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

FEBRUARY, 1867.

BATH OR SCOURING BRICK.

Amongst the contributions sent by the Board of Arts and Manufactures of Upper Canada, to the Paris Exhibition, is a case of *Bath* or Scouring Bricks, manufactured by Mr. J. S. Rutherford, of Stratford, at his Bridgewater Brick-Works, Kincardine, County of Huron, C. W. He has also sent a case as samples for the Model Rooms of the Board. We have not only tried them and satisfied ourselves of their superior quality, but have also submitted specimens to E. J. Chapman, Esq., Professor of Geology and Mineralogy, University College, Toronto; and he has kindly given us his opinion in the following words:—

"The samples of "scouring brick," prepared by Mr. Rutherford, of Kincardine, is of excellent quality. It compares very favourably with the ordinary "Bath brick" of England, and is equally suitable for scouring purposes, and as a polishing material for knives, &c Its manufacture reflects much credit on Mr. Rutherford's skill and enterprize."

We attach much importance to the discovery of this clay, which, from present indications, appears to be so excellent in quality.

If it is as we are given to understand, that these bricks are not made anywhere but at Bath, or Bridgewater, in England, and the demand for them being so general for domestic uses, Mr. Rutherford should not only be able to supply our home market, but to export largely to the neighbouring States; and at prices that will successfully compete with the English article.

We have examined the trade and navigation returns of the Province, but can find no separate mention of these as articles of import, as they are no doubt classed under the head of "Unenumerated Articles;" the quantity used, however, in this and in other countries, must be very large, as we read that they "constitute the staple trade" of Bridgewater, in England—a town of some 50,000 inhabitants.

We wish this new enterprize every success.

TORONTO MECHANICS' INSTITUTE EXHIBITION.

It will be seen by advertisement on first page of cover of this Journal, that the Toronto Mechanics' Institute proposes to hold its next Annual Exhibition commencing on the 20th of March next, and will continue it for at least eleven days.

The objects of these Exhibitions are, as stated in a former programme: 1st. To afford Artists, Manufacturers, and possessors of interesting specimens of whatever kind, an opportunity of exhibiting their various articles. 2nd. To realize funds towards reducing the liabilities of the Institute. 3rd. To afford interesting and instructive amusement to the public.

The Exhibitions for the past two years have been of so interesting a nature, and have been attended by so large a number of our citizens, of all ranks and ages, to whom both instruction and innocent recreation have been so abundantly afforded, that the Directors would appear to be derelict in their duty, did they fail to provide a similar opportunity for entertainment during their year of office.

To the Artist, Professional or Amateur, these Exhibitions afford the best, and we may almost say the only opportunities that occur for submitting their productions to public inspection, with a fair chance of their being seen to advantage, and with comfort to the visitor; and owners of rare works of art may here enjoy the pleasure of knowing, that, by their kindness in exhibiting them, pleasure is imparted to a great many of their fellow citizens, as well as to others from a distance.

The Mechanic, who has perhaps toiled and wearied himself for weeks or months, over some ingenious or elaborate piece of workmanship or mechanism, may here enjoy the satisfaction of having his production appreciated by an intelligent public; and referring to the Ladies' Department, those who attended last year's Exhibition know with what pleasure the crowds lingered around their elaborate productions in silks, muslins, worsted, wax, &c., and how much they were admired.

Having two of Her Majesty's Regiments now in garrison here, that have seen much service in other portions of the Empire, we may also anticipate a fine collection of the antique and curious—mementos or remembrancers of important and interesting events, affording much gratification to those who may for the first time have an opportunity of inspecting them.

In specimens of Natural History—especially in the department of stuffed birds, of which so fine a classified collection has just been sent to Paris

—we should look for a large display. There are very few families but what can contribute something or other of interest,—Will it not be done?

The Hamilton Mechanics' Institute, in 1865, had a very fine Exhibition of a similar character—last year the Fenian raid upset their arrangements. We trust they may succeed during the coming season, and that other Institutions throughout the Province may also inaugurate similar Exhibitions; as we are confident, from many years experience, of their decidedly elevating tendency upon the masses of visitors who attend them.

ODELL'S PATENT CLOTHES WRINGER.

We have had one of these useful machines in operation in our family for the last five months, and no article of domestic use has given greater satisfaction to all parties concerned, than it has done. The clothes contain less water on leaving the machine than from hand wringing, and with far less labour is the result obtained; but another great advantage is, that in passing through the very flexible rollers of the machine, no injury is done to the clothes, as is the case with hand-wringing. A machine will pay for itself in the saving of wear and tear on the clothes, in the course of a few months. This is the best wringer we know of.

MR. GEORGE LONGMAN.

For some years past, Mr. Longman has held the office of Secretary and Librarian to the Toronto Mechanics' Institute. During that period he has assisted in inaugurating, and has carried out with great zeal and activity, several new enterprizes in connection with the Institution—such as Readings, Re-Unions, Classes, and Arts Exhibitions. He has now received a lucrative appointment as Manager of the St. Louis Mercantile Agency Office of Messrs. Dunn, Wiman & Co. On the evening of the 30th ultimo, a number of ladies and gentlemen, professional and amateur, gave him a Complimentary Concert, in the Music Hall of the Institute, at which Mr. Carter and Mr. Martin acted as joint conductors. In the course of the evening a committee, on behalf of a large number of subscribing members, presented a very complimentary address to Mr. Longman, accompanied by a very beautiful service of plate, appreciative of his zeal, and uniform kindness, in the performance of the duties of his office. The address was read by Mr. W Edwards, Chairman of the Committee. Mr. John Moss, successor to Mr. Longman, enters upon his duties on the 1st of February instant.

SUBSCRIPTION PRICE.

The subscription to this Journal, by members of Mechanics' Institutes and Agricultural Societies, when paid through their respective officers, is 50 cents per annum, in advance. To non-members of such Societies, 75 cents. Remittances to be made to the Secretary of the Board.

Board of Arts and Manufactures

FOR UPPER CANADA.

ANNUAL MEETING.

BOARD ROOM, TORONTO,
January 29, 1867.

The Annual Meeting of the Board, adjourned from Tuesday, the 1st instant, was held in the Board Room, Mechanics' Institute, to-day, at two o'clock, P. M.

The members who recorded their names as being present, in accordance with the By-Laws, were:—The President (Dr. Beatty, of Cobourg); the Vice-President (Professor Buckland, Toronto); Major Harper (Whitby); Edward Miall (Oshawa); H. Langley, W. H. Sheppard, H. E. Clarke, J. Carty; W. P. Marston, W. J. Macdonell, and W. Edwards (Toronto).

A Communication from Mr. E. A. McNaughton, Cobourg, stating his inability to attend, on account of illness in his family, was read.

List of Mechanic Members, and Certificates of Delegates appointed, were submitted from the Cobourg, Toronto, Oshawa and Whitby Mechanics' Institutes, and the Toronto Board of Trade.

Minutes of previous Annual Meeting were read and approved of.

The Secretary submitted a large amount of correspondence relating to the Arts and Manufactures Department of the Provincial Agricultural Association's Exhibitions; with the Deputy Minister of Agriculture, on Departmental matters; with the Board of Arts and Manufactures for Lower Canada, and the contributors to Paris Exhibition, on matters relating to the Exhibition; and with other parties. Upon the whole of this correspondence action has been taken by the Secretary, or upon the orders of the Sub-Committee, which was approved of.

Copies of all invoices of goods procured for the Paris Exhibition, and of inventory sheets, incidental expenses, &c., were submitted—which were ordered to be audited so soon as the accounts shall be closed.

The Secretary then read the Report of the Sub-Committee for the past year.

Moved by Mr. Shier, and seconded by Mr. Harper,—That the Report just read be adopted.—*Carried.*

Moved by Mr. Shier, and seconded by Mr. Clarke,—That Dr. Beatty be re-elected President of the Board for the ensuing year.—*Carried.*

The President thanked the members of the Board for the honour they had again conferred upon him, in re electing him to so honourable a position. His connection with the Board, ever since its organization, had been of the most agreeable nature; and he only hoped that at an early day means may be placed to the credit of the Board to enable it to carry on more active operations than it had so far been in a position to do.

Moved by Professor Buckland, and seconded by Mr. Sheppard,—That Mr. Shier be elected Vice-President for the ensuing year. *Carried.*

Moved by Mr. Harper, seconded by Mr. Shier,—That Mr. Edwards be re-elected Secretary-Treasurer for the ensuing year. *Carried.*

On motion of Mr. Harper, seconded by Mr. Shier, the President and Secretary were appointed Scrutineers of the ballot, in the election of a Sub-Committee for the ensuing year.

Nominations being made, and the ballot taken and duly recorded, the Scrutineers declared the following gentlemen elected:

E. A. McNaughton, Cobourg; W. H. Sheppard, H. Langley, H. E. Clarke, W. P. Marston, Professor Buckland, J. Carty and J. J. Withrow, Toronto; and E. Miall, Oshawa.

A discussion occurred on several topics mentioned in the Report of the Sub-Committee; such as the Patent Laws, Industrial Museums, City Grant to Free Library, removal of British Patent Publications, &c.—which were finally referred to the Sub-Committee elect for their consideration and action.

On motion of Mr. Harper, seconded by Mr. Miall, the thanks of the Board were accorded the several office-bearers of the past year.

The President, on request, left the chair, which was taken by the Vice-President, Mr. Shier.

Mr. Macdonell moved, seconded by Mr. Harper,—That the thanks of the members of the Board be given to Dr. Beatty, for the manner in which he has presided over the deliberations of the Board.—*Carried unanimously.*

Subsequent to the foregoing proceedings, certificate of appointment of several Delegates by the Hamilton Mechanics' Institute was received.

The Board adjourned.

W. Edwards, *Secretary.*

REPORT.

In presenting this the tenth Annual Report, the retiring Committee beg to submit as brief a sketch as possible of their proceedings for the past year.

The several Institutions represented at the Board were as follows:—Ayr Mechanics' Institute, by two delegates; Cobourg, by two delegates; Dundas, by its President; St. Catharines, by four delegates; Toronto, by its President and eight delegates; Whitby, by two delegates; the Toronto Board of Trade, by one delegate; the Toronto University College, by the Rev. W. Hincks, F.L.S., Professor of Natural History, and G. Buckland, Esq., Professor of Agriculture.

During the year your Committee were deprived, by death, of one of their most esteemed colleagues, in the person of Mr. Thomas Sheldrick, President of the Dundas Mechanics' Institute. He was regular in his attendance, and respected by all who had a seat with him in the Committee, of which he had been—with one year's exception—a member from the first organization of the Board.

Your Committee have to report, generally, that the various operations of the Board, to as full an extent as its income would permit, have been successfully carried out, with the exception of the programme for the Annual Examinations, which will be hereafter referred to.

Library.

The excellent Free Library of Reference, containing so many valuable works on almost every branch of practical, and several branches of general knowledge, continues to be visited by a very encouraging number of Artizans, and others; not only during the ordinary office hours of the day, but on every Tuesday and Friday evening of each week, when it is always open from 7 till 10 o'clock, for the benefit of those who are otherwise occupied during the day.

In addition to the new and standard works on the shelves, the table is regularly supplied with the London *Artizan, Builder, Gas Light Journal,* British *Patent Journal, Bookseller, Engineer, Engineer and Architect, Grocer,* Morgan's *Trade Journal, Mechanics' Magazine, Practical Mechanics' Journal, Popular Science Review, Photographic Notes, Photographic Journal, Technologist,* the *Working Man,* and Willis' *Price Current;* the American *Artizan, Scientific American, Publisher's Circular, Gas-Light Journal, Coach-Maker's Magazine,* the *American Farmer, American Agriculturist,* and the *Gardener's Monthly;* the *Canadian Farmer, Canada Gazette, Canadian Journal, Journal of Education, U. C.,* and the French and English copies of the *Journal of Education* for L. C. The most of these when taken

off the table are filed, and subsequently bound up for reference.

During the year there has been added to the Library 45 volumes of Books; and 26 volumes of the class of works above referred to have been bound up and placed on the shelves. Your Committee would also acknowledge donations from the Literary and Philosophical Society of Manchester, of one volume of its Memoirs and two of its Proceedings; from the Institute of Mechanical Engineers Birmingham, the regular receipt of copies of its Proceedings; from Dr. W. Canniff, formerly of this city, a copy of his valuable work on Anatomy; and from the Publishers several valuable Exchanges named in the above list.

From personal communications with both the Minister and Deputy Minister of Agriculture, your Committee learn that the valuable set of British Patent Publications will soon be removed from the charge of this Board, to the Patent Department at Ottawa. No doubt another complete set could be obtained, on application to the British Commissioner of Patents, at the cost to the Board of the binding only; but as that item alone would amount to from $1,200 to $1,600, your Committee fear that the Board will have to sustain the loss the removal of these valuable works will involve, unless the Government render the pecuniary assistance necessary to obtain another set. It will be a matter for the serious consideration of their successors in office.

Section 246, sub-section 4, of the Consolidated New Municipal Act for U. C., provides that the Council of any Municipality may pass a By-Law granting money or land in aid of the Board of Arts and Manufactures for Upper Canada. The citizens of Toronto, and members of previous Councils of this city, have at various times advocated a grant of money for the purpose of establishing a public free Library. Your Committee respectfully represent, that, so far as valuable works of a really useful character are concerned, this Board has established just such a Library as is required; and that it is therefore worthy the support of, and entitled to a grant of money by, the Municipal Council of this city, in which—although a Provincial Library—it is localised.

The Journal.

The sixth annual volume of the Journal of the Board has now been completed; and it is gratifying to know that it is appreciated by a large number of subscribers. That the issue has not been more extended, is owing to the absence of any effort to increase its circulation above the usual 1,000 copies; as, at the price charged, the Board cannot afford to publish a larger number.

Although the Journal contains a large amount of valuable practical information, it might be much more useful were it made the medium of interchange of thoughts and ideas between the numerous Mechanics and Manufacturers of the Province; and the vehicle for communicating to the public new discoveries and inventions, and the establishment of new branches of manufacture or other industries throughout the Province.

Annual Examinations.

No candidates presented themselves for examination during the past year. The volunteer movement, no doubt, interfered much with the opportunities for study of many young men; still, there is reason to believe that some other inducements are necessary to hold out, other than the mere acquirement of knowledge. In the Society of Arts, London, where *such* examinations are carried on so successfully, and the Society's diplomas are accepted as evidences of proficiency by employers in every department of business, large rewards are given in money and medals, in addition to the diplomas, to successful candidates. A small annual subscription, on the part of a number of those interested in the educational progress of the industrial classes, would secure the carrying out of the suggestions here made.

The programme of Examinations for the ensuing season, and also statistics of previous Examinations, were published in the last number of the Journal.

Patent Laws.

The unwise restrictions in the Patent Laws, continue to be a subject of complaint. The Minister of Agriculture in his last annual report, says:—

"Amendments to the Patent Laws which have been frequently urged upon the attention of the Department, and favourably reported upon, by my predecessors in office and myself, are not again put forward this year, in view of the union of the Provinces. Should that union take place within a reasonable time, it would be obviously premature for Canada to lay down a basis of legislation in respect to Patents and Copyrights, which might be essentially changed by the Legislature of British North America. I have, therefore, although most anxious to introduce several changes in our Patent Law, postponed the subject, until the Confederation goes into operation."

Your Committee draw attention to the desirability of having copies of all drawings and specifications of Canadian Patents made, and published, within a short specified time after the issue of each and every patent; and that copies thereof should be on file for public reference at the free libraries of this and the Lower Canada Board, as it is now the case with Trade Marks and Designs. A small advance in the fee charged patentees would be

sufficient to meet the outlay, and be cheerfully submitted to by them—the publicity thus given their inventions, especially if copies should also be on sale, as at the British Patent Office, more than compensating them for the additional cost of letters patent. Some other practical suggestions may be made, whenever the Legislature is prepared to introduce such a measure as is referred to by the Hon. Minister of Agriculture.

Paris Exhibition.

In the early part of the year your committee had a conference with the Minister of Agriculture, in respect to the best mode to adopt to secure a good representation of the Province at the Paris Exhibition. Nothing definite, however, was decided upon until the month of August, when a communication was received from the Deputy Minister of Agriculture, informing your Committee of an appropriation having been made of $4,000 for the purchase of articles of the manufactures of Upper Canada. Special appropriations were subsequently made to your Committee for the purchase and preparation of a collection of the stuffed birds of Upper Canada; a collection of books pamphlets, and newspapers published in Upper Canada; and a representation of the apparatus and other appliances of our public schools, as manufactured here for the Department of Education—the combined appropriations, including a sum for incidental expenses, packing, &c., amounting in all to $5,050; all of which, with the exception of from $50 to $75, is or will be expended in the purchase and transmission from here of the collection, of which a list is hereto appended.

Owing to the prosperous state of the manufactures of the country, generally, and the press of orders waiting for fulfilment, great difficulty was experienced in securing the attention and contributions necessary for the purpose. The larger portion of the goods sent have been selected from stock on hand, or are of a description made to meet the ordinary demands of the country. This feature of the collection, although not securing the advantage of rich display produced by articles prepared specially for exhibition, will yet give a fairer representation of the resources and progress of the Province in the industrial arts.

One important department of our manufactures will be entirely unrepresented in this collection at Paris, viz.; steam and other heavy machinery. This is much to be regretted, as no branch of our industries would afford more satisfactory evidence of progress, had time and means permitted of a suitable selection being made; but with an appropriation of but $4,000 for manufactures, and with but little over three months time allowed wherein to complete the collection and have it ready for transmission, your Committee did not deem it prudent to make any attempt to secure what would under more favorable circumstances have been so highly desirable.

The native stuffed birds sent by your Committee, comprising some 421 specimens, and classified for the Board by the Rev. Professor Hincks, of University College, is probably the largest and finest collection ever got together in Western Canada.

The accounts connected with this fund are not yet closed, as some other incidental expenses may yet have to be met; but the balance unexpended will be within the sums above mentioned.

The Future of the Board.

Present indications are, that, 'ere another year elapses, the confederation of these Provinces will have been completed. If established in accordance with the terms of the arrangement made by the Quebec Delegates, the duty of encouraging arts, manufactures and agriculture, will devolve upon the local government. In view of the probability of such a change taking place during the ensuing year, your committee refrain from suggesting any new operations to the consideration of their successors in office, or urging upon Government to provide means for the prosecution of those so strongly recommended by their predecessors for the two past years, such as a School of Arts and Design, an Industrial Museum, &c. The incoming Committee will, no doubt, watch the course of events, and take such steps as may be necessary in the interests of the Board, so as to secure the early establishment of the important objects referred to. The rapid advance made, and still making, in the various branches of our infant manufactures, will justify all the nurture and encouragement that can be given on the part of the Government of the Province; and means furnished to enable the manufacturer to make himself acquainted with the philosophy of the art he practises, and beauty of design in construction, are amongst the readiest modes of accomplishing the desired objects.

Finances.

The Secretary-Treasurer's detailed statement herewith submitted, shows total receipts for the year, including a balance of $1,072 89 from previous year, of $3,386 33; expenditure, $2,165 00; leaving a balance in hand of $1,221 33, to meet current expenses of the Board to the 30th of June next.

Your Committee have great pleasure in bearing testimony to the labours of your Secretary, in connection with the *Journal*, and also to the large

amount of extra time and trouble required of him in procuring and preparing material for transportation to the Paris Exhibition; and have made an appropriation of $200 to Mr. Edwards as a substantial approval of the manner in which he has performed these duties.

Report of the Minister of Agriculture.

The Honorable the Minister of Agriculture, in his Report to His Excellency the Governor General, dated January, 1866, says:

"It is thought that the organization provided by the Statute 20 Vic., cap. 32, is defective, and calls for amendment; but the Boards themselves and the public seem to be of opinion that the main impediment to their usefulness lies not so much in the legal organization, as in the insufficiency of the annual grants voted by Parliament for these purposes. The course marked out for the Boards by the Statute was certainly a most extensive one —including Industrial Museums, Schools of Design, Evening Schools for Apprentices and Adults, Free Libraries of Mechanical Works, &c., &c. It is now apparent that with $4,000 per year not one of these objects, not to speak of all, could be fully carried out; and it is, therefore, not surprising to find that the burden of the Annual Reports of these Boards to the Department has been, and is, 'give us more funds and we will give you returns, such as were contemplated by the Legislature when we were first instituted.'

"While concurring in this view, I yet feel it my duty to observe that it seems most undesirable to have institutions of this description dependent on the Government alone, or even principally, for their pecuniary means. In England, to whose example we are frequently referred by complainants on this subject, all such institutions depend mainly on local subscriptions and only partially on Parliamentary grants. Such is the fact in relation to Mechanics' Institutes, Science Schools, Evening Schools, and Schools of Design. The English Government, indeed, does much; its Committee of Council on Education, and its Science and Art Department, have effected great things for Arts and Manufactures since the attention of the State was fairly challenged to those important subjects in 1851. The Government of Canada ought unquestionably to do much more than it has done to promote similar objects and interests, but without liberal and continuous local co-operation, the desirable results never can be reached.

"An additional reason for calling especial attention to the condition of both Boards, is to be found in the extraordinary development of all our artificial and manufacturing interests, within the last few years. If complete statistics of the capital engaged and labour employed in such pursuits could be obtained (as under an improved method of collecting such statistics, it is to be hoped they may and will be), there could not exist a second opinion on the importance of the interests at stake, or the necessity for enlarging the powers and resources of the Boards.

"In evidence of the good use made of the inconsiderable annual grants now voted to the Board in Upper and Lower Canada respectively, the 'Balance Sheet' of each, for the year 1865, is given under a separate head, in the Appendix."

Your Committee would merely remark on the above, that the funds at the disposal of the Board have not been sufficient to allow the commencement of any of the more important operations anticipated by the Statute, in which the parties participating in the benefits could be called upon to contribute a portion of the expense—as would be the case in the operations of a School of Design, and School of Arts for mechanics' and practical men, such as was submitted to the Government by this Board in the year 1865.

Your Committee will conclude by giving one other extract from the Minister's Report, relating to the representation of this Province at the Dublin Exhibition, in which this Board took an active part. The Report says:

"It is certain that relatively and proportionately the contributions from Canada were, as a collection, amongst the best Colonial collections shewn at Dublin, as the decision of the Juries in favour of our Exhibition, sufficiently proves.

"The grant of the Legislature was made available for its object only on the 17th of March, rather less than six weeks before the time at which the Canadian Court was required to be open to the public in Dublin, and the total sum voted was five thousand dollars; out of which all the expenses of purchasing, packing and transporting goods to Portland, and from Portland to Dublin, the installation and agency expenses and all contingent outlay were to be taken. Notwithstanding these difficulties, the products of Canada arrived in time at Dublin and received a comparatively large share of the prizes awarded by the Judges of the Exhibition. It is satisfactory to be able to add that the display of Canadian minerals was the immediate cause of the sale of some of our Crown Lands to an amount much exceeding the entire grant placed at our disposal.

"All articles for the Dublin Exhibition were procured departmentally, some (comprising general collections) directly by the Department, and the remainder through the active co-operation of the Geological survey, the Boards of Agriculture and Boards of Arts and Manufactures of Upper and Lower Canada.

"Before referring more particularly to the Prize List, it will not be without interest to quote a few sentences in relation to the Canadian Court from the semi-official volume intituled *The Visitors' Guide to the International Exhibition of* 1865.

"At page 135, after a short description of the most important collections constituting the Canada Exhibition, occurs the following remarks:—'We have, however, named only so many of the various products as will enable visitors to recognize the Canadian Department, and which, we trust, will lead visitors to look for some of the more characteristic exhibits of the Department. The arrangement of what is shown, the selection of things exhibited, and the general aspect of affairs about the Canadian section, do credit, in a very high degree, to the industry, judgment, skill, and good

sense of those who have been entrusted with the representation of this important part of Britain's Possessions. There are few parts of the building, where visitors, who like to see the result of self-reliant industry, and the marks of indomitable courage in mining and agricultural operations, will spend their time more agreeably than at the Canadian stand.'"

All which is respectfully submitted.

JOHN BEATTY, M.D.,
President.

Toronto, Jan. 29, 1867.

LIST OF CONTRIBUTORS,

AND ARTICLES FORWARDED, TO THE FORTHCOMING PARIS EXHIBITION, AS COLLECTED BY THE BOARD OF ARTS AND MANUFACTURES FOR U. C.

Abbott, E. E., Gananoque.—Specimen cards of bolts, nuts and washers.

Armstrong, J. R. & Co. Toronto.—Two cooking stoves, assortment of hollow-ware, and copper stove-furniture.

Board of Arts and Manufacturers, U. C, Toronto.—A collection of stuffed birds of Upper Canada,* classified, and scientific and common names attached.

Board of Arts and Manufacturers, U. C., Toronto.—A collection of (Upper) Canadian books and pamphlets, and copies of all the newspapers published in Upper Canada.

Brown, J. O, Toronto.—A map of the City of Toronto.

Brown, (Hon.) Geo., Toronto.—Specimens of ornamental letter-press printing.

Brown, Bros, Toronto.—Specimens of plain and ornamental letter-press book-binding; set of account books; and specimens of diaries, wallets, &c.

Bach, Edward, Toronto.—One full quilted ladies' saddle, and one gentleman's plain full shaftoe saddle.

Byers and Matthews, Gananoque.—Specimen cards of assorted hinges.

Bethune, (Rev.) C. J. S., Cobourg, Secretary of the Entymological Society of Canada.—A representative collection of Canadian insects—1,209 specimens.

Barber Bros., Streetsville.—Eighteen pieces of Winter and Summer tweeds.

Campbell, J. A., Whitby.—One newspaper "patent" addressing and mailing machine.

Date, H H., Galt.—An assortment of upwards of one hundred specimens of edge tools

Duncan & Clark, Toronto.—Specimens of patent Petroleum mineral oil, and crude Petroleum machine oil.

Educational Department of Upper Canada, Toronto.—A collection of Canadian made philosophical apparatus, as used in the Public Schools of Upper Canada, with sundry other educational appliances.

Evans, W. C., Kingston.—An assortment of one hundred different locks, and specimen cards of malleable hardware, as manufactured by Penitentiary convict labour.

Elliott, Hunt & Co., Preston.—An assortment of specimens of ropes and cordage, twines, halters, sheeting, towelling, seamless bags, Canada logging and flax yarns. The ropes fron scutching tow, the remainder from Canada flax.

Ferguson, James, & Sons, Thamesville.—Sections of trunks of black walnut and buttonwood.

Flint, J., St. Catharines.—An assortment of circular saws, from 3 in. to 66 in. diameter; mulay, pit, mill, hand and other saws, trowel, &c.

Gates & Co., Toronto.—One Victoria Sewing Machine.

Gordon & Makay, Toronto.—Two pieces of grey cotton sheeting.

Irwin, C., & Co., Belleville.—One sewing machine.

Irish, Peter, Brighton.—Samples of spirits of turpentine and resins.

Jacques & Hay, Toronto.—One carved and inlaid centre table, and commercial samples of chairs, bedsteads, &c.

Jones, T. J., Bowmanville.—Assortment of dental work, set in rubber and gold.

Knitting Co., Ancaster.—An assortment of knitted woollen hose and under garments.

Linseed Oil Co., Toronto.—Samples of linseed oil and oil-cake; and colours in oil, pulp, and powder.

Miall, & Co., Oshawa.—A set of bed-room furniture, and an assortment of chairs, as commercial samples.

Martin, Geo., Toronto.—An assortment of boots, &c.

McKinlay, R., St. Catharines.—An assortment of bent and other carriage and cutter material.

McKelvey, James, St. Catharines.—A refrigerator and a cream still.

McNaughton, E. A., Cobourg.—Samples of pearl and granulated starch.

Offord, Geo., & Co., Kingston.—An assortment of boots and shoes, as manufactured by penetentiary convict labour.

Parsons Bros., Toronto.—Sample of refined Canadian petroleum oil.

Potter, Charles, Toronto.—One theodolite, one ophthalmoscope with camera, and one compass.

Passmore, Samuel W., Toronto.—A collection of preserved Canadian fishes, thirty-three specimens.

Randall, Farr, & Co., Hespeler.—An assortment of knitted woollen hose and under garments.

Reid, James, Hamilton.—One set of bed-room furniture, in curled ash.

Raymond, Chas., Guelph.—One sewing machine.

Rutherford, J. S., Stratford.—One box of bath or scouring brick, manufactured at Kincardine, C. W.

Slingsby and Kitchen, Canning.—Two pairs of bed blankets.

Saunders, W., London, C. W.—A collection of native medicinal roots and plants, embracing one hundred and twenty species.

Skinner & Co., Gananoque.—An assortment of carriage, gig, and team hames.

Staunton, Moses, Toronto.—An assortment of samples of room paper hangings.

Steward, Wm., Toronto.—One full quilted ladies' saddle.

Tackerbury, & Co., London, C. W.—One map of Upper Canada.

Thuresson, Eyre, Ancaster.—An assortment of card Clothing.

Young, Law, & Co., Ancaster Mills.—One piece each plain and twilled cotton sheeting, and samples of cotton bags.

* Four hundred and twenty one specimens as per list published in January number of this Journal.

TRADE MARKS.

Trade Marks registered in the Office of the Board of Registration and Statistics, and open for inspection at the Library of this Board.

(Continued from page 8).

A. Hibbard, Montreal. Trade Mark for India Rubber Goods. It consists of a yellow or gold color stripe on the edges of the web, parallel with the rubber

thread. Vol. A. fol. 155, No. ——. Dated 25th December, 1866.

C. P. Reid & Co., Toronto. Trade Mark consists of a lion with right foot on a ball, on a case or pedestal, with the words "Hollands Gin" in black letters on the front of pedestal, and the words "Dutch Lion." Vol. A. fol. 156, No. ——. Dated 31st December, 1866.

T. H. Bailey & Co., London, C.W. Trade Mark consists of a circular black stencilled stamp or band, eighteen inches in diameter, containing the words "London Oil Company," extra refined, —— gall. Rock Oil. Manufactured by A. H. Bailey & Co., London, C.W. Vol. A. fol. 158, No. 6. Dated 4th January, 1867.

William Hearn, Ottawa. For Trade Mark, "Pain Charmer." Vol. A. fol. 154, No. ——. Dated 4th January, 1867.

Messrs. Dow & Co., Montreal. Trade Mark consists of a circular label, with address and name of firm, &c., and the printed words "Indian Pale Ale," "Strong Ale XXX," "Mild Ale XX," "Brown Stout SS," or other designations of Ale or Porter, &c. Vol. A. fol. 157, No. 32. Dated 14th January, 1867.

Board of Arts and Manufactures

FOR LOWER CANADA.

ANNUAL MEETING.

Montreal, January 2nd, 1867.

The Annual Meeting of this Board was held in the Board Rooms, Mechanics' Hall, this day, at 3 o'clock, P. M., the President, Henry Bulmer, Esq., in the chair.

After reading Minutes of former meeting, and the transaction of other formal business, the Annual Report of the Sub-Committee was read by the Secretary, and on motion of J. Findlay, seconded by H. Lyman, was received and adopted.

The President appointed as Auditors of the Treasurer's Accounts, Messrs. Wm. Reid and Charles Alexander.

The Secretary reported returns of Delegates from the Art Association of Montreal, the Mechanics' Institute of Montreal, and the Institut des artizans Canadiens de Montreal, with required lists of members, which were received. The list of ex-officio members and delegates was also read.

Scrutineers of the ballot having been appointed, the election of office-bearers for the ensuing year was proceeded with, and resulted as follows:—

President.....Henry Bulmer.
Vice-President.....Geo. A. Drummond.
Secretary.....A. A. Stevenson.
Treasurer.....N. B. Corse.

Sub-Committee:—G. W. Weaver, David Brown, Alex. Murray, W. H. A. Davies, N. Valois, Dunbar Browne, J. B. Polland, G. Frothingham, and F. B. Matthews.

REPORT.

The Sub-Committee of the Board of Arts and Manufactures for Lower Canada have the honor to report, for the information of the Board,—

That upon their assumption of office they felt, as their predecessors had, the pressing necessity of adopting immediate action to secure the reduction and discharge of the liabilities incurred in the erection of the Exhibition Building, which has been an incubus for several years past, paralysing the efforts of the Board and circumscribing its operations, as without the necessary funds it was impossible to carry out the important work expected of it. Your Sub-Committee proceeded at once to lay before Government a statement of the position and liabilities of the Board, together with the claim for five years occupation of the Exhibition Building by the Government, for Militia purposes. Your Sub-Committee was led to believe that the amount of the contractor's mortgage would be paid and charged to the rent account of the Building; but notwithstanding the assurances thus given, no action was taken by the Government until the sixth day of November last, when the sum of four thousand seven hundred and twenty-four dollars and ninety-six cents was appropriated by the Governor in Council, in settlement of the claim for rent of the Exhibition Building, during the last five years; and in order to extinguish the mortgage due to Government on the property, the Hon. Mr. Ferrier was authorized, under the direction of Government, to dispose of the vacant lots adjoining the property, to the extent required to meet the balance of amount due.

The amount thus allowed for rent, your Sub-Committee paid over to the holder of the contractor's mortgage, in reduction of the amount due by the Board, and your President signed and received the necessary discharge.

As it appeared, however, from the terms of the minutes of the meeting of the Governor in Council, that a misapprehension still exists respecting the funds out of which the building was erected, and the nature of the Government claim upon it and the adjoining lots, your Sub-Committee felt bound to remonstrate against the repeated misapprehensions made on this subject and repeatedly corrected by your Sub-Committee; and duplicate letters were consequently addressed to the Hon. the President of the Council, and the Hon. the Minister of Agriculture. A reply from the latter has been received, containing assurances that, notwithstanding what has been done, he is still fully alive to the difficulties under which the Board labours, and that he will seize the first favourable opportunity to renew his efforts in its behalf. The correspondence and a copy of the minute are herewith submitted.

Your Sub-Committee would recommend to their successors renewed application to the Government, for the relief of the Board from the liabilities still remaining due on the Exhibition Building, as soon as the members of the Government now in England return to this country, inasmuch as the operations of the Board cannot be carried out on a proper scale until these barriers are removed.

The valuable free Library of reference held in trust by this Board was, in the early part of the year, transferred to the Reading Room of the Me-

chanics' Institute of Montreal, under an arrangement by which the Reading Room was enlarged and a portion set apart for this Library, with a separate entrance for the public at all hours, whereby not only enlarged accommodation for the Board was secured, and a considerable saving in its expenses affected, but additional facilities were afforded to the public for reference to it.

The specifications and drawings of the English Patent Office have been regularly received and bound: but with the exception of these, your Sub-Committee have been unable to place any additional works on their shelves, for the reasons already set forth as circumscribing the efforts of the Board.

Your Sub-Committee, desirous of having a worthy representation of the manufactures of Lower Canada at the Paris Exhibition of 1867, opened up a correspondence with the Bureau of Agriculture on the subject immediately after entering upon their duties, but was unable to take any action until the latter part of August, owing to a want of information respecting the amount to be placed at the disposal of the Board for that purpose. Notwithstanding these difficulties, your Sub-Committee have no reason to be ashamed of the collection they have made, and believe that the representation of this section of the country will not be injured by the collection now made, and awaiting transportation to Paris.

As soon as your Sub-Committee was informed that the sum of $4000 was all that was appropriated for the purchase of manufactures, the Secretary was instructed to write to the Minister of Agriculture, and remonstrate against its insufficiency for the purpose intended.

It is to be regretted that the recommendation of your Sub-Committee's predecessors, that a joint exhibition of the products of the two sections of the country, should be held previous to the transportation of the articles to Paris, has not been acted upon; as an excellent opportunity would have been afforded the residents of both sections to see what progress had been made by each other in the Arts and Manufactures.

Your Sub-Committee petitioned Parliament last session for the amendments to the Patent Law, which have been repeatedly recommended by the Board; but no beneficial result has attended their labour, although special legislation was evoked in individual cases, and one of the principles asked for by the petition—the patenting foreign inventions—was admitted in these particular cases; a result which your Sub-Committee remonstrated strongly against, inasmuch as the man of means was favoured, while the equally worthy but poor man was ignored; whereas, in the opinion of your Sub-Committee, no distinction between the two should be recognized.

Your Sub-Committee, while regretting that these remonstrances were insufficient to overcome the influence exerted in this matter, was nevertheless gratified that they were not fruitless, but led to the insertion into each act granting such privileges of restricting clauses which had been recommended as desirable and applicable to a general measure.

The petition and correspondence are herewith submitted.

Your Sub-Committee recommend to their successors the desirability of continued action in endeavouring to obtain the adoption of such a law on this important subject as will be a happy substitute for the unjust and illiberal measure which now exists in our statute book.

Your Sub-Committee has much pleasure in drawing your attention to the fact, that the Act 24th Vic., chap. 21, respecting Trade Marks, which was prepared and submitted to the Legislature by a previous Sub-Committee, has been largely taken advantage of during the past year, and is one of the fruits of the efforts for the public good put forth by this Board.

It is a cause of regret that the clauses respecting the registration of designs have not also been taken advantage of; but your Sub-Committee is of opinion that this result is attributable rather to a want of information than to a want of appreciation on the part of the public, of the provisions of the Act. It is therefore suggested to your Sub-Committee's successors that the question, whether more publicity should be given this matter, and what action should be taken by the Board for that purpose? is not worthy of consideration.

Your Sub-Committee have had under consideration the feasibility of founding a School of Design in this city, and plans have been prepared by which the required accommodation can be provided at the Exhibition Building, at a comparatively small outlay. At the same time the Arts Association of Montreal having under consideration the desirability of establishing a Gallery of Art, a Committee was appointed to confer with a Committee of the latter Association, for the purpose of securing a School of Design and a Gallery of Art combined; but nothing definite has yet been decided upon.

Your Sub-Committee recommend to the consideration of their successors, this scheme for supplying a want, the necessity and importance of which is daily increasing.

In the early part of the year your Sub-Committee made application to the Minister of Agriculture for duplicate models and copies of specifications of Canadian Patents, but in consequence of his having no funds for that purpose, he was unable to comply with that request.

As it is highly desirable that these models and specifications, or copies of them, should be placed in some central position where access to them could easily be had by the public; and as Montreal is the centre and seat of the mechanical class, your Sub-Committee suggest to their successors the consideration of what measures are necessary to procure and place on exhibition such a valuable collection as this would undoubtedly be.

Your Sub-Committee appointed a delegation to visit the Provincial Exhibition held in the city of Toronto, in the month of September last; the result of which visit appears from the report of Messrs. G Weaver and David Brown, which is herewith submitted.

The Classes of the Mechanics' Institute for the winters of 1865–6 were visited and examined by a Committee consisting of Dr. Dawson and McMurray, and in consequence of their favourable report, a sum of $80 was appropriated for their aid by the Sub-Committee.

These Classes have again resumed their operations; and, considering the benefits they confer, and for the purpose of enlarging their usefulness, your Sub-Committee, at the beginning of the present session, expended a sum of $100 in the purchase of such models and blocks as were required to fully carry out the objects of the classes, and these are now among the assets of the Board.

The long expected Dublin Exhibition Medals were received during the past summer, and those awarded to Montreal Exhibitors were distributed by the Hon. the Minister of Agriculture, at a meeting of the Board, held on the 18th September.

During the year now closed a new element—delegates from the Art Association of Montreal—was introduced into the composition of the Board, under the provisions of the amendments of 1864 to the Act incorporating this Board, thereby proving that the operations of this Board have not been wholly deprived of public interest; and your Sub-Committee sincerely trusts that every succeeding year will exhibit not only an increasing interest, but largely increasing means of carrying out the great and noble objects for which this Board was organized.

The Treasurer's statement for the year is herewith submitted, from which it will be seen that the funds of the Board have been carefully husbanded, awaiting the fulfilment of the many promises on the part of the members of the Government for the amelioration of the condition of the Board.

The whole, nevertheless, respectfully submitted.

(Signed) DUNBAR BROWNE,
Secretary.

Selected Articles.

KNOWLEDGE BY THE FIRESIDE.

In our last volume, we published a very interesting series of papers from that excellent journal the *Maine Farmer*, entitled "Chemistry by the Fireside." Below we commence to publish, from the same journal, a series on "Knowledge by the Fireside," which we trust will not fail to be as interesting to the non-scientific reader as the previous articles. We copy into our pages any thing instructive to the practical man, giving credit to the author or publication copied, whenever known.

No. 1.—Ancient Coins.

Money consists of whatever is used in exchange for something else. As soon as mankind increased in numbers, they commenced to exchange one article for another in trade. This was done first by using some substance of great value and small in bulk. At a very early period metallic exchanges were made by weight—the giver of the money weighing out so many pieces of gold or silver. At a later period actual coins having a certain weight and guaranteed by government with the stamp or seal of State was made the medium of exchange. At what period silver and gold were used is not known. Nearly 2000 years before the Christian era, Abraham returned from Egypt very rich in cattle, silver and gold. The shape of silver and gold among the Egyptians appears to be that of a ring, with an opening on one side to form a chain when necessary. This sort of money passed by weight. Thus Abraham *weighed* four hundred shekels of money to the merchant. The Jews never had any other mode of using coin than by weight so long as they were an independent nation. Furthermore it may be a new idea to many that they never used gold as a coin. Silver and copper were their sole medium. You never hear them talking about shekels of gold in any of their writings.

Among the Egyptians and Assyrians the coin was frequently in the shape of a sheep or a lamb, possibly of the value of these animals It has been supposed that the change from weight to a coin representing a given value was first made by the Romans. The pound weight was stamped with the image of an ox. Hence our word *pecuniary* is derived from the Latin word *pecunia*, signifying *money*, which in turn was derived from the word *pecu* signifying cattle. Thus an immense stride was made in civilization when a real value was given to a coin guaranteed by the seal of State, so as to avoid the necessity of weighing it every time a transaction was made. The earliest coins were exceedingly rude in character. They were not perfectly round as you now see them. A die was formed, over which the coin was placed, and then it was struck with a punch which stamped the coin on one side, and left a rude dent on the other. After a while, a die was made on the end of the punch so that both sides were stamped.

Alexander I. King of Macedonia, is the first who had his name stamped on a coin. The Athenians made the owl their type. This gave rise to the anecdote of the Athenian miser, the roof of whose house was said to be infested with a vast number of owls, in allusion to money of the well-known Athenian type being concealed there.

The Romans carried on the coining of money to a high degree of perfection. Each State and sometimes a single city was authorized to issue its own coins. Every coin was a brief history of the age in which it was struck. The skill of the artizan, the composition of the coin, the history of the people, and the name of the ruling monarch were frequently told on the same coin. It is probable that almost the only portraits we have of the ancients are what may be seen on ancient coins that have come down to us. It is very singular that when they could stamp on copper, silver and gold the names of kings, that the art of printing was not known till within less than five hundred years. An immense number of ancient coins are preserved in museums in Europe. They are valuable records of past history. They are in fact printed books, on whose surfaces are stamped the records of a past age. It is said that ancient Roman coins are still in circulation in Spain. They have become worn smooth and thin by time.

No. 2.—Evaporation.

Many of the operations in nature are invisible to us. If we place a dish of water in the window of a warm room, it will all disappear in a few hours without any visible change whatever, Particle by particle, far too small to be seen with the

naked eye, the water flies off from the surface and fills the air with vapor from which it is again precipitated upon a cold surface in the form of visible moisture.

This property of evaporation is common to all liquids and to some solids, but differing greatly in degree. If you place upon your hand some ether or alcohol, it will soon evaporate and leave the hand dry. Water evaporates much more slowly. Solid ice will evaporate slowly and waste away in dry air. The same is true of snow and solid camphor. Take a piece of camphor and put it in a drawer, and in a few months it will be all gone.

What are some of the benefits arising from evaporation? It is by the process of evaporation from the surface of the ocean and from the land that the air is loaded with vapors, which in due time descend in the form of rain. Were it not for this property of evaporation, the earth would in a short time be a sterile waste through excessive dryness. Vegetation would soon wither and die by the complete drainage of the country of its waters.

Evaporation is one of the great processes for purifying the air and waters. Let us see. Evaporation takes place abundantly from the surface of the ocean, but it leaves behind all the impurities of the ocean, and all of its various salts, and when the air is saturated with moisture it is blown upon the land in the form of rain. So also evaporation takes place from the soil when the moisture has served its purpose in the growth of vegetation and passes into the air to descend again as rain.

Evaporation takes place more rapidly when the air is dry. Housekeepers say that water evaporates more rapidly from boiling water just before rain. If so, the air must be dry, and the atmosphere becomes more rapidly saturated with moisture and consequently soon descends in the form of rain. When the pressure of the atmosphere is removed, evaporation takes place more rapidly. Ether will boil violently at common temperature when the atmosphere is removed by an air-pump. Advantage is taken of this fact in evaporating molasses for the manufacture of sugar. The syrup is put into a huge copper globe from which the air is partially pumped out. The liquid will begin to boil at about one hundred and forty degrees, instead of two hundred and twelve, the boiling point of water, which induces rapid evaporation without the risk of burning. Cider and milk and vegetable extracts may be condensed in the same way.

One great advantage of evaporation arises from its rapid reduction of temperature. If you put a little ether on the back of your hand and swing it through the air, it will be painfully cold from the rapid abstraction of the heat during evaporation. When carried on under favorable circumstances, water may be readily frozen. Hence in a clear night water will freeze more rapidly than during one that is cloudy. Clothes hung out to dry in a cold wind will freeze before anything else. Damp clothes will rapidly reduce the temperature, and endanger the health.

Sometimes it is necessary to boil substances at a higher pressure than usual. This is done by boiling under atmospheric pressure. Bones can be dissolved in this way. In this way the heat can be raised to more than four hundred degrees.

Rapid evaporation may be promoted by blowing over the surface. We recently saw a process for drying wool in large quantities simply by warming it by means of steam pipes, and then blowing through it by machinery large quantities of cold air.

There is one curious phenomenon connected with evaporation. If you throw water on to a hot stove it will not evaporate, but dance about over the stove in globules. These globules are surrounded by an atmosphere of vapor which keeps them cool and prevents them from evaporating; but if you let the stove cool they will evaporate with great rapidity. By means of this fact a very curious experiment can be performed. By taking a little platinum crucible and heating it to a white heat and dropping into it liquid sulphurous acid, water may be frozen to a solid mass in the vessel and thrown out upon the floor. This depends upon the rapid evaporation of the acid. It is on this principle that a person by wetting his hands may dip them into melted lead without injury. We have seen a workman wet his finger and dip it into a stream of melted iron as it flowed from a furnace, but woe to the unlucky wight who should attempt the experiment without first wetting his finger. Extent of surface promotes evaporation. This is manifest when we harrow a piece of land on a dry day in spring. It will dry much more rapidly as every farmer knows.

No. 3.—Amber.

This curious substance is familiar to most persons in the shape of beads, buttons, and mouth-pieces for meerschaums. It is found in nodules in the lower part of what geologists call the Tertiary formation. It is frequently found between the bark and the wood of fossil trees, which shows that it was a resinous matter as formed in those trees which exude that class of substances.

That amber was once a soft substance is evident from the fact that insects, leaves, and other portions of vegetables are frequently found in them, perfectly preserved in all their parts, just the same as if an insect became fastened and imbedded in a soft gum on a tree which afterwards hardened to a solid. Naturalists have detected and described more than eight hundred different species of insects thus entombed in the amber. Though found in the most northern regions, they appear to have been tropical insects, showing that the climate was warmer during the period of their existence than now, while not a single species is known to exist at the present time.

The most important locality, perhaps, of amber, is along the shores of the Baltic sea. It is frequently worked out of the clay along the banks of small streams, or on the shores of the sea, and is gathered by the fishermen, who sell it to the merchants to be transported over the world. It also abounds in Sicily, Poland, Saxony and Siberia. It has also been found at Gay Head, Massachusetts, and in Greenland.

Amber is of a yellow color, and is composed of nearly equal portions of hydrogen, carbon and oxygen, like common vegetable resin. It burns like resin with a white flame and gives out a pungent odor. It is but little heavier than water. If

you take a smooth piece and rub it on flannel it will be powerfully electric and will attract bits of paper. It sometimes becomes so highly electrical when undergoing the polishing process as to fly to pieces, and it affects the arms and wrists of the workmen with peculiar nervous tremors which are anything but pleasant.—Two pieces of amber may be readily joined together by smearing the smooth surfaces with pure linseed oils, and pressing them strongly together and heating them over a charcoal fire. Amber is employed for trinkets to a very great extent in the East. This is especially the case with the Turks, consequently the trade in amber is greater with them than elsewhere. Amber has been much used in making varnishes, and the nice black varnish used by coach-makers, is said to be made of amber and other substances. An artificial musk has also been made of it. The demand for amber is fully equal to the supply.

It has served to corroborate by its geological position one of the great questions in geology, that at the time when it was found, and previous to that period, the northern portions of the globe were washed by the warm waters of the ocean the same as they now exist in the tropical regions of the globe.

MANUFACTURE OF CAST STEEL AT ESSEN.

(Continued from page 22).

(*From the Mechanics' Magazine.*)

In our previous article on this interesting and important subject, we have recorded the efforts made at the establishment at Essen to promote the progress of those mechanical and scientific inventions tending to the welfare and happiness of the community at large. It is with regret, in one sense of the term, that we now turn to the dark side of the picture, and proceed to lay before our readers some account of the success of M. Krupp in manufacturing implements of destruction which have rendered his name celebrated throughout the greater part of the world. It appears that our authority considers it a difficult matter for an amateur to pronounce an opinion upon the subject of cannon; more especially if he should happen to be a Frenchman. In France the process of the manufacture of these tremendous engines of destruction is rarely permitted to be witnessed by visitors. It is even by no means an easy affair to obtain a view of them; for the artillery museum, however rich in ancient specimens, does not contain a single modern example of a French cannon of large calibre; and it is only about a month since that a few specimens of the newest pieces of light artillery were forwarded for exhibition. The parks of artillery, moreover, are jealously guarded, the very sentinels assuming a repulsive air if one merely regards their pieces at a distance. The officer in authority, who might be willing to afford some information on the point, is seldom to be got at; besides, it would not be *de régle*, considering his numerous occupations, to trouble him in a matter of a nature so trifling.

During the visit of the correspondent of "Les Grandes Usines" at Essen, there were upwards of one hundred and fifty cannon in different stages of construction, nearly all of them carrying a projectile weighing a couple of hundredweight; a few being adapted for heavier ones. Of these, fifty were despatched to Cronstadt, among which number was included one carrying a ball weighing 3 cwt., and whose total weight was 12½ tons. A special truck was built to convey this last to its destination. In the various workshops there were cannon for the Russians, English, Belgians, Italians, Turks, Austrians, Dutch, even for the Japanese. None of large size were ordered by the French. A few of these were muzzle-loaders, but the majority were breech-loaders. The cost of these steel cannon varies from £2,000 to £5,000. The manufacture of steel cannon dates but a very few years back, and it is only within the last five or six years that any real demand has been created for them. In 1849 their existence was hardly known, and one sent by M. Krupp to the Great Exhibition of 1851 was regarded as a complete novelty and received honourable mention. This *avant courier* of future artillery was a small cannon of cast steel, forged under the hammer, and about 5½ft. long, mounted upon a frame. M. Krupp also received honorable mention for his steel cuirasses. In 1858 no demand of any consequence yet existed for steel ordnance, as barely a hundred had been turned out of the workshops. From this date, however, the rate of demand rapidly increased, and at present nearly three thousand in all, many of very large size, have been sent out from the premises at Essen; their total value reaching nearly £2,000,000. Of the different governments who have ordered ordnance from M. Krupp, Russia claims the precedence with respect to the amount of the orders and the size of the pieces supplied. Prussia comes next, then Belgium, and in succession Austria, Holland, Japan, Turkey, Germany, and Egypt. The English Government sent no direct order, but the establishment at Essen has supplied cannon to Armstrong, Whitworth, and Blakely. It is worth noticing that in last year alone Armstrong ordered one hundred and twelve pieces. The question might here be appropriately demanded, What has become of them? If they have been made over to the authorities at the War Office, it would surely have been more candid in the Government to have ordered them direct and given the merit to whom it was due.

A visit to the workshops served to demonstrate the truth of the various orders in hand. In the shop where the steel ingots lay amid hot cinders and ashes, with the exception of one or two blocks intended for the construction of large cranked axles, they all exhibited unmistakable signs of their warlike character, and the shape of some was distinctly defined. When the forging of the block is completed, the cannon are not permitted to cool suddenly, but are left for eight or nine days in a hot bed, so to term it, of incandescent *débris*. The process of the manufacture of steel ordnance is extremely slow, particularly for cannon of large size and calibre, in which case the operations can not be hurried. As the resources of the establishment are almost inexhaustible, the daily productions can be maintained with unfailing regularity and constancy; and, when once the orders are fairly started and the men and machinery engaged upon them, if the urgent nature of the demand

requires it, from three to five field batteries can be turned out daily. The batteries consist each of eight small pieces and one piece of large calibre; the whole in perfect condition and ready for immediate service. The single piece of large calibre attached to each battery carries a shot weighing close upon 2 cwt. when solid, and about 1¼ cwt. when hollow. It is rifled and a breech-loader; its price is a little over £2,000. The field-pieces cost about £100 each.

At the works at Essen are manufactured a large number of hollow cast-steel shot, for the express purpose of perforating the armour-plates of men-of-war. They are of a conicle cylindrical shape, rounded off at one extremity, and turned externally with deep grooves cut on the surface. They are cast from the best and most expensive description of steel, and afterwards turned, bored, filled, and finished in a superior manner. The interior cavity being filled with gunpowder, the elevation of temperature caused by the passage of the shot through the armour-plating is so great that it suffices to ignite the powder and cause the projectile to explode in the interior of the vessel. The probable explanation of the ignition of the contents of the shot is that the sudden elevation of temperature is due to the resistance experienced by the shot on traversing the plating. Every one is well aware that if one of the small discs of metal punched out of an iron plate be taken up immediately it leaves the punch, it will be found quite warm, and it is clear that the action of the shot in perforating an armour-plate is perfectly analogous. A fair idea of the enormous expense attending experiments of a similar nature may be gained from the following facts:—A hollow cast-steel shot, weighing 2 cwt., costs for itself alone about £17; its charge is from 27lb. to 30lb. of powder, and the cost of each separate firing, including interest on the capital, and the proportion represented by the cannon, amounts to £30. In addition to these pieces of ordnance carrying a 2 cwt. ball, which are continually in progress of construction at Essen, others have been and are manufactured capable of throwing a shot weighing when solid 3 cwt., and 2½ cwt. when hollow. The total weight of one of these monsters is nearly 13 tons; there are 32 rifling grooves in it, the charge is 30lb. of powder, and the cost price nearly £3,500. In order to prove that he is able to far surpass these huge specimens of what his establishment can furnish towards improving the national artillery, M. Krupp has in hand at present a cannon destined to attract some notice in the French Exhibition of next year. The process of forging the steel ingot from which the cannon will be formed is now in progress. It will throw a solid shot weighing 10 cwt. The trunnions, however, will not be attached directly to the body of the cannon, but to a strong ring encircling it. This is the usual course whenever the cannon are intended to throw a ball whose weight is more than 2 cwt. It will also be further strengthened by the addition of several hoops or rings fastened on in the ordinary manner. It is calculated that every shot fired in war-time by a piece of ordnance of the above description will cost nearly £200.

The premises of M. Krupp may be regarded in the light of a neutral ground, as a kind of international establishment where different nations resort to test the merits of their war-like weapons in general. It is certainly somewhat strange that in a country like Prussia, which is frequently represented as intolerant and prejudiced to a degree, a private individual should be permitted to retain the management and control of an establishment so vast, in mere point of area, so aspiring in its character, and so indispensable to the state. One would have fully expected it to be under the sole surveillance and authority of the Government. As it is, since every nation fancies its own system the best, M. Krupp manufactures impartially for the whole world, whether his orders refer to breech-loaders or muzzle-loaders, smooth-bores or rifle-bores, heavy cylindrical cannon like the English or gracefully tapering ones like the Japanese. Having completed the order, the next step is the testing of the pieces, during which process the cannon is manœuvred by a crane, and enclosed in a protective cover of wood and earth to avoid the chance of injury to the workmen or lookers-on. For these experiments alone the quantity of powder consumed in a month amounts to nearly two tons weight. It was not until a large number of these experiments, as well as numerous others of a different nature, had been undertaken, and a considerable outlay of time and money expended, that M. Krupp was induced to adopt a form of cannon that he believed to best answer the various conditions required of such a weapon. His peculiar invention has been for some time before the public, and its capabilities fully discussed, so that we shall not do more than give a brief description of it. It is a breech-loading cannon, the breech being opened and closed by the simple drawing out and in of a bolt. The charge is introduced at the back of the breech, and by means of a screw the cavity behind the cartridge is filled up and solidly closed by a steel pin. A copper ring, which is driven by the explosion against the groove of the closed part, totally prevents all escape of the gas and makes the joint virtually hermetical.

[We omit the results of experiments by commission appointed by the Russian Government, on the different kinds of cannon.—Ed. J.]

One of the chief differences between a wise man and a fool is that the former benefits by his own errors and mistakes whether arising from inexperience or ignorance, while the latter either cannot or will not perceive that he has fallen into error, and remains a fool to the end of the chapter. That the proprietor of Essen belongs to the first-named is amply evidenced by the use he makes of the fractured remnants of his numerous experiments. Instead of redespatching to the melting pot indiscriminately the broken fragments of the specimens of ordnance or other castings operated upon, he has set apart a small portion of his premises as a receptacle for them. In this mechanical hospital he can examine the damaged pieces at his leisure, can take accurate photographs and impressions of the appearance they present, and make calculations and investigations respecting the proportions and dimensions to be adopted in designing a future example of a similar nature. One of the principal problems to be solved respecting the theoretical

construction of the steel breech-loaders was the accurate determination of the upper front angle of inclination of the slot along which the breech-bolt slides; and it was not until several guns had chipped and broken at this point that the proper curve was ascertained for rounding off the projecting edge. A movable crane capable of lifting 80 tons performs the final duty of hoisting the completed cannon on to the truck provided for transporting them to their destination. Both the crane itself and frame supporting it are manœuvred by a steam engine, which, in order that the shop may be as free as possible from all encroachments on its space, is ingeniously fixed in the thickness of the walls of the workshop. We shall bring our subject to a termination by a brief description of what may be termed the domestic arrangements of this vast establishment, including the means of ensuring a constant water supply and other particulars, to the careful management and regular superintendence of which much of the deserved success and *éclat* attached to the works at Essen may be attributed.

In an establishment whose operations are conducted on a scale so stupendous as the one belonging exclusively to M. Krupp, the management of the domestic arrangements, as they may not improperly be termed, requires as much, if not more, forethought and attention than are bestowed upon the productions of its workshops. First in importance, a constant supply of water must be procured, and in a manner to render it easily and universally accessible. We shall briefly describe the plan by which this indispensable requisite is rendered almost omnipresent in the premises at Essen. The manufacture of the cast steel consumes at the rate of nearly 1,000 gallons per minute. For drinking and culinary purposes a branch of the canal conducting the waters of the River Ruhr to the town of Essen is extended to the interior of the establishment, and affords a supply of pure water to the whole population. In addition to this, there is also the water for the boilers and for working purposes in general to be procured, the greater portion of which is brought by small canals or conduits, averaging from 3¾ to 4 metres in length, having their origin at the coal mines. The water before being used is very wisely allowed to remain for some time in reservoirs, which answer for storage, and also permit all particles held in mechanical suspension to subside to the bottom. These reservoirs, owing to the continual enlargement of the working portion of the premises, are in a state of incessant transition, being successively destroyed and re-established in some other convenient locality. As the water from the coal mines of the country and vicinity is not charged with any soluble matter which would render it injurious to the boilers, the temporary rest in the reservoirs previously to use, thoroughly purifies and clears it. In this manner four-fifths of the water supply is procured by M. Krupp; the remaining fraction is obtained by pumping it from the bottom of a well about 150ft. deep, which receives the water running into it from a conduit nearly a quarter of a mile in length. Solely to bring a supply of water to the surface of the manufacturing premises is, however, not enough; the work is only half done, the task but half accomplished. Beside mere water supply, water power is imperatively demanded. The contingency of fire is ever present, and a supply of water without the power to direct it, or project it in large quantities upon one particular spot, is of little or no use. It simply adds fuel to the flame. The ground, as may be expected in similar cases where large work shops are erected, is nearly on a dead level, and although a little broken in some places, has in no part an elevation sufficient for the erection of a reservoir whose contents could command the premises. M. Krupp, to obviate this natural inconvenience, has constructed an octagonal tower 200ft. in height, supporting a reservoir, containing 34,000 gallons of water. A set of pumps worked by steam raise the water and mantain the cistern full; by the force of gravity the water in re-descending could be discharged over the highest roof of any part of the works. Conduits and pipes in connection with this elevated cistern circulate through all the shops, and cocks are attached in every convenient and prominent locality; all that is required is to fix on the flexible hose, and the water power and supply are both instantly available for emergencies. A regular fire brigade, known by their red helmets, is charged with the special and important duty of attending to the whole water service, and their captain is responsible for all the pipes, cocks, cisterns, and other details of the service being in perfect order and ready for immediate use at any time.

Many would consider a journey up 124 steps somewhat *pênible*, but according to our authority this effort, which is necessary to reach the top of the octagonal tower, is amply repaid by the rather remarkable panorama spread out below the view of him who has undergone the labour. The whole of the vast establishment, the workshops, the habitations of the *employés*, the railways, the roads, the canals and reservoirs, lie horizontally projected before the vision, while in the distance can be seen the wreaths of smoke ascending from the neighboring coal pits. The progress in development of the establishment can be distinctly traced from this elevated post. The new and larger buildings contrast forcibly and advantageously with their older and smaller neighbours. In the midst of them, on a small eminence, stands a specimen of the last relics of ancient machinery, now superseded by steam in almost every country except Holland. A windmill remains solitary in the middle of the new erections, with its arms uplifted in mute astonishment and indignation at the advent and success of the new force which has extinguished its own power for ever. Instead of attaching a boiler to each separate engine, as is frequently done, M. Krupp groups them all together, and causes the steam to pass into a large pipe or main, 3·28ft. in diameter. To this main, smaller pipes are connected leading to the different engines, and it is easy to understand that by cutting off the connection by means of a cock, between any engine and its feed pipe, the supply of steam can be diverted into another pipe, and made to augment the quantity already supplied by it. When necessary, steam power of 2,000-horse can be concentrated at any particular spot of the workshops. This concentration is obtained by uniting the power of several of the boilers, fifty

of which are ranged side by side in the boiler house. They are all double-flued, are provided with guages, and have each their own pump and injector. The proprietor does not leave to other hands the manufacture of his boilers, but has appropriated one of the largest workshops to their special fabrication. In it are united all the machines and tools necessary for carrying on boiler-making on a large scale. Bending rolls, boring, drilling, riveting, and other machines, of the best and most modern make, are therein employed incessantly in either manufacturing new boilers or repairing old ones, and between the two operations they are kept constantly busy. Lying on the south side of the main road from Essen are the shops in which is performed the cooling of the solid cast steel disc wheels; in their immediate proximity is that devoted to the rolling, tempering, annealing, and forging of the steel blades forming the springs of waggons and locomotives. In the same portion of the premises is situated the laboratory, whose organisation and maintenance are quite on a par with the rest of the arrangements, mutually tending to the progress and interest of the establishment. Three chemists of known ability and skill are continually employed in analysing minerals, specimens of coal, and other fuel, ores of iron, and pigs. Particular attention is directed to the chemical composition of the different descriptions of steel produced in the foundry. At every running, almost at the cooling of each separate ingot, a piece is cut off and despatched at once to the laboratory. It is there seized upon by the chemists; attacked by every sort of acid and chemical re-agent likely to produce any effect upon it; treated hot in contact with other substances, and again subjected to the same operation when cold. The slightest action of any of the re-agents upon it is scrupulously and accurately registered at the time, and practical deductions and conclusions arrived at afterwards. There is very little doubt that the majority of our own manufacturers in a similar position to that of the proprietor of Essen would consider all this examination and assiduous attention to minute details altogether a work of supererogation, if not money actually thrown away. Yet, on the other hand, if everything else were wanting, this circumstance alone would be sufficient to stamp M. Krupp as a superior man. It is not until we possess an amount of theoretical knowledge infinitely in excess of that at our present command, that we shall ever succeed in turning steel to those purposes for which its constitution and nature appear to render it specially adapted. Moreover, it must be borne in mind that this accurate acquaintance with the properties and nature of steel can only be acquired by means similar to those adopted by M. Krupp. Mere practical knowledge and the results of long experience will do much, but will never supply that information unattainable except by the rigid fulfilment of other conditions.

Close to the chemical laboratory is what is termed the physical laboratory. This latter is instituted for the purpose of testing the quality, or, in plain terms, the strength of steel. A small piece of the specimen to be tested is made into a bolt or pin, and submitted to the action of a machine manufactured by Greenwood and Battly of Leeds. This machine is constructed for measuring the resistance of the bolt to tension, compression, and torsion. The knowledge previously acquired in the chemical laboratory of the chemical qualities of the metal, added to the information obtained of its physical qualities by the above tests, affords all the data attainable for determining to what particular purpose any one description of steel is more suitable than another. It may be truly said that in all his constructions M. Krupp puts the right article in the right place. Forming a portion of this scientific district of the works is the photographic studio, amply furnished with lenses, cameras, chemicals, and every instrument and utensil necessary for the production of photographs in the highest possible state of accuracy and finish. To ensure this result, M. Krupp selected one of his assistants, who appeared to have an artistic taste, sent him to travel over the greater part of the continent, and pay short visits to the chief photographic studios he encountered on his tour. The favoured artist had only one object to accomplish, and that was to make himself thoroughly master of his art; his patron spared no expense, grudged no outlay, provided this end was attained, although the purchasing of the most complete and largest cameras procurable was attended with no small pecuniary sacrifice. The outlay, however, has been well repaid; the photographs from Essen received a medal at the Prussian Exhibition; and as a proof of what can be done in this line there, it may be mentioned that there is a photograph of the whole works, composed of fourteen pieces or sheets, each having the dimensions of 20 in. by 16 in., and the uniformity of tinting and light is so good that when put together it would be difficult for even a connoisseur in the art to discover that they were not the result of a single taking. This photograph is justly regarded as a very valuable production of art. The minutest details are shown up with surprising fidelity, even to the white wreaths of smoke, contrasting in its upward progress with the darker colour of the roofs, blackened by the continual deposit of impalpable coal dust.

The physical and moral condition of the workman has been carefully considered and attended to in the organisation of this large community. We have not space at present to give a description of the bakery and the manner in which it is conducted to the best advantage of its customers. An ice house is also attached to the premises, and a barrack for the single men. The gasholder furnishes a supply of gas to more than 8,000 burners. The lighting, and in fact the whole of the gas service, is under the superintendence and management of the fire and water brigade with the red helmets, who are assisted in the performance of these latter duties by another corps, who rejoice in a similar head-dress of a green colour. It will readily be imagined that the commercial department of the establishment must be exceedingly extensive, and that it is a labour of no small magnitude to keep the books at Essen. We shall present a short account of the financial department, and also give some information respecting a very vital subject —viz., the cost at which work is turned out, compared with what it can be done here for. There was a time when people were content to pay almost any price for a good article: it is no longer

doubtful, but certain, that very few retain that inclination at present. Cheapness, at all times a most seductive persuasion, is tenfold so now; and if one establishment can produce the same article at a less cost than another, there is only one alternative for the latter—either to come down to the standard of its rival or close its doors.

We have reserved for a final notice a description of those internal arrangemants conducted at the establishment at Essen which amply demonstrate the care and attention bestowed by the proprietor upon the health and comfort of his *employés*. It is not enough to attract to any particular locality a large number of men, to provide them with work and pay them regular wages. Something more must be accomplished if the employer expects to obtain even an approach to a corresponding return of his outlay. It is only now that we ourselves are becoming alive to the absolute necessity of carefully investigating the domestic arrangements, the inner life as it may be called, of a very large community of working men. Among other sanitary and benevolent measures adopted by M. Krupp to promote the welfare of those inhabiting his premises may be included that of the bakery he has established for their sole use and benefit. It supplies daily bread for more than twenty thousand people, including the single, the married men, and their wives and families. The bread is made of the purest rye, without the slightest adulteration. The loaves weigh rather over six pounds and a half and are of a square shape. As may be anticipated the price varies with that of the material of which they are composed; the average cost of each loaf being about fivepence. This is nearly exactly one-half of the price we pay for our bread, but of course there are two circumstances tending to equalise this discrepancy. The one is that no profit is expected from the bakery; all that is required is that the expenditure should be recouped by the sale, and the cost of the bread is based upon this assumption. The second is that rye bread, although exceedingly wholesome, is not up to the standard of wheaten bread in any sense, still less in the opinion of those who would find the contrast too vivid to easily overlook. The furnaces have the soles in cement and are heated by pit coal; the baking occupies three hours; each furnace containing two hundred and ten loaves. The advantage of the employment of pit coal for the baking of bread has been frequently disputed in France, but there appears to be very little doubt of its utility judging from the results obtained from it in the bakery at Essen. It is probable that the judicious disposition of the ovens, so as to lose none of the heat, combined with the purity of the fuel employed, contributes largely to the success which has hitherto attended its use. In addition to the benefit of being supplied with unadulterated bread at cost price, the workmen are permitted to pay for it with metallic counters or checks, and the amount is deducted from their wages on pay day. It is evident that by virtue of this arrangement, so long as a man is willing to work he cannot starve, as he need not wait for his week's wages to pay for his bread; and at the same time he is equally prevented from running into debt for the chief necessary of life and spending his ready money in drink and luxuries.

The *employés* are paid in part by a fixed salary or scale of wages and also by a remuneration increasing in accordance with the particular description of work they are employed upon. The men moreover subscribe to a club or provident fund, which in case of sickness pays the medical expenses and allows the *malade* something to live upon until he is able to resume work. It also grants pensions to the widows and orphans of those who have been a certain length of time attached to the society. The resources of this fund are sufficient to grant to every man who has completed a term of labour in the establishment extending over sixteen years a certain pension, which gradually increases year by year until a term of twenty-five years has been fulfilled. At this stage the pension becomes equivalent to the wages the man is then receiving, and there is therefore no necessity for him to work any more. Several of the men at the present time are in the enjoyment of this well-earned pension and only work at odd times when there happens to be any great pressure upon the number of hands engaged. The barracks built for the accommodation of the single men contain about one thousand five hundred; their board and lodging costs about a franc per diem, inclusive of their meals in the dining-hall, but exclusive of whatever they choose to partake of in the *café*; this last-mentioned place is very much frequented by the smith's and foundry men. The *café* being at some little distance from the busy part of the premises, some rooms have been built in a more convenient locality, at the foot of the large chimney, for the express purpose of therein preparing the favourite beverage. The men are thus enabled to have their coffee brought to them during their hours of rest in tin jugs, which preserve it at that degree of temperature which alone renders it acceptable to the palate of the real coffee drinker. The supervision of this army of foundry men, smiths, fitters, boiler-makers, mechanics, and canon-makers is entrusted to fifty head engineers or officers, among whom may be reckoned some of the best known artillery officers and chemists in the whole of Germany. The commercial department at Essen gives employment to a similar number of clerks and accountants without counting the representatives of the proprietor in the principal cities of Europe. It is not sufficient to erect extensive workshops, monumental towers, gigantic chimneys; to design and construct machines of a power so stupendous that it is difficult to credit them. It is necessary to sell, and sell largely also. M. Krupp had other ends in view in thus expending his capital and energies than to demonstrate simply to what a pitch human ingenuity and industry can arrive. His principal commercial success is based upon the profit derived from the manufacture of the enormous steel forgings, which both on account of their unusual dimensions as well as their superior quality can alone satisfy the demands of a certain class of his customers who can afford to pay for them and concerning whose solvency there is no question. It was with the object of more especially developing this important branch of his business that the proprietor undertook those extensive alterations and enlargements of his premises, enabling him to turn out during last year a quantity of cast steel amounting in the aggregate to 28,000 tons, and

representing a pecuniary value of £1,400,000. The price of the various productions in cast steel has, as can be readily surmised, a very wide range. To the price on the ground at the workshops must be added the ever-varying ones of carriage and duties; the destination to which the article is despatched very materially affecting the amount of these latter. For instance, at Essen, steel rails are turned out at £20 per ton; but it must be borne in mind that of all manufactured articles in steel or iron, a rail is the most favourable for a rapid realisation of the capital expended in its construction. It loses but a very small proportion of its original quantity of metal in the process of fabrication, and there is no finishing to be done to it. In a few days a batch of rails is rolled, the ends trimmed, delivered to the party ordering them, and preparations made for manufacturing the next supply. A large increase in the price per ton accompanies the demand for articles similar to tyres and axles. A considerable business is done at Essen in these two departments. The tyres, demanding the employment of complicated and costly machinery in their production, cannot be delivered on the premises under £25 per ton. It is not, however, until we come to the question of steel cannons, whether muzzle or breech-loaders, that we obtain any idea of the excessive price to which the same metal under different circumstances can attain. The cost of these reaches so high as £350 per ton. A variety of circumstances impossible to control contribute to this formidable sum. In the first place the loss of metal is enormous; frequently two-thirds, and sometimes more, of the original ingot is sacrificed. The fabrication requires the aid of the most powerful and valuable machinery; the best paid and most intelligent workmen are alone employed on the work; the ingenious and mechanical resources of the foremen and others are taxed to the uttermost during the process; a large outlay of capital is often necessary; and in the case of canon of heavy calibre it sometimes bears no interest for more than a year. Taking into consideration all these drawbacks, which may perhaps be mitigated at some future time, but can never be altogether obviated, it is not surprising that the price of heavy guns should be apparently so disproportionate. The ordinary price, delivered at Essen, ranges therefore from £20 to £350 per ton; there are no articles whose cost falls below that of the former of these sums, but there are a few surpassing that of the latter. Steel bullets, certain cylinders used in the manufacture of gold and silver, and the production of german silver, weight for weight, surpass all other productions in point of cost. Their cost is, in fact, unlimited, depending upon the nature of their construction; but on the other hand, their weight is comparatively insignificant. In the three prices quoted we have illustrations of the different items, whether separate or combined, which contribute to the value of any article. In the first—the rails—we have material without workmanship, and the price is consequently the lowest. In the second, we have both in various proportions, and the price at once rises. In the third, we have all workmanship, and find the cost to far exceed that of the other two. During the forty years since the commencement of the manufacture of cast steel—that is, since 1827—the increase in the production has been regularly every year that of a third of the preceding year. The year 1848 was a solitary exception to this uniform progression, but to make amends for its deficiency the year 1865 brought an increase of a half instead of a third. The whole of M. Krupp's premises comprise an area of 500 acres, a fifth of which is occupied by workshops, and the rest covered by a network of branch railways. There are no partners associated with M. Krupp in this gigantic concern; he is the sole proprietor, and has invested in it from first to last a capital of two millions sterling.

Those of our readers who have followed us in our interesting description of this vast establishment, a description never previously published in any English journal, cannot fail to be struck at the perfection of all its working arrangements. It is not exactly that this one, or that one, attracts our attention more prominently than others. It is the *tout ensemble*, the manner in which they all act and react upon one another, the fitness of things, so to call it, which is so admirably organised. M. Krupp appears to have adopted a totally opposite line of proceeding to the majority of those in similar situations to himself. With him it evidently is the intention to first perfect, so far as human endeavours can, any production, and trust to its own value and superiority for making it remunerative. With many others the object plainly is to endeavour by connection and other means to create a demand, and manufacture the article accordingly. In one sense M. Krupp does not make to sell, whereas, unfortunately, no higher motive actuates many of his cotemporaries. In conclusion, notwithstanding that we possess in our own country many establishments of a similar nature, of which we have no reason to be ashamed; yet, let the impartial reader judge for himself whether we must not confess, however unwillingly and ignominiously, that we have not one to be compared to that situated in the Prussian dominions.

Machinery and Manufactures.

Tempering Springs.

A knowledge of the art of tempering springs is of some importance to the mechanic. There is, perhaps, no kind of tempering that requires so much care in manipulation as getting a good spring temper. It is necessary that the spring be carefully forged; not over-heated and not hammered too cold. The one is as detrimental as the other. To insure a spring that will not warp in tempering, it is requisite also that both sides of the forging be equally wrought upon with the hammer; if not, by the compression of the metal on one side more than another, it will be sure to warp and twist. We will suppose that the article has been forged, finished up, and is ready for tempering. Clean out the forge and make a brisk fire with good clean charcoal, or if bituminous coal must be used, see that it is well burned to a coke, in order to free it from the sulphur that it contains, as sulphur will destroy the "life" of the metal; then carefully insert the steel in the fire and slowly heat it evenly

throughout its entire length. Give it time to heat through its thickness, and when the color shows a light red, plunge it evenly into lukewarm water, or water from which the cold chill has been taken off, so as not to chill the surface of the metal too quick before the inside also can harden, and let it lie in the water until it is of the same temperature as the water. A much better substitute for water is a good quality of animal oil—whale oil or lard oil is best; as a substitute we have used lard, by melting it before we inserted the heated steel in it. The advantage of using oil is that it does not chill the steel so suddenly as water, and there is less liability to crack it. Remove the hardened spring from the water after it is sufficiently cooled and prepare to temper it. To do this make a brisk fire with plenty of live coals and then smear the hardened spring with tallow and hold it over the coals, but do not urge the draught of the fire with the bellows while so doing; let the fire heat the steel very gradually and evenly; if the spring is long, move it slowly over the fire so as to receive the heat equally. In a few minutes the tallow will melt, then take fire and blaze for some time; while the blaze continues, incline the spring or carefully elevate either end, so that the blaze will freely circulate from end to end and completely envelope it. The blaze will soon die out; then smear it again with tallow and blaze it off as before. If the spring is to be subjected to a great strain, or it will be required to perform much labor, it may be lightly blazed off a third time, and if it is to be exposed to the vicissitudes of heat and cold it must be left to cool upon a corner of the forge, and not cooled by putting in water or throwing it on the ground.

Spiral springs of steel wire are tempered by heating them in a close vessel with animal charcoal or with bone dust packed around them similar to the process of case hardening; and when thoroughly heated, cool them in a bath of oil and proceed to temper them by putting a handful of them in a sheet-iron pan, with tallow or oil, and agitate them over a brisk fire. The tallow will soon blaze and the agitation will cause them to heat very evenly. The steel springs for fire-arms are tempered in this manner, and may be said to be literally "fried in oil." If a long slender spring is needed that requires a low temper, it can be made by simply beating the soft forging on a smooth anvil with a smooth-faced hammer. By this means the metal will be sufficiently compressed to form a very good spring without further tempering. Use a light hammer in the process and "many blows," and a spring will be made that will last for a long time, where it has to bear no great portion of labor in its action.—*American Artisan.*

Annealing of Steel.

We have often noticed that, after the smith had finished his work and wished to leave the steel or iron forging in a condition of sufficient ductility for the lathe workman or filer to operate upon, he would carelessly heat the forging and either insert it into the ashes and coal-dust of the forge or heedlessly throw it upon the ground beside the anvil-block; consequently when the turner or filer begins his work he finds it full of small hard spots, some of them exceeding minute, and technically called "pins," which spoil the cutting edges of his tools and destroy his files Finding it impossible to proceed further in his manipulations he takes the unfinished article from the lathe or vice and sends it back to the forger to be re-annealed and returned to him. We have seen this process repeated two or three times on some kind of work, when a little knowledge and care would remedy the whole thing.

In annealing, the steel should be heated slowly and carefully, as their is as much danger in overheating as their is in forging, and the whole article must be thoroughly heated through and brought to no higher temperature than a "light red" heat. If the article is long, like a spindle, it must be frequently turned in the fire, to prevent its warping or becoming sprung by the unequal expansion upon its sides; and at the same time be careful to heat it equally the entire length. The forger ought always to have an iron box of dry powdered charcoal by his forge, and in this quickly insert the article that is to be annealed, and cover it close with the coal-dust, so that the air cannot come to it, and there let it remain until perfectly cold and no sign of warmth be perceptible. If this is carefully done, the lathe workman or filer will have no cause of complaint about "pins" in the course of his operations.

Some forgers bury the articles that they wish to anneal in powdered or air-slacked lime, cast-iron borings and saw dust, etc. These may answer a very good purpose, but they are in no way equal to the box of charcoal dust.

There is another method called "fire annealing" that is practiced to some extent. It consists in heating the steel to a red heat and then holding it in a dark place until a faint glow of heat is seen upon it, and then quenching the heat that remains in it in water. This may answer when there is need of the forging to be wrought upon immediately, but it is an operation that we do not approve of, and is not as effectual as the operation that we have described with coal dust. Let any one who works in steel try the various methods, and they will give a hearty approval to the box of charcoal dust.—*Ibid.*

Life Boats and Life-Saving Tackle.

The natives of the East and West Indies, of portions of South America, and of the Pacific Islands, employ a peculiar style of raft for passing through the heavy surf of the coast, either when fishing or landing the cargoes of outside vessels. The principle of the catamaran has been made use of, by Captain L. F. Frazee, in constructing a life-boat combining so many really excellent features, that the inventor merits the lasting gratitude of the seafaring community.

The value of this life-saving raft was well tested on the 6th inst., at an official trial made under the direction of a committee appointed by the United States Board of Supervisors of steamboats, at their annual session in Buffalo. The beach at Long Branch was selected as the scene of operation, and thither the commissioners and invited guests were conveyed.

Constructed on the duplicate principle, the boat or raft requires neither davits nor tackle of any kind for launching, but is thrown overboard directly from the deck of the vessel, and righting itself immediately, whichever side turns uppermost, is ready for use. The buoyant power resides in two cylinders of galvanized iron, each twenty feet in length, divided into forty air-tight chambers, capable when combined of supporting a dead weight of twenty thousand pounds exclusive of itself. The central compartment is a trench some two feet in depth, designed to hold the oars, mast and all other necessary equipments. Water-tight lockers adjacent, are for the storage of bread and water: at each end there is a moveable flapbow which can be adjusted so as to break somewhat the force of the waves.

This, the third public trial, proved as eminently successful as the preceding had been. With sail set, the craft proceeded from the steamer safely through the heavy surf, and returned entirely uninjured by the hazardous voyage.

The succeeding experiments with boat-detaching apparatus were hardly less important. Boats lowered at sea are always liable to capsize, either on account of getting foul, or the bow or stern may be lowered too fast, or those on board may be thrown to one side by the rolling of the ship. To detach both ends from the tackles simultaneously is the object of the several devices experimented with at that time.

A law passed by Congress in July last, requires that all vessels carrying passengers shall be provided with a disengaging apparatus whereby boats may be launched under speed or otherwise, and to be operated by one man. The same principle was employed in each of the five devices exhibited, differing only in mechanical arrangement. The boats were dropped from the davits, when the steamer lay at anchor, also when under full head of steam, and the trials one and all proved entirely satisfactory.—*Scientific American.*

Ancient Workers in Iron.

It is probable that the first manufactured iron ever produced was in the form of malleable iron, highly carbonized, in consequence of the manner of its production. The method employed to this day by the natives of Central Africa, for producing iron, is supposed to be substantially identical with that of the most ancient workers in that metal. This method is described as follows:—A circular furnace of clay, about ten feet high by three in diameter, is constructed, near the hearth of which and through several tubes of clay, used as tuyeres, air is forced, generally by blowing with a kind of bellows made of a goat skin. A charcoal fire is made upon the hearth, upon which a stratum of ore is placed. Charcoal is subsequently added from time to time, as occasion requires, and the fire kept up by a continual blast for about three days, when the whole is allowed to cool, and a portion of the furnace taken down to obtain the iron, which is found in an irregular mass upon the hearth. This mass is sonorous, and when broken presents a granulated appearance like steel. It is in this condition fit to be directly wrought, by forging, into ordinary cutlery. Being highly carbonized, it possesses the quality of steel. The African smith refuses to use English iron, which he characterizes as "rotten" compared with his own. The Hindoo iron smelter, also, to this day, builds his furnace and obtains his iron in the same manner. The lump of iron thus produced is called wootz, and it is said to be of a quality which the most expert manufacturer of Europe cannot equal. Out of this wootz, by a subsequent melting and refining, in the presence of carbonaceous matter, the finest Indian sword-blades are made, the wonderful temper of which, as of the Damascus blades, European artisans have never been able to equal. The ancient metallurgists entertained the idea that by burying iron in the earth until the greater part of it was converted into rust the remainder was the better prepared for being forged into weapons, etc. This idea still prevails, and the custom is practiced to this day in Japan. However much experience may seem to warrant the practice, science fails to find any reason for it. Some of the old English Sheffield cutlers, who were famous years ago for turning out the most superior cutlery of their day, were in the habit of placing their bundles of steel, before being worked, in the mud of some water-course, where they were suffered to remain for some weeks, under the impression that by this process they were greatly improved. Science is again at fault to discover the *rationale.* Yet it is stated that on removing the piles of Old London Bridge, the wrought-iron of which they were made was found to be of such superior quality that a celebrated cutler bought up many tons of it for conversion into steel, he claiming that the action of moist clay upon it, without exposure to the atmosphere, had produced such an effect as to render it almost equal to steel.—*San Francisco Mining and Scientific Press.*

India-rubber Varnish.

That india-rubber dissolved in various liquids yields a good varnish is well known; but in general they are too viscid for delicate purposes, and are only good for making stuffs water-proof. India-rubber liquefied by heat, dissolved in oil or coal-tar, or drying linseed oil, does not give a varnish of sufficient fluency or free from smell. Moreover, a considerable quantity of india-rubber remains undissolved in a gelatinous state, suspended in the liquid, so that the solution is never clear. Dr. Bolly has recently published some remarks on this subject which may be useful. If india-rubber be cut into small pieces and digested in sulphuret of carbon a jelly will be formed; this must be treated with benzine, and thus a much greater proportion of caoutchouc will be dissolved than would be done by any other method. The liquid must be strained through a woolen cloth, and the sulphuret of carbon be drawn off by evaporation in a water bath; after which the remaining liquid may be diluted at will with benzine, and frequently shaking the bottle which contains it. The jelly thus formed will partly dissolve, yielding a liquid which is thicker than benzine, and may be obtained very clear by filtration and rest. The residue may be separated by straining, and will furnish an excellent water-proof composition. As for the liquid itself, it incorporates easily with all fixed or volatile oils. It dries very fast, and does not shine.

unless mixed with resinous varnishes. It is extremely flexible, may be spread in very thin layers, and remains unaltered under the influence of air and light. It may be employed to varnish geographical maps or prints, because it does not reflect light disagreeably as resinous varnishes do, and is not subject to crack or come off in scales. It may be used to fix black chalk or pencil drawings; and unsized paper when covered with varnish may be written on with ink.—*Journal of Applied Chemistry.*

Tempering and Sharpening Steel.

Tempering a tool consists commonly in giving it a hardness greater than required, and then softening it by again bringing the metal to the action of the heat. This heating is variable, according to the softness required, and steel possessing then the faculty of covering itself with a very thin stratum of oxide of iron, the color of which varies with the degree of heat, the mechanic wants only to follow the indications of the thermometer for operating surely.

At 4 .0° F., pale yellow; 470°, gold yellow; 490°, brown; 510°, purple; 550°, bluish; 570°, indigo (blue); 610°, water green. Hence the expressions, to "heat to a blue," etc.

As proved by your correspondent "I. E. E.," the stratum of colored oxide is of no consequence to the temper. He removed it with diluted acid, and the former elasticity remained. He, like correspondent "E. P. W.," found that loss of elasticity resulted from the polishing and grinding of blades. The softening proceeded from the heat occasioned by the grinding and polishing. By heating your blades again, you temper them more and more. By sharpening and using the tools, a great amount of heat is developed, and little by little the tools lose their hardness.

I have seen many good carpenters, who rejoiced in having a planing-knife a little hard. "It will soften by use," they would say, and with reason, although perhaps not knowing why.

For grinding, the stone should be dipped in water to prevent the heating of the tools; and careful cutlers use oil for polishing, instead of water, when using grindstones of small diameter.

Never follow the example of the street knife-grinder. He does much work, and cheap work. He uses as little water as possible. You give him a good razor or a good knife, and he gives it back to you well sharpened, but a spoiled tool, which needs to be hardened anew.

Therefore, when sharpening your tools, take large stones with much water, and make slow and good work.—*Cor. in Scientific American.*

A new Gunpowder.

G. A. Neumeyer, of Doblitz, near Leipsic, originally a blacksmith by trade, has invented a new gunpowder which, by experiments made at Hassfurt, Zwickau, Leipsic, and Bouchet, near Paris, has been proved to possess the superior advantage of not exploding so long as the air has access to it, but acting with greater force in an air-tight inclosure, leaving less residuum there than the ordinary powder, and producing less smoke and of more evanescent nature. In the Mansfield mining operations, where it is largely employed, the smoke emitted does not exercise any injurious influence on the health of the miners. An additional recommendation is its being cheaper than the ordinary powder. M. Neumeyer has taken out patents in England, France, Belgium, and Holland, and is now in treaty with the French Government for the sale of his patent in that country.

A New Excavator.

A Belgian engineer has invented a machine called the "excavator," which, worked by a machine of six horse-power, can, in ten hours, break up and cart off upwards of 2,400 cubic yards of earth. The invention has been applied with great success in some public works now going on at Brussels, and the results anticipated from this machine are enormous.

Artificial Saltpetre.

Mr. J. Bernhard, of Paris, has recently produced an artificial saltpetre by a process which at the same time yields, as by-products, white lead and ammonia. He proposes to mix 157 parts of nitrate of lead with 39 parts of carbonate of ammonia, to obtain carbonate of lead and nitrate of ammonia. To the nitrate of ammonia thus obtained he adds 28 parts of lime, by which nitrate of lime is produced and ammoniacal vapors given off, which are collected in the usual way. The nitrate of lime remaining is mixed with 87 parts of sulphate of potash, by which an insoluble sulphate of lime is formed, and a soluble nitrate of potash, which upon being concentrated yields saltpetre in crystals.

Turpentine from Petroleum.

We understand by a letter from London (England) that scientific experiments made there have resulted in extracting turpentine from petroleum. The process is said to be a safe one, and it is added that turpentine obtained by it can be produced at one-third the price that has been herotofore paid for the same article from the two "Carolinas." This would seem to be confirmed by the fact that the painters in this country have, since the war began, used naphtha—one of the products distilled from petroleum—for the purpose to which turpentine was formerly applied.—*Prof. Dussauce's Journal of Applied Chemistry.*

Compressed Peat.

Compressed peat promises to be valuable for other uses besides fuel. An English patent has been taken out by which picture-frames, book-backs, card-paper mouldings, and decorations for furniture, brick for building purposes, fronts for stores and dwellings, and all other purposes in which bone, india-rubber, and gutta-percha are component parts, can be manufactured from peat.

The largest mass of pure gold ever discovered was that found at Ballarat, Australia, in 1859, which weighed 224 pounds; another big lump found in Calaveras county, Cal. in 1854, weighed 195 pounds. —*London Mining Journal.*

Useful Receipts.

Waterproof Boots.

A correspondent writes that six years' experience has convinced him that a coat of gum copal varnish applied to the soles of boots and shoes, and repeated as it dries until the pores are filled and the surface shines like the polished mahogany, will make the soles water-proof, and also cause them to last three times as long as ordinary ones.—*Northwest, Freeport, Ill.*

Frosted Limbs.

Make a boiled lye of wood-ashes so strong as to be quite slippery between the fingers, let it settle, drain it off, put in a large handful of common salt to a quart of lye, have it quite warm to begin with, submerging the afflicted part for one or two hours —one or two applications affording permanent relief.

Bronze for Castings.

An excellent bronze for small castings may be made by fusing together in a closed crucible ninety-five parts of copper by weight, and thirty-six parts of tin.

Cheap Rough Paint.

Hydraulic cement, six parts; fine beech sand, two parts; salt, one part; mixed with water to the consistency of cream, and then applied to a rough surface.

Glyconine.

A mixture of four ounces of the yolk of eggs, with five ounces of pure glycerine, forms a preparation for soothing the irritation resulting from burns. The compound forms a sort of varnish, protecting the surface of the skin from the action of the air, and can be easily washed off when desired.

Soldering Solution.

The following solution is recommended for making a most excellent soldering fluid:—Two ounces muriatic acid, in which as much zinc dissolved as it will hold, to which add half an ounce of sal-ammoniac. Clean the metal well and the solder will run and adhere to any part of the metal to which the solution is applied. It will also solder brass and steel together,

Preserving Polished Steel from Rust.

A correspondent says that nothing is equal to pure paraffine for preserving the polished surface of iron and steel from oxidation. The paraffine should be warmed, rubbed on, and then wiped off with a woolen rag. It will not change the color, whether bright or blue, and will protect the surface better than any varnish.

Laundry Gloss.

The beautiful finish of linen got up for sale is imparted by pressure and friction upon curved surfaces of hard pasteboard. Try a true cylinder, or convex table, veneered with the best quality of press board, such as printers use, instead of the domestic "ironing sheet."

Deodorization of Vulcanized Rubber.

The offensive sulphurous smell of india-rubber goods, is a serious drawback upon their otherwise great convenience. Mr. Stephen Bourne, an Englishman, has patented a process for removing this odor by treating the fabrics in a heated chamber with charcoal, and in preference, animal charcoal, as more rapid in its effect. The operation may be conducted simultaneously with the vulcanizing, the apparatus required being very simple.

A Superior Glue.

A very superior glue may be made by dissolving three parts of india-rubber in thirty-four parts of naphtha. Heat and agitation will be required to readily effect the solution. When the rubber is completely dissolved, add sixty-four parts of finely-powdered shellac, which must also be heated in the mixture until all is dissolved. This mixture may be obtained in sheets like glue, by pouring it, when hot, upon plates of metal, where it will harden. When required for use, it may be simply heated in a pot till soft. Two pieces of wood or leather joined together with this glue can scarcely be sundered without a fracture or tearing of the parts.

Practical Memoranda.

Tinctures.

Tinctures are solutions of vegetable and animal drugs, and sometimes of mineral substances, in spirituous liquids. The spirit most commonly employed is proof-spirit; sometimes rectified spirit is used, and occasionally ether. Ammonia is sometimes conjoined with the spirit, in which case the solution is termed an ammoniated tincture. Rectified spirit is alcohol, with 16 per cent of water, and its specific gravity is 838. Proof-spirit is composed of 5 parts of rectified spirit mixed with 3 parts of water, the resulting compound containing 47·5 per cent of water, specific gravity 920. The choice between proof and rectified spirit depends on their respective solvent powers over the active principles of the drugs employed.

To test quality of Wool.

To test the quality of wool, take a lock from the sheeps back and place it on an inch. If the spirals count from thirty to thirty-three in the space of an inch, it equals the finest Electoral or Saxony wool grown. The diminution in number of folds to the inch shows the inferiority.

To light a dark Room.

The London *Builder*, referring to rooms situated on narrow passages says:—"If the glass of a window in such a room is placed several inches within

the outer face of the wall, as is the general custom in building houses, it will admit very little light, that which it gets being only the reflection from the walls of the opposite houses. If, however, for the window be substituted another in which all the panes of glass are roughly ground on the outside and flush with the outer wall, the light from the whole of the visible sky and from the remotest parts of the opposite wall will be introduced into the apartment, reflected from the innumerable faces or facets which the rough grinding of the glass has produced. The whole window will appear as if the sky were beyond it, and from every point of this luminous surface light will radiate into all parts of the room."

Gold or Silver test.

For testing gold or silver, slightly wet the metal and rub gently with lunar caustic. If genuine gold or silver the mark will be faint; but if an inferior metal it will be quite black.

To drill glass.

Glass may be readily drilled by using a steel drill hardened and not "drawn" at all; run fast, with a sharp drill, wet with spirits of turpentine and feed light. The operation will be more speedy if the turpentine be saturated with camphor gum.

Gunpowder, Gun-Cotton, and Charcoal.

Charcoal inflames at about 460 degrees, Fahr. When charcoal has not absorbed moisture and is mixed with oxydizing substances, it may be inflamed by violent shocks or by friction. The projectile force of gun-cotton, when used in moderate charges in musket or cannon, is equal to that of about twice its weight of the best gunpowder. Gun-cotton, when properly prepared, explodes at a temperature of about 380 degrees Fahr. It will not, therfore, ignite gunpowder when loosely poured over it. A sudden heat of 572 degrees Fahr. will ignite gunpowder; flame will not ignite it, unless it remains long enough in contact with the grains to heat them to redness.

For the manufacture of gunpowder saltpetre should not contain more than 1-3000th part of chlorides. Saltpetre for the best sporting powder contains not more than 1-6000th part of chlorides. —*Lond. Engineer.*

Test for Gilt vs Bronze.

A test for gilt articles, to distinguish them from those which are simply made of a gold-colored bronze, will be found in chloride of copper. A solution of this applied to gilt or gold articles produces no change, while a brown stain results from its contact with an alloy.

To fix Labels on tin.

To fix labels on tin, use French polish or a solution of shellac in naphtha or alcohol.

The sugar crop of Liberia—a settlement almost left for dead, not many years ago—is estimated at 4,211,200 lbs. for 1866, of which 2,000,900 will be exported.

Statistical Information.

Education in New York.

The amount of money appropriated in this state to public schools, during the year past, was $7,378,880. Four and a half millions were paid to 15,664 teachers. Of 931,000 children in the State, between 6 and 17 years, 919,000, or nearly 99 per cent, attended the schools—some portion, however, being outside these ages. The average attendance daily was over 43 per cent—the largest ever reported. It is proposed and expected to create in the legislature this winter a Metropolitan Board of Instruction for the city of New York, to replace the ignorant, corrupt and disgraceful body into which our elective commission has degenerated.—*Scientific American.*

Education in Lower Canada.

The Public School System of Lower Canada comprises 10 universities and professional institutions, with 818 students; 210 secondary institutions, as classical and industrial colleges and academies, with 28,613 students; 3 normal schools; 4 special schools; and 3,479 primary schools, with 172,733 pupils. The total amount levied for the support of this system, in 1865, was nearly $600,000.

Civic Expenses, Paris vs. N. York.

In 1866 the expenses of the city of Paris amounted to $46,000,000. In return for this seemingly large expenditure, the Parisians had the cleanest and best governed city in the world, together with an astonishing development of great improvements, in the opening of broad spacious streets, and in the erection of splendid public buildings: New York city expends about $18,000,000, and gets in return dirty streets, a brutalized swindling political ring, and no improvements that are worth mentioning.

Lowell Manufactories

The Lowell corporation, whose united capital amounts to $13,000,000, employ the immense number of 403,708 spindles. Of the operatives employed 8,218 are women, and 4,897 are men. The number of looms employed is 11,358, and 1,906, 500 yards of goods of every kind are manufactured every week. The mills consume 604,000 lbs. of cotton and 160,00 lbs of clean wool every week, or at the rate of more than thirty-one millions of pounds of cotton and six millions of pounds of wool per annum.

The revolution in trade anticipated through the working of the Atlantic telegraph, begins already to be realized. English orders on the California markets for wheat pass under ocean and over land, and advices of the purchase return by the same path, within the business hours of a single day.

According to a German author, the number of useful plants is about 12,000, but it must be remembered that researches have only been completed in certain portions of the globe.

Miscellaneous.

On Focussing.

One is constantly struck, in examining the photographs which are exposed for sale, how much bad focussing is done. When a good lens is perfectly focussed, and the resulting negative is printed upon highly albumenized paper pressed firmly against it, there results a picture with a brilliant clearness of surface which no engraving, no artist's sketch, can in the least rival. The effect is extremely beautiful. It by no means interferes with softness—it would be as reasonable to say that a landscape could have no softness with a clear atmosphere, and that the best time to view natural scenery was in foggy weather.

Doubtless much imperfect focussing depends upon the defective surface upon which the picture is often focussed. I have yet to see a good piece of ground glass made in this country, and I have known photographers to remove the ground glass from the camera and laboriously work it over themselves, in the hope of getting it into such a condition as would enable them to see some of the fine detail upon it. Such care is exceedingly well bestowed; but all have not the necessary familiarity with the mechanical operations of grinding and smoothing. Besides it is annoying to have to devote so much time and trouble to preparing a plate which at any time may be broken.

In a previous article devoted to this subject, I proposed several methods of producing a surface upon glass, with a grain so exceedingly fine as to make it capable of receiving very exact detail. One of these methods consisted in applying a layer of *starch* upon the plate, which in drying leaves a thin opalescent pellicle.

With time, the films showed a strong tendency to flake off and leave the plate in spots. These spots continually widened, until in one plate which I had constantly in use, the whole of one end of the film split off from the glass.

To avoid these difficulties only one way suggested itself—to prepare a varnish which should itself have the necessary opalesence.

I take a good negative varnish made with alcohol, and saturate it thoroughly with tartaric acid. It does not dissolve a great deal, and to get a sufficient quantity into solution, the acid must be finely pulverized, added in considerable excess, and the vial well shaken at intervals for several days. It may then be allowed to settle for a day or two, when the clear liquid is to be poured off.

It is to be applied precisely in the same way as in varnishing a negative: that is, the plate to be gently warmed before and after the application of the varnish.

I cannot of course affirm that all negative varnishes will answer equally well for this purpose, even if made with alcohol, though there seems no reason to the contrary. That which I used was an old varnish made after Hardwich's receipt of lac, sandaric, and alcohol.

The grain of the film obtained in this way is so fine that the smallest print may be read through it with ease, even when the other side of the glass is placed next to it; at the same time it is not too transparent. It thus reconciles the two points to combine which is the grand difficulty in making a focussing film; for there is no difficulty in obtaining a film of fine grain in many ways. But this quality is accompanied with a transparency which renders the image on the ground glass too dark and indistinct. When it is attempted to focus upon such a film, only the strong contrasts of the picture can be seen—a dead branch standing out against a sky, or something similar; but the film which I here describe renders every part of the picture plain and distinct, and the purest details can be watched as the camera draws out and in to find the focus.

I think it may perhaps give a better idea of the quality of such a film as this, if I describe what it is capable of accomplishing in the way of clearness.

I placed a book before the camera, of clear, but not unusually large type, and at such a distance that the image on the focussing plate was diminished to *one hundreth* of superficial size as compared with the original. On this image, with the aid of a single lens of moderate power, the loops of the letter "o," whenever it occurred, could be made out. Now this could not be done on ground glass, at least not on any that I have seen, even with a much more powerful lens: for if the grain of the film be not sufficiently fine to receive and show the fine detail, no magnifying can bring it out. A comparison which I made between this film and a glass plate which I had roughened with hydrofluoric acid gas, was three to one in favor of the former in point of visible detail.

M. Carey Lea.

Exports of the World.

France exports wines, brandies, silks, fancy articles, jewelry, clocks, watches, paper, perfumery, and fancy goods generally.

Italy exports corn, oil, flax, wines, essence, dyestuffs, drugs, fine marble, soap, paintings, engravings, mosaics and salt.

Prussia exports linen, woolen, zinc, articles of iron, copper, and brass, indigo, wax, hams, musical instruments, tobacco, wines, and porcelain.

Germany exports wool, woolen goods, linens, rags, corn, timber, iron, lead, flax, hemp, wines, wax, tallow and cattle.

Austria exports minerals, raw and manufactured, silk thread, glass, grain, wax, tar, nut-gall, wines, honey, and mathematical instruments.

England exports woolen, glass, hardware, earthenware cutlery, iron, metallic wares, salt, coal-watches, tin, silks and linens.

Russia exports tallow, flax, hemp, flour, iron, copper, linseed, lard, hides, wax, duck, cordage, bristles, fur, potash and tar.

Spain exports wine, brandy, oil, fresh and dried fruits, quicksilver, sulphur, salt, cork, saffron, anchovies, silks and woolens.

China exports tea, rhubarb, musk, ginger, zinc, borax, silks, cassia, filagree works, ivory-ware, lacquered-ware and porcelain.

Turkey exports coffee, opium, silks, drugs, gums, dried fruits, tobacco, wines, camel's hair, carpets, camlets, shawls and morocco.

Hindostan exports silks, shawls, carpets, opium, saltpeter, pepper, gum, indigo, cinnamon, cochineal, diamonds, pearls and drugs.

Mexico exports gold and silver, cochineal, indigo, sarsaparilla, vanilla, jalap, fustic, campeachy wood, pimento, drugs and dyestuffs.

Brazil exports coffee, indigo, sugar, rice, hides, dried meats, tallow, gold, diamonds and other precious stones, gums, mahogany and india-rubber.

East Indies export cloves, nutmegs, mace, pepper, rice, indigo, gold dust, camphor, benzoin, sulphur, ivory, ratans, sandalwood, zinc, and nuts.

Switzerland exports cattle, cheese, butter, tallow, dried fruit, limes, silks, velvets, laces, jewelry, paper and gunpowder.

Japan exports tea, leather, silks, lacquered ware, gold, silver, and fancy ornaments.

West Indies export sugar, molasses, rum, tobacco, cigars, mahogany, dye-wood, coffee, pimento, fresh fruits and preserves, rubber, wax, ginger, and other spices.

United States export principally agricultural produce, cotton, tobacco, flour, provisions of all kinds, lumber, turpentine, the precious metals, whale oil, fish, wearing apparel, machinery, and many other manufactures.

Non-explosive Nitro-glycerine.

To miners, particularly, it will be interesting to know that that powerful explosive compound, nitro-glycerine, can be rendered *non-explosive* at pleasure. Since the terrible explosion at San Francisco, a little more than a year ago, a universal distrust has been felt in regard to using so apparently dangerous an agent, and it has failed to attract that attention among miners which it deserves. It is well known that the blasting effects of this oil are fully ten times more than those of powder, yet such has been the feeling of distrust in regard to it that not a pound has ever been brought to Sierra county, to our knowledge. It has been tried on the line of the Pacific railroad, and in the mines at Michigan bluffs, with perfect safety and success. The compound has many advantages over powder, in the fact that smaller holes and less of them are required. Another great point in its favor is, the effect of the blast commences from the bottom of the bore-hole, consequently the hole need not be so deep as is required for powder. Another advantage is that it requires very little tamping; indeed, water simply poured on top of the charge has been used, though loose sand is preferred by those who have used it.

The maxim that *the human mind can control whatever it can invent*, has never been proved more true than in the invaluable invention to make nitro-glycerine inexplosive, and thus harmless, by adding to it a certain quantity of wood-naptha. To make the same explosive again, a quantity of pure water added will mix with the naptha, while the glycerine will sink to the bottom. Any miner can separate the naptha from the glycerine in any quantity he may choose, thus preventing accidents. Various experiments have been tried with the non-explosive compound, and it has been found absolutely impossible to explode it until the naptha is removed.

There is no estimating the advantages of a general use of nitro-glycerine as a means of opening and working our mines, and by its superior effects rendering those mines productive which now will not pay for working, with the expensive powder-blasting in use. We trust some of our miners will give nitro-glycerine a trial and demonstrate to their satisfaction its superiority.—*Mountain Messenger, Downieville, Cal.*

Aluminium.

Aluminium is a metal of white appearance colored with a faint tinge of blue. It is very malleable and ductile; it may be beaten and rolled as easily as gold and silver, and drawn into very fine wire. But in the latter process it becomes very brittle, and it is necessary to anneal it quite often. This can be done by continuously heating it over a lamp. In tenacity and elasticity it is about equal to silver. After fusion it is about as soft as pure silver, but by hammering it when cold it acquires a hardness equal to wrought-iron. It is highly sonorous, and by suspending a bar by a thread and striking it with a hard body it emits a beautiful, clear, ringing sound. It is very light, being not much more than two and a half times as heavy as water, and about one-fourth the weight of silver. Its density after fusion is 2-56, and after being hammered it is about 2-67. The melting point is between that of zinc and silver, but nearer the former than the latter. It is easy to cast, and both metallic or sand molds may be used. In fusing no flux is necessary, but is detrimental on account of the facility with which it attacks both glass and borax. It shows no tendency to volatilize or oxydize by being heated. At a white heat it decomposes water very slowly.

It is not acted upon by either nitric or sulphuric acid at ordinary temperatures, but hydrochloric acid dissolves it very readily, even at a low temperature, and while dissolving it evolves hydrogen.

Aluminium forms alloys with most metals. With zinc and tin it forms a brittle alloy; with cadmium, a malleable alloy; with iron, when the iron amounts to 7 or 8 per cent., it forms a hard, brittle alloy which crystallizes in long needles; with a small proportion of silver, it loses its malleability; with five per cent., of silver, it may be worked like the pure metal. An alloy of 10 parts of aluminium and 90 of copper form a bronze of the color of gold, extremely hard, of a tenacity equal to steel, very malleable, and susceptible of a high polish.

Aluminium is difficult to solder, partly because no flux has yet been found that will clean the surface without attacking either the aluminium or the copper, and partly because the surface of the aluminium is not easily melted by metals more fusible than itself. An imperfect soldering may be effected by means of zinc or tin, but a better method is to coat the aluminium with copper by the electrolytic process, and then solder in the ordinary way.—*American Artizan.*

Damming the St. Lawrence.

Damming the St. Lawrence, is the topic of the day with the citizens of Montreal. Monstrous as the undertaking seems, engineers have laid it out, and capitalists are about to apply to parliament for a charter incorporating a capital of two millions of dollars for the purpose. It is needless to remark that the waterpower to be obtained by a successful accomplishment of this work would be many times greater than any other in the world, and could not fail to build up a mighty manufacturing metropolis around the present nucleus called Montreal. At the same time, the city would acquire what it must soon have by some means, a head of water and a pumping power adequate to its own supply.

The arrangements of nature to facilitate the gigantic work, are quite interesting. The Lachine rapids, just above the city, are said to afford a fall of twenty-five feet in about a mile. They are divided longitudinally by a series of islands running their entire length, and forming with the northern bank of the river a natural enclosure, lacking only the proposed dam at its lower end to make an enormous basin and to convert the rapids into a smooth mill-pond or rather lake, with a semi-Niagara at its outlet, and a hydraulic power estimated as two millions of horses. There is also another natural channel running between the islands, which admits of being made into a mill-stream of seventy-five thousand horse power. To complete the work of nature in this way, requires a dam two thousand eight hundred feet in length, leaving the southern and only navigable channel open for commerce, and the shoal rocky bed of the river below the dam, besides the shore, for the accommodation of a city of mills and factories. A grand canal is also to be led inland from the new lake, to supply other factories and conduct an abundance of water to the city.—*Scientific American.*

Pain of Decapitation.

Dr. Guillotin, who from humane motives proposed in the constituent Assembly of revolutionary France the adoption of the mediæval decapitating machine which bears his name, supposed that death by this agency would be attended with the least possible suffering. Others maintained the contrary; but his opinion prevailed, and has been generally accepted. Latterly, however, the French Academy of Scienees has reviewed the question. Experiments made some years ago in the shambles of Paris proved that, although sensation must be instantly paralyxed below the division of the spine, yet the sensorium continued active for more than one minute. The facial muscles were agitated with violent convulsions, the respiratory organs of the face worked, the mouth alternately opened and closed, and the animal appeared to experience intense agony, and an imperative desire to breathe. The eyes also retained their sensibility, shutting at the approach of a finger, and then opening as in life. The anecdote is therefore not wholly incredible, that on the beheading of a state prisoner in England, when the executioner, according to custom, held up the head, with the words: "This is the head of a traitor," the mouth of the still living head ejaculated the answer "That's a lie!" Whether the vocal organs could, by any possible effort, draw through the severed windpipe a sufficient current of air to form a sound, the learned might perhaps be able to judge. That after decapitation the head is still the living man, for some moments, seems to admit of no doubt.—*Ibid.*

The "Great Eastern."

The French company who have chartered the *Great Eastern* as a tender to the Great Exhibition, are to pay, it is said, about $57,000 for the year, beside a share of the fitting up amounting to about $133,000, making $190,000 in all. Six hundred men are now employed on this work, and the ship is to be ready to proceed to New York on the 5th of March, and to return on her first trip early in April. The price of passage for the round trip will be $190; so that the first thousand passengers —one third of a full load—will settle the "rent." She will run from Brest or Cherbourg.

The United States in Washington!

A correspondent of the New York *Herald*, writing recently from Washington, alludes to the new "National Park," which is designed to be constructed in the District of Columbia, and states that it is proposed to make the park a "working model" of the United States—to delineate the topography of this continent—to set the lakes Huron and Ontario on a reduced scale upon a living map, some two miles long, not in water-colors but in the aqueous element itself—to lead a tiny Mississippi from its baby-nursery in the Rocky Mountains, made of real rock, through a little continent to a small Gulf of Mexico. The St Lawrence, the Colorado, and all other great rivers are to be represented by mimic streams. All the States and territories are to be represented, preserving their relative positions and proportions. It is also proposed that museums shall be erected upon each of these little representative tracts, and that the citizens shall be invited to contribute to these museums specimens of the natural and artificial productions of the States represented. This is a grand scheme, which will require considerable time, ingenuity, labor, and money to carry it out; but it will be altogether unique, and a great addition to the many attractions of Washington.

Prizes to be Awarded at the Paris Exhibition.

The total value of the prizes to be given at the Paris exhibition is $160,000 in gold. In the department of arts there are seventeen grand prizes, valued at $400 each; thirty-two first prizes, valued at $160 each; forty-four second prizes, valued at $100 each; and forty-six third prizes, valued at $80 each. Besides these, there are to be various other grand prizes and allowances of money, of a total value of $10,000; 100 gold medals, $200 each; 1,000 silver medals, 3,000 bronze medals, and over 5,000 "honorable mentions."

"Shut the Door, John."

A correspondent of the *Scientific American*, under this heading, writes—Many of the highest as well as the lowest traits of the human character are often made known by very simple means.

And very important principles in ethics, natural philosophy, and mechanics, have been discovered by accidents, incidents and details, which are common in domestic life; but who would have thought, in olden times, of consulting with a four-paneled door, as a philosophic and a metaphysical friend, to obtain a knowledge of the hidden mysteries and the general effects of the human mind?

During the last ten years, in the winter season, according to our daily record, we have noticed the manner in which one thousand persons who called for work, have opened, shut or not shut our store door: this, you may say, is a futile and a useless undertaking; but we entertain a very different opinion. What are the facts, and what the deduction?

First, out of the 1,000 persons recorded, 355 opened the door and shut it after them carefully, when they came in and when they went out, without much noise.

Secondly, 226 opened it in a hurry and made an attempt to shut it, but did not and merely pulled it to, when they went out.

Thirdly, 202 did not attempt to shut it at all, either on coming in or going out.

Fourthly, 96 left it open when they came in, but when reminded of the fact, made ample apology, and shut it when they went out.

Fifthly, 102 opened it in a great hurry, and then slammed it to violently, but left it open when they went out.

Sixthly, 20 came in with "how do you do, sir," or "good morning," or "good evening, sir," and all these went through the operation of wiping their feet on the mat, but did not shut the door when they came in, nor when they went out.

Remarks.—We have employed men out of all the above classes, and during that time have had an opportunity of judging of their merit, &c.

The first class, of 355, were those who knew their trade, and commenced and finished their work in a methodical manner, were quiet, had but little to say in their working hours, and were well approved of by those for whom we did the work. They were punctual to time, and left nothing undone which they had been ordered to do. They did not complain about trifles, and in all respects they were reliable men, and were kind and obliging in their general conduct.

Class the second, 226.—These were not methodical in their work, had much to talk about, were generally late, but were willing to quit work early. They were always in a hurry when we overlooked them, but they did not do as much work in the same time as class the first, and often left little things unfinished, and if they were told of it, would make many trifling excuses, but highly extol their own abilities.

Class the third, 202,—These were negligent in personal appearance and in their work. They talked much about their own good qualities, and were better acquainted with the business and domestic habits of their neighbours than with their own. They always belonged to the temperance society when first set to work, but in a few days afterward their breath would smell more like an old rum cask, than that of human beings. These men were not steady at their work, were always short of money, and could not be relied on in regard to truth and honesty.

Class the fourth, 96.—These are careless in their manner of work, committed many errors, but when they were pointed out to them, would apoligize most willingly; soon forgot particular small items, were tenacious of their own rights, but not very nice about the rights of others; still, there was something pleasant in their manners at first sight, but they did not improve on further acquaintance. They required much watching and often talked about what they had done and what they had been, what they could do and what they intended to do, but they seldom did any thing properly.

Class the fifth, 102.—They were of a strong, nervous temperament—always in a hurry—little order and method in their work, often met with accidents, and often got themselves into difficulties by their hasty proceedings: otherwise, they were kind and willing to oblige, but the promises they so hastily made were soon forgotten.

Class the sixth, 20.—These were better dressed than the others, but were not good workmen, as they had tried many things, but had not mastered any one in particular. Their politeness was artificial, and one day was often sufficient to expose their deception. Innocent and small impositions seemed to be their legitimate business. They were too ignorant to blush at their own folly, and too proud to acknowledge their own faults. They were vain in the extreme, and unreliable.

Remarks.—Whether these rules are applicable to all trades, professions and classes of men, I do not know, but I am thoroughly acquainted with the facts above stated, and also with the traits of character I have there described: therefore I leave the reader to make his own deductions."

The Dangers of Gasoline.

The *American Artisan* says the Compton House (New York) conflagration arose from a cask of that volatile fluid, gasoline, which is of the same ignitible family as petroleum, with more of its perilous qualities. Its specific gravity is less than ether, and is so volatile that an ounce exposed to the evaporation of the atmosphere will disappear in a few hours. It is highly inflammable, burning under almost any circumstances, and ought never to be admitted into a house, especially when incased in such an insecure vessel as a wooden cask. We trust that some measure will be adopted to exclude this liquid from use as a burning oil.

Cheese as Food.

Compared with other people the Americans place but little value on cheese as an article of food. We use it as a condiment, sauce, or side dish, rather than as necessary or proper food. In England, Scotland, Ireland, Wales, and in many parts of continental Europe, it is regarded as a common and sometimes a necessary article of food. There is reason why it should be so regarded. Its composition is very similar to that of flesh, the casein representing the muscular fibre, and the buttery matter the fat portion. Casein is an albuminous substance, useful in building up the muscles, and the buttery matter is a concentrated carbon as useful, in its way, for

food as for meat. The Swiss chamois hunters take on their expeditions among the higher alps, where they remain sometimes for days together, exposed to intense cold and undergoing the hardest of exercise, only a small quantity of cheese and a flask of brandy. The English harvesters live on ale, cheese, bread, and occasionally a bit of mutton. The Germans and Hollanders use cheese as a common article of food.

With some persons cheese is not in favor because of its constipating qualities. Eaten raw it is less so than when toasted or made into the popular dish known as Welsh rabbit, in this form it is scarcely fit for the human stomach. The fatty particles are separated from the albumen and appear simply as liquid oil, while the albumen is changed to a tough, stringy substance, without nutritious qualities and almost as indigestible as sole leather.

Cheese derives a factitious and market value from the districts in which it is produced. The Stilton cheese is a synonym of superior excellence to the English palate, and those who have made themselves acquainted with Teutonic tastes understand well what is meant by Limburger and Sweitzer kase. But for years past the American cheeses have been growing in favor, not only here but in England. A late number of the London *Grocer* says:—"The Americans and Canadians are emulating our most successful dairymen, and really choice American and Canadian cheese may now be obtained from those English importers who have made themselves well acquainted with the best sources of supply."

If cheese could be afforded at a fair price as compared with meat, there is no reason why it should not become, in a measure, a substitute, as it seems to restore the force expended by those whose work is extra laborious and exhaustive; and, indeed, it may be questioned, now, whether it is not as cheap, all things considered, as fresh meats. It is a subject worthy some consideration.—*Scientific American.*

Cutting Timber.

If oak, hickory, or chestnut be felled in August, in the second running of the sap, and barked, quite a large tree will season perfectly, and even the twigs will remain sound for years; whereas that cut in winter and remaining until the next fall, (as thick as your wrist,) will be completely sap-rotten, and will be almost unfit for any purpose. The body of the oak split into rails will not last more than 10 or 12 years. Chestnut will last longer, but no comparison to that cut in August. Hickory cut in August is not subject to be worm eaten and lasts a long time for fencing. When I began farming in 1802, it was the practice to cut timber for post fencing in the winter. White oak post and black oak rails, cut at that time, would not last more than 10 or 12 years. In 1808, I began cutting fence timber in August. Many of the oak rails cut that year are yet sound, as well as most of the chestnut. If the bark is not taken off this month, it will of itself peel off the 2nd or 3rd year, and leave the tree perfectly sound. The tops of the tree are also more valuable for fuel, than when cut in winter or spring. I advise young farmers to try the experiment, and if post fences do not last twice as long, I forfeit all my experience as worthless.

Irish-American Whiskey.

Irish-American whiskey, according to the Revenue Commission, may be made by the following delightful receipt: 40 gallons of whiskey, 30 gallons of water, 5 gallons tincture of Guinea pepper, 1 quart tincture of killitory (or killaliberal), 2 ounces acetic ether, 1¼ gallons of strong tea. To improve the flavor, add 3 ounces pulverized charcoal, and four ounces ground rice to the gallon, and let it stand for a week, stirring daily. Mix in any nasty receptacle convenient, in any subterranean den which the revenue officers are least likely to penetrate.—*Scientific American.*

The Nature and Value of Oatmeal.

Dr Whislow writes: In Scotland, the nourishing quality of oats, both for man and brute, is well known. With respect to oatmeal, the people of England seem to have fallen into an egregious error respecting its qualities: from its producing in some a sensation of heartburn, or heat at the stomach, they have condemned it as heating; and from a mistake in regard to the nature of diseases, have supposed it to give cutaneous affections not more frequent in Scotland than in other countries; and which, indeed, arises from no peculiar aliment, but always from a contagion communicated from one person to another.—Besides, the most eminent French physicians speak of oatmeal as cooling, and consequently prescribe it in fever; and the inhabitants of the East and West Indies prefer it to arrow-root, when laboring under inflammatory diseases. Though oats be the food of horses in England, yet the people of Scotland live principally upon it; and in no country in Europe do we find a more healthy and vigorous race of men.—Oatmeal porridge is the best for children; and as an old author has justly observed. "It is the king of spoon-meats, and the queen of soups, and gratifies nature above all others."

Separating Nitric from Sulphuric Acid.

The following remarks on the removal of nitric acid from sulphuric acid by charcoal, written by William Skey, analyst to the Geological Survey, New Zealand, were recently published in the *Chemical News*:—"In certain analytical operations, also for voltaic batteries, it is sometimes necessary to use sulphuric acid which is uncontaminated with nitric acid; but their separation has hitherto been a matter of difficulty, only attained by methods of a very protracted nature. In the case of dilute sulphuric acid, however, this can be effected by shaking it up with a little freshly burned charcoal in a state of powder for a few minutes and afterwards filtering. Sulphuric acid which has passed through this operation does not give any reaction of nitric acid when left in contact with crystallized sulphate of iron, although before the action may have been very decided. But if concentrated sulphuric acid which is only very slightly admixed with nitric acid be taken and agitated with charcoal as before, it will be found, even after a very

long contact, that a crystal of sulphate of iron immersed in it is turned of a pink color just as quickly as if charcoal had not been used. This refusal of charcoal to absorb nitric acid from its solution in concentrated sulphuric acid, would seem to indicate that this acid is retained by the charcoal in the first instance in the form of a hydrate, the dilute condition of the sulphuric acid employed preventing its decomposition."

Cadgers' Ciphers.

The chalk-marks made on fences, doorsteps, and railings are not always made by mischievous boys; they are often the ciphers or hieroglyphics of beggars. In New York, for example, two straight lines forming an angle, L, indicate that the occupants of the house are generous, and victuals can be easily obtained. An arrow warns the "cadgers," as they call themselves, that they are liable to be put under arrest if they call; and an X signifies that there is no use in calling, because they can get nothing. There is a perfect knowledge of these ciphers on the part of beggars. We suggest that the inhabitants should mark their houses with one of the two latter signs, and thus keep the "cadgers" away.—*American Artizan.*

Cancers.

It is, we believe, the received opinion, indeed the foregone conclusion of the medical faculty that a cancer is incurable, except by excision. This remedy is always painful and uncertain, and not unfrequently the operation itself is the immediate cause of death. Even in cases in which the wound readily heals, and the cancer does not reappear, it often happens that the patient never recovers from the shock upon the system produced by the cruel operation, but after lingering for a few weeks or months, sinks and dies.

Now it is well known that a wide spread popular opinion prevails that this painful and dangerous disease is curable by some external application. Ignorant pretenders, although unfitted, by a total want of education and practical knowledge, to meddle with so delicate a subject as the human organism take advantage of this state of things, and not unfrequently reap an excellent harvest from it. Nor can it, we think, be questioned, that these people have the knowledge of some valuable remedy, which in every favourable case, succeeds in perfectly removing the evil, with very little inconvenience or suffering to the patient. Some such instances have come within our own knowledge. Well defined cancers, so pronounced by competent medical authority, have been perfectly cured by plasters prepared by an old woman or an ignorant man. Unfortunately, however, these persons being totally ignorant of pathology and the kindred sciences apply their remedy without regard to any other symptoms which may be present in their patient, and hence, from the presence of some other disease, or on account of some special condition of the nervous system, the application sometimes proves fatal and the patient dies in their hands.

In view of these facts, the question has often presented itself to us with great force—Why do not learned physicians and surgeons inform themselves of these facts, and take this important branch of practice into their own hands where it justly belongs, and so deliver this class of their suffering fellow creatures, who entirely deserve their sympathy, from the hands of ignorant Empirics and pretenders? Perhaps they think it unbecoming the dignity of their learned profession, to seek for even valuable knowledge at such vulgar sources, and we admit without question, that it would be mortifying humiliation for a learned member of the College of Physicians and Surgeons to go to such an one as Dr. Lanktree and give him a hundred dollars for his secret We can save him that mortification by presenting the recipe from a source with the respectability of which he will be satisfied; Dr. Fell, of London, who is said to be the discoverer, and we consider it equally creditable to him, whether he discovered the remedy himself or whether he found it in the hands of some Lanktree or Deienbaugh, and rescued it to its just and proper position. We have no doubt but it is substantially the the same preparation which has been frequently used in Canada by the parties above alluded to and by them kept as a valuable secret.

Though we give the recipe we shall accompany it with the advice that none of our unlearned readers should venture to apply it, but if unfortunately suffering from cancer take it to his family physician and request him to make the application, provided he finds the condition of the bodily health such as to render it safe to do it.

How to Cure Cancers.

Not long since an article appeared in the Milwaukie *Free Democrat*, which the Providence *Post* thinks of sufficient importance to receive general notice. The statement of the *Democrat* is, that some eight months ago Mr. T. B. Mason, who keeps a music store on Wisconsin street, ascertained that he had a cancer on his face the size of a pea. It was cut out by Dr. Walcott, and the wound partially healed. Subsequently it grew again, and while he was at Cincinnati on business, it attained the size of a hickory nut. He has remained there since Christmas, under treatment, and is now perfectly cured. The process is this; a piece of sticking plaster is put over the cancer, having a hole in the centre a little larger than the cancer, so that the cancer and a circular rim of healthy skin next to it was exposed. Then a plaster made of chloride of zinc, blood root, [*Sanguinaria Canadensis*] and wheat flower, was spread on a piece of muslin the size of this circular opening, and applied to the cancer for twenty-four hours. On removing it the cancer will be found to be burnt into an appearance of the color and hardness of an old shoe, and the circular rim outside of it will appear white and parboiled, as if scalded yb hot steam. The wound is now dressed, and the outside rim soon separates and the cancer comes out in a hard lump, and the place heals up. The plaster kills the cancer so that it sloughs out like dead flesh and never grows again. The remedy was discovered by Dr. Fell, of London, and has been used by him for six or eight years with unfailing success, and not a case has been known of the re-appearance of the cancer when this remedy has been applied. —*Baptist Freeman.*