—

"The early date after the end of the year at which the Parliament has been called has rendered it difficult to prepare in time to study them, the different documents which constitute the Appendix of the Annual Report. However, I may state that the efficiency of the Board of Arts and Manufactures of Upper Canada progresses favourably. This is not, unfortunately, the case with the Lower Canada Board, as may be seen by their report in the Appendix.

The Lower Canada Board of Arts and Manufac-

tures is not yet freed from the paralysing embarrassment in which it was plunged by the building of the Montreal Crystal Palace at the time of the Prince of Wales's visit; notwithstanding that the $20,000 voted for an exhibition at that time was employed on the building, a heavy mortgage amounting to, I believe, some $11,000 still remains.

Immigration.

The number of immigrant arrivals given in the Report for 1864 is 19,149, against 19,419 in 1363, showing a decrease of 270; while the arrivals at New York, in 1864, exceeded any previous year since 1854.

Patents and Copyrights.

As the report under this head treats of matters of great importance to inventors, and those interested in the progress of Arts and Manufactures, we give the following lengthy extracts:—

"Although a considerable degree of attention has been devoted to Patents, Copyrights and Trade Marks, it is not intended to discuss in the present report the changes required in our laws on these important subjects. It is very easy to discover that the laws are not what they ought to be, but it is a little more difficult to arrive at a definite and practical conclusion on the *modus curandi* of the evils complained of.

"There is besides nothing so detrimental to the interests of the people at large, and so disorganizing to the public service, as fluctuations in such laws. Moreover, the whole question of Reciprocity, now open between us and our next neighbours, with whom we have hitherto had such large commercial transactions, must naturally embrace these subjects. I must, therefore, however strong my convictions may be upon these points, respectfully refrain from recommending legislative changes, on any of them, at this moment.

"Another very obvious reason would restrain me from suggesting amendments to the Patent and Copyrights laws during the present session, it is the physical impossibility of the Department being so placed as to carry out any large change such as may arise from admitting foreigners to the privilege of acquiring in Canada patent rights for their inventions. This principle (I take it for granted) cannot be omitted from any new Canadian law on patents, without subjecting the country to disagreeable reflections and damaging retaliations. The impossibility arises from the transitory stage through which the Department is just now passing, and from the total want of space and accomodation for the reception of models of inventions, owing mainly to the prospect of an early removal to Ottawa, as the permanent seat of Government. At present our models are kept partly at Toronto, under the guardianship of the Board of Arts and Manufactures of Upper Canada, and partly at Quebec, in two small and unsuitable rooms, and nothing short of the zeal and continued attention of our able curator, could save them from destruction. It has even been found necessary to pack a number of them in boxes for want of place and the necessity of saving them, whence they are kept out of being consulted for administrative purposes, and out of view of the numerous persons, especially mechanics, who resort to those rooms for information.

"The following tabular statement shows the variations in increase and decrease of the operations of this branch of the Department for the last ten years.

	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.
Applications for Patents	99	120	126	116	142	170	160	180	207	170
Patents granted.....	92	108	115	98	112	162	142	160	156	146
Transfers registered.....	32	62	45	35	26	47	56	72	78	74
Drawings registered	.....	.....	.....	.....	.....	.....	2	.....	4	1
Trade Marks registered.....	.....	.....	.....	.....	.....	.....	8	17	1	7
Fees Received	$1911 80	$2370 50	$2406 76	$2105 00	$2479 75	$2644 17	$3012 70	$3650 90	$3759 75	$3267 95

"An examination of the above table shows that, although there may be an occasional difference against one special year as compared with the years immediately anterior, still the importance of the operations of the Patent Office is steadily advancing when considered by periods.

"If it was possible to arrange matters so as to cause no unnecessary delays in the proceedings connected with the granting of Patents, there is no doubt that it would have a good effect on the numerous class who take a decided interest in the progress of Arts and Manufactures. No one can conceive the anxiety of inventors and the eagerness of their friends *to see the Patent through*, to make use of the common expression; their minds find no rest till it is through; and in the interval between the day of their application and the one on which the parchment is in their hands, their

inquiries are incessant as to the result of their application. Sometimes also it is of great importance to them that no delay should take place; a favorable season lost is often a serious injury to the discoverer of some useful invention.

"There is a principle already existing in our Patent law (however defective in other respects) which ought in my opinion, to be preserved, whatever future amendments may be made: it is that by which the Patentee is made the only judge, and alone responsible for the merit or novelty of his invention, leaving to the ordinary tribunals to decide between parties about the validity of the Patent, as far as the exclusive rights to the use of the thing are concerned.

"It is quite proper for officers connected with the Patent Office to advise applicants, whenever they have grounds to suspect the worthlessness of pretended inventions, or the errors of real inventors whose misfortune it is really to invent (as sometimes occurs) things which have been long before in operation in the world; but between this benevolent duty and a binding decision upon the merits or demerits of alleged inventions there is a wide difference. The establishment of such a tribunal as a commission of Examiners of Inventions is surrounded with difficulties and dangers of every kind. Besides, it is not always a service to an enthusiastic inventor to save him from the trifling expense of getting a Patent, for no decision of Examiners will wean him from this idea. On the contrary, he will rather suspect them of having some interest in the rejection than suspect himself of having been deluded by his own fancies. In his case nothing short of a Patent and a fair trial, under the fullest possible legal protection, can cure him of his expectations.

"As far as the public interest is concerned, the free granting of Patents can never inflict any injury, because a recourse in law on the part of the Patentee would not fail, before a proper tribunal, to elucidate the facts much better than could possibly be done, before a board of examiners, where, in nine cases out of ten, all the proceedings would partake of a superficial *exparte* character.

"Several projects for the amendment of our Patent Laws, some of them marked by great ability, have been submitted to this Department, and will be made use of when the proper time has arrived to frame a more perfect law, on this interesting subject.

"Every attention is now given in the Department to forwarding the dispatch of business generally, and specially of Patent business; however, when, from any reason, it is impossible to issue a Patent as quickly as the inventor would wish it, the Department is not always to blame. Sometimes delays are incurred by the parties addressing their letters to the Minister personally, even marking them *private*, instead of addressing them simply to THE BUREAU OF AGRICULTURE. Delays of that sort have occurred during my absence from Quebec either on official or other business.

"It will be remarked, that the determination of publishing in volumes the specifications and drawings of Patents having been arrived at in 1857, only one volume, containing 258 descriptions of patented articles has been completed down to the end of the year 1864. Since October last, every possible effort has been made to obtain from the printer the second volume, *in progress* since 1859, and there is now some prospect of having the long-delayed volume shortly ready for distribution."

Statistics.

On this subject the Report says:—

"The subject of Statistics is one of the most vital importance in both an administrative and scientific point of view, but it is one very delicate to deal with. The materials for Statistical information are difficult to collect, difficult to arrange, and in the handling they require more than ordinary industry and judgment.

"Our Canadian statistics, such as they are, have not yet been thoroughly sifted; for hitherto the staff and the circumstances of the Department could not have permitted it. But the researches recently made have been quite sufficient to establish the very painful fact, that the printed reports of the two last *Censuses* are not to be relied upon.

"To what extent the errors can now be traced and corrected remains for us to ascertain.

"The Board of Registration and Statistics, created by law in 1847, has not, apparently, been called together more than a dozen times during the whole period between the date of its creation and the end of the year 1864. No regular minutes of even these few meetings have been kept, in fact such entries as are found in the Registers of the Office, are so few, so formal and so meagre, as to be perfectly valueless.

"Besides the Census reports there is, in this office, no statistical information to speak of, except such as is to be found in the remaining copies of the Blue Book, and in some detached papers.

"I do not venture to speak of remedies after so short a space of time spent in reviewing the state of the Department farther than to say, that the subject is on the *tapis*, is seriously taken in hand, and that, at the close of the year 1864, much interest was manifested by the other members of the Board of Registration and Statistics, in a project submitted by us, for its immediate re-organization."

In conclusion, reference is made to the Bureau of Agriculture being "originally created without well-defined powers, business of every sort accumulating from year to year, the frequent changes in the 'political heads' of the Department, which gave it almost as many Ministers as years of existence, and the long interval betweeen the death of the last Secretary, Mr. William Hutton, in 1861, and the appointment of the present Deputy-head in August last," being causes fully sufficient to account for the unsatisfactory state of the Department during the interval; the acting secretary (Mr. Campbell) having to carry on the Department from day to day, for nearly four years, without the adequate official powers.

Truth always fits. It is always congruous and agrees with itself. Every truth in the universe agrees with all others.

The Board of Arts and Manufactures for Upper Canada.

PROVINCIAL EXHIBITION.

PRIZE LIST—ARTS AND MANUFACTURES DEPARTMENT.

The following is the Prize List of the Arts and Manufactures Department of the Agricultural Association's Exhibition, to be held in the City of LONDON, on Monday, Tuesday, Wednesday, Thursday and Friday, September 18th, 19th, 20th, 21st and 22nd, 1865. The Rules and Regulations will be published in the next issue of the Journal.

CLASSIFICATION OF PRIZE LIST.

ARTS, MANUFACTURES, LADIES' WORK, &c. &c.

Class 40—Cabinet Ware and otherWood Manufactures.
" 41—Carriages and Sleighs, and parts thereof.
" 42—Chemical Manufactures and Preparations.
" 43—Decorative and Useful Arts; Drawings and Designs.
" 44—Fine Arts.
" 45—Groceries and Provisions.
" 46—Ladies' Work.
" 47—Machinery, Castings and Tools.
" 48—Metal Work (Miscellaneous) including Stoves.
Class 49—Miscellaneous, including Pottery and Indian Work.
" 50—Musical Instruments.
" 51—Natural History.
" 52—Paper, Printing, and Bookbinding.
" 53—Saddle, Engine Hose, Trunkmaker's Work and Leather.
" 54—Shoe and Bootmakers' Work, and Leather.
" 55—Woollen, Flax, and Cotton Goods and Furs; and Wearing Apparel.
" 56—Foreign Manufactures.

Class 40—Cabinet Ware and other Wood Manufactures.

Cabinet Ware.

Sect.		1st Prize.	2nd Prize.
1	Bedroom Furniture, set of	$10 00	$6 00
2	Centre Table	8 00	4 00
3	Drawing-room Sofa	8 00	4 00
4	Drawing-room Chairs, set of	8 00	4 00
5	Dining-room Furniture, set of	10 00	6 00
6	Inlaid Work, of Canadian woods	6 00	3 00
7	Side Board	8 00	4 00
8	Wardrobe	6 00	3 00

Miscellaneous.

9	Cooper's Work	$6 00	$3 00
10	Corn Brooms, 1 doz.	2 00	1 00
11	Handles for Tools of Carpenters, Blacksmiths, Gunsmiths, Watchmakers, &c., collection of	8 00	4 00
12	Joiner's Work, assortment of	8 00	4 00
13	Machine-wrought Moulding and Flooring, 100 feet of each	6 00	3 00
14	Turning in Wood, collection of specimens	6 00	3 00
15	Turned Hollow Wooden Ware, assortment of	6 00	3 00
16	Veneers, from Canadian woods, undressed	8 00	4 00
17	Veneers, from Canadian woods, dressed and polished	8 00	4 00
18	Wash Tubs and Pails, Factory-made, three of each	4 00	2 00
19	Willow Ware, six specimens	4 00	2 00
20	Extra Entries		

Class 41—Carriages and Sleighs, and Parts thereof.

Sect.		1st Prize.	2nd Prize.
1	Axle, wrought iron	$4 00	$2 00
2	Bent Shafts, half a dozen	3 00	2 00
3	Bows for Carriage Tops, two sets	3 00	2 00
4	Buggy, double-seated	10 00	6 00
5	Buggy, single-seated	8 00	5 00
6	Buggy, trotting	6 00	4 00
7	Carriage, two-horse, pleasure	12 00	8 00
8	Carriage, one-horse, pleasure	10 00	6 00
9	Carriage, Child's	4 00	2 00
10	Carriage Hubs, Rims and Felloes, and machine-made Spokes, the best assortment	7 00	4 00
11	Dog Cart	7 00	4 00
12	Express Waggon	7 00	4 00
13	Sleigh, two-horse, pleasure	12 00	8 00
14	Sleigh, one-horse, pleasure	10 00	6 00
15	Springs, one set Steel Carriage	5 00	3 00

Sect.	Class 41.—Continued.	1st Prize.	2nd Prize.
16	Sulky, trotting	5 00	3 00
17	Wheels, one pair of Carriage, unpainted	4 00	2 00
18	Extra Entries		

Class 42—Chemical Manufactures and Preparations.

Sect.		1st Prize.	2nd Prize.
1	Colours, assortment, in Oil, Pulp, and Powder	$6 00	$4 00
2	Essential Oils, assortment of	6 00	4 00
3	Glue, 14 lbs.	3 00	2 00
4	Isinglass, 1 lb.	3 00	2 00
5	Medical Herbs, Roots and Plants, native growth	12 00	7 00
6	Oils—Linseed, Rape, and other expressed kinds	6 00	4 00
7	Oil—Coal, Shale, or Rock	6 00	4 00
8	Oil, Neat's foot, half gallon	2 00	1 00
9	Printing Inks, an assortment	3 00	2 00
10	Pitch, 30 lbs.	5 00	3 00
11	Resin, 30 lbs.	5 00	3 00
12	Tar, 1 gallon	3 00	2 00
13	Turpentine, Spirits of, 1 gallon	5 00	3 00
14	Varnishes, assortment of	6 00	4 00
15	Extra Entries		

Class 43—Decorative and Useful Arts, Drawings and Designs.

Sect.		1st Prize.	2nd Prize.
1	Carving in Wood	$10 00	6 00
2	Drawing of Machinery, in perspective	6 00	4 00
3	Decorative House Painting	6 00	4 00
4	Engraving on Wood, with proof	6 00	4 00
5	Engraving on Copper, with proof	6 00	4 00
6	Goldsmith's Work	6 00	4 00
7	Gold and Silver Leaf	4 00	3 00
8	Geometrical Drawing of Engine or Mill Work, coloured	6 00	4 00
9	Lithographic Drawing, plain	6 00	4 00
10	Lithographic Drawing, coloured	6 00	4 00
11	Mantlepiece in Marble	10 00	6 00
12	Mathematical, Philosophical and Surveyor's Instruments, collection of	15 00	10 00
13	Modelling in Plaster	6 00	4 00
14	Monumental Headstone	6 00	4 00
15	Picture Frame, Ornamented Gilt	5 00	3 00
16	Penmanship, business hand, without flourishes	4 00	2 00
17	Penmanship, Ornamental (not Pen and Ink Pictures)	4 00	2 00
18	Seal Engraving, collection of Impressions	6 00	4 00
19	Sign Writing	5 00	3 00
20	Silversmith's Work	6 00	4 00
21	Stained Glass, collection of specimens	12 00	8 00
22	Extra Entries		

Class 44—Fine Arts.

Professional List—Oil.

Sect.		1st Prize.	2nd Prize.
1	Animals, grouped or single	$12 00	$7 00
2	Historical Painting	12 00	7 00
3	Landscape, Canadian subject	12 00	7 00
4	Landscape or Marine Painting, not Canadian subject	10 00	6 00
5	Marine Painting, Canadian subject	12 00	7 00
6	Portrait, from original sittings	10 00	6 00
	In Water Colours.		
7	Animals, grouped or single	7 00	5 00
8	Flowers, grouped or single	7 00	5 00
9	Landscape, Canadian subject	7 00	5 00
10	Landscape or Marine Painting, not Canadian subject	7 00	5 00
11	Marine View, Canadian subject	7 00	5 00
12	Portrait, from original sittings	6 00	4 00
	Pencil, Crayon, &c.		
13	Any subject, or mixed style of execution	6 00	4 00
14	Crayon, coloured	6 00	4 00
15	Crayon, plain	6 00	4 00
16	Crayon Portrait, from original sittings	6 00	4 00
17	Pencil Portrait, from original sittings	6 00	4 00
18	Pencil Drawing	6 00	4 00
19	Pen-and-Ink Sketch	6 00	4 00
20	Sepia	6 00	4 00

Class 44.—Continued.

Amateur List—Oil.

Sect.		1st Prize.	2nd Prize.
21	Animals, grouped or single	8 00	5 00
22	Historical Painting	8 00	5 00
23	Landscape, Canadian subject	8 00	5 00
24	Landscape or Marine Painting, not Canadian subject	8 00	5 00
25	Marine Painting, Canadian subject	8 00	5 00
26	Portrait, from original sittings	8 00	5 00
	In Water Colours.		
27	Animals, grouped or single	7 00	5 00
28	Flowers, grouped or single	7 00	5 00
29	Landscape, Canadian subject	7 00	5 00
30	Landscape or Marine Painting, not Canadian subject.	7 00	5 00
31	Marine View, Canadian subject	7 00	5 00
32	Portrait, from original sittings	6 00	4 00
	Pencil, Crayon, &c.		
33	Any subject, or mixed style of execution	5 00	3 00
34	Crayon, coloured	5 00	3 00
35	Crayon, plain	5 00	3 00
36	Crayon Portrait, from original sittings	5 00	3 00
37	Moss Picture	5 00	3 00
38	Pencil Portrait, from original sittings	5 00	3 00
39	Pencil Drawing	5 00	3 00
40	Pen-and-Ink Sketch	5 00	3 00
41	Sepia	5 00	3 00
	Photography.		
42	Ambrotypes, collection of	6 00	4 00
43	Photograph Portraits, collection of, in duplicate, one set coloured	10 00	6 00
44	Photograph Portraits, collection of, plain	8 00	5 00
45	Photograph Landscapes and Views, collection of	8 00	5 00
46	Photograph Portrait, finished in Oil	8 00	5 00
47	Photograph Portrait, finished in Indian Ink	6 00	4 00
48	Photograph Portrait, finished in Water Colours	6 00	4 00
49	Extra Entries		

Class 45—Groceries and Provisions.

Sect.		1st Prize.	2nd Prize.
1	Barley, Pearl, 25 lbs.	$3 00	2 00
2	Barley, Pot, 25 lbs.	3 00	2 00
3	Biscuits, an assortment of	6 00	4 00
4	Bottled Fruits, an assortment, manufactured for sale	6 00	4 00
5	Bottled Pickles, an assortment, manufactured for sale	6 00	4 00
6	Buckwheat Flour, 25 lbs.	3 00	2 00
7	Chickory, 20 lbs., prepared	3 00	2 00
8	Confectionery, an assortment of	5 00	3 00
9	Indian Corn Meal, 25 lbs.	3 00	2 00
10	Oatmeal, 25 lbs.	3 00	2 00
11	Sauces for Table use, an assortment, manufactured for sale	6 00	4 00
12	Soap, one box of Common	4 00	3 00
13	Soaps, collection of assorted Fancy	6 00	4 00
14	Starch, 12 lbs. Corn	2 00	1 00
15	Starch, 12 lbs. Flour	2 00	1 00
16	Starch, 12 lbs. Potatoe	2 00	1 00
17	Sugar, 20 lbs. Sorghum	5 00	3 00
18	Sugar, 1 loaf Refined	5 00	3 00
19	Tobacco, 14 lbs. Canadian manufactured	5 00	3 00
20	Wheat Flour, 50 lbs.	7 00	5 00
21	Extra Entries		

Class 46—Ladies' Work.

Sect.		1st Prize.	2nd Prize.	3rd Prize.
1	Bead Work	$3 00	$2 00	$1 00
2	Braiding	3 00	2 00	1 00
3	Cone Work	3 00	2 00	1 00
4	Crochet Work	3 00	2 00	1 00
5	Embroidery in Muslin	3 00	2 00	1 00
6	Embroidery in Cotton	3 00	2 00	1 00
7	Embroidery in Silk	3 00	2 00	1 00
8	Embroidery in Worsted	3 00	2 00	1 00
9	Flowers, Silver Wire	2 00	1 00	0 50
10	Flowers, Feather	2 00	1 00	0 50

Sect.	Class 46.—Continued.	1st Prize.	2nd Prize.	3d Prize.
11	Gloves, 3 pairs	2 00	1 00	0 50
12	Guipure Work	3 00	2 00	1 00
13	Hair Work	3 00	2 00	1 00
14	Knitting	3 00	2 00	1 00
15	Lace Work	3 00	2 00	1 00
16	Machine Sewing, Family	2 00	1 00	0 50
17	Mittens, 3 pairs Woollen	2 00	1 00	0 50
18	Moss Work	2 00	1 00	0 50
19	Needle Work, Ornamental	3 00	2 00	1 00
20	Netting, Fancy	3 00	2 00	1 00
21	Plait for Bonnets or Hats, of Canadian Straw	3 00	2 00	1 00
22	Quilt, Silk	2 00	1 00	0 50
23	Quilt, Patch-work	2 00	1 00	0 50
24	Shell Work	2 00	1 00	0 50
25	Shirt, Gentleman's	3 00	2 00	1 00
26	Socks, 3 pairs Woollen	2 00	1 00	0 50
27	Stockings, 3 pairs of Woollen	2 00	1 00	0 50
28	Tatting	3 00	2 00	1 00
29	Wax Flowers	6 00	4 00	2 00
30	Wax Fruit	6 00	4 00	2 00
31	Wax Shells, a collection of	3 00	2 00	1 00
32	Worsted Work	3 00	2 00	1 00
33	Worsted Work, Fancy, for framing	3 00	2 00	1 00
34	Worsted Work, Raised	3 00	2 00	1 00
35	Wreath, Flower	2 00	1 00	0 50
36	Wreath, Seed	2 00	1 00	0 50
37	Extra Entries			

Class 47—Machinery, Castings, and Tools.

Sect.		1st Prize.	2nd Prize.
1	Blacksmith's Bellows	$4 00	$3 00
2	Castings for General Machinery	10 00	6 00
3	Cast Wheel, Spur or Bevel, not less than 50 lbs. weight	8 00	5 00
4	Castings for Railways, Railroad Cars, and Locomotives, assortment of	12 00	7 00
5	Cordwood Sawing Machine	8 00	5 00
6	Hand Power Weaving Loom	6 00	4 00
7	Edge Tools, an assortment	15 00	10 00
8	Engine, Steam, stationary, of one to four horse power, in operation	15 00	10 00
9	Engine, Steam, stationary, five horse power and upwards, in operation	25 00	15 00
10	Fire Engine, Steam, in operation on the ground	25 00	15 00
11	Fire Engine, hand-power	15 00	10 00
12	Machines for Planing and Drilling Metals	8 00	5 00
13	Pump, in metal	6 00	4 00
14	Refrigerator	6 00	4 00
15	Saws, an assortment	10 00	6 00
16	Saw Mill, in Model or otherwise	6 00	4 00
17	Sash and Moulding Machines	6 00	4 00
18	Sugar and Coffee Mills	6 00	4 00
19	Scales, Platform	5 00	3 00
20	Scales, Counter	3 00	2 00
21	Shingle-Splitting Machine	6 00	4 00
22	Skates, an assortment of	6 00	4 00
23	Smoke-Consuming Furnace, in operation on the ground	12 00	7 00
24	Tools for Working in Metals, assortment of	12 00	7 00
25	Turning Lathe	7 00	4 00
26	Valves and Gearing for working Steam expansively, either in model or otherwise; principle of working to be the point of competition	12 00	7 00
27	Extra Entries		

Class 48—Metal Work (Miscellaneous), including Stoves.

Sect.	*Miscellansous.*	1st Prize.	2nd Prize.
1	Coppersmith's Work, an assortment	$8 00	$5 00
2	Engineer's Brass Work, an assortment	8 00	5 00
3	Fire Arms, an assortment	8 00	5 00
4	Files, collection of Cast Steel	3 00	2 00
5	Fire-proof Office Safe	8 00	5 00
6	Gas Fixtures, an assortment	7 00	4 00
7	Iron Fencing and Gate, ornamental	8 00	5 00
8	Iron Work from the hammer, ornamental	7 00	4 00
9	Iron Work, ornamental Cast	7 00	4 00
10	Lock—Combination Bank Lock	8 00	5 00
11	Locksmith's Work, an assortment	8 00	5 00

Class 48.—Continued.

Sect.		1st Prize.	2nd Prize.
12	Malleable Hardware Manufactures, an assortment	8 00	5 00
13	Nails, 20 lbs. Pressed	6 00	4 00
14	Nails, 20 lbs. Cut	6 00	4 00
15	Plumber's Work, an assortment	8 00	5 00
16	Screws and Bolts, an assortment	6 00	4 00
17	Sheet Brass Work, an assortment	8 00	5 00
18	Tinsmith's Work, an assortment	6 00	4 00
19	Tinsmith's Lacquered Work, an assortment	6 00	4 00
20	Wire Work, an assortment	6 00	4 00
	Stoves.		
21	Cooking Stove, for wood	6 00	4 00
22	Cooking Stove, for coal	6 00	4 00
23	Furniture for Cooking Stove, one set	4 00	3 00
24	Hall Stove, for wood	5 00	3 00
25	Hall Stove, for coal	5 00	3 00
26	Parlour Stove, for wood	5 00	3 00
27	Parlour Stove, for coal	5 00	3 00
28	Parlour Grate	5 00	3 00
29	Parlour Fire Place complete, including setting of grate so as to economise fuel; and arrangement for ventilating room	10 00	6 00
30	Extra Entries		

Class 49—Miscellaneous, including Pottery and Indian Work.

Miscellaneous.

Sect.		1st Prize.	2nd Prize.
1	Artificial Leg	$6 00	0 00
2	Artificial Arm	6 00	0 00
3	Brushes, an assortment	6 00	4 00
4	Brushes, Paint and Whitewash, assortment	6 00	4 00
5	Model of a Steam Vessel	6 00	4 00
6	Model of a Sailing Vessel	6 00	4 00
	Pottery.		
7	Filterer for water	3 00	2 00
8	Pottery, an assortment	8 00	5 00
9	Sewerage Pipes, stoneware, assortment of sizes	10 00	6 00
10	Stoneware an assortment	10 00	6 00
11	Slates for roofing	8 00	5 00
	Indian Work.		
12	Bead Work, an assortment	2 00	1 00
13	Buckskin Mittens, one pair	2 00	1 00
14	Clothes Basket	2 00	1 00
15	Fruit Basket	2 00	1 00
16	Hand Basket	2 00	1 00
17	Moccasins, one pair of plain	2 00	1 00
18	Moccasins, worked with beads or porcupine quills, one pair	3 00	2 00
19	Extra Entries		

Class 50—Musical Instruments.

Sect.		1st Prize.	2nd Prize.
1	Harmonium	$10 00	6 00
2	Melodeon	6 00	4 00
3	Organ, Church	25 00	15 00
4	Piano, Grand	20 00	12 00
5	Piano, Square	15 00	10 00
6	Piano, Cottage	10 00	6 00
7	Extra Entries		

Class 51—Natural History.

Sect.		1st Prize.	2nd Prize.
1	BIRDS—Collection of Stuffed Birds of Canada, classified, and Common and technical names attached	$8 00	$6 00
2	FISHES—Collection of Native Fishes, stuffed or preserved in spirits, and common and technical names attached	8 00	6 00
3	INSECTS—Collection of Native Insects, classified, and common and technical names attached	8 00	6 00
4	MAMMALIA AND REPTILES of Canada, stuffed or preserved in spirits, classified, and common and technical names attached	8 00	6 00
5	MINERALS—Collection of Minerals of Canada, named and classified	8 00	6 00
6	PLANTS—Collection of Native Plants, arranged in their natural families, and named	8 00	6 00
7	STUFFED BIRDS AND ANIMALS of any country, collection of	8 00	6 00
8	Extra Entries		

Class 52—Paper, Printing, Bookbinding and Type.

Sect.		1st Prize.	2nd Prize.
1	Bookbinding (blank-book), assortment of	$5 00	$3 00
2	Bookbinding (letter-press), assortment of	5 00	3 00
3	Letter-press Printing, plain	5 00	3 00
4	Letter-press Printing, ornamental	5 00	3 00
5	Letter-press Printing,—Posters, plain and ornamental	4 00	3 00
6	Millboard and Strawboard, assortment	5 00	3 00
7	Paper Hangings (Canadian paper), one dozen rolls, assorted	6 00	4 00
8	Papers—Printing, Writing, and Wrapping, one ream of each	6 00	4 00
9	Papers—Blotting and Coloured, one ream of each	6 00	4 00
10	Pocket Books, Wallets, &c., an assortment	6 00	4 00
11	Printing Type, an assortment	6 00	4 00
12	Extra Entries	6 00	4 00

Class 53—Saddle, Engine Hose, Trunk Maker's Work, and Leather.

Saddlery, &c.

Sect.		1st Prize.	2nd Prize.
1	Collars, an assortment	$5 00	$3 00
2	Engine Hose and Joints, 2¾ inches diameter, 50 feet of copper rivetted	8 00	5 00
3	Harness, set of double carriage	8 00	5 00
4	Harness, set of single carriage	7 00	4 00
5	Harness, set of team	5 00	3 00
6	Harness, set of Express	6 00	4 00
7	Hames, carriage or gig, best assortment	5 00	3 00
8	Hames, team or cart, best assortment	5 00	3 00
9	India Rubber Belting, Engine-Hose, &c., an assortment	8 00	5 00
10	Leather Machine Belting, an assortment	8 00	5 00
11	Saddle, Ladies' full quilted	8 00	5 00
12	Saddle, Ladies' quilted safe	6 00	4 00
13	Saddle, Gentlemen's full quilted	7 00	4 00
14	Saddle, Gentlemen's plain shaftoe	6 00	3 00
15	Trunks, an assortment	8 00	5 00
16	Valises and Travelling Bags, an assortment	5 00	3 00
17	Whips, an assortment	5 00	3 00
18	Thongs, an assortment	3 00	2 00

Leather.

19	Belt Leather, 30 lbs	4 00	3 00
20	Brown Strap and Bridle, one side of each	4 00	3 00
21	Carriage Cover, two skins (whole)	4 00	3 00
22	Deer Skins, three dressed	3 00	2 00
23	Harness Leather, two sides	4 00	3 00
24	Hog Skins for saddles, three	4 00	3 00
25	Patent Leather, for carriage or harness work, 20 feet	6 00	4 00
26	Skirting for saddles, two sides	4 00	3 00
27	Extra Entries		

Class 54—Shoe and Bootmakers' Work, Leather, &c.

Boots, &c.

Sect.		1st Prize.	2nd Prize.
1	Boots, Ladies', an assortment	$7 00	$4 00
2	Boots, Gentlemens' sewed, an assortment	7 00	4 00
3	Boots, Machine made, an assortment	7 00	4 00
4	Boots, pegged, an assortment	5 00	3 00
5	Boot and Shoemaker's Tools, an assortment	8 00	5 00
6	Boot and Shoemakers' Lasts and Trees, an assortment	8 00	5 00
7	Shoemakers' Pegs, an assortment	4 00	3 00
8	Shoes, India Rubber, an assortment	6 00	4 00

Leather.

9	Calf Skins	$3 00	$2 00
10	Calf Skins, grained	3 00	2 00
11	Calf Skins, two morrocco	3 00	2 00
12	Cordovan, two skins of	3 00	2 00
13	Dog Skins, two dressed	3 00	2 00
14	Kip Skins, two sides	3 00	2 00
15	Kip Skins, grained	3 00	2 00
16	Linings, six skins	3 00	2 00
17	Patent Leather for bootmakers, 20 feet	6 00	4 00
18	Sheep Skins, six coloured	3 00	2 00
19	Sole Leather, two sides	3 00	2 00
20	Upper Leather, two sides	3 00	2 00

Sect.	Class 53.—Continued.	1st Prize.	2nd Prize.
21	Upper Leather, grained, two sides	3 00	2 00
22	Extra Entries		

Class 55—Woollen, Flax and Cotton Goods, and Furs and Wearing Apparel.

Sect.		1st Prize.	2nd Prize.
1	Bags, from flax or hemp, the growth of Canada, one dozen	$8 00	$5 00
2	Bags, one dozen cotton	4 00	3 00
3	Blankets, woollen, one pair	6 00	4 00
4	Calico, unbleached, one piece	5 00	3 00
5	Caps, Cloth, an assortment	5 00	3 00
6	Carpet, woollen, one piece	8 00	5 00
7	Carpet, woollen, stair, one piece	7 00	4 00
8	Carpet, rag, one piece	5 00	3 00
9	Cassimere cloth, from Merino wool, one piece	7 00	4 00
10	Cloth, fulled, one piece	7 00	4 00
11	Cloth, broad, one piece	7 00	4 00
12	Counterpanes, two	5 00	3 00
13	Cordage and Twines, from Canadian flax or hemp, assortment of	10 00	6 00
14	Check for horse collars, one piece	6 00	4 00
15	Drawers, factory made, woollen, one pair	5 00	3 00
16	Flannel, factory made, one piece	5 00	3 00
17	Flannel, not factory made, one piece	5 00	3 00
18	Flannel, scarlet, one piece	5 00	3 00
19	Fur Cap and Gloves	5 00	3 00
20	Fur Sleigh Robes, Buffalo, Wolf and Raccoon (an assortment)	10 00	6 00
21	Gloves and Mits of any leather, an assortment	5 00	3 00
22	Horse Blankets, two pairs	5 00	3 00
23	Kersey for horse clothing, one piece	5 00	3 00
24	Linen Goods, one piece	5 00	3 00
25	Oxford Grey Cloth, one piece	5 00	3 00
26	Overcoat of Canadian Cloth	5 00	3 00
27	Satinet, black, one piece	6 00	4 00
28	Satinet, mixed, one piece	5 00	3 00
29	Shawls, home made	4 00	2 00
30	Sheep Skin Mats, dressed and coloured, an assortment	6 00	4 00
31	Shirts, factory made, three of each, woollen and Angola	5 00	3 00
32	Silk and Felt Hats	5 00	3 00
33	Stockings and Socks, factory made, woollen, three pairs of each	4 00	2 00
34	Stockings and Socks, factory made, mixed woollen and cotton, three pairs of each	4 00	2 00
35	Suit of Clothes of Canadian Cloth	8 00	5 00
36	Tweed, Winter, one piece	6 00	4 00
37	Tweed, summer, one piece	6 00	4 00
38	Twine, linen and cotton, an assortment	3 00	2 00
39	Winsey, checked, one piece	5 00	3 00
40	Woollen Cloths, Tweeds, &c., an assortment	10 00	6 00
41	Woollen Shawls, Stockings, Drawers, Shirts, and Mits, an assortment	10 00	6 00
42	Yarn, white and dyed, one pound of each	3 00	2 00
43	Yarn, fleecy woollen, for knitting, one pound	3 00	2 00
44	Yarn, cotton, two pounds	3 00	2 00
45	Yarn, linen, two pounds	3 00	2 00
46	LINEN GOODS—For the best 6 varieties on Linen Goods, manufactured in Canada, from Canadian grown flax; each specimen of cloth to contain not less than 12 yards	60 00	40 00
47	Extra Entries		

Class 56—Foreign Manufactures.

Foreign Articles will be admitted for exhibition only; but Certificates will be awarded to any article of worth or peculiar merit.

"ENGLISH LARD FACTORY."

A Correction.

We copied from the *Scientific American* of Nov. 5th, into the March number of this Journal, a description of an English Lard Factory, *leaded* in that Journal as editorial matter, and without quotation marks. We naturally concluded that it was an original article, and credited it accordingly. In a letter addressed to us by the Editor of the London "Grocer" he writes:—"Will you kindly inform your readers that this article was written by one of our Editorial staff specially for the Grocer 'and Oil Trade Review,' and was probably copied into the *Scientific American* without acknowledgement."

We take great pleasure in making this explanation, as it is our invariable rule to give credit to whom it is properly due, whenever in our power to do so.

Correspondence.

VENTILATION.

To the Editor of the Journal of the Board of Arts.

Sir,—At page 69 of your March number I notice an article captioned "Appliances for Ventilation," which purports to be a paper read before the "Northern Architectural Association" in England, by a *Mr. Thomas Oliver.*

But for the respect I have for this body of learned men, as well as for your very useful journal, into which this production has been copied, I should not have thought it worth while to publicly notice it. I feel, moreover, that as you have honored me with the mention of my name in a foot note I am called upon to say a few words *anent* the subject matter, least it might be supposed that the "*American*" to whom Mr. Oliver alludes, is the *only* person who advocates the "admission of pure air into the *top* of apartments and the expulsion of foul air from the *bottom.*"

I can only tell Mr. Oliver and all others concerned, that in no *cold* country can any other mode be allowed. Neither to England nor to any other country, where little if any artificial warmth is required, need we look for perfection in the ventilation of our buildings; for there the people, if not, for the most part, living in the open air with their windows and doors open become so accustomed to a low temperature, that so far as the sense of *feeling* only is concerned, it matters little where the air comes in or goes out of their apartments; but in a climate where for more than six months out of the twelve we are obliged to have every crack and crevice in our dwellings made air-tight, no body of air can be allowed to come in unless it be first warmed. We in Canada have therefore been *driven* to the expedient of bringing in the fresh air *all in some one channel*, for the convenience of warming before it is distributed in our dwellings, and in this channel to erect a *warming machine.* So far, so good, but now it was discovered that the external air *would not come in*, and unless some means were devised to compel it to come in and through the machine to be warmed by the hot metal, our work was all thrown away.

From this point I must refer you to my book on "Ventilation and Warming," which will be found at Rowsell's in Toronto, and in many book stores in the United States and Canada.

Suffice it to say at present, that, although the scientific principles upon which this work of ventilation is founded are just as necessary in England as here, yet from the circumstances of our being such mere creatures of *sense* it is not so apparent in that country, and hence the total ignorance of the architects and builders in the temperate climates of the old countries. In verification of this lamentable state of things only hear *Mr. Oliver*, (and he but reiterates the general idea in England): "I have no faith in systems," "all systems resolve themselves in letting air in and pushing air out." He speaks approvingly of "opening the tops and bottoms of windows," and gravely urges upon his audience of architects the trial of the experiment of holding a candle at the top and bottom of a door, when he says it will be seen that the air moves in contrary directions! and a good deal more of such twaddle. He talks of "Arnott's valve ventilator," "Chadwick's archimedian revolving ventilator," "Doulton's double flue extractor," "Sheringham's wall ventilator," and such like "appliances," most conclusively proving that he is entirely innocent of the very first principles of ventilation. But Mr. Oliver's crowning experiment was with "Dr. Chown's reversed syphon," of which he speaks thus: "I am satisfied that it is the best simple extractor of air I have yet seen."

And what does this "best simple extractor" perform? I will not ask you to follow me in calculations, but I give you my word that it will take out of a building 40 feet square and two stories of 10 feet each high, the whole of the air in (640) six hundred and forty days!

The government of this Province have now, and have had for several years, in its employ an expensive commission of several gentlemen to examine into the ventilation of our public buildings. With the exception of *Mr. Ferris*, I will venture the assertion that not one of them knows the first thing about ventilation. Of our gaols, penitentiaries, and hospitals, can you shew me one, or any other public edifices can you shew me one, ventilated building? And what of our school-houses—buildings upon whose purity so much of the health of the succeeding generation depends—what of them? There are just *four* in this whole country of three millions of inhabitants!

This ventilation of school-houses is a matter of so much importance that, with your leave, and in order to leave *your Toronto* trustees without excuse, I will inform them through your valuable journal that there are two buildings almost under their noses which are warmed and ventilated on the proper system, one at *Richmond Hill* and the other at *Oshawa.* If in spite of this information they still persist in trusting to their "old fogy" architects, and continue to smother their poor innocent children in their own filth, I can only say that they are incorrigible.

In the United States, where I could point to hundreds of buildings, railway carriages, and other apartments, all of which are ventilated upon the "*exhaustion* principle" of "admitting the pure air at the *top* and expelling, or more properly speaking, *drawing* the mephitic air from the bottom" of the apartment. When you hear a man talking as this man, Mr. Oliver, does about this man's principles or that man's principles, you may at once conclude that he knows nothing about ventilation. THERE IS BUT ONE WAY.

H. RUTTAN.

Cobourg, 28th March, 1865.

[Some ten years ago we occupied a bed room about 14 feet square, on the west side of which was one window, and nearly opposite to it was the entrance door. On the south side of the room an ordinary brick chimney flue passed through, but there was no open fire-place. Although the door and window were kept open as much as possible, yet the atmosphere always appeared close, and gave evidence that the room was not ventilated. To test the *exhaust* principle we cut a square hole in the *base* board (near the floor), and removed 4 bricks from the wall of the chimney, and the ventilation was thorough—the draft inwards was so strong that it would generally extinguish a lighted candle if held at the aperture. The hole remained open for years, no inconvenience being experienced by the escape of smoke into the room, the *exhaust* being continuous.—ED. JOURNAL].

ANSWER TO CORRESPONDENTS.

C. H. Waterous, & Co., Brantford.—Your letter in answer to the communication of "Z.," on the "Economical use of Steam," in the March number, was received too late for insertion in this number, but will appear in the next.

Board of Arts and Manufactures

FOR UPPER CANADA.

ANNUAL EXHIBITION OF THE PROVINCIAL AGRICULTURAL ASSOCIATION.

We beg to direct the attention of our manufacturing and artist readers, to the Prize List of the Arts and Manufactures Department of the Provincial Exhibition, to be held in the city of London, C. W., commencing on Monday the 18th of September next.

To intending exhibitors we say commence early to prepare, so that you may not finally be hurried to have your goods on the grounds in time. We hope to see a good representation of our Woollen, Flax, Wood and Metal Manufactures, and also of Fine Art products. One great improvement in the arrangements has been determined upon by the council of the Association, namely, that the main building be closed to the public for one half day, while the Judges shall be performing their onerous duties. This will be especially satisfactory to the Judges and the competitors, and we doubt not will be cheerfully acquiesced in by the visitors.

FINAL EXAMINATIONS.

Notice to Institutes.

Directors and members of Mechanics' Institutes are reminded that the Final Examinations of the Board will be held not later than the first week in June next, and that the names of Candidates, and the subjects they propose to be examined in, must be communicated to this Board on or before the first day of May, so as to enable the Examiners to *set* the papers necessary for the examinations.

BLANK FORMS, upon which to make these returns, will be mailed to any institute applying for them.

The details of the preliminary and final examinations will be found in the No. of this Journal for Dec. 1864; but any further information required will be furnished on application.

W. EDWARDS,
Secretary.

GOODS FOR THE DUBLIN EXHIBITION.

The following is a list of the goods selected by this Board, and shipped per Moravian from Portland, on the 22nd ultimo, for the Exhibition to be opened in the Dublin Exhibition Palace, on the 9th of May, instant. These articles have mostly been purchased at reduced prices — those presented without charge are so stated.

From MCKINLEY & Co., St. Catharines,—Assortments of Carriage and Buggy Hubs, Felloes, seat Rail, bent Buggy Shafts, and Wheel Spokes.

From TORONTO LINSEED OIL Co.—Samples of Oil Cake, Raw, Refined and Boiled Oils, and sample Bottles of six Pure Colours of paints. (*presented.*)

From GALT EDGE TOOL Co.—An assortment of Adzes, Axes, Chisels, Shaves, Scrapers, &c., 42 pieces.

From H. E. CLARKE, Toronto,—A solid Canadian Leather Portmanteau.

From ALFRED GREEN, Hamilton,—An assortment of Horse, Spoke, Water, Plate, Stove, Scrubbing, and Shoe brushes.

From W. Armstrong, Toronto,—28 Water Colour Views between Toronto and Vancouver's Island, 41 Steroscopic Views on Lake Superior, 27 Water coloured Photographs of Indian Chiefs, 3 large Water Colour Drawings. (the first one purchased, the others lent.)

From J. G. Crane, Ancaster,—An assortment of Gents knitted Drawers and Shirts, Ladies Hose, and Berlin Wool.

From W. B. Butler, Toronto,—Tremaine's map of Canada, and J. O. Browne's map of Toronto.

From Selway, Iredale & Ward, Toronto,—A set of Boot Tree and (4) lasts, an assortment of 8 lasts, and 2 lasts rough from the Lathe.

From Thomas Moore, Etobicoke,—An assortment of Axe and other Tool Handles.

From W. C. Chewett & Co., Toronto,—Canada and Toronto Directories, 4 vols. Journal of Arts, 1 vol. Canadian Almanacs, as specimens of Printing and Binding.

(8 Frames of specimens of Lithography *presented.*)

From Hurd & Leigh, Toronto,—18 specimens of Gilding and Decoration of China.

From Charles Boeckh, Toronto,—An assortment of horse, cloth, flesh, hair, hat, paper-hanger's, whitewash and paint brushes.

(A frame of ornamental brush work *presented.*)

From Jacques & Hay, Toronto,—A Table-top, inlaid with Canadian Woods.

From Joseph McCausland, Toronto,—The Arms of Canada, 4 × 3 ft., in stained glass.

From Educational Department, Toronto, — Map of B. N. America, McCallum's Chart and Browne's Diagrams, Assortments of Globes, Planetarium, Tellurium, Air Pump, and Geometrical Solids, all Canadian productions.

(Set of Educational Journals, C. Superintendents Reports, Merit Cards, Object Lesson, and plan of Educational Buildings, *presented.*)

From Charles Heise, Preston,—A frame of samples of Waved Mouldings, (*presented.*)

From John Edwards, Toronto,—4 books of "Orr's Commercial and Ladies Penmanship copies."

From Barber Brothers, Streetsville,—Sample cards of Summer and Winter Cloths (*presented.*)

From Petrie & Strowger, Newcastle,—Sample boxes of Potatoe and Wheaten Starch.

From Charles Potter, Toronto,—One of Dr. Roseburgh's Ophthalmoscopes.

From Brown Brothers, Toronto,—One Account Book, one Maple Leaf, one Canadian Journal, as samples of Blank-book and Letter-press Binding; and two pocket Diaries.

From J. Hollingsworth, Toronto,—Six Photographed Architectural views of Toronto, and forty Carte views of the principal Buildings in Toronto.

From Rollo & Adam, Toronto,—Six volumes of Canadian Books, published by them—3 Law, 2 Magazines, and 1 *Scaddings Shakespeare.*

From J. A. Donaldson, Toronto,—Specimens of Cottonized Flax, bleached and unbleached; 2 samples of linen bleached and unbleached; 1 linen bag, and 2 specimens of Cordage (*presented.*)

From Rice Lewis, Toronto (merchant).— Self-fastening Skates, by James Ashton, Toronto; Sample Card of Hinges, by Byers & Mathews, Gananoque; Mill Saw, by J. Flint, St. Catharines; Cross-cut and Circular Saws, by Morland & Watson, Montreal; Manilla Rope, by J. McGreggor, Toronto.

From Slingsby & Kitchen, Canning,—One pair of Woolen Blankets.

From W. P. Marston, Toronto,—One Marston Rifle, with new attachments.

The above mentioned goods were mostly selected from *Stock*, sufficient time not having been allowed to prepare articles specially for the occasion, but are nevertheless very creditable to the Province. It is to be regretted that some of the leading manufacturers in new branches of Industries, did not respond to the request of the Board to furnish specimens—being apparently under the impression that an exposition of their products would be likely to create a rivalry in their manufactures, and thus operate to their injury. We believe that no views could be more erroneous—the time has gone by for fostering monopolies, and securing business by maintaining trade secrets and shunning publicity. These exhibitions not only afford means for introducing new wares to the public, but by comparison with other goods create a legitimate rivalry amongst manufacturers both as to superior styles and finish, and economical modes of production; thus cheapening the price and creating a correspondingly increased demand.

Notices of Books.

THE CORRELATION AND CONSERVATION OF FORCES.

We have before us a series of expositions under the above title by Grove, Helmholtz, Mayer, Faraday and Carpenter, which for beauty of illustration and comprehensiveness of matter are very seldom equalled.

The correlation and conservation of forces, is a subject that has occupied the attention, more or

less, of some of the most learned of our experimentalists, from the period of Sir H. Davy to the present time. Until a comparatively recent period the general impression has been, and yet prevails to a considerable extent, that the various agencies of change, viz: Light, Heat, Electricity, Magnetism, &c., are all imponderable bodies, or at least too subtle to be estimated by any means which our present experience enables us to command. This idea is fast losing ground, and the evident tendency under the new light which the investigations of the before mentioned authors and others, have thrown upon the subject is towards the belief, that all these agencies are modifications of one, and the same force, and that they are mediately or immediately convertible into each other.

The space available for a review will not permit us here to examine the whole work. We have therefore chosen to lay before our readers a few remarks on the treatise of Mr. William R. Grove, not because it is of greater interest, but because it is the first and most extensive of the series. We however cordially recommend the careful perusal of the whole series, to those of our readers who desire to enter fully into the subject, firmly convinced that such perusal will fully repay the trouble expended upon them.

Our author commences by pointing out the difficulty of introducing new ideas in opposition to prevailing theories; that the earliest theories enunciated obtained the firmest hold, for in consequence of the want of knowledge of the subject and power of testing, there were no means of contradiction and the theory was accepted mainly on authority. This, though not devoid of good, often caused the most immature theories to become the most permanent.

After asking for a fair and candid hearing, the author defines his subject to be "the relation of the affections of matter to each other, and to matter," and warns the reader that if the different aspects and views under which the agencies have been contemplated, be pursued beyond what may be considered as fair deductions from existing experience, almost insurmountable difficulties will result.

After referring to his own peculiar claims as expressed in the preface of the work, he reviews the reasoning of the ancients, gradually follows the changes of that mode to recent times, and concludes by expressing his conviction that the object of physical science should be to search after facts and relations rather than essential causes. He proves that abstract secondary causation does not exist, and that it is useless to seek after essential causes. "The position which I seek to establish in this Essay is, that the various affections of matter which constitute the main objects of experimental physics, viz., heat, light, electricity, magnetism, chemical affinity, and motion, are all correlative or have a reciprocal dependence, that neither taken abstractedly, can be said to be the essential cause of the others, but that either may produce or be convertible into any of the others: thus heat may mediately or immediately produce electricity, electricity may produce heat; and so of the rest, each merging itself as the force it produces becomes developed; and that the same must hold good of other forces, it being an irresistable inference from observed phenomena, that a force cannot originate otherwise than by devolution from some pre-existing force or forces."

The term force is then defined in its limited sense as "that which produces or resists motion;" and in its general sense, "as meaning that active principle inseparable from matter, which is supposed to induce its various changes. Proceeding with the argument he shows clearly that we can know nothing of matter except by its effects, and concludes that nothing repeats itself because nothing can be placed again in the same condition; the past is irrevocable.

We now pass on to the second part of the subject; to *visible motion*, or the relative change of position in space. There is somewhere a limit at which obvious motion fades away. What then becomes of it? Into what is it converted, or is it destroyed? Experiment proves that it is not destroyed, but is converted into some other mode of motion. Sound, which was formerly considered to arise from the vibration of an *ether*, can now be shown to be motion. Light and Electricity, though not evident to the senses as motion, may nevertheless by inverse deduction from the known relations of motion to time and space, be shown to be modes of motion.

All matter as far as we can ascertain is in motion, being influenced by heat, light, chemical and other actions; and motion again cannot be annihilated, it is merely altered in direction and character.

Having detailed experiments by means of which the preceding propositions can be established, our author proceeds to explain the nature of the experiments by which Dr. Joule established the mechanical equivalent of heat. Friction between homogeneous bodies produces heat only, but between heterogeneous substances electricity is produced. The experiments of Mr. Sullivan prove that electricity may be produced by vibration alone, if the substance vibrating be composed either of

dissimilar metals—as a wire partly of iron and partly of brass caused to emit a musical sound—or if its parts be not homogeneous, as a piece of iron, one part of which is hard and crystalized, and the other soft and fibrous; the current resulting appears to be due to the vibration and not to heat engendered, as it ceases immediately with the vibration.

Putting aside the sensations which heat produces in our bodies, the effects of heat are the expansion of the matter acted upon, and this matter has the power by its own contraction of communicating expansion to all bodies in contiguity with it. Heat thus viewed is motion; this molecular motion may be changed into the motion of masses. To make this motion continuous we must have alternation of heat and cold, producing alternately expansion and contraction. All modes of measuring heat are measurements of expansion and contraction.

Latent heat has been generally supposed to be the matter of heat, associated in a dormant state with ordinary matter, and not capable of being detected by any test so long as the matter with which it is associated remains in the same physical condition; but it is communicated to or absorbed from other bodies when the matter with which it is associated changes its state. If hot water, for example, be added to an equal quantity of cold water, the temperature of the mixture will be a mean between the temperatures of the mixed liquids; but if hot water be added to an equal weight of ice at 32° F., the temperature of the water will be reduced to the temperature of the melting point of ice. (32° F.) By the dynamic theory the heat apparently lost, or rendered latent, is shown to be expended in effecting a change in the water from the solid (ice) to the liquid state. The same effect may be traced in the change of a liquid to the form of gas or vapour.

"If we compare the action of heat on two substances, water and mercury alone, and throw out of consideration the ice, we shall be able to apply the same view: thus if a given source of heat be applied to water containing a mercurial thermometer, both the water and the mercury gradually expand, but in different degrees; at a certain point the attractive force of the molecules of the water is so far overcome that the water becomes vapour. At this point the heat or force meeting with much less resistance from the attraction of the particles of steam, than from those of the mercury, expends itself upon the former; the mercury does not further expand, or expands in an infinitesimally small degree, and the steam expands greatly. As soon as this arrives at a point where circumambient pressure causes its resistance to further expansion, to be equal to the resistance to expansion in the mercury of the thermometer, the latter again rises, and so both go on expanding in an inverse ratio to their molecular attractive force. If the circumambient pressure be increased, as by confining the water at the commencement of the experiment, within a less expansible body than itself, such as a metallic chamber, then the mercury of the thermometer continues to rise; and if the experiment were continued, the water being confined and not the mercury, until we have arrived at a degree of repulsive force which is able to overcome the cohesive power of the mercury, so that this expands into vapour, then we get the converse effect; the force expends itself upon the mercury, which expands indefinitely, as the water did in the first case, and the water does not expand at all."

Some apparent exceptions are noticed and explained.

The various plans proposed for economizing heat in its application to the steam engine are then examined as to their practicability.

In the chapter on Electricity this force is suggested to be due to the molecular polarization of ordinary matter, or as matter acting by attraction and repulsion in a definite direction, and some of its effects in generating other forces are explained.

Light and magnetism are also examined, as to their relations to other forces and to each other.

In treating of chemical affinity the *atomic theory* is investigated. The author endeavours to show that the theory of indivisible atoms is inconsistent with the present state of our knowledge of chemical compounds. This will be best explained by quoting the author's own words.

"It was perfectly consistent with the atomic view that a substance might be formed with one part combined with eight parts, or with sixteen, or with twenty-four, for in such a substance there would be no subdivision of the (supposed indivisible) molecule; and this holds good with many compounds; thus fourteen parts by weight, say grains of nitrogen will combine respectively with eight, sixteen, twenty-four, thirty-two, and forty parts by weight, or grains, of oxygen.

"So again twenty-seven grains of iron will combine with eight grains of oxygen, or with twenty-four—*i. e.*, three proportionals of oxygen. No compound is known in which twenty-seven grains of iron will combine with two proportionals, or sixteen grains of oxygen; but this does not much affect the theory, as such a compound may

yet be discovered, or there may be reasons at present unknown why it cannot be formed.

"But now comes a difficulty. Twenty-seven parts by weight of iron *will* combine with twelve parts by weight of oxygen, and twenty-seven parts by weight of iron will combine with ten and two-third parts of oxygen. Thus if we retain the unit of iron we must subdivide the unit of oxygen; or if we retain the unit of oxygen, we must subdivide the unit of iron, or we must subdivide both by a different division; What then becomes of an atom or molecule, physically indivisible."

After giving several other examples in support of this view, he proceeds to say that, "By selecting a separate multiplier or divisor, chemists may denote every combination in terms derived from the atomic theory; but they have passed from the original law, which contemplated only definite multiples, and the very hypothetical expression of atoms, which the apparently simple relations of combining weights first led them to adopt, they are obliged to vary, and to contradict in terms, by dividing that which their hypothesis and the expression of it assumed to be indivisible."

The remaining forces for which we have definite names, as catalysis, gravitation, inertia, &c., are all briefly treated of, and in the concluding remarks the various subjects are cleverly summarized.

To the student of Natural and Experimental Philosophy, and to those of our readers who wish to pursue the subject further, we cordially recommend the perusal of this by no means expensive work, which though it fails fully to explain many interesting phenomena connected with the subject treated of, yet it teems with suggestions and ideas that tend greatly to modify our ideas with regard to first causes. It is a work that cannot be read without pleasure by every real student of science.

CANADA: A GEOGRAPHICAL, AGRICULTURAL, AND MINERALOGICAL SKETCH, by T. STERRY HUNT, of the Provincial Geological Survey, and published by authority of the Bureau of Agriculture, for distribution at the Dublin Exhibition.

This little work gives a concise account of the Physical Geography and Geology of Canada, considered in reference to its agricultural capabilities, with a notice of some of the more important natural productions of the country. We may find space for some extracts in future numbers.

PRACTICAL HINTS ON THE CULTIVATION AND TREATMENT OF THE FLAX PLANT, expressly for the use of the Canadian Farmer: by J. A. DONALDSON, Government Emigrant Agent, Toronto.

This Pamphlet is intended to impress on the Canadian Farmer the importance of cultivating this valuable fibre, and contains hints and suggestions as to the most suitable soils, and the best modes of procedure in the different stages of cultivation and preparation; and also the importance to Canada, of promoting linen manufacture.

Selected Articles.

CORROSION OF STEAM BOILERS.

"The insiduous action of various waters upon the plates of steam boilers is of sufficient interest and importance to justify the dissemination of any facts or circumstances at all bearing upon the subject. A few remarks upon the question may do more practical good in the way of calling attention to the disease and its remedy than tons of boiler compositions—or decompositions—used haphazard or promiscuously, as is too often done. We shall confine ourselves to the corrosion in steam boilers, leaving the equally important question of incrustation for a subsequent notice. Corrosion may go on for years, either internally or externally of a boiler, and no suspicion be entertained of its presence until an explosion, more or less serious in its result, reveals the dire fact. A great amount of ignorance prevails with regard to the quality of water used for raising steam, owing to the general difficulty in judging thereof. This is to be obviated by the proper use of chemical tests, but in too many cases the tests would have to be, and even are, applied by those lacking sufficient chemical knowledge to enable them to arrive at correct results. Hence, a course may be taken to remedy the evil, totally unsuited, if not opposed, to the necessities of the case.

The ingredients in most waters are the same, differing only in their relative proportions, the principal constituents being the carbonate and sulphate of lime. But other ingredients are frequently found in combination, and exert a baneful influence upon the metal of which the boiler is made. Instances are not wanting of internal corrosion caused by the acidity of the water, which, in some cases, has been most virulent. Sometimes the whole plate is attacked, presenting a honeycombed appearance all over the surface, whilst at other times only small patches and some of the rivet heads are eaten into. We know an instance of a boiler plate having been reduced from an original thickness of 7-16ths of an inch to less than 1-16th from internal corrosion, the surface of the plate being honey-combed all over. A badly made boiler suffers severely at all the seams from the use of corrosive water. Small leaks, which, with a sedimentary water, might take up, are, with a corrosive water, found to enlarge their channel constantly, and to grow worse daily. In many cases where the use of acidulated water is unavoidable, great benefit has ensued from the use of soda. By its adoption boilers have become tight which were previously very leaky and required constant repair.

A noteworthy instance of the action of peaty water on a boiler is afforded by one belonging to a mountain colliery in South Wales. This boiler was made of 9-16th in. Staffordshire plates, and was put up for work in 1849. It had been noticed from the first that, when the gauge cocks were tried, or when the boiler was cleaned out, the water was always of a red colour. To such an extent was this the case that all objects near the gauge cocks were coated with an incrustation of red oxide of iron, when the cocks were tried, and this circumstance led in 1854 to an examination of the boiler and the source of supply water, which was an adjacent pond into which water ran from the surrounding mountains. On analysis, one gallon of the water, which was turbid and dirty, gave in grains—silica ·405, peroxide of iron ·240, sulphate of iron ·201, alumina ·126, phosphate of lime ·127, sulphate of lime ·350, sulphate of magnesia ·360, alkaline chlorides ·487, sulphate of soda ·258: total 2·554 grains; there were also traces of copper, and a large amount of peaty matter. As regards the amount of silica, alumina, and iron given by the analysis, it is evident from the turbid character of the water that a large portion of these ingredients are held in suspension as clay. The iron exists in a certain amount as peroxide, which the peaty matter present holds in solution. The other portion exists as sulphate of iron and is formed by the oxidation of iron pyrites in the peat. The oxidation of copper pyrites also gives the trace of copper, which, however, was so minute as to be only detected by evaporating a gallon of the water to dryness.

Upon examination of the semi-liquid deposit in the boiler it was found to consist chiefly of oxide of iron, with an appreciable amount of copper and the other salts in the water in a concentrated state. An inspection of the boiler was made after it had been cleaned out, and it was discovered that from the water line downwards the boiler was considerably acted upon, especially at the bottom, the action decreasing upwards in wavy lines. We examined a piece of plate taken from the bottom, through which holes were perforated from 3-16ths to 1-16th of an inch in diameter. The only wonder is that a boiler with such a plate in it could work at 60 lbs. pressure, or even hold water. Small rounded pieces of coal or shale, however, were found inside the boiler, which were forced into the holes, and although the boiler leaked it could yet be worked. Small, thin scales of metallic copper, some nearly 1-8th of an inch in diameter, were found in the deposit, as were also pieces of oxide of iron, with a small scale of metallic copper in the centre. The action of the water on the boiler may be attributed, in the first place to the action of the minute quantity of sulphate of copper, which is immediately decomposed by the iron, metallic copper being deposited and an equivalent amount of iron dissolved. Secondly, to the sulphate of iron, which is soon decomposed into a basic sulphate with the liberation of free sulphuric acid, this action being greatly facilitated by the small particles of metallic copper which form a galvanic circuit with the iron. Thirdly, to the large amount of peaty matter which contains organic acids, the action of the acids being facilitated by the galvanic action set up between the iron and the copper.

Unquestionably, the best method of preserving a boiler working under these conditions would be to use hard water for a time and allow the boiler to scale. If hard water could not be had, then chalk or lime or sulphate of lime might be added so as to form an artificial scale. The injurious results to the boiler arose from the purity of the water and the absence of lime salts. If the boiler scaled a little this water might be used. Hence, it is doubtful if pure waters are well adapted for steam boilers. The addition of a small amount of lime salts is beneficial, as by being deposited on the iron they preserve it. But in large quantities these salts become prejudicial by forming an incrustation. The alternate use of soft and hard water would prove advantageous. In many cases where corrosion has taken place in boilers where surface condensers are used, it may be attributed to small particles of the copper or brass from the tubes of the condenser being carried into the boiler, and not, as is often supposed, to a galvanic action originating in the condenser. In fixing surface condensers care should be taken that all filings and other loose particles of the tubes should be entirely removed.

External corrosion arises generally from external damp, which is caused sometimes by water penetrating into the flues and saturating the seating, and sometimes from blowing seams and rivets. The injurious effect upon the boiler is much accelerated when in contact with the brick-setting, which frequently retains the water, and holds it against the plate, the result being rapid oxidation. Boilers are most liable to external corrosion when set on mid-feathers. 7-16th in. plates have been reduced in this way to 1-8th in. thick This external corrosion is more easily prevented than cured, and prevention lies in having, in the first instance, thoroughly good material and work, both in the manufacture and setting of the boiler. Equal care should be taken to secure the completeness and perfect arrangement of the fittings, inasmuch as the blow-out apparatus and the lower man-hole joint in front of the boiler, when not well made, are frequently the cause of damp ash-pits, from which serious cases of corrosion have resulted. Similar consequences arise as well from the discharge from the glass-water gauges. Channelling has been supposed to be the result of oxidation caused by a slight leak at the joint. This, doubtless, holds good in some cases, but many instances occur where no external damp can be discovered, and on separating the plates no trace of leak can be detected.

In a marine boiler external corrosion takes place in the region of the steam-chest by the dripping of water from the deck; the bottom of the boiler is corroded by bilge-water, and the ash-pits by the practice of quenching the ashes with salt-water. But these sources of injury are easily remedied. A felt covering, upon which sheet-lead is laid, will preserve the top of the boiler from corrosion. The ash-pit may be protected by guard-plates, which may be replaced when worn out, and the wear on the bottom of a boiler will be but trifling if it be bedded in mastic cement laid on a suitable platform. The greatest part of corrosion, however, in a marine boiler takes place inside the steam chest, and its origin is wrapt in obscurity. If it arose from

the chemical action of the salt water upon the iron, the flues and other parts of the boiler below water-level would suffer corrosion, which they do not. In vessels where the boilers are supplied with fresh water with Hall's condensers no great increase in durability of the boiler has been experienced. The parts of a marine boiler beneath the water are protected from corrosion by the thin film of scale spread over them, and when other parts are worn out the flues are generally found perfect. The steam, too, in corroding the interior, operates in a most capricious manner, different parts in different boilers being affected; and in some cases a steam chest will be worn out on one side, the other being uninjured. Boilers are more corroded where there is a large accumulation of scale than where there is none; and the iron of a steam chest, where the funnel passes through it, is invariably more corroded than where it does not pass through. The general facts lead to the conclusion that internal corrosion in marine boilers is due to the presence of surcharged steam within them. The application of felt to the outside of a boiler has been found in several cases to accelerate internal corrosion, and this may arise from the steam being kept in a surcharged state, which would cease to be the case if a portion of that heat was dispersed."—*Mechanics' Magazine.*

SYSTEM.

The application of machinery to the production of wares, fabrics, utensils of whatever description, texture or nature, is in these days of competition indispensable to prosperity; but system, or a fixed plan of procedure to regulate the operation of the works is oftener wanting than present.

It is suprising to see what lack of appreciation there is for habits of order and routine among many of our manufacturers, and it is strange that any profits accrue where such make-shift policy as some practice prevails. We know of one shop in this city, the largest and oldest concern of its kind in the country, which has literally no beginning nor ending, for the construction of its work. If a man wants a tool for some particular job he makes it out of another tool, and in the end throws it on the floor, or leaves it where he gets through with it. The work is sometimes commenced in one part, sometimes in another; it goes backward and forward, and round about, is hoisted up, lowered down, carried on trucks, or left on one side altogether, at the will and pleasure of the foreman in charge. Holes are drilled for which there are no bolts, and bolts are forged which are too long or too short, and new ones are made while the old ones are kicked around under foot. The yard is full of iron scraps; washers, nuts, bolts and rivets lie about indiscriminately vexing the sight of orderly persons and running to loss and waste generally.

What excuse is there for such a style of things? Not the slightest. The picture is so far from overdrawn we dare not tell all that may be seen least those at a distance should deem the statement incredible. Work is polished in a lathe, put somewhere on one side, becomes damp, gets rusty, and then a laborer comes with his emery paper and oil and does "lathe work" sitting on a bench. What an absurdity. It is more than this; it is a positive wrong; no workshop should be permitted to fall into such hands, for, apart from the actual loss involved in wasted time and material, the example has a mischievous tendency and destroys the ambition of the workmen.

There can be no dividends where such outrageous disorder prevails. Said a New England man to us a short time ago, "I came a long distance to see your works, and from the time they have been in existence I expected to find the latest improvements, but after I had gone through one or two rooms I got homesick and went out; such disorder I never saw before."

If there was any necessity for this slovenliness and waste there would be some excuse, but there is none, and it should be remedied. There is nothing that men admire more than clean, well arranged workshops, and we have noticed in our travels about the country that order and system have a marked effect on the men themselves. Good workmen will not stay in a place where they are up to their knees in filth, or where they see the jobs in hand made to cost four times what they should. Let every one interested in manufactures of any kind examine their factories and they will find ample room for improvement in many places.—*Scientific American.*

PHYSICAL EFFECTS OF MUSIC.

It communicates to the body shocks which agitate the members to their base. In churches the flame of the candle oscillates to the quake of the organ. A powerful orchestra near a sheet of water ruffles its surface. A learned traveller speaks of an iron ring which swings to and fro to the sound of the Tivoli Falls. In Switzerland I excited at will, in a poor child afflicted with a frightful nervous malady, hysterical and cataleptic crises, by playing on the minor key of E flat. The celebrated Dr. Bertier asserts that the sound of a drum gives him the colic. Certain medical men state that the sound of the trumpet quickens the pulse and induces a slight perspiration. The sound of the bassoon is cold; the notes of the French horn at a distance, and of the harp are voluptuous. The flute played softly in the middle register calms the nerves. The low notes of the piano frighten children. I once had a dog who would generally sleep on hearing music, but the moment I played on the minor key he would bark piteously. The dog of a celebrated singer whom I knew would moan bitterly, and give sign of violent suffering, the instant his mistress chanted a chromatic gamut. A certain chord produces on my own sense of hearing the same effect as the heliotrope on my sense of smell and the pineapple on my sense of taste. Rachel's voice delighted the ear by its ring pefore one had time to seize what was said, or or appreciate the purity of her diction.

We may affirm, then, that musical sound, rythmical or not, agitates the whole physical frame—quickens the pulse, incites perspiration, and produces a pleasant momentary irritation of the whole nervous system.—*Gottschalk.*

So long as life remains to us, our duties are unfinished. There is no room for idleness here.

THE RESTORATION OF THE APPARENTLY DROWNED.

In the number of the Journal for August last, we published the New Rules of the Royal National Life Boat Institution, for the restoration of the apparently drowned, but without the woodcut illustrations. Through the influence of J. F. Perrault, Esq., M.P.P., these have now been loaned to us by M. Desbarats, Esq., of Quebec, and we therefore republish the whole for the benefit not only of our last year's subscribers, but for those who commenced with the present volume. These directions are of such vast importance that every person should be familiar with them.

I.

Send immediately for medical assistance, blankets, and dry clothing, but proceed to treat the patient instantly on the spot, in the open air, with the face downwards, whether on the shore or afloat; exposing the face, neck, and chest to the wind, except in severe weather, and removing all tight clothing from the neck and chest, especially the braces.

The points to be aimed at are—first and immediately, the restoration of breathing; and, secondly, after breathing is restored, the promotion of warmth and circulation.

The efforts to restore breathing must be commenced immediately and energetically, and persevered in for one or two hours, or until a medical man has pronounced that life is extinct. Efforts to promote warmth and circulation beyond removing the wet clothes and drying the skin must not be made until the first appearance of natural breathing. For if circulation of the blood be induced before breathing has commenced the restoration to life will be endangered.

II.—To Restore Breathing.

To clear the throat.—Place the patient on the floor or ground with the face downwards, and one of the arms under the forehead, in which position all fluids will more readily escape by the mouth, and the tongue itself will fall forward, leaving the entrance into the windpipe free. Assist this operation by wiping and cleansing the mouth.

If satisfactory breathing commences, use the treatment described below to promote warmth. If this be only slight breathing—or no breathing—or if the breathing fail, then—

To excite breathing.—Turn the patient well and instantly on the side, supporting the head, and excite the nostrils with snuff, hartshorn and smelling salts, or tickle the throat with a feather, &c., if they are at hand. Rub the chest and face warm, and dash cold water, or cold and hot alternately on them.

If there be no success, lose not a moment, but instantly.

To Imitate Breathing.—Replace the patient on the face, raising and supporting the chest well on a folded coat or other article of dress.

1. *Respiration.*—Turn the body very gently on the side and a little beyond, and then briskly on the face, back again; repeating these measures cautiously, efficiently, and perseveringly about fifteen times in the minute, or once every four or five seconds, occasionally varying the side.

[By placing the patient on the chest the weight of the body forces the air out; when turned on the side this pressure is removed, and air enters the chest.]

On each occasion that the body is replaced on the face make uniform but efficient pressure with brisk movement, on the back between and below the shoulder blades or bones on each side, removing the pressure immediately before turning the body on the side. During the whole of the operations let one person attend solely to the movements of the head, and the arm placed under it.

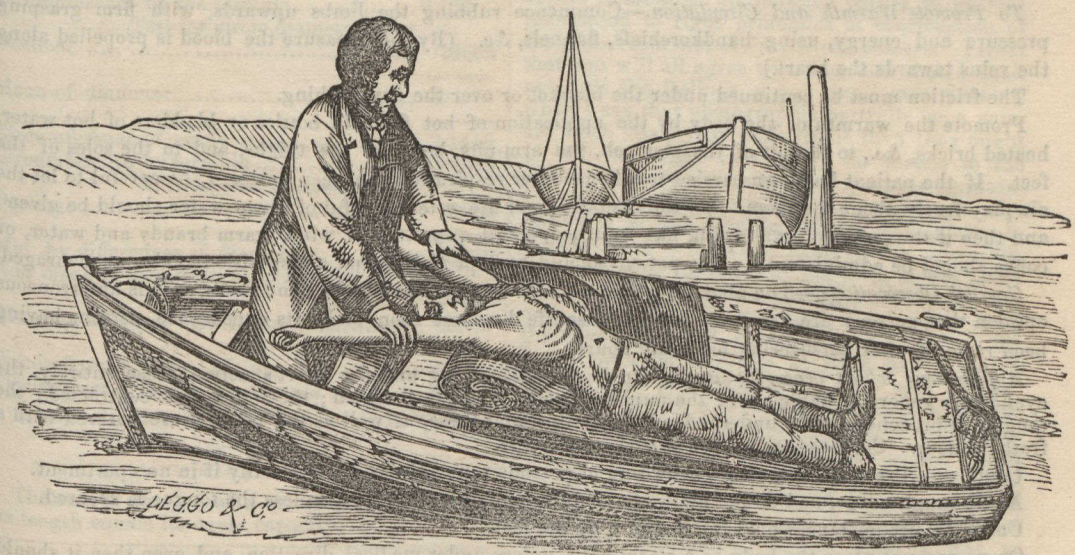
The first measure increases the expiration, the second commences inspiration. The result is respiration or natural breathing, and, if not too late, life.

While the above operations are being proceeded with, dry the hands and feet; and as soon as dry clothing or blankets can be procured, strip the body and cover, or gradually reclothe it, but taking care not to interfere with the efforts to restore breathing.

2. *Expiration.*—The foregoing two illustrations show the position of the body during the employment of Dr. Marshall Hall's method of inducing respiration.

III.

Should these efforts not prove successful in the course of from two to five minutes, proceed to imitate breathing by Dr. Silvester's method, as follows:—Place the patient on the back on a flat surface, inclined a little upwards from the feet: raise and support the head and shoulders on a small firm cushion or folded article of dress placed under the shoulder-blades.



1. *Inspiration.*—Draw forward the patient's tongue, and keep it projecting beyond the lips; an elastic band over the tongue and under the chin will answer this purpose, or a piece of string or tape may be tied round them, or by raising the lower jaw, the teeth may be made to retain the tongue in that position. Remove all tight clothing from about the neck and chest, especially the braces.

To Imitate the Movements of Breathing.—Standing at the patient's head grasp the arms just above the elbows, and draw the arms gently and steadily upwards above the head, and keep them stretched upwards for two seconds. (By this means air is drawn into the lungs.) Then turn down the patient's arms, and press them gently and firmly for two seconds against the sides of the chest. (By this means air is pressed out of the lungs.)

Repeat these measures alternately, deliberately and perseveringly, about fifteen times in a minute until a spontaneous effort to respire is perceived, immediately upon which cease to imitate the movements of breathing and proceed to induce circulation and warmth.

2. *Expiration.*—The last two illustrations show the position of the body during the employment of Dr. Sylvester's method of inducing respiration.

IV.—Treatment after Natural Breathing has been Restored.

To Promote Warmth and Circulation.—Commence rubbing the limbs upwards, with firm grasping pressure and energy, using handkerchiefs, flannels, &c. (By this measure the blood is propelled along the veins towards the heart.)

The friction must be continued under the blanket or over the dry clothing.

Promote the warmth of the body by the application of hot flannels, bottles or bladders of hot water, heated bricks, &c., to the pit of the stomach, the arm-pits, between the thighs, and to the soles of the feet. If the patient has been carried to a house after respiration has been restored, be careful to let the air play freely about the room. On the restoration of life, a teaspoonful of warm water should be given; and then if the power of swallowing has returned, small quantities of wine, warm brandy and water, or coffee should be administered. The patient should be kept in bed, and a disposition to sleep encouraged.

General Observations.—The above treatment should be persevered in for some hours, as it is an erroneous opinion that persons are irrecoverable because life does not soon make its appearance, persons having been restored after persevering for many hours.

Appearances which generally accompany Death.—Breathing and the heart's action cease entirely, the eyelids are generally half-closed; the pupils dilated; the jaws clenched; the fingers semi-contracted; the tongue approaches to the under edges of the lips, and these, as well as the nostrils are covered with a frothy mucus. Coldness and pallor of surface increase.

Cautions.—Prevent unnecessary crowding of persons round the body, especially if in an apartment.

Avoid rough usage, and do not allow the body to remain on the back unless the tongue is secured.

Under no circumstances hold the body up by the feet.

On no account place the body in a warm bath, unless under medical direction, and even then it should only be employed as a momentary excitant.

Practical Memoranda.

Circumference of the Ellipse.

(From the *Scientific American.*)

Several branches of mechanics and engineering experience the want of a correct mode of finding the circumference of an ellipse. The rules by the books give an approximation to truth only when the difference in the two diameters is small; and the most correct is by the formula: $\sqrt{4D^2+d^2}+1\cdot11$.

The error in this rule increases with the elongation of the ellipse, and the true test for correctness is to apply it to both extremes of the ellipse, viz: —a circle having two equal diameters and a line with only one diameter. The rule now presented is circuitous but exact. *It gives the diameter of a circle of which the circumference is equal to that of the ellipse.* Rule:—Multiply the decimal ·13662* by the difference of diameters. Let the diameters take the form and office of a vulgar fraction; subtract what the fraction demands from the above product; repeat the process with the remainder; to this last remainder add the mean of the two diameters for diameter of required circle.

Example.

Diameters of ellipse	$\frac{1}{4}$	
Decimal		·13662
Difference of diameter		3
		·40986
Subtract	$\frac{1}{4}$	·10247
		·30740
Subtract	$\frac{1}{4}$	·07685
		·23055
Add mean diameter		2.5
Diameter of circle		2·73055
Circumference of ellipse		8·576
Circumference by the formula		9·153
Test for circle diameters:—	$\frac{1}{4}$	
Decimal		·13662
Mean of diameter		1·
Circumference of circle		3·1416
Circumference by formula		3·1395
Test for line diameters:—	$\frac{0}{1}$	
Decimal		·13662
Mul. by differences of diameters.		·13662
Add mean of diameter		·5
Diameter of circle		·63662
Circumference (sides) of line		2·
Circumference (sides) by formula		2·22

Cincinnati, March, 1865. F. W. B.

Cubic Capacity of Cylinders.

The area of the end of a cylinder multiplied by its length equals its cubic capacity.

* More accurately, ·1366197697.

Solid Contents of a Cone.

To find the solid contents of a cone, multiply one-third of the area of the base by the height.

A steel wire may be made from an iron one by plunging it into melted cast iron.

Fats and vegetable acids may be cooked in hot copper sauce-pans without danger, since the metal is not attacked by them except when cold.

Rosin for violins should be melted with a little vinegar.

The cube of the diameter of a sphere multiplied by ·5236 will give the solid contents.

Photography.

ON THE GLASS ROOM AND PORTRAIT CAMERA.

By Thomas Sutton.

(Paper read before the Photographic Society of Scotland on March 14th, 1865.)

Mr. Chairman and Gentleman,—The great development of photographic portraiture, and the great importance which that branch of photography has assumed as compared with all other branches of the art render it unnecessary for me to offer any apology for the subject which I have chosen for my paper this evening, viz. the Construction of the Glass Room and of the Portrait Camera. The chemical processes employed for taking portraits have now been brought to a very high state of perfection, and it must be a matter of regret to every reflecting person that, with such excellent processes and such excellent lenses as photographic portraitists now possess, so many glaring defects should still be seen in their productions—defects which appear to me to be attributable chiefly to general inattention to right principles of construction of the glass room and of the portrait camera. I trust that you will all agree with me, and that I shall not hurt the feelings of any gentleman present, when I say that photographic portraits, as a rule, are much less perfect and artistic than they ought to be,—that they very rarely do justice to the sitter,—that the expression is commonly unpleasing—the eyes like anything but what eyes are known to be, and even the vaunted resemblance to the sitter, in a multitude of cases very questionable. Some amusing instances of the truth of the latter remark I will relate, as having come under my own observation. I was perfectly familiar with the countenance of your respected President, Sir David Brewster, through at least half a dozen photographic portraits which I have seen of him, when one day he was pointed out to me in *propria persona* as a visitor to the exhibition of the Photographic Society. I should not have known him in the least for the original of any of the photographic portraits I had seen of him, or even of one which was then hanging upon the walls of that very Exhibition. Again, when I was at King's College Mr. Hardwich left behind him a

negative of Major Russel, from which I took several prints. The portrait was upon a whole plate, and the idea conveyed was that the gallant gentleman was a very austere dogmatic little man, with grey hair and whiskers—one, in fact, under whose rule, whether military or otherwise, it would be an infliction to be placed. Judge then of my surprise on making the acquaintance of the gallant Major the other day to find him above the middle height, with hair, no matter of what colour, but certainly not grey, and a very jolly fellow. I was similarly deceived in Mr. Taylor, whom you all know as an old member of your Society, and now one of the editors of the 'British Journal.' He and I had known each other for some years through our respective cartes; but we neither of us recognized the other when we met for the first time, the other day, in Mr. Ross's office. Mr. Taylor I had always regarded, from the evidence afforded by his photographic portrait, as a little pale-faced fat man, with very large square shoes, and probably a shuffle in his walk. He turned out to be a very tall rosy-faced man, and neither fat nor shuffling. What he had thought of me was evidently quite as wide of the mark; and he did not hesitate to confess his surprise. I have often wondered whether the world-wide celebrities, whose cartes one sees in one's own and every body else's album, are as unlike their photographic portraits as one's own friends are known to be. The question assumes quite a serious aspect when we reflect upon the permanent prints of the notabilities of the present day, which are to be handed down to posterity in Swan's or Pouncy's carbon. Query, is it not morally wrong to go on thus deluding one's fellow-creatures, not only of this but of all succeeding ages? And yet if people will knowingly go, as they do, into hot, short, glaring glass rooms and be taken,—with the results of such a practice staring them in the face in nearly every photograph they see,—why then, I can only say, on their own head be it, and posterity must take the consequences.

I am surely not exaggerating the case a bit. The evils which I describe exist, and it ought to be a question of the first importance to every professional portraitist to ascertain whether his glass room is properly constructed, and whether his mode of posing and exposing is the best possible.

Too much importance is, I think, attached, in the first place, to a good business locality, and not enough to the aspect of the studio and the general conveniences for work. A first-class photographer need not surely confine himself to Regent Street or Princes Street, if the aspect of the room in that locality is objectionable. M. Silvy and M. Joubert probably do as much business at Bayswater as most of the Regent Street professionals. Who ever dreams of caring about where a great artist lives, and of making a difficulty of a mile or two more or less to his studio, or whether it be north or west of the General Post Office? A photographer who aspires to be an artist must show excellence in his work, and make the public go to him, wherever he happens to find it most suitable to his purpose to live. If a smoky atmosphere stops the actinic rays and lengthens the exposure, besides precipitating blacks upon the negative and filling the studio with a haze which veils the picture, let the photographer have the courage to tell his sitters to come to him a mile or two out of town where he can take them better. The question of the proper construction of the glass room ought never to be how to make the most of a bad situation, but how to construct the best possible room in a thoroughly suitable situation.

Assuming, then, that we *have* a suitable situation, what *is* the best possible construction of the glass room? Examine, first, the generality of photographic portraits, and then go about amongst photographers and observe the kind of room in which these portraits are taken, and I think the truth will not fail to dawn upon you. The common faults of photographs are in the eyes and the expression, while the common faults of glass rooms are that there is too much top-light, too much glare, too much light opposite the eye, too much dirty glass, and that they are too short, and have too little ventilation. A glass room is generally an uncomfortable place to go into; and no one would willingly sit in a chair in the front of the background and face the light if there were any other chair in the room unoccupied. The place of the sitter is the most uncomfortable in the most uncomfortable of rooms; how then can a photographer hope to get a pleasing expression in his picture?

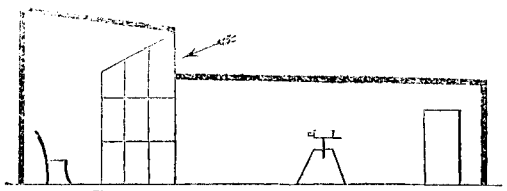
But I will not go on enlarging upon evils with which you are all, gentleman, but too well acquainted. I will endeavour to suggest a remedy, and leave it to you to discuss the merits of that suggestion, and point out the mistakes in it, if there are any. But first let me submit for your inspection four little portraits which I cut out the other day from a recent Number of the 'Bulletin Belge,' and which illustrate four different methods of lighting the sitter, viz. by a top light, a front light, a side light, and an oblique light. They are all portraits of the same person, and yet I beg of you to observe that so different are the effects of the different methods of lighting, that the likeness to the same individual is scarcely preserved in any two of them. Please observe, also, that in the case of the front lighting, the eyes are entirely put out by staring at the light, and look like two white wafers.

The type of the worst possible construction of glass room is, I think, that at King's College, as well as that of M. Claudet; in both of which there is glass all round, and a glass roof, pointed in the former case and round in the latter. The term "glass room" very properly applies to this sort of construction; and if we bear in mind that it is *not* a glass room that we want, but rather a long dark passage, we can then change both the name and the plan of the studio (the "crystal gallery," as it is sometimes facetiously called) at the same time. Let us then agree in future to call the studio the dark gallery, and remember that it is darkness, coolness, and ventilation that we want,—and not heat, glare, and a common promenade for the friends of the sitter, which is to look showy and smart. Let the reception-room be as elegant as you please; but let the studio be as it were another optical contrivance (a sort of continuation of the camera), and let it be just as ugly inside, and with walls blackened in the same way wherever blackness is required; and let us not forget that

the walls of the studio are intended to keep *out* the light, and the glass only intended to keep the wind and rain from entering through those openings by which the light is to be properly admitted.

Rather more than three years ago I suggested a plan for the portrait-studio, in an article which was published in my 'Photographic News' of Sept. 15, 1861; and although I have considered the matter a great deal since, I do not yet see any reason for modifying that plan in the least. Fig. 1 is a sketch of it.

CD is a long dark passage in which the camera is placed. The walls and ceiling of this passage ought to be blackened with lampblack and glue, and the floor should be covered with black matting, everything being dead black, and with no varnish.



The space BC on both sides of the room, as well as the space near the point of the arrow, should be glass. The portion AB, as well as the entire ceiling over the sitter, should be opaque, and the ceiling sloping in the way which I have indicated, and painted black in order that it may reflect no light downwards.

The room should have a true northern aspect, and the sitter must face the north. One of the side lights must always be shut. Whenever the weather permits, the whole of the front window must be opened, in order to reduce the time of exposure and ventilate the room. In the morning the eastern side-light should be shut and the western one open, and conversely in the afternoon, the object being to keep out the sunshine, which should never by any chance enter the room. White screens will of course be necessary at times for reflectors. The room should not be more than 8 feet wide, and its length should be at least 40 feet.

I had no sooner suggested the above plan of glass room than some of the leading professional photographers took it up, but with modifications of their own, none of which I think were good. Instead of leaving the front light perpendicular, as I have drawn it, they brought the point C nearer D, and made it inclined, the effect of which would be, of course, to let in the sunshine earlier in the afternoon, as well as to lighten the passage, which ought to be kept dark. Besides which, these gentlemen did not seem to recognize the principle of shutting out top light, but made the ceiling incline the other way, painted it white instead of black, and allowed the front light to encroach upon it. In fact they treated my suggestion as a mere crude idea, when it was, in fact, the result of much careful consideration in every part. There are, however, circumstances under which it would be allowable to make the front light a little more inclined; for instance, if there should happen to be a very high wall at A. I need not add that the chief advantages I claim for this plan of room are, that the eyes of the sitter are directed into darkness (instead of being made to stare and blink at the light), by which a pleasanter expression is secured, and the eye better brought out; and also that the advantages due to length of room are gained without the drawback of having to take the portrait through many feet of illuminated haze, and thus veil the shadows of the picture. Even if the passage should be filled with the smoky atmosphere of a town, the smoke would not be in the light but in the dark, and would not therefore produce a light veil upon the shadows of the picture, but would merely lengthen the time of exposure. In the common form of glass room it is a great objection to having it too long, and to using long focus-lenses, that the illuminated smoke in the atmosphere veils the image upon the ground-glass, and fogs the negative.

Let us now turn to the subject of the exposure, and the arrangement of the sitter. According to the present plan, the image is viewed inverted upon the ground-glass; and that has to be removed and the dark slide put in its place, and the shutter drawn up, and the cap taken off the lens, before the exposure of the plate takes place. But this may be very simply obviated by having a mirror inside the camera, according to a plan which I described some years ago, and called a reflecting camera. The ground-glass lies horizontally beneath your eye, and you look down upon it as you do at an album photograph, and see the picture erect, thus obtaining a very perfect idea of the composition, pose, arrangement, lighting, &c. Who can doubt that the constant habit of viewing the image in this way would have a beneficial effect upon the artistic character of a man's pictures, seeing that it would greatly assist him in forming a correct idea of the ultimate result? I have constantly found that an inverted image is very deceptive, and the result often very disappointing. Now, surely, considering the difficulties that lie in the way of taking artistic photographs, no chance of improving them in that respect ought to be thrown away. I believe that no amount of experience will ever enable any man, however clever, to form a correct judgment of the finished picture from an inverted image of it upon the ground-glass.

When I first suggested the reflecting camera, I placed the manufacture of it in the hands of the two leading opticians; but very few were manufactured, and at last the thing fairly fell to the ground. The chief reason was that a plate-glass reflector, owing to the two refractions which take place at its front surface, rather injures the definition upon the focusing screen, and a metal reflector became necessary; or, better still, perhaps, a glass silvered upon the face by Drayton's patent process. A metal reflector made optically true, as it ought to be, would be rather expensive, and that has been the chief reason why the reflecting camera has not come into use! Photographers have been afraid of spending a little money upon an instrument which would greatly abridge their labour in posing and exposing, and which could not fail greatly to improve the artistic character of their works. I may add that my patent for this camera has been allowed to expire, and that any optician may now manufacture it free of all restriction. I will not extend this paper by a description of the instrument, but leave it to your Secretary to explain its

mode of action, if necessary, in his own words, simply observing that no black cloth will be necessary over the head of the operator whilst focusing in such a room as I have described.

And now permit me, in conclusion, to repeat my conviction that, unless some radical change is made by photographers in the construction of their glass studio and their portrait camera, the present quality of photographic portraiture, with all its glaring defects, must be considered as having reached the maximum average of excellence. Nothing better can be done, I really believe, than is now down, so long as the present style of studio and camera continue to be used; and it is only by such a complete change in these matters as I suggest that we can hope to produce photographic portraits free from the glaring defects which I have pointed out.

If I have expressed myself strongly in this paper, it is from no wish to dogmatize, but simply to call your earnest attention to what I feel to be a very important matter.

Miscellaneous.

Vegetable Parchment.

"A remarkable modification in vegetable fiber is effected by the action af chloride of zinc or of sulphuric acid, in consequence of which paper may be converted into a material which, in toughness and appearance, much resembles parchment, and is known under the name of 'vegetable parchment.' It is more transparent than true parchment. In order to prepare it, thin *unsized* paper is plunged ior a few moments into a mixture of oil-of-vitriol with half its bulk of water, at a temperature of 60°. The paper must be quickly withdrawn and then washed, first with water, then with a weak solution of ammonia, and lastly with water again. In this process the outer surfrce of the fibers appears to have become converted into a glutinous substance by which the fibers are cemented together. This substance (according to Hofmann) is intermediate between cellulin and dextrih, with both of which it is isomeric; having neither acquired nor given up the elements of water, and not having entered into permanent combination with sulphuric acid. Hofmann found the toughness of this vegetable parchment to be *five times* greater than that of the paper which furnished it, and to be about *three-fourths* that of ordinary parchment. It takes ink well. Water at 212° exerts very little action upon it for several hours, but if immersed for many months in water it gradually looses its tenacity. It may be substituted for bladder, as a septum in electrolytic operations, with advantage."—*Miller's "Organic Chemistry."*

Chloride of Barium against Boiler Incrustation.

The applicability of chloride of barium for removing and preventing boiler incrustations of sulphate of lime is not so well known as it should be. Recent experiments made in Hanover show that it may be used with advantage in many cases. Chloride of barium decomposes the sulphate of lime present in many waters, forming chloride of lime, which remains in solution, and sulphate of barium which precipitates in the form of powder, producing a yellowish white slush at the bottom of the boiler. The chloride of barium should always be present in excess in the boiler, which is the case when no further turbidity is produced on adding some to a sample of the water. The high specific gravity of the sulphate of barium, which is double that of any lime salt, requires the use of a shovel for removing the slush, but also prevents the possibility of any of the particles being carried up by the steam. When the boiler is stopped for cleansing purposes, the water should not be entirely drawn off until cold, the slush becoming otherwise dried and hardened by the heat. The water may also be purified previous to use, time being allowed for the settling down of the turbidity. Unlike certain other chemicals frequently employed, chloride of barium has not the least injurious effect upon iron.—*Engineer.*

Chimney Built Without a Scaffold.

We saw—says the *Shoe and Leather reporter*—something new at the patent leather mannfactory of Messrs. J. H. & T. W. Davidson, at Newark, N. J. recently. They are erecting a new chimney, which will be something over 100 feet high above the level of the ground, and it is being erected *without scaffolding*; to do away with the necessity for which they have inserted at given spaces bars of iron, which form a complete ladder in the interior of the chimney. The chimney is constructed with an outer and an inner wall, thereby giving an opportunity for a more rapid escapement of heat, and preventing the cracking of the wall so liable in the old mode of construction. The bars of iron and the two walls have given all the facilities required in its construction, and all that will be needed at any time for repairs.

An English Cure for Drunkenness.

There is a prescription in use in England for the cure of drunkenness, by which thousands are said to have been assisted in recovering themselves. The receipt came into notoriety through the efforts of John Vine Hall, commander of the Great Eastern steamship. He had fallen into such habitual drunkenness, that his most earnest efforts to reclaim himself proved unavailing. At length he sought the advice of an eminent physician who gave him a prescription which he followed faithfully for seven months, and at the end of that time had lost all desire for liquor, although he had been for many years led captive by a most debasing appetite. The receipt, which he afterwards published, and by which so many other drunkards have been assisted to reform, is as follows; Sulphate of iron, five grains; magnesia, ten grains; peppermint water, eleven drachms; spirit of nutmeg, one drachm; twice a day. This preparation acts as a tonic and stimulant, and so partially supplies the place of the accustomed liquor and prevents that absolute physical and moral prostration that follows a sudden breaking off from the use of stimulating drinks.

The gem cannot be polished without friction, nor man perfected without adversity.