THE JOURNAL

OF THE

Board of Arts and Manufactures

FOR ONTARIO.

OCTOBER, 1867.

THE PROVINCIAL EXHIBITION OF 1867.

The twenty-second Annual Exhibition of the Agricultural Association of Upper Canada, now Ontario, just closed at Kingston, has been the most successful of any previously held in that city, both as to weather, stock and articles shown, and the number of visitors attending.

In consequence of our engagements in connection with the Arts and Manufactures Department of the Exhibition, the issue of this number of the Journal has been delayed beyond its proper time; we will, therefore, have to defer publication of the corrected list of prize awards, and statistics of entries and attendance of visitors; and also detailed notices of the articles on exhibition in this department, for the November number.

It is unfortunate that the particular season of the year in which these Exhibitions are annually held, should be so near to or during the prevalence of the equinoctial gales. The subject of holding them somewhat earlier, has frequently engaged the earnest attention of the Council of the Association; but the general impression has been that the attendance of the farmers, and a fair exposition of *matured* roots, grains and seeds, could not be secured earlier than about the last week in September. Could it be held during the first or second week, instead of the last, finer weather might generally be anticipated. These remarks do not, however, apply to the exhibition just closed. The weather during the week preceding having been remarkably fine, it was feared that the show week would be, *as* during the two previous Provincial Exhibitions in Kingston, most unfavourable. Thankful were the Officers of the Association, the exhibitors and visitors, and the denizens of the good old City of Kingston, that these forebodings were not realized—during the whole week, with the exception of a couple of showers, just sufficient to lay the dust and cool the atmosphere, the weather was all that could have been desired by the most fastidious—and right well did all parties appear to enjoy *it*, and the annual opportunity thus afforded of meeting together in friendly rivalry and association, on an occasion of so much interest to the progress of agriculture and the arts and manufactures of the Province.

The competition in the City of Kingston, in any of the departments, is never equal to what it is in the more western cities; but on this occasion the improvement was very marked, in comparison with previous exhibitions here, in all except roots and vegetables; and in these the falling off was owing to the severe and continuous drought of the past season, in this and other extensive sections of the Province.

As very full descriptions of the agricultural and horticultural departments of the Exhibition have been given in the daily papers, and will yet, no doubt, be yet more critically noticed in detail in the pages of our excellent cotemporary the *Canada Farmer*, we shall confine our remarks in the succeeding number to the special department represented by this Board, *viz.*, Arts and Manufactures.

We must here express a regret that, owing to other excessive labours during the week, we were unable to devote that amount of time and close attention to an examination of the articles on exhibition that they were so justly entitled to. Should any meritorious articles, therefore, pass unnoticed by us, we apologize to the owners thereof in advance, and plead the foregoing as our excuse for the omission.

We return our thanks to the several gentlemen who acted as judges on this occasion, and apologize to several of them for the protracted delay in commencing their labours, occasioned by the non-arrival of their colleagues for twenty-fours after the time appointed for meeting, and of the total non-attendance of others; rendering it necessary at the last moment, when the judgments should all have been rendered, to telegraph to a distance for other gentlemen to fill the vacancies.

We are much pleased with the rule in operation for this and the past year, requiring all specimens in the Fine Arts to be delivered at the Exhibition Building on the Friday previous to the opening of the exhibition, instead of on the Monday of the Fair Week. The labour of classifying and hanging pictures is arduous, and if not properly done devolves a large amount of unnecessary labour and annoyance upon the judges, and render it quite impossible for them to make their awards with satisfaction either to themselves or anybody else. Under the present arrangement, the Superintendent has the whole of the Saturday and Monday in which to prepare for the Judges, and the consequence is a very marked improvement in this department. We trust the artists will bear this in mind in future, and have their pictures delivered promptly on the Friday. The result will be more satisfactory to themselves, in the better hanging and judging of their pictures.

Coming back to the question of the judges, we are aware that their services are gratuitous, often arduous, and frequently rendered disagreeable by the cantankerousness and fault-finding of *some* of the exhibitors; but the duty is a public one, and whoever serves the public gratuitously, and faithfully, must expect to have not only his judgment but his motives impugned—his only satisfaction being, that, in the faithful discharge of his duty, voluntarily or otherwise assumed, he has the approval of his own conscience, and the appreciation of the good and honourable of his fellows.

EVENING CLASS INSTRUCTION FOR ARTISANS.

Within one month from the date of the present issue, a large number of evening classes for the instruction of operative adults and youths, ought to be established in the various cities and towns of this Province; and we know of no organizations to whose management they could be so appropriately entrusted, as the Mechanics' Institutes. The instruction of the industrial members of the community, by means of lectures, classes, and books, was the leading idea of the originators of these useful institutions; but we regret to have to say, that but few of them are carrying it into practice. A library, composed largely of works of fiction, open one or more evenings in each week, and in a few cases a reading-room attached, constitute the only active operations of nine-tenths of them. The Toronto Mechanics' Institute is an exception, as it has not only a large library and excellent reading-room open every day, from 8 A.M., to 10 P.M.—an Annual Exhibition of works of taste, art, and manufactures; and musical and other entertainments; but, each winter season of five months there are organized about seven evening classes, for instruction in English, French, Mathematics, Phonography, Freehand and Geometrical Drawing, Bookkeeping and Penmanship; and for the session now about to open it is proposed to add a class for Chemistry and Natural Philosophy. These classes, for each of the past three years, have averaged between 150 and 200 pupils, the most of whom through the day have been occupied in active labours, and consequently were the most likely to appreciate at their real value these opportunities for instruction. How much better, even in a moral point of view, to have those young men thus engaged in improving their minds, rather than to be spending their leisure time in indulgence, or something worse; but when we consider that not only morally are they the better, but that they become much better fitted for their several positions in life, we conclude that such institutions, in their active operations, are entitled to the moral and pecuniary support of all well-wishers of the industrial classes.

That pupils attending these institutions will become better and more intelligent workmen, none will attempt to deny; and this being the case, how necessary that we should provide that *all* who *will* shall have the opportunity of participating in their benefits. It is only by the thorough instruction of our engineers and artisans, that we can hope to successfully compete in manufactures and artistic designs with older communities. Even in our dear old mother country, the importance of this subject is beginning to be fully appreciated, and an agitation is now being excited on the question of technical education for the working classes, that will undoubtedly lead to practical results. We would direct the attention of our readers to articles in this and the two or three preceding numbers on this subject; and especially to the article on "Art education of artisans in Paris" in the present number; and hope that some will be stimulated thereby to assist in providing similar means of instruction here, and that others will be induced to receive the instruction when the means are provided.

MR. WILLARD'S ADDRESS AT THE CANADA DAIRYMEN'S CONVENTION.

At the meeting of the "Convention." held at Ingersoll, Ontario, on Wednesday, July 21st, an address was delivered by Mr. Willard, of Herkimer Co., New York State, on Cheese and Cheese-factories. The address will be found in full in the "*Canada Farmer*" of the 2nd of September.

Mr. Willard commenced by assuring his hearers of "the good will and respect which all men of liberal views in New York held towards the people and Government of these provinces," and referred to the privileges we are enjoying under the free institutions secured to the Anglo-Saxon race, as resulting from the great magna charter forced from King John, more than six hundred years ago; and urged that, from our commercial relations, to say nothing of race, language, religion and laws, the most close friendship should exist between Great Britain and the United States; and trusted "that no unkind feelings may ever be engendered between such near neighbors as the States and these provinces; and said:—"We hail, therefore, the inauguration of a Canada Dairyman's Association, hoping it will make common cause with us in our competition with European manufactures."

Mr. Willard then spoke of Great Britain as "our principal foreign market" and said she now imports from Holland, 80,000,000 pounds of cheese per annum, being about double the quantity she takes from us. The speaker then referred to the necessity of manufacturing a first class article, *only*, for the British market, and regretted that, in this respect, but little improvement had been made in the United States during the past year. He also spoke of the gradual decline in the quality of the Cheshire cheese, which is now inferior to that from American factories.

After describing the process of manufacture in the principal cheese-making districts of England, as unscientific and outlandish, he said:—"The Cheddar, however, is a very high character of cheese, and commands a high price. Its qualities have not been overrated. These best samples have rarely been equalled, and never surpassed in American dairies. The quantity made is comparatively small. It takes its name from a small village at the foot of the Mendip Hills, in Somerset County, its manufacture there having commenced more than a hundred years ago. Various improvements have been made in the process, until it has been reduced to a system which is at once simple and philosophical. It may be said to be a chemical process, requiring judgment and skill in the management of acids, until the curds have passed through its different stages, and is properly developed by the press. Its leading principles have been understood and practised by our leading cheese-makers, for some years, and it is due to these that our American cheese has been able to obtain so firm a foothold in the English market."

Mr. Willard spoke of the extreme cleanliness pervading every thing and process connected with the English Dairy, and the absence of much of this cleanliness in this country; the fine flavor of much of the English cheese, and the cause of its absence in the American; and after giving a very glowing description of the "Prince Albert Model Farm, and the Royal Dairy," referred at some length to the progress of the "factory system" of this country. The first cheese-factory was erected in Rome, N.Y., in 1851; and at the end of 1866, New York State had more than 500 such factories in operation; and in the Eastern, Western and Middle States, and these Provinces, "we have track of a thousand" others.

The speaker referred to the comparative cost of manufacturing cheese in New York State and in this Province, and dwelt on questions of shipping to Europe; cleanliness in manufacture; kind of vessels for milk; recent improvements in factory buildings; utilizing whey; styles of cheese, &c., &c. The *Canada Farmer* says:—"Our factory-men who are newly embarked in the business of cheese-making, will do well to heed the counsels tendered them in Mr. Willard's address, especially on the subject of scrupulous cleanliness." The address is well worthy the careful perusal of all interested in cheese-making in Canada.

TECHNICAL EDUCATION.

In the July number, under the heading of "Canada: Her Educational and Industrial Future," we drew attention to the very liberal provision made by the Legislature of the Province of Canada,—now ONTARIO and QUEBEC,—for the rudimentary instruction of all classes of the community, and College and University instruction for those intending to follow the learned professions; and, at the same time, the total absence of any special provision for the education of the working or operative classes, in technical or practical subjects,—and especially for evening CLASS instruction, for youths actually engaged in mechanical or engineering pursuits. Our August and September numbers also contain articles and correspondence on this important subject. We now propose to refer to views held by some of the best scientific journals and practical men of Britain, and to state, shortly, what are some of the features of this system of technical instruction, which we hope to see promoted by the Legislature of this Province. The correctness of the conclusions arrived at by Dr. Lyon Playfair, as given in his letter contained in our July article, having been disputed by some other learned writers, was thus brought under the notice of the Royal Commissioners appointed to inquire into the education of a certain class of schools. The Commissioners, therefore, have made a special report to Her Majesty, in which they say:—

"Our attention has been incidentally called to the evidence considered to be afforded by the International Exhibition at Paris, of the inferior rate of progress recently made in manufacturing and mechanical industry in England, compared with that made in other European countries. It has been stated to us that this alleged inferiority is due in a great measure to the want of technical education, and we have therefore thought it desirable to ascertain from many eminent English jurors in this department whether they agree with this opinion.

"We think it expedient at once to report to your Majesty the answers which we have received to our inquiry on this point. Although they have an obvious bearing on the propriety of encouraging to a large extent the study of physical science in our schools, and especially in schools used by those classes which are probably destined to the pursuit of manufacturing industry (a question which had already engaged much of our attention, and to which we hope more fully to revert in our general report), yet we have not considered that an inquiry into technical education came directly within the scope of our commission, nor could we now undertake it without interposing a longer delay in making our report than we should wish. But considering the great importance of the subject, we venture to suggest, for the consideration of your Majesty's Government, whether a special inquiry into the state and effect of technical education abroad, and particularly in France, Germany, and Switzerland, should not be instituted in whatever manner may appear to your Majesty's Government best calculated to obtain full and accurate information about it."

The commission, by its secretary, sent the following circular to a number of jurors and others engaged in iron, physics, locomotion, chemical manufactures, naval architecture, general machinery, furniture and carpets, glass and artistic design, woollens, flax, engineering, education, chemistry, mining, hosiery, &c.

CIRCULAR.

"SIR,—I am instructed by Her Majesty's schools inquiry commissioners to send you a copy of a letter lately addressed to their Chairman by Dr. Lyon Playfair, and to request that you will favour them by stating whether you agree with the substance of that letter."

Many of the answers to this circular are very lengthy, we can only give a very brief synopsis of some of them.

The Rev. Canon Norris fully agrees with Dr. Playfair, and says:—"While in the matter of primary education we were, to say the least, well abreast of those three nations, yet in the matter of higher instruction, of all that tends to convert the mere workman into the artisan, Austria, France, and Prussia, were clearly passing us."

John Tyndall, Esq., F.R.S., concurs in the views of the Dr., and says:—"I have long entertained the opinion, that in virtue of the better education provided by continental nations, England must one day—and that no distant one—find herself outstripped by those nations, both in the arts of peace and war. As sure as knowledge is power this must be the result."

Edward Huth, Esq., agrees with Dr. Playfair in "*toto.*" He says, in one passage of a long letter:—"I found my for a long time previously entertained convictions entirely confirmed, that it is the want of industrial education in this country which prevents our manufacturers from making that progress which other nations are making. From all I could see and learn I found both masters and foremen of other countries much more scientifically educated than our own. The production of the workmen also show clearly that there is not a machine working the machine, but that brains sit at the loom, and intelligence sit at the spinning wheel. You have a fine nucleus for scientific industrial schools, in our Mechanics' institutions, whenever such institutions are properly conducted." This last view of Mr. Hurt's fully coincides with our own, as our July article testifies.

Professor Frankland, of the School of Mines, says Dr. Playfair's letter substantially expresses his convictions in regard to the matters therein mentioned. He says: "In the Polytechnic schools of Germany and Switzerland the future manufacturer or manager is made familiar with those laws and applications of the great natural forces which must always form the basis of every intelligent and progressive industry."

John Fowler, Esq., President of the Institution of Civil Engineers, quite "agrees with the substance of the letter, that foreign nations have made greater manufacturing progress than England since the Exhibition of 1851."

J. E. McConnell, C.E., agrees with Dr. Playfair in his views generally, he says:—"It requires no skill to predict that, unless we adopt a system of technical education for our workmen in this country, we shall soon not even hold our own in cheapness of cost, as well as in excellence of quality, of our mechanical productions. In England, when a good workman is selected for a foreman's place, he is generally found wanting in technical knowledge."

Capt. Beaumont, R.E., says he concurs in the substance of the Dr.'s letter, and trusts he may not be deemed presumptious in stating "what he believes to be a very great want in England, viz., such an institution as the well-known 'Arts et Metiers' of Paris." He says, "I know of no national institution where the public of our own country may study practical mechanics and the arts appertaining thereto."

W. S. Smyth, Esq., of the School of Mines, says: "As regards the broad subject of technical education, I will only add, that the greater proportional advancement made by France, Prussia, and Belgium, in mining, colliery working, and metallurgy, appears to me to be due, not to the workmen, but in great part to the superior training and attention to the general knowledge of their subject, observable among the managers and sub-officers of the works. No person can deny that they are far better educated, as a rule, than those who hold similar positions in Britain."

Robert Mallet, Esq., F.R.S., says: "I do fully agree with Dr. Playfair in opinion that a better system of technical education for all classes connected with industrial pursuits, has become a pressing necessity in Great Britain; that immediate steps ought to be taken for organizing and securing legislatively such a system; and that large and accurate inquiry as to the state of such education in foreign countries, and as to the want of it at home, ought to be made under such sanction as will be best calculated to rouse the public mind in England from the apathy and ignorance which prevail upon the subject."

Peter Graham, Esq., agrees with Dr. Playfair, that "a system of technical education must tend to the improvement of the manufactures of every country in which it is in operation, and that the advances made by some other countries may to some extent be attributed to its influence."

David S. Price, Esq., Ph. D., says: "I must express my firm belief that extended scientific education is of the highest consequence to us if we wish to retain our present position in the scale of nations, that it will mostly benefit the future master manufacturer, that it must tend to elevate the social position of the intelligent workingman, and to create a greater sympathy between master and man than at present prevails; and if it do this, the evils which threaten to impede, if not to paralyze, our material progress, may be averted."

J. Scott Russell, Esq., F.R.S., writes, that from his own recent personal enquiries into the state of technical education in Switzerland, Germany and France, he has "reluctantly come to the conclusion that it is much more advanced in those countries than in our own;" and attributes the "surprising strides those countries have been making for the last ten years, in many of the great staple branches of mechanical construction and manufacture, to the admirable scientific and practical training which the governments of those countries provide for their working classes."

In a "memorandum" enclosed in Mr. Scott Russell's letter occurs the following passage:—

"Dissatisfied with our national progress, we have naturally turned our minds to search for the cause of the progress of other nations, and for the cure of our own deficiency. We find that during these years some nations have been occupied in diligently promoting the national education of the various classes of skilled mechanical workmen, for the purpose of giving skill to the unskilled, and rendering the skilled more skilful. We find that some nations have gone so far as to have established in every considerable town technical schools, for the purpose of teaching all the youth intended to be craftsmen those branches of science which relate most nearly to the principles of their future craft. Workers in metal are taught the nature of the mechanical powers with which they will have to work, and the chemical properties of the materials they will have to operate upon; engine builders are taught the principles of heat and steam, and the nature of the engines they have to make and work; shipbuilders are taught the laws of construction, hydraulics, and hydrostatics; and dyers and painters are taught the laws of chemistry and colour. All skilled youths are taught geometry, drawing and calculation; and in many countries every youth who shows great talent in any department is promoted to a higher training school, and there educated at the public cost.

"Besides these local schools other countries have technical colleges of a very high class for the education of masters and foremen in engineering, mechanics, merchandise, and other practical and technical professions.

"We have not failed to notice that it is precisely those nations which have been systematically giving a course of preparatory training and education to their population in their skilled trades that have shown the most marked progress in national industry in these successive exhibitions."

E. W. Cooke, Esq., R.A., F.R.S., writes that he is compelled to agree entirely with the opinions and conclusions expressed in Dr. Lyon Playfair's letter.

W. Spotten, Esq., of Belfast, another of the jurors, also expresses his full concurrence in the substance of the letter referred to.

A. J. Mundella, Esq., of Nottingham, a managing partner in a hosiery manufacturing firm in England and Saxony, enters at great length into a comparison of the educational attainments of their British and Saxon work-people. He says: "In Saxony, our manager, an Englishman of superior intelligence, and greatly interested in education, during a residence of seven years has never yet met with a workman who cannot read or write. And not in the limited or imperfect manner in which the majority of English artisans are said to read and write, but with a freedom and familiarity that enables them to enjoy reading, and to conduct their correspondence in a creditable and often superior style. Some of the sons of our poorest workmen in Saxony are receiving a technical education at the Polytechnic schools, such as the sons of our manufacturers cannot hope to obtain.

"Whilst, therefore, I believe that the English workman is possessed of greater natural capacity than any of his foreign competitors, I am of opinion that he is gradually losing the race through the superior intelligence which foreign governments are carefully developing in their artisans."

James Young, Esq., Chemical Works, Bathgate, writes: "I am bound to say that my experience accords with that of Dr. Lyon Playfair;" and alluding to the greater progress made by continental countries in manufactures, he says: "The reason for this increased rate of progress is the excellent system of technical education given to the masters of workshops, sub-managers, foremen, and even workmen."

Our article, thus far, consists mainly of extracts from or opinions of eminent British jurors, or manufacturers, at the Paris Exhibition; and as these opinions will carry with them infinitely more weight than any we can ourselves advance on this to us important subject, we have no hesitation in thus placing them before our readers. The letters in full, from which the extracts are made, will be found in the London *Engineer* of July 12th to August the 9th, and will well repay a careful perusal.

On the value of a thorough scientific training to the manufacturer, Mr. Young thus writes:—

"England for a long time excelled all other countries in the finish of her machines; but we now find that foreign machine makers are rapidly approaching us in finish, and having skilled and intelligent labour cheaper than ourselves, are progressing in all the elements of manufactures.

"Permit me to use my own case as an illustration. Originally I was a working man, but have succeeded in increasing the range of manufacturing industry. The foundation of my success consisted in my having been fortunately attached to the laboratory of the Andersonian University in Glasgow, where I learned chemistry under Graham, and natural philosophy and other subjects under the respective professors. This knowledge gave me the power of improving the chemical manufactures into which I afterwards passed as a servant, and ultimately led to my being the founder of a new branch of industry, and owner of the largest chemical manufacturing works of the Kingdom. It would be most ungrateful of me if I did not recognise the importance of scientific and technical education in improving and advancing manufactures. Many men without such education have made inventions and improvements, but they have struggled against enormous difficulties, which only a powerful genius could overcome, and they have been sensible of the obstacles to their progress. Stephenson, who so greatly improved locomotives, had to be his own instructor, but he sent his son Robert to Edinburgh University, and the son did works at least as great as his father and with far less difficulty to himself."

In another portion of this number we publish a paper by Mr. Kitson, of Leeds, on "The Paris Exhibition in its relation to industrial instruction."

Although Mr. Kitson there maintains that England is yet "able to hold her own" in manufactures, a fact of which we have not a doubt, he yet admits the pressing necessity that devolves upon the government of Britain, to provide a higher class technical education for its people, if she is to continue to hold the advanced position she has heretofore done, and, to a certain extent, yet holds amongst the industrial nations.

The London *Engineer* remarks, that "the Paris Exhibition has at least shown that our manufacturing supremacy is in great danger, and that the cause lies in the uneducated condition of our workmen as a body. * * * Fifteen years ago we were suddenly awakened to the utter want of artistic knowledge which disfigured and often rendered grotesque the forms of our unquestioned mechanical supremacy. South Kensington (Art and Science Instruction) was the result, and despite the feeling that exists against the management there, it is admitted that much has been done, amongst the middle classes at least, to bring in a better state of things. On every side we see proofs of the spread of sounder art principles, and a more educated appreciation of the beautiful, largely due, no doubt, to borrowing and imitation, but yet with a small element of self-production underlying or accompanying. * * * * But when shall the children, whose lives are to be devoted to the mechanical or manufacturing arts, go to learn the principles that underlie their daily calling, principles without which they can only work like mechanics, and contribute nothing to the advancement of the arts to which they are devoted? Where shall the masses go for any sound elementary instruction in mechanics, natural philosophy, or chemistry? How shall they learn anything scientifically about fluids, air, light, electricity, or heat? * * * It is of trained, thinking workmen we are mainly in want. Men who have studied and mastered the principles which underlie their callings, and who go about their work not from rule of thumb but from rule of brain. We have obstinately thought it sufficient to train the hands merely of our workmen, and we suddenly awake to the fact that our neighbors have trained their heads too, and to such an extent that not only can they find amongst the choice intellects of their men scientific and thoroughly skilled managers, but workmen who can intelligently carry out scientific notions without slavish dependence on the thought or directions of their chief. * * * On the basis of a generous and liberal system of truly national education (such as we have in Canada with some improvements—Ed.) We need, too, a broad system of secondary instruction, in whose circle all the choice spirits from below shall join those whose superior advantages naturally place them on a higher intellectual plain; and here art and science schools will find their true vocation, and intellects prepared to the point that shall make their instructions at once acceptable and reproductive."

Engineering, a leading scientific journal, edited by Zerah Colburn, referring to the advantages possessed by continental over British workmen, says: "Let us at least maintain the prestige of the leading nations, for that the race is becoming keener and keener no observing man can see and fail to admit. We know how our relative positions have changed in the last ten years, and there are reasons for fearing that within the next ten years the change may be much more decisive against us. Let us begin with organized technical education, in which we are already one generation behind."

If the position of this question in England is as shown by the various and numerous extracts here given, how do we stand in respect to the same question here in Canada, and what steps should our Legislature take to supply the want, if it really exists? Our article has already extended to so great a length, that we must defer the answers to these questions for our next issue.

Board of Arts and Manufactures
FOR ONTARIO.

TRADE MARKS.

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

(*Continued from page 234.*)

M. W. Heathfield, London, Ontario. Trade Mark:—"Confederation Bitters." Recorded in Vol. A, folio 188 (No. 640), August 19th, 1867.

J. D. Lewis, Toronto, Ontario. Trade Mark:—"Dominion Tobacco Works." Recorded in Vol. A. folio 189 (No. 645), August 19th, 1867.

James Mills, St. Catharines, Ontario. Trade Mark:—"Bloss' Vegetable Pain Killer." Recorded in Vol. A. folio 190 (No. 666), August 24th, 1867

T. Workman, Montreal, Quebec. Trade Mark:—"F. & W.", within a circle, which is surmounted by the British Crown. Recorded in Vol. A, folio 192 (No. 668), August 26th 1867.

T. Workman, Montreal, Quebec. Trade Mark:—"Trade (a crown) Mark," and underneath the initial "W, St. Paul's Works, Montreal." Recorded in Vol. A, folio 191 (No. 668), August 26th 1867.

W. M. Mooney, Montreal, Quebec. Trade Mark:—"A form of a horse shoe, with the words "Trade Mark" above, & "Horse Shoe Nail" underneath. Recorded in Vol. A; folio 193 (No. 678), August 30th, 1867.

John Gardner, Montreal, Quebec. Trade Mark:—"Gardner's Domestic Cough Remedy." Recorded in Vol. A., folio 195 (No. 703), September 11th, 1867.

RECENT PUBLICATIONS.

British.

Allen, C. Bruce. Cottage Building; and Hints for Improved Dwellings for the Labouring Classes. With Notes and Additions by John Weale. 6th Ed., with numerous Illust. (Weale's Rud. Ser. 42) 12mo. cl. sd. pp. viii—133. Virtue. 1*s*.

Clausius, R. Mechanical Theory of Heat, with its Application to the Steam-Engine, &c. With Introd. by Professor Tyndall. 8vo. Van Voorst. 15*s*.

Foden, James. Mechanical Tables, showing the Diameters and Circumferences to every eight of an inch, from one Inch to upwards of Twenty Feet. 3rd Ed. Corrected and amended. 12mo. pp. 47. Pannell Liverpool; Whittaker. 1*s*. 6*d*.

Ottoline, V., and Lose, F. Terra-Cotta Architecture of North Italy; portrayed as Examples for Imitation. From careful Drawings and Restorations; with Descriptive Text. Edit. by Lewis Gruner. With 48 chromo-lithographic Illust. Folio. Murray. 5*l*. 5*s*.

Rankine, W. J. M. Useful Rules and Tables relating to Mensuration, Engineering, &c. 2nd Ed. Post 8vo. Griffin. 9*s*.

Tyndall, John, L.L.D., F.R.S., Sound. A Course of Eight Lectures delivered at the Royal Institution of Great Britain. Post 8vo. pp. xiii—335. Longmans. 9*s*.

American.

Almanac. The American Photographic Almanac for 1867; being an Annual Appendix to Humphrey's Journal of Photography. By John Fowler, M.D. 16mo. pp. 102. N. Y.: J. H. Ladd. Paper.—50 cts.

Campbell. Self-instructor in the Art of Hair Work, Dressing Hair, making Curls, Switches, Braid, and Hair Jewelry of every description. By M. Campbell. Illust. 8vo. pp. 276. N. Y: The Author. Cl.—$5.

Feuchtwanger. A popular treatise on Gems, in reference to their Scientific Value. A Guide for the Teacher, Lapidary, Jeweller, and Amateur, etc. etc. By L. Feuchtwanger. Illust. 3rd Ed. 12mo. pp. 437. N. Y.: The Author. Cl.—$5.

Geyelin's Poultry Breeding in a Commercial Point of View, Natural and Artificial Hatching, Rearing, and Fattening. With Plans, Elevations, Sections, and Details. With Preface by Charles L. Flint. Illust. 12mo. pp. 128. Boston: A Williams & Co. Cl.—$1 25.

Henriques. Modern Mercantile Calculator. A Companion for the Accountant and Book-keeper. For the use of Bankers, Brokers, Book-keepers, etc., etc. By A. D. Y. Henriques. 8vo. pp. xv. 369. N. Y.; J. M. Bradstreet & Son. Cl.—$5.

Moorman. The Mineral Waters of the United States and Canada. With Map and Plates, and General Directions for reaching Mineral Springs. By J. J. Moorman, M.D. 12mo. pp. 507. Baltimore; Kelly & Piet. Cl.—$2 50.

McVicar. The Metric System of Weights and Measures. Prepared for Robinson's Series of Arithmetics. By M. McVicar. 16mo. pp. 47. N. Y.: Ivison, Phinney Blakeman & Co. Paper.—35 cts.

Waring. Draining for Profit, and Draining for Health. By Geo. E. Waring, jun. Illust. 12mo. pp. 224. N. Y.: O. Judd & Co. Cl.—$1 50.

Wormley. Micro-Chemistry of Poisons, including their Physiological, Pathological, and Legal Relations: adapted to the Use of the Medical Jurist, Physician, and General Chemist. By Theo. G. Wormley, M.D. Illust. 8vo. pp. 668. N Y.: Baillière Bros. Cl.—$10.

Correspondence.

TECHNICAL EDUCATION.

To the Editor of the Arts Journal.

Sir.—The question of Technical Education does not seem to have been advanced by the subsequent discussion in your pages, beyond the very advantageous position in which your first article placed it. Empiric assertion is among the least satisfactory modes of dealing with any subject, and the mere re-assertion of your position in other terms is about the amount of the contributions others have made in support of your article. The assertion that witchcraft prevailed and that burning was its appropriate preventive and punishment led to what is now con fessed to have been an ignorant superstitious sacrifice of human life. The assertion that shop lifting and sheep stealing required the gibbet as a terror to evil doers, has become an exploded theory; and there is little doubt but that a few years hence, the Kensington conglomerations with "the Science and Art department," in London, will be regarded as the vagaries and follies of Mr. Cole and a few others, and to a very large extent not only a waste but a pernicious expenditure of public money. The cry for technical education, which seems mainly, if not wholly, the production of that pretentious establishment, I have no manner of doubt, will be at no distant date regarded as a delusion, and the increasing superiority of foreign over British artizans, owing to the superior art education, will take its place with witchcraft, and nature's abhorrence of a vacuum, in the long catalogue of unwarranted assumptions on which men are led to expend unavailing energy and attention through mere unreasoning assertion, and which a very small attention to the ascertainment of fact and the logic of means to ends would have tended to prevent. Now the subject is as has been generally admitted, one of very great importance, and with your permission I should like to follow up your own article in a manner such as business as well as scientific men adopt, and must adhere to, if they would succeed in obtaining the aims they variously pursue. The first question your excellent article suggests, and the very marrow, not of the whole matter, but of the technical education part of it as a cure for a presumed evil, is this, does that evil exist? Is it true that British workmen are falling behind the foreigner in the excellence, the suitability, or the artistic finish of their industrial productions? And if it is true is it owing to the superior technical education received by the foreigner, and unattainable by the Briton? If it is not true, any attempt to cure a purely imaginary defect in our system would be worse than even pursuing Will o' the Wisp; and if it is true, but not owing to any such cause as that alleged, the supplying technical education as a cure would be like attempting to remedy unproductiveness in clayey soils by the application of salt, or any other evil by means which may have no suitability for the purpose. Now these two questions appear to admit but of one reply each. The increasing advancement of foreigners in the excellence of industrial productions as compared with the British worker, is a mere assertion unsupported by any evidence such as business men rely on in their ordinary transactions, or such as the logician and man of science can admit as even approximately sufficient, and it need scarcely be added, that until its existence be satisfactorily proved any attempt to cure it must be futile. Again, suppose its existence established, there has been no attempt by reference to facts, so far as I am aware, to show that it is owing to a superior technical education, and not to the many other influences known to exist, and having a more direct tendency to produce this result. With your permission, in a future number, I purpose very briefly to support both these conclusions by a reference to the argument in support of the contrary assumption, and having thus removed the impediments to satisfactory progress, the question how our workmen may be prepared most effectually to pursue their avocations with increasing efficiency, progress and profit, may be entered on with a better prospect of a speedy and satisfactory solution.

Montreal, 21 Sept., 1867 S. R.

Selected Articles.

THE PARIS EXHIBITION IN ITS RELATION TO INDUSTRIAL INSTRUCTION.

The following excellent paper was read by Mr. James Kitson, junior member of the Leeds firm, at the 30th annual meeting of the Yorkshire Union of Mechanics' Institutes, recently held at Castleford. It will be found well worth perusal:—

At the request of our president I have undertaken to call your attention to the Paris Exhibition, and to introduce the discussion which is naturally suggested by a study of the position of the various arts and industries of the world which are there represented. This Exhibition, designed as it is to afford a means of comparing the merits of the arts and manufactures of different countries, offers to us a favourable opportunity of examining the state of industrial education, and of comparing our position in this respect with that of the countries of Europe with which we have the most intimate relations, and with which we are now competing in the various markets of the world. I spent last week in Paris, and having attended there at a meeting of an English Society of Mechanical Engineers, I have had a favourable opportunity of noting some facts which have a special bearing on this matter, and also have had the advantage of examining and criticising the various products exhibited in company with some mechanical engineers of the highest position in England. I would here remark that the opinions I offer as to the quality of the exhibited articles are not simply my own unsupported judgment, but the same opinions have been expressed by many of the distinguished engineers, French and English, with whom I had the honour of discussing the merits of the Exhibition. The question of industrial education has been raised in a letter recently published in the *Times* by Dr. Lyon Playfair, and our president has directed the attention of several of our friends to it, who will probably shortly address you ; to confine the discussion I will, therefore, content myself at the present moment of considering the remarks and proposals of Dr. Playfair, though it is a topic which might be advantageously examined in a more extended manner. I will first reply to the statement made by Dr. Lyon Playfair, that a singular accordance of opinion prevailed, that our country (England) had shown little inventiveness, and had made but little progress in the peaceful arts of industry since 1862. This is a very bold and a very disparaging statement, and is so derogatory to our country that it is desirable to examine into the grounds on which it is based, and to see whether it is not rather an opinion founded on limited or deficient information, than one which is a true representation of the progress of arts and manufactures in our country. In the first place, it is incorrect to judge of the manufacturing excellences and the power of production of England from the objects and collections at the Exhibition. France has exposed the products of her manufactures at her own doors, and, what is of more importance to her, in her own market. England has had to transport her articles across the sea at a much greater cost, and to a market which is to a great extent closed to her. France has in manufactures as well as in war a great idea of glory ; England has in trade little idea of glory, but a great idea of doing what will pay. The French have an opportunity of gaining both glory and profit, and hence have been induced to make great efforts to appear well at their universal Exhibition. It is important to bear this in mind, and if we attempt to compare the industrial progress of France with that of England, we must remember that France has shown the choicest products of her manufactures, while we have much at home superior which it has not been thought advantageous to represent at Paris. The great houses of France have spent enormous sums of money on their displays, which no English firm would have been justified in spending. Indeed, it is said that some of the foreign exhibitors have had to defray the whole of their own expenses. It is true our Government had voted some £200,000 towards the English sectional expenses, but I fear that this sum will not fertilise the pockets of the English exhibitors, as it appears already to have been absorbed by the commission appointed by the mysterious and despotic powers at South Kensington. I would instance as exhibitions which have produced the feeling of depression on the minds of many of our jurors and writers the pavilion of Le Creusot. It is a remarkable and a beautiful exhibition, and most wonderful as showing the power and immense capacity of a single establishment, but there is nothing in it which we do not produce in England of in most points superior quality, and certainly of superior design. The locomotive engines made for an English railway, for which Mr. Schneider obtains great praise, are from English designs, and their construction has been controlled by an English inspector, who has gone direct there immediately after controlling similar works in the best English workshops. Mr. Schneider exhibits three locomotive engines in his own pavilion—the whole of England sends but five; but it would be very erroneous to judge from this the comparative powers of the two countries. I think I have said sufficient to warrant me in asserting that there is a very deficient representation of English manufactures, and, therefore, those who would compare the industry of this country with that of foreign nations must carry their inquiries very much beyond the boundaries of the Paris Exhibition. In my observations as to the position of England in the Exhibition, I naturally prefer to confine myself to those departments with the products of which I have a practical acquaintance; in these I am fortified by having similar opinions expressed to me by men of greater experience, but I have no hesitation in affirming in all the different branches of trade connected with mechanical science we still stand without superiors. I will mention some of these in detail. In marine engines our makers are superior to any of the Continent, both in finish and design. The English marine engines are gems of mechanical finish. In locomotive engines we have the best specimens in the Exhibition ; they are equalled in finish of work by one or two foreign engines, but are unequalled in beauty of form and simplicity, and appropriateness of construction. In machinery for working iron and other metals we have no equals. Our makers show the best quality of work, the most mechanical ingenuity and the greatest beauty of form and outline. The best foreign machine tools are copies of English designs, and the engines whose work nearest approaches the English excellence of finish have been made for the most part with tools constructed in the manufactories of Leeds and Manchester. In iron we exhibit in very small quantities samples of unequalled quality, but only the makers of iron of special quality are represented. The great houses who make iron most in demand for the general purposes of commerce are not represented, and for the simple reason that it would not pay them to exhibit. France has high duties on manufactured iron, which close her markets to English produce, and therefore there is no inducement to England to show samples of wares for which she has no market there. The *tours de force*, as samples of skill and power, exhibited by various Continental ironworks, are very remarkable, and exhibit an extraordinary advance in this branch of French industry. Enormous plates, bars of great length and large sectional area are to be seen in great abundance, but are only interesting as showing what can be done, and that any demands of the engineering profession can be satisfied. These heavy plates are not as large as are rolled in England, and all their bars can be as well obtained from English makers if such be required. The material shown by our War Department, by Sir Wm. Armstrong, by the Whitworth Company, is incontestably superior in finish to any other exhibited; all the products of these manufactories are remarkably beautiful, and in advance of those of any nation. I have ventured to give you these specific references to sections of our manufactures, because it is more valuable to give a few positive examples of my view of our position than to make general statements, and also because I think they are sufficient to confute the assertion that we have been surpassed in mechanical science, and to show you that if pre-eminence has been denied us, it has been denied us by those who have not had sufficient information on which to ground their judgment. In the fine arts and in manufactures where the fine arts are most directly applied I am rather diffident in expressing an opinion, but I have seen specimens of engraved glass designed by Englishmen and executed by English workmen which are unequalled by any country exhibiting. On this point it is interesting, indeed, almost amusing, to read an extract from the *Journal des Débats*, which, as you know, is one of the leading papers of France, in which the writer takes almost the same view of his own country that Dr. Lyon Playfair does of England, and endeavours to read to his country the same warning lesson that we have had from Dr. Playfair. "A manufactory at Vienna sends some table services that are strikingly elegant in form, and though of crystal they are almost as light as Venetian glass. They are also comparatively cheap, which is an advantage that deserves to be noted. Cheapness is the principal merit of the crystal objects from Belgium that we have examined; but it is not so of those that come from England. The latter are perhaps less pure and less graceful in form than ours, but in the engraving they are admirable. Englishmen are rich and can afford to pay for fine things. They take away our most skilful workmen, and, in addition, are willing to make any sacrifice in order to extend instruction and education, and to improve the taste of their own operatives. During the last twelve years they have made enormous progress in every branch of industry to which art belongs. We Frenchmen must take care that one of these days we do not lose that artistic superiority in which our artisans have taken a lawful pride. Let us multiply our schools for adults; let us employ every effort to enable our workmen to have easy access to those admirable works in which engraving has produced the masterpieces of art in every epoch; if possible, let us open for them collections of objects of art, in every style, in the localities where they live. Let us be upon our guard. Our rivals have arrived very nearly equal to us, and we must take care not to have to say one day that they have surpassed us." Having said thus much in defence of my country, I am free to admit that continental nations have made giant strides in industry, and have relatively made greater progress in manufactures than we have. They had scarcely started a few years ago, while we had advanced to a very high position, and now they have attained to considerable excellence while we have contented ourselves in increasing the quantity of our manufactures, and in the profits of trade unparalleled in extent, and enlarging constantly in an increasing ratio. If continental nations have made these great advances which we admit in the space of a very few years, it is important for us to examine the causes which have favoured it, and to endeavour, if possible, to gather and use the experience of our neighbours. The nations which have made the most marked advances are France, Prussia, and Belgium, and as the same causes have been at work in all these countries, for the sake of brevity I will at the present time confine my remarks to the case of France. Seeing that the natural advantages of France as an iron producing country are inferior to ours, that it is deficient in mineral, which is consequently a drawback to all its manufactures, we can but come to the conclusion that the intelligence which has created and fostered the manufactures, which have produced the magnificent displays set forth in the Exhibition, must be of a very high order. It has been my fortune during the past week to meet with several of the first engineers of France, and from them I learn the remarkable fact, that almost without exception, the chief engineers of the railways, of the Government department of the Ponts et Chaussées, and the heads of many of the large manufactories had been pupils of the Central School of Arts and Manufactures, while most of the managers and foremen of works, engineering establishments and factories have been pupils of the Ecole des Arts et Metiers. There are few expections to these; the rough and ready self-educated men rarely rise above those who have been educated at these schools because they start the race of life under too serious a disadvantage. I cannot learn that their artizan population are better educated than ours; they are brought up under much the same condition as ours, and after attending their communal schools are sent to work at an early age. In support of this view of the similarity of education of the two countries, I may mention that it was found that an average of 300 conscripts in 1,000 of the year 1866 were unable to read; and in 1864 only 239 in 1,000 recruits in England were unable to read; the advantage is therefore on the side of England, more particularly when you bear in mind the class from which our recruits are taken, and that in France the conscripts are taken by lot from the whole population. If we find these pupils of particular schools monopolising the direction of the whole of the manuturing industries of France, we cannot but acknowledge the merit the schools must possess; and also we could not bring forward a better example of the immense value of education, and can form from this fact some idea of what results we might be able to obtain if the moral and intellectual education of our whole people were as well cared for as the scientific education of a small portion of the French nation appears to be. The Central School of Arts and Manufactures is specially designed to form engineers for all branches of industry, and for public works. Diplomas of Engineer of Arts and Manufactures are given by the Minister of State to those who pass in the first class, and certificates of capacity to those who pass in the second class. Foreigners are admitted as well as natives, and the course is for a period of three years, commencing at seventeen years. The course costs £32 per year, but in certain cases the State will grant a subvention to needy scholars. The Ecole Centrale trains principally engineers who enter the higher grades of the profession, to which their diploma gives them an acknowledged certificate of competency. The Ecole des Arts et Metiers has three schools established at Aix, Angers, and Chalons-sur-Marne, which are designed to form chiefs of workshops and workmen instructed for industries where iron and wood are worked. Every pupil must pass an examination, and must be from fourteen to sixteen years old. Only resident scholars are received, who pay £20 a year. The course is for three years, and the instruction is practical as well as theoretic. The theoretic instruction comprises arithmetic, elementary algebra, trigonometry, geometry, mechanics, drawing, and grammar. The practical instruction is given in four workshops of models and carpentry, casting, smiths' works, and mechanical construction. Scholars arrived at the end of their studies receive a certificate, and a silver medal is granted to those who show an exceptional merit. The Conservatoire des Arts et Metiers, where public gratuitous lectures on scientific subjects are given, is also a valuable institution to which we have no parallel in England. Here are kept models of all invention; in the museum are 7,000 models of mechanical appliances, and in the library are 18,000 volumes on scientific subjects, accessible without difficulty to any seeker of knowledge. By these institutions all the known information on scientific subjects is imparted to the students. Every new invention and new mechanical appliance is recorded and made known. The scholar is taught how to apply his classical and mathematical education to the calling which he is to follow, instead of being left, as in England, to gather his knowledge in the uncertain school of practical work. The student is thus started at a much more advanced point than he is in England, where we have no regular scientific schools, and is saved much plodding and stumbling through inquiries which have been worked out for him long ago. Our English school of practice has produced many glorious men, but how much weary work and wasteful toil might have been saved them if some such sources of information of the accomplished labours of the past had been opened to them. The work to be done in England in my opinion is, in the first instance, the education of the upper working and the middle class, a work which I think is above the power of mechanics' institutions and so-called departments of science and art. It is a question which is worthy of the earnest attention of Government, who are as much bound to interest themselves in the industrial education of the country as they are to regulate the education of the surgeon or physician for the prosperity of the country, and hence the material comfort and well-being of the population, without which you can have no true moral advancement, depends on the measure of success you obtain in your industrial pursuits. As far as the powers of mechanics' institutes can be developed, they should be exercised in the scientific education of the working classes of this country; and special attention should be given to the forming of some organisation by which this education can be made more efficient. Although I have stated that the working class of this country is as well educated as that of France, it is not so in Prussia, where, in some degree, education is universal. But in France they are fully alive to the advantage of educating the labouring population, and are making great efforts in this direction. At Creusot Mr. Schneider has established schools under most able management, where, out of a total population of 23,000, there are 4,065 children in regular attendance at school. If we do not bestir ourselves earnestly we shall soon see our working population surpassed in superior education, as at present we see we are surpassed in higher education by the engineers and managers of the great industries of France. There is little doubt that England can still hold the first place at the head of manufacturing industry if she will only make use of the advantages she possesses. Our engineers must have the facilities for acquiring special knowledge which are attainable in other countries, and our people must have the education which will enable them to turn to the best advantage the directions of those whose province it is to guide them. With mineral resources unequalled and unbounded, with a climate the most congenial in the world, and a freedom of government which allows to every man the reasonable hope of attaining any position to which his talents and industry may entitle him — the countrymen of Shakspere and Watt and Stephenson, if afforded the same advantages of education as are given to those nations which compete with them, can never fail to lead in the industrial advancement of the world.

ART EDUCATION FOR ARTIZANS IN PARIS.

If there is one conclusion which is forced upon us in examining the purely artistic features of the manufactured articles in the French Section of the Paris Exhibition, it is that whether in surface or sculptured ornament there is a freedom of handling, a beauty of outline, and delicacy of finish, such as is seldom, if ever characteristic of similar works in our own English department. Perhaps the best workmanship of both countries may be nearly equal in technical execution, but there is a wide gulf between the second or third rate work of France and England, which is almost equivalent to dividing the good from the bad, and in this division France certainly has the better part. In the most elaborate and costly objects, such as painted porcelain and cabinet-making, we can compete with credit with French manufacturers; but in the cheaper pottery, or common furniture for the million, they very far surpass us in taste and design. There is hardly an object exhibited by France which does not display some grace of constructional form, or delicacy of ornamentation, contrasting strangely with the rude and coarse shapes and vulgar ornament of our own productions, where a special effort has not been made to ensure an exceptional quality of design. Comparing the cheap furniture exhibited in the French Furniture Court, with what we may see in Tottenham-court-road, one thing strikes us very forcibly. In the former there is little ornament, either carved or painted; but when either is applied, it is simple, refined in form, or well drawn,—differing from the decoration of the costliest ebony work, for which thousands of francs are demanded, only in the extent of the ornament applied, or the degree of richness of its design, but not in the *quality*, so far as it goes, of the fine art element in its execution. We see the same good drawing, the same graceful curves in the simple terminal of the post of a twenty-franc bedstead cut in pine or lime tree, as in the carving in mahogany or ebony of a masterpiece by Fourdinois or Lemoine. And this sort of native grace is not confined to furniture, but pervades all branches of industrial production into which art may be introduced, whether it be earthenware, glass, cutlery, iron work, or even objects of personal costume or decoration. Now, in England, there is absolutely no common element in the best works of Jackson & Graham, Holland & Son, and the Messrs. Trollope, on the one hand, and the common furniture we have referred to as Tottenham-court-road work, on the other hand. Who has not been disgusted with the lumpy, putty-like carving on cheap furniture in England, or with the atrocious drawing of vulgar-painted green and yellow surface-ornament, when the chisel gives way to the paint-pot? Even where the forms used give evidence of having been related by distant ancestry to well-designed shapes, yet in the reproduction the good drawing becomes distorted and vulgarised, the relief coarse and heavy, and all grace of outline is utterly lost. That this is so, however disagreeable it may be to us to allow, needs for confirmation only an appeal to our eyesight. The general superiority of the French industrial art to the English is now too much recognised to be brought in question, and what is seen in the Exhibition in the Champs Elysées is but a reflex of that which is seen outside it, in Paris, and indeed in all France. There seems to be but one explanation of this superiority, and that is, that the French workman has received, as a necessary portion of his education, some instruction in drawing, and that when the workman becomes especially an art-workman, his instruction in secondary schools is both general and effectual. It is only upon this hypothesis that the all-pervading taste in French workmanship can be accounted for. Instances of a high order of design in any special manufacture, whether in France or England, may be traced to special causes, and we fear that in the latter it is not seldom due to the employment of foreign designers; but that every French workman should, as a general rule, produce graceful and refined work, whether the eye of the master be upon him or not, is due rather to systematic education of a general nature than to special instruction in particular cases. We know that success in art, a knowledge of the beautiful from the ugly, and power of facile execution, do not come by accident, nor are they, except in rare instances, the gifts of nature; for, if it were so, then all civilized nations would be nearly on a par with each other in art-manufactures. Our experience is that, where we sow education we reap intelligence, and if we plant art, we grow refinement; but if we permit ignorance, we encourage brutality, and if we utterly ignore art-education, the fruits become visible in a general want of taste. There is a consistency of cause and effect in these matters, and it is a shallow and worthless begging of the question to say that some races or nations are by nature more tasteful and artistic than others. Art-power is acquired power, the result of educational processes of one kind or another: it may be of instruction obtained in the class-room or work-shop, or the influence of ever-visible taste in the streets, in public buildings, in art galleries and national collections, or monuments,—these acting as cultivators of taste which may lead to self-education. The French and English workmen differ artistically from each other precisely in the ratio of their opportunities and the demand which exists for art-workmanship in the two countries; and this demand is regulated by the amount of taste generated by the public mind according to the degree of art-instruction received by the public.

We cannot believe that there is any inferiority of race in the English to the French workman, though there is a material difference in the sort of education they receive, quite sufficient to explain why the former as a rule does not possess art power, and the latter as a rule does possess it. Much of the natural tendency to art may, doubtless, be traced in France to the sensible influence of public collections of art, galleries of painting and sculpture, museums of antiquities, and industrial masterpieces, and to the almost universal habit of adorning the façades of buildings with sculpture, all these together creating an artistic atmosphere in which the incipient art-workman draws in taste with his breath. But more direct is the explanation afforded by the numerous Schools of Art abounding in Paris, as well as in the more important provincial towns of France. Something also may be attributed to the general instruction in drawing given in the Primary Schools, as well as to the efforts so long made by the Government to popularise art-education by the aid given to the production of good examples to be used for instruction, and their dissemination at a nominal cost to the schools. This prepares the way for the action of the schools in which art-instruction is alone given, and in which the young workman studies as a part of his necessary trade education, and the part he is taught to recognise as by far the most important.

It is worth while to examine for ourselves the nature of the instruction given in the municipal schools in Paris, in order that we may discover, if possible, the means by which so general an art-power is communicated to the Parisian artizan. As before remarked, these municipal schools of art are very numerous; but no two of them are exactly alike in range of study. This is accounted for by the fact that the masters or professors conducting them are professional artists, either painters, sculptors, or architects, and that no conditions whatever appear to be imposed upon them, either as to subjects or systems of education; each man there developes those branches of art in the school in which he himself is most successful or practises professionally. We will refer to this feature of management again; at present it is our intention to describe the method of study pursued in one school, where a large number of workmen were engaged in the study of drawing and modelling, at the time of a recent visit paid to this school, among others, for the special purpose of the present article.

The "Ecole Municipale de Dessin et de Sculpture," of the 10th Arrondissement of Paris, situated in the Rue des Petits Hôtels, is conducted by M. Lequien, fils, whose father has long been engaged as master of a municipal school in another part of Paris. M. Lequien, fils, is professionally a sculptor, and his school has a high reputation for drawing and modelling. From information concerning the principal schools we are justified in regarding M. Lequien's as a good representative of its order, and especially so of the peculiarly characteristic method of teaching drawing, alike in all the schools, which was to be seen there in operation. The students varied in age from fifteen years to thirty, and seemed to be clad in the ordinary costume of the workman, no effort being made to appear in best clothes, as is usually the case in English schools of art. Beginning with a pupil who had been but a few days in the school, and had not previously studied in an art school, and going on through the various stages until we came to the work of young men who were drawing from the living model, and who were employed in the daytime as designers for the great French manufacturing firms, at large salaries, the whole of the students' drawings were carefully examined, in the presence and with the explanation of the professor. Afterwards, all the works produced during the past year, some of which are now in the *Exposition*, and many others still in the school, were displayed by M. Lequien, and information concerning the ages, occupations, and length of time occupied in study, and production of the drawings, was communicated by him also.

It seems, then, that in teaching drawing, but one medium is used,—carbon, chalk, or charcoal, —and from first to last the drawings are made upon a coarse, cheap paper, of a grey colour, very much like what English grocers wrap their moist sugar in, only that the drawing paper is not of quite so good a quality. There are three stages of study:—

1. From lithographed shaded copies, or original drawings.
2. Shading from the cast, of figure and ornament.
3. Shading from the living model.

The examples used by beginners were simple bold details of ornament, drawn with thick lines, and having a little more than half-tint shadows; perhaps there were as many as three degrees of shade, all being boldly expressed by lines. The point used was such as a boy of fifteen would be able or willing to keep on a stick of charcoal; and the means of erasure was a piece of wash-leather. The student is placed at a distance of perhaps a yard from his copy, which is hung on a screen or the wall in a glazed frame, and which he is not allowed to touch or measure from. Painful was the mess made by the first two or three boys, with their blunt points making such heavy black lines, and their still blunter eyesight, which betrayed them into such doleful errors. "But," said M. Lequien, "they soon tire of this black mess and these frivolous lines, and get to cleaner habits and more accurate observation of form. This boy, fifth up the line from the bottom of the school, has been here two months, and has done twenty drawings, and you see he is already using his charcoal in an economical manner, and putting shadow in only where he sees it in the copy." The pupils attend five nights in the week for two hours, and it is commonly in the indentures of the young apprentice that he attends a municipal school of art, for which his master pays the fee. At the first about two of these simple rough drawings are made in a week; imperfect many of them, but each showing some advance on the last. Thus the interest of the pupil is kept up by a change of examples, and he is never allowed to form a habit of slow or monotonous work. A little further on in the school the examples used are larger and more elaborate pieces of ornament, in which either the human or animal form is partially introduced. This takes the student as many evenings as his earlier copies occupied hours, and some of them as many weeks as the more elementary examples took evenings to copy. But by this time his work has lost all traces of blackness and messiness, the shadows become delicate and transparent, the free outlines made by the soft and willing charcoal are firm and expressive, the white chalk begins to express light and direct reflection, and the workmen appears to be getting master of his medium. The improvement appears to be startling, and M. Lequien says it is not exceptional. He objects to outline-drawing with lead pencil as a commencement, and thinks more power is got by regarding drawing as the imitating of masses of light and shade, from the first to the last. Judging from what we saw, there certainly appears to be a corrective influence in adding the shadow to the outline, which mere outline cannot have by itself. By adding shadow to bad form, you intensify the errors, mistakes of proportion become evident, and bad lines become uglier still.

The middle stage is drawing from the cast, the same medium being used. Good specimens of drawings made by previous pupils, are displayed from the student's guidance in his first efforts, and the casts are very simple in form, sometimes a section of the echinus moulding, one acanthus-leaf for an antique capital, a cast of the eye, mouth, or chin, from heroic busts, or mask of a smooth face. By the time the student arrives at this stage, he has mastered his vehicle of expression partially, not so completely as he will when he gets to the living model, but it no longer gives him trouble and vexation of spirit by doing in his hands just what he wishes not done. The process of drawing from the cast may thus be stated. The large forms are, firstly, indicated by faint outlines, and the lines dividing masses of light from shadow are touched in. The shapes of shadows are drawn, but shade is not at first expressed.* When a sort of map of the form has been thus obtained, the cast shadows are rubbed in flatly with wash-leather and soft chalk, and deeper tints in these shadows drawn in, as it were, with the blunt point of a leather stump. In this condition the drawing looks exactly like a faintly-printed photograph, and it seems to us that is some recommendation of the system, which is natural, effective, and simple. Then the student, having obtained the general effect of his subject, proceeds to add the shades, whether faint or deep, of the half tints, blending them into the shadows, and afterwards taken out by means of a clean corner of his wash-leather, the reflected lights in the shadows, and by the use of white chalk, adding the high lights, used thickly or thinly according to the amount of brilliancy of the light. The grey paper stands for the natural colour of the cast; or sometimes much white chalk is used, and the colour of the paper then becomes a half tint to express the lighter shades. This mode of drawing from the cast is a rapid one in comparison with our own English method

* Shade is the partial absence of direct light on an object; shadow, the total absence.

of stippling shadow with chalk point, and it is very much more effective. A week or even a month may be spent on a subject from the cast by M. Lequien's pupils, seldom more, and the drawings made are varied in size according to the pupil's powers, from a foot square representation of a hand or a leaf to a cartoon on strained canvas some 5 ft. or 6 ft. square, of the Apollo Belvidere or the actual size of a section of the Panathenaic freize. Very lovely in feeling and truth of *chiaroscuro* were many of these large drawings from the cast—absolute imitation of natural effect being the aim of the student, and every detail of form was carefully rendered, either by the sharp bits of forcible shadows occurring where the light was strongest, or by delicate modulations in the broad shadows, or in the play of reflected light on the prominent portions of the unilluminated parts of the cast. The subjects used for study are similar to those in use in our Royal Academy and schools of art, with the addition of a few good modern French busts and figures. The Greek and Roman antique and French renaissance are the styles of ornament which exclusively supply the ornamental casts, no example of Gothic being apparently used.

The final stage, after the practice of figure-drawing from the antique, is drawing from the living nude model. In this stage only the more advanced students study, and a very considerable power in drawing has been acquired previously to commencing from the living subject. A longer time is given to each model than we are prepared to expect, three hours each evening for five nights a week being allotted to each study. A very great amount of care is expended on the form of the figure, and the degree of finish is expected to be higher, though even in this the effect and truth of drawing are considered of more importance than finish. Stump and leather are used also in drawing from the life: they may, in fact, be considered as universal in teaching drawing in France. Besides drawing, modelling is practised in the school, in similar stages as already described for drawing, alto-relievo being the general method adopted for studying the antique and living figure. Ornament appears rarely to be copied, though original designs for special purposes of ornamental treatment were exhibited to us as the work of the students, and these were well designed and very spiritedly modelled. French art masters appear to believe that figure practice includes the study of all kinds of form, and that a good draughtsman of the human figure can draw ornament or design decoration in any style as a matter of course. The evidence is rather in favour of this view,—at any rate, so far as drawing goes. In another class a few students were drawing from examples architectural line drawings, and projections of geometric solids; but there was nothing in this portion of the school studies in any way remarkable.

It seems to us that in this system of teaching drawing in light and shade with charcoal and leather, and the effect it appears to have of giving facility of drawing and readiness to reproduce effects of light and shade, lies much of the secret of French skill in art. The medium is simple and easy to manage after the first few drawings have been made, and afterwards the student occupies himself solely in the study of form and its reproduction. Drawing is the first thought, drawing the second, and drawing all the remaining thoughts of the French professors in art schools. For the English systems of teaching drawing with outlines in pencil, and going on afterwards to the study of light and shade with the point, they profess to have the greatest contempt. The first, they say, cramps the hand instead of giving freedom and power, and the second only leads to the mechanical power of making fine dots, and neither has anything but a distant connexion with generating art power. There is a good deal of force in this opinion, and the very great superiority of French workmen to English in the matter of drawing, when both have been students in art schools, ought to lead to some further consideration of the two systems by the masters of our schools of art. We trust that in the reports which may be written on the subject of art education by the teachers of schools of art who visit the Paris Exhibition, and for which prizes are offered by the Science and Art Department, this contrast of system may be referred to, and that we shall hear what can be said on both sides of the question. Nothing can be more directly opposed than the two methods by which the French and English Governments seek to develope the art power of working men. It is not a mere question of detail; it is one of principle, and if we are to judge of a tree by its fruits, the judgment is not a difficult matter. The real question is, are the twenty or thirty stages of art instruction doing for English industrial art what charcoal and wash-leather are doing for France? We must shut our eyes to the facts of the case, and look inwardly to the beauties of a perfect theory before we can answer this question in the affirmative.

Feeling interested in the pecuniary part of the matter as to how the schools in France are maintained, we learnt that the Government grants a subsidy of 3,000 francs per annum towards the support of the School of the Tenth-Arrondissement. This pays the rent, and covers all expenses of maintenance. The master is paid by the fees of the students, and these are fixed at 4 francs a month. It is obviously the master's interest to fill his classes, and he is allowed free scope to do so, no limitations being placed upon him, no dictation as to methods or systems, and no tests are applied to his students. The State gives him nothing, but it provides a fit place for the working men of Paris to study in, and it takes nothing from him. It neither pays him for accidental cleverness in his pupils, nor stops payment if they are stupid and cannot pass examinations. It simply says to him,—Here is provided for the public good a studio for artisans, which you may take charge of. If you can teach soundly and well, and make it worth the money of working men to pay for your instruction, you will find yourself surrounded by pupils. If so, the better for you; if not, a more popular teacher, whose instruction will be sought for, will take your place. The greater your pecuniary success, the better for the public, for then the larger number of artisans will not suit the public to be without instruction.

This seems to us by no means an unfair view of the question, for, whilst not ignoring the responsibility of the State, it does not waste the ratepayers' money. It places the art-education of working men on a somewhat similar basis as middle-class education in England has been placed in our endowed grammar schools and universities, by either private or public generosity.

The educationalist visiting the Paris Exhibition, at any rate if he is interested in art-education, should examine the French collections in group 10, class 90, the works of the French art-schools. Here we may see not only the productions of the school we have described, but of many others of equal, if not greater, reputation. These collections will repay any time that may be spent on them; and we would warn him not to be content with looking only at the displays on the walls of the court,—for the wall-space is limited, but to open the portfolios of drawings, which are very numerous and highly interesting. They will show the same style of drawing as we have seen at M. Lequien's,—generally, with the addition of some branches of study added, here and there, according to the particular qualifications of the masters of the schools. The drawings do not look so well in an exhibition as we may frequently see at a School of Art Exhibition in England; there are but few works in colour, or monochrome, or original designs. There are no pretty works at all, nothing to attract the public gaze amid all the glitter surrounding. All that can be seen, and that need be sought for, are sound and serviceable evidences of useful education, presented in a manner which shows that there has been no effort to make it appear better than it is. But there are proofs on all hands of good instruction and powerful drawing, and the visitor who chances to examine these works at an early period of his visit, will have no difficulty in understanding all the grace and good art in the French department, and of detecting its origin and primary cause.

Perhaps the best description that can be given of these carbon drawings on sugar paper is, that they are evidently regarded as the means to an end, and not the end itself. We often feel in the exhibition of the works produced in English Schools of Art, that the elaborate drawings which must have taken many months to produce, are treated as pictures, and are themselves the end of study. They point no further, and between them and the design and execution of art-workmanship in industrial manufactures, there is no connecting link. In our own schools there is certainly a greater breadth of subject taught, but we are justified in believing that what the art-education of our country gains by comparison in breadth of subject, it loses positively in depth of direct usefulness. We cannot conceal from ourselves the fact that French workmen possess great art-power, and are successful draughtsmen, and that it is not the case with English workmen. We see no more direct means of accounting for this than in the more rapid, simple, and effective method of teaching drawing in France than in England, as a primary, even if not the only explanation of their superiority. Let an unprejudiced person glance at the list of prizes awarded at the Paris Exhibition to the *co-operators* or *workmen* of English firms, who have been successful in obtaining the grand prizes or medals. How frequently the names are foreign, and what does this suggest, but that either we are unable to supply our own demands for art-power, or that we supply only the inferior branches of manufacture, whilst in pottery, the precious metals, and in cabinetwork of a high class, the better education of foreign workmen fits them for the highest positions or designers?

That this will not always be the case we fervently hope and believe; but that an improvement which will place our workmen on an equal footing with their foreign competitors will occur without a thorough remodelling of our system of art education, we as thoroughly disbelieve. The art progress of the age and our backwardness in many branches of industrial manufacture demand that this shall be done. We have all the means and appliances, and do actually spend the money every year, sufficient to supply good instruction in art to every town in the empire. Our artizan population is an intelligent one, and the demand for art-power in our manufactures is great: all that is wanted, therefore, is that some attention should be paid to our systems of instruction and national expenditure of grants for art. The results we now obtain are not commensurate either with our outlay, our intelligence, or our demands; and this, we are disposed to believe, is the fault, not of the public, or the capabilities of our art students, but of our system.

From the Exhibition of 1851 we derived great impulses to art education. From that of 1862 we obtained less advantage, because a greater success in it made us more callous and better satisfied with ourselves. The lesson we now have to learn is that it will not do to rest upon our oars, or be betrayed into a fools paradise of self-satisfaction. We are as far behind in 1867 as we were in 1851; and the disease we suffer from requires as prompt action to remedy it as those we were then compelled to adopt. Our art-schools were then placed on an entirely new basis, which had some good in it, and has lasted long enough, cultivating in many points its own good qualities. Fifteen years of experience have taught us something, and we cannot do better than repeat our experiment of 1851, and, with the additional light we now have, place the art education of the country on a new and improved basis.

NIGHT SCHOOLS IN FRANCE.

The Paris correspondent of the London *Star* writes:

"M. Duray, Minister of Public Instruction, presided last Sunday at the distribution of prizes at the Polytechnic association. The meeting was held at the Cirque Napoleon, which vast building was crowded by foreign workmen. I give you some extracts of the speech delivered by his Excellency on this occasion. The eloquence of figures is undeniable. Notwithstanding the splendid results of the last year's examination, education has made still more gigantic strides within the last twelve months; 40,000 teachers, that is, 10,000 more than last year, have opened 32,383 gratuitous night schools, attended by 823,000 adult scholars. Above one third of these were uninstructed, of whom but 23,000 in spite of their anxiety to learn, quitted the school as ignorantly as they entered; whereas 800,000 have made considerable progress in knowledge

"Calculate the accession of industrial power thus gained in a few months, the progress of trade being in proportion to that of general instruction. Contrary to the usual course of events this movement has begun from the lower strata of society. The people inspired by a few brief and energetic words of the Emperor, have crowded to these new schools Thirteen thousand teachers have given their time and energy gratuitously to these schools, nine thousand of whom have spent 235,000 francs of their small salaries on the good work; ten thousand municipal councils have made it a point of honor to subscribe a sum nearly amounting to two millions francs ($80,000) towards the necessary expenses.

"To prove the severe investigations which have resulted in the above statistics, M. Duray read an official report of what had taken place in one department. A competitive examination of the adult classes took place on the 5th of March, 1865, the subject for composition having been enclosed in a sealed envelope and forwarded to each teacher. The presence of the mayors, curates and delegates from surrounding districts guaranteed the honesty with which the conditions imposed by the board had been fulfilled. One thousand two hundred and sixty seven compositions were sent in to the Inspector; 317 of these were written without a single fault. On the 11th of February, 1866, the number of competitors was trebled, and numbered 4,880; 900 compositions were sent up without a single error. In 1867, on the 27th February, 5,159 adults entered the lists, all either labourers or mechanics; the result was 1,409 faultless compositions—the writing, spelling and moral sense of the compositions being equally admirable.

"The most touching instances of anxiety for instruction are recorded. A little girl, for instance, ten years of age, herself brought her mother to the night school, and there taught her herself to read. A sick workmen wrote the exercises for the night school while confined to his bed, while another paid a friend to replace him at his factory during the school hour. In the South, where the passions are violent, and where quarrels are more frequent than in cooler northern districts, the moral benefit derived by these night schools has been so great that in one instance, when illness prevented the teacher from giving his lessons, a young curate volunteered to replace him—a service which necessitated a fatiguing journey on foot across' a mountain and through a wood of considerable extent. He never could reach home before half-past eleven at night. During four months the young priest was punctual to his self-imposed task, for which he received no reward save the gratification of having continued the good work begun by one as poor as himself. At Creuzot drunkenness and quarrelling are unknown in the founderies, where ten thousand workmen are employed—a result attributed by the president of the Corps Legislatif to the night schools."

Steam Rollers, weighing twenty tons and driven by engines of twelve horse power, are used in Hyde Park for solidifying and smoothing the carriage ways.

THE REGULATION OF TEMPERATURE AND MOISTURE.

All extremes of heat and cold, moisture and dryness, are injurious, but for short periods the human system can easily resist an influence from which injurious effects are experienced after a protracted exposure. Thus the workmen around furnaces never experience from an intermittent exposure the injurious effects to which men are subjected who work on hot summer days in the continuous radiation of the sun and sometimes fall victims to sunstroke.

Short exposure to cold will not produce that injury to a healthy person which follows when portions of the body are thoroughly cooled off and the natural perspiration checked for some time. It is an error to think it better to cool off gradually than to go from a hot fire at once into the cold. On the contrary, when before going out on a very cold day we warm up well before a good fire, and immediately wrap up in a coat or shawl, we find that we can resist the cold much better and longer than when we cool off before going out. It must be noted, however, when we remain in a place which is very warm so long that our perspiration becomes as free as it naturally is in the summer season, and then at once go out into the cold, there is danger of taking cold by the sudden check produced in a perspiration which was too free for the winter season. The artificial heating must therefore be moderate, or if too strong, must be of short duration. A thorough cooling off of the body below a certain standard of temperature (which is sometimes different for different individuals) will surely produce disease, which also will be different in its nature according to the different predispositions of the individuals; thus, by the same exposure to cold one will get a catarrh in the head, another become hoarse in the throat, another will have his respiratory or digestive apparatus disturbed, still another will be visited by rheumatism or neuralgia, etc., and it is one of the duties to be attended to during our material existence here on earth *to know ourselves* in this respect also, in order to guard against the weak points in our constitution.

As healthy as is wet and moisture, when we are exposed to it for a very short period of time (witness the use of baths, etc.), just as injurious is it when protracted beyond reasonable limits. Even when the moisture is only in the air in great excess, it is injurious to live in this air, as is proved by the unhealthfulness of low, damp localities, whether in a temperate or hot climate: such a damp air will always be a continuous check to the perspiration, as it does not absorb the invisible moisture which is always passing off the whole surface of the body, and which is so readily removed by dry air. Besides this, a damp atmosphere is very favorable to the generation and development of the fever-producing miasma.

But the most dangerous enemy we have to contend with in our climate is the extreme dryness of the air in the winter season. Cold air has much less capacity for absorbing moisture than warm air, while the general evaporation of course supplies less moisture for the atmosphere to absorb in winter than in summer. Now when we heat this cold dry air in our rooms in winter, we increase its capacity for watery vapour, and consequently its relative dryness. In this condition the air powerfully absorbs the moisture from all surfaces, those of the skin, throat and lungs not excepted. The air of every room should be supplied with moisture from the evaporation of water in connection with the stove or furnace. For a middle-sized room the evaporating surface should be about half a foot square. Unfortunately many furnaces and stoves are not provided with this arrangement, and where they are, too often the addition of water is entirely neglected, and the consequence is that the inmates of the place live in an atmosphere so dry as to injure their respiratory organs, produce pains in the throat, or rush of blood to the head, increase all kinds of pulmonary trouble, etc. On the other hand, an excess of vapour from keeping the water too hot may produce a deposit of moisture on the walls, and prove injurious. This is easily guarded against. To steam coils, a small stop cock may be attached, from which by operating it a small amount of steam may be discharged from time to time; when not neglected, this is an excellent arrangement.

In many churches and public buildings in our cities, and even in private residences, this deficiency of water in the heating apparatus is very evident in the effects it produces on delicate lungs and throats, and this dry air is often made worse still by being heated in contact with the red-hot iron of the stoves The air should not be scorched by contact of a small surface of red-hot iron, but it should be heated by a more prolonged contact with a larger surface of iron moderately heated, and always come also in contact with tepid water, which will correct the drying of the hot iron and make the air more congenial to the moist surface of the throat and lungs.—*Scientific American.*

Machinery and Manufactures.

TRIAL OF ENGLISH & AMERICAN BURGLAR-PROOF SAFES, IN THE PARIS EXHIBITION.

Correspondence of Engineering.

PARIS, August 13, 1867.

The trial of the burglar-proof safes of Mr. Chatwood, of Bolton, and of Mr. S. F. Herring, of New York, or, as our American friends like to call it, "the great contest of American *vs.* English safes," has commenced at last in the British testing-house at the International Exhibition. The terms and history of the challenge we have already published, but it may be as well to refer to them in a few words before proceeding to report upon the trial itself. Mr. Herring exhibited a safe upon which he posted a challenge offering to test it against any other safe in the Exhibition. Mr. Chatwood accepted this challenge, and an agreement was drawn up to that effect. Mr. Herring then declared that his safe was not really burglar-proof at all, but simply fire-proof; but that there was a burglar-proof box inside the safe, which was the article meant. if not named in the challenge. The appearance of these after-declarations created a somewhat unfavorable impression against the American safe-maker, if not against his safe, which occasionally manifested itself during the trial; but the jury certainly tried to do all in their power to maintain the balance as even as circumstances would allow. The jury was chosen by the two competitors; Mr. R. Mallet and Mr. R. F. Fairlie having been proposed by Mr. Chatwood, and Mr. Holmes and Mr. Pickering representing Mr. Herring's interest. These four gentlemen had chosen M. Paul Douliot, engineer of the firm of Cail & Co., of Paris, as their fifth member, and as their president; and Mr. W. T. Hoyle, secretary of the Whitworth Company, acted as secretary to this jury. The jury met at 11 a.m. to-day. After the preliminary arrangements had been completed, then the sham burglars were introduced, three in number on either side. They were some of the best workmen that could be mustered in England, America and Germany. Mr. Chatwood had brought one of his foremen and a workman from his shop; the third man, a foreman at Messrs. W. & J. Galloway & Sons, in Manchester, had volunteered his services on the day of the trial. Mr. Herring had sent expressly to America for a celebrated safe-breaker, who was assisted by a man described as particularly expert at picking locks; and the third also a volunteer, who was the foreman of an Austrian exhibitor of safes, who had a very intimate acquaintance with the construction of Chatwood's safes, having been in the Exhibition ever since its opening, and repeatedly examined Mr. Chatwood's drawings and details of construction, which are exhibited without reserve. These six men, combined in two respective groups, were an interesting match, although the unequal nature of their capabilities somewhat lessened the interest of the trial. Mr. Chatwood had in his favor the calm and business-like method of his foreman, and an extraordinary amount of skill on the part of Messrs. Galloway's man in the use of his hammer, which attracted the just admiration of every one present. On the other hand, Mr. Herring's man showed much judgment and experience, assisted, as it was, by the correct knowledge of the Austrian foreman. The *personnel* having been mustered on both sides, the tools were brought forward. Mr. Chatwood's men had their tools packed in a neat small leather portmanteau. The contents were the well-known serrated wedges used by expert burglars, some levers screwed together in short lengths so as to pack up easily, a small hand-hammer, and a block-tin hammer which gives no ringing noise in striking. Against this the Americans brought in a sledge hammer, the exact weight of which has not yet been ascertained, but which may have been somewhere about 28 lbs. There were several levers and crowbars five or six feet long, and a complete drilling-frame large enough to enclose the entire safe, and to insert the ratchet brace for drilling. Last, but not least, came some steel wedges of an enormous size. Call these burglars' implements! The jury immediately objected to the employment of this portable blacksmith's shop, and the sensible suggestion was made to allow equal weight, and a maximum size of implements only on each side. This, however, could not be adhered to, since the American tools were not prepared for such a condition, and all parties, anxious to see the trial through, agreed to allow the heavy American tools to be used, with the exception only of some of the very large wedges. The jury allowed the sledge hammer to the Americans, reserving to Mr. Chatwood the right to use a similar one if he thought necessary. This, although it changed the entire nature of the trial, was wise on the part of the jury, since it has been proved by the trial itself, that without sledge hammers the trials would have lasted much longer than anybody would have cared to witness the operations, except perhaps Mr. Chatwood and Mr. Herring. The operations commenced at 2.45 p.m. There was a clear space all around each safe reserved for the workmen, and the two sets were divided by a screen. In front of the latter, Mr. Walker, the well-known watchmaker of Cornhill and Regent street, placed one of his beautiful chronometers for taxing the time occupied by the different operations. A piece of wood sufficiently small to be enclosed in the little box inside Mr. Herring's safe, was put into this latter box, and a piece of similar size was put into Mr. Chatwood's safe; but Mr. Chatwood would not put his block into the small box inside his safe, as he declared that the contest was between the two safes, and not between a series of boxes hidden one within the other. Mr. Chatwood's workmen commenced by applying their small wedges to Mr. Herring's safe, while Mr. Herring's men tried their chance in drilling through the door in front of Chatwood's lock. The wedges did their work expeditiously, although the want of accquaintance with the details of Mr. Herring's construction caused some loss of time, the workmen attempting to drive in wedges at a place where the outer plate of the door overlaped the other part, and could have been removed by a cross-cutting chisel, so as to allow the immediate insertion of the wedge. In spite of this drawback, however, Mr. Herring's safe was completely thrown open in 29 minutes. The audience cheered, and Mr. Herring called out that this was only the fire-proof part of his safe, to which the English workmen replied by knocking out all the drawers and shelves of the safe, and throwing them out on the floor. Meanwhile the workman on the other side had erected their drilling frame, and worked the ratchet-brace, but without success. The drill touched the spiegelcisen which is behind the outer plate of Chatwood's safes, refused to cut, and the work had to be given up as impracticable. They also tried to pick the lock and to apply steel screws and punches to the door, but they made no progress in that direction, and had to give up all idea of forcing the door. As far as the trial had gone on with real burglars' tools it had lasted till 3 45 P.M. After that the sledge hammer came into request. Mr. Herring's men commenced the attack upon the dovetailing at the corners of Chatwood's safe by driving in chisels with the sledge. Mr. Chatwood then requested that his men should also be provided with sledge hammers for breaking the small box which contained the wood block, and this was at once agreed to by the jury. The hammer was brought in at 4P.M., and then an amount of battering began at each of the two safes, which will be remembered for some time by every one present. The fragments of chisels and wedges were flying about the room, and the din was so terrific that crowds of spectators collected outside. "This is not burglar's work," somebody remarked, "the police would soon stop such a proceeding." But the police in the Exhibtion had quite enough to do to keep off the people attracted by the noise, and, as usual, they were courteous enough to hear nothing. The work went on for about half an hour. The English workmen had the disadvantage of working upon a very small surface, as afforded by the door of the small box, enclosed as it was inside a large chest, which prevented a fair blow from being struck in any direction. Here the unusual skill of the striker proved of great value; his blows very rarely missed, although they were sometimes applied in the most trying positions. At Chatwood's safe the manual skill was less; but the men, knowing every joint and pin, made steady progress, step by step, all parts being perfectly accessible for their operations. The attack was made upon the side of the safe next to the lock of the door; the dovetails were wedged open singly, and each of the connecting studs binding the outer plate to the inner structure was cut through by itself with large chisels. At 4 35 P.M. the outer plate of Chatwood's safe was removed entirely, and the spiegeleisen laid bare. In this form spiegeleisen, as is well known, has no resisting power, on account of its brittleness, and it therefore took a short time only to knock off this material with the crowbars, so as to arrive at the inner plate of Chatwood's safe. The same operation was repeated on this latter, and at 5 05 P.M. a ridge was opened, through which the ashes and other powdery substances forming the protection against fire, commenced to fall out. It took half an hour more to open up a crevice at the side of the door, through which the paint of the interior could be seen, yet the peculiar construction of the bolts prevented all possibility of widening that breech, and the work had to be recommenced at the other side. The progress with Mr. Herring's safe was of a different character. The box was fastened inside the safe by an angle-iron girder, which had to be cut through to get access to the front plate of the door. Behind this the box itself consists of a thick front plate, tied to the back plate by a great number of steel bolts, about one inch diameter each, and rivited in with countersunk heads. Behind the front plate there is a construction somewhat resembling the plan of the Chalmers' target, viz., a series of steel plates put on edge, and having their interspaces filled with franklinite iron, which is very nearly the same material as the German spiegel, only made of American ore. The connection between the front and back plate of Herring's box came out to great advantage under these circumstances, since the smallness of the surface exposed to the attack, and the close proximity of the strengthening points, afford no proper working space nor leverage for the tools. This, however, is easy enough with so small a box as that inclosed in Mr. Herring's safe while it is doubtful whether a larger safe of the same make would allow anything like a proportionate strength of connections. At 5.50 P. M. the workmen on both sides were allowed to rest, and operations were recommenced at 6.35. At 7.15 the outer plate of Herring's box was thrown off, and wedges were inserted to force open the rest of the door. Daylight was immediately afterwards visible in the small box of Herring's safe and it would have been possible to remove small valuables, such as coins, from this chest through the crevice made. The want of a larger wedge was felt towards the end of this operation, and the suggestion was made to allow Mr. Chatwood's men one wedge similar to those which were used on the other side. This, however, was not carried out, as Mr. Chatwood's safe had been broken into and the block of wood removed from it at this time, 7 25 P. M., the men having removed the side plate entirely, and cut a hole into the thin sheet-iron plate which forms the inside skin. The hole was just large enough to insert the hand and pull out the small wood block, but there was no access to any one of the drawers in Chatwood's safe, nor would it have been feasible to get at the block if it had been placed in the inside chest without expending a very considerable amount of further time and labor. Mr. Herring's safe being by this time so nearly destroyed that it appeared to be the work of a few minutes only to force the small box open, it was resolved to complete this operation on the following day. The trials were consequently adjourned at 7 40 P. M.

PARIS, August 14.

The jury met at 11 o'clock this morning, and after deliberation, called upon Mr. Chatwood's men to complete their work, which was done in three minutes. This is only one of a series of tests which these safes are to undergo, and it will be acknowledged by every competent man that it was not of a very scientific character, the *rèsumè* stands simply as follows: The two safes were both "third-class bankers' safes" according to the maker's catalogues. They had each a small separate compartment inside the safe proper. Mr. Chatwood deposited his wooden block in his safe proper, making no use of the inside chest. Mr. Herring deposited his wooden block in the small wooden chest within his safe. Mr, Chatwood's men were skilful, but unacquainted with the exact construction; Mr. Herring's men showed less manual dexterity, but an intimate acquaintance with the construction of Chatwood's safe. The tools of the English workmen were proper burglar's tools, while the tools of the American workmen were boiler-maker's implements of full size, and incomparably heavier than the others, including even the sledge-hammer given to the English workmen at a later hour. Under these conditions Herring's safe was opened in 29 minutes, and the contents of it thrown out to the public. Chatwood's safe proper had a hole made in its side in 4 hours 35 minutes working time. Herring's small box inside the safe was completely broken open within 4 hours 43 minutes working time. Chatwood's small box inside the safe was not opened at all in this trial.

Type Writing Machine.

A machine by which it is assumed that a man may print his thoughts twice as fast as he can write them, and with the advantage of the legibility, compactness and neatness of print, has lately been exhibited before the London Society of Arts by the inventor, Mr. Pratt, of Alabama. He draws up his alphabet in a solid square battalion, say seventy characters in seven rows, the whole in a solid electrotype plate about five-eighths-inch square or more according to the size of type desired. He prints a letter by the blow of a minute hammer of uniform size with all the type bodies, striking the letter, with the paper interposed, and a carbonized sheet also between that and the type. Each letter, as wanted, is moved into position before the hammer by compound levers actuated by keys like those of a piano. The same touch of the key readjusts the paper to the new impression (with or without a space before it, according to the force used), readjusts the type plate so as to present the desired type to the hammer, and gives the printing blow. Simple arrangements also retract the page at once laterally and vertically to begin a new line. The type plate and paper are placed vertically, the latter with its face to the operator, so that the work done is before his eyes as in writing. The keys actuate two double-acting levers, one of which raises or lowers the type plate, while the other moves it laterally. Each key is so applied to the levers as to adjust the plate at once sideways and vertically to the position for bringing a particular character into play. Or, a better way, one key will do duty for the vertical movement of each entire horizontal row, another key for the lateral movement of each vertical column; and thus by pressing two keys for each character, seventeen keys will be sufficient to operate the whole font of seventy characters above supposed. The case of the instrument is small and compact, the parts are mostly of wood, and it could be manufactured and sold on a large scale for about $15, with a handsome profit.

The subject of type writing is one of the interesting aspects of the near future. Its manifest feasibility and advantage indicate that the laborious and unsatisfactory performance of the pen must sooner or later become obsolete for general purposes. "Printed copy" will become the rule, not the exception, for compositors, even on original papers like the *Scientific American.* Legal copying and the writing and delivery of sermons and lectures, not to speak of letters and editorials, will undergo a revolution as remarkable as that effected in books by the invention of printing, and the weary process of learning penmanship in schools will be reduced to the acquirement of the art of writing one's own signature and playing on the literary piano above described, or rather on its improved successors.—*Scientific American.*

Glass from Native Ore.

On the 27th of February, 1866, a patent was issued through the *Scientific American* Agency to Richard Washburn, of Monsey, N. Y., for the manufacture of glass from the native ore. This ore, which is really pure glass, or silicate of iron, in a crystallized and hence opaque condition, exists in abundance in many parts of the world, as in the columnar basaltic rock of the Palisades of the Hudson, of St. Helena, and of the famous "Giant.s Causeway." But all efforts to utilize it for the manufacture of glass had proved singularly unsuccessful until the invention we have referred to. Messrs. Chance, Son & Co., the celebrated manufacturers of Birmingham, who export great quantities of plate glass to this country, are reported to have expended not less than a quarter of a million dollars, some years ago, for this purpose. It is gratifying to be able to add this important source of wealth to the list of those opened to mankind by American inventive genius, and to record the fact that the Newburgh (N. Y.) Glass Manufacturing Company, organized to work the ore of that vicinity under this patent, are already successfully turning out quantities of glassware, with the two peculiarities of unequalled toughness and unapproachable cheapness. The artificial glass hitherto produced, requiring some thirty per cent. of soda or other oxides as a base, consuming much fuel, and losing much dross, evidently could never be cheapened sufficiently for many of the uses for which it is very desirable. The simplicity of this manufacture direct from the native article, the abundance and accessibility of the material, and the extraordinary tenacity of the product—common quart bottles of the Newburgh manufacture may be freely used in driving nails into solid timber without risk to their contents—must eventually extend existing applications of glass in a beneficent degree, and bring it into many uses from which it has hitherto been excluded. The native glass in this region, and in fact generally, being the silicate of iron, has a dark color, and it is yet to be seen how far it can be whitened by modification of the base and admixture of other bases, so as to become available for the finer purposes. That common window glass may be produced at a great reduction of cost, seems not to admit of doubt, and this alone involves great improvement in the structure of houses, in common horticulture, and in many other respects which will occur to the reader.

We have thought it of interest to numerous readers who may not have turned their attention to the chemistry of glass, to take this opportunity for giving a popular sketch of its character. And first·

WHAT IS GLASS?—Most persons probably take for granted that glass is a simple mineral substance found in the earth, and would be surprised to learn that it is a *salt* formed by the chemical union of at least two and often three or four compound substances, and thus composed of from three to five very different and interesting ingredients. In fact, taking all the varieties of glass in actual use, it may be said to contain a dozen or more ingredients. Now, the popular notion of a salt is derived in part from the usual appearance of that class of substances in crystals, or small angular grains. Glass does not appear in that form, for the same reason that hot maple syrup, or any other melted sugar, "waxes" or candies when poured upon ice, as many of our readers may remember treating it in younger days in the maple orchards of new England. The reason is that, being cooled suddenly from the boiling point, the atoms are not allowed time to segregate and settle themselves into individual crystals, according to their natural disposition, but are overtaken by solidity as they are, in a single unitary mass. Suffer molten glass or any other salt to cool slowly enough, and its atoms will group themselves in multiplied units instead of one, forming a semi-opaque and crumbling mass: a striking instance and illustration in the lowest sphere, of that union of the kind and the individual which pervades the universe, from grains up to worlds, and from cell-life up to that of immortal spirits. Another part of the popular notion of a salt is derived from the ready solubility of most salts, and their consequent pungent effect upon the tongue. Glass is considered almost a synonym for insolubility; and yet it has all degrees of solubility according to its composition, and there is a kind of glass, differing from the common article only in the proportions in which the ingredients are combined, which will dissolve in water like any other salt, and not only yields a strong alkaline taste to the tongue, but will also wash the hands, if you please, of dirt and skin at once. It is sometimes used in making soap, but in Prussia this is prohibited, on account of its destructive effect upon textile fabrics. Hence we may understand the taste of a glass tumbler, although we can get at it only by imagination, because the substance is too hard to dissolve on the tongue.

But again, more particularly, what is glass?—Silicon, oxygen, and any metal or metals the maker chooses, according to the color or hardness he wishes to produce: the metals being necessarily taken in their oxides—of which that of sodium (soda) and that of potassium (potash) are most used—and the silicon also in its combination with oxygen, with which its quick and tenacious affinity for that element keeps it always united, forming silicic acid. Most persons who have observed rock crystal or quartz, everywhere veining or specking the rocks, or gleaming in sand, wherever sand is washed clean, have as little suspected that this apparently tasteless because almost utterly insoluble substance is an acid, as that glass is a salt. It is silicic acid, or one part of silicon with three of oxygen. The base silicon, like boron (to the analogy of which to carbon we referred in an article on borax) becomes a wonderfully interesting substance under the light of "chemic fire." From what has just been said, it is apparent that silicon is the main characteristic constituent of the inorganic earth, as carbon is of the animal and vegetable kingdoms. It is capable of the three allotropic conditions of boron and carbon, described in a former article, and is only hardened by the action of heat, unless exposed to air or oxygen, in which it takes fire and burns superficially; the silicic acid formed on the surface protecting the mass from oxidization. Silicic acid, silica, or quartz, can be melted by nothing short of the oxy-hydrogen blow pipe; but when heated with metallic oxides, the silicates resulting from union with those substances are melted at various temperatures, according to the metal involved, and the result is glass.

We might go on to describe numerous beautiful forms besides common quartz, in which silica presents itself in nature, such as opal, amethyst, chalcedony, cornelian, onyx, sardonyx, agate, and others, which owe their brilliant variety to various tinging materials, chiefly oxides of iron and other metals. Besides these, it is the stiffening in the framework of plants, and leaves, and animal cartilages. But as our object in setting out was merely to define the nature of glass, we close with a mere reference to the principal metals used in producing the usual varieties of that "salt."

What may be termed the highest variety of glass, is the *strass*, or "paste," used in imitation of precious stones. This is made with potassa and oxide of lead; the latter metal being remarkable for the high lustre, refractive power or brilliancy, specific gravity and softness, which it gives to the silicate. These qualities appear to be proportioned to the atomic weight of the bases employed, that of lead being among the greatest. Flint glass and crystal for optical purposes, are of like composition with strass. Common window glass and English crown, are silicates of potassa or soda, lime and alumina. Plate glass differs from this only in the purity of the materials. Oxides of gold, silver, copper and other metals, are employed to impart a variety of brilliant colors. The native glass which gives occasion to this article, as we have observed, is silicate of iron, with some added mixture of alkalies, alumina, or other "fluxes" (bases) of which we are not precisely informed, but which are among the usual elements of green bottle glass. —*Scientific American.*

Inlays.

White and colored inlays and enamels of almost indestructible hardness and beautiful polish may be made on wood or metals with oxychloride of zinc. The oxide of zinc, very pure and dense, is made into a stiff paste with water (if pigments are used, they are introduced into the dry oxide in powder), and introduced into the hollows to be inlaid, where it is allowed to dry. It is then carefully painted over with a strong solution of chloride of zinc, and the two compounds unite chemically, forming a very hard and dense substance. Before it sets, it may be polished with a piece of smooth, hard wood. If the object is such that the application can be performed very quickly, the oxide and chloride may be first mixed and introduced at once. It is an advantage to have all the materials warm.

Silver Inlaying.—A cheap and simple process recently published, consists in first engraving with nitric acid or otherwise the metallic surface to be inlaid, with the desired pattern, and then rubbing into the depressions a little moistened nitrite of silver. When perfectly dry, the metal is heated until the nitrous acid is driven off, and the metallic silver fills the hollows in a spongy mass. This must be rubbed down and compressed well into the engraving with a burnisher. The silver thus inlaid adheres inseparably, and is of the utmost purity.

Electro Casting.

Statues and other fine models in metal are made with microscopical exactitude in the fine-art foundery of Messrs. Elbington, at Birmingham, by electro-casting, *i. e.*, precipitating the metal from a state of solution upon the surface of the mold by electrical decomposition of its salts. In order to do this, the mold itself is first produced by the same process. The object to be copied is made impervious to moisture, and then coated with fine black lead. Placed in a copper solution, it is electrically coated with the metal to a sufficient thickness to retain its form when removed, and is then divided and taken off, or the model is removed from within. Its interior is, of course, a surface negatively identical with that of the model, and on being filled with a solution of bronze, and submitted to the battery, receives a deposit of bronze, the form of which is not to be distinguished from the original by the finest scrutiny. These castings are usually made one-fourth of an inch thick, but the thickness can be varied at will, requiring weeks or months, according to the thickness. Unlike other modes of casting, in this there is no imperfection from the distortion either of the mold or of the casting, nor from imperfect filling of the finest lines of the mold.

Darning Machine for Stockings, &c.

This is an English invention recently patented by Mr. E. A. Cowper, of London, and consists substantially in the use of a small rectangular frame, large enough to enclose any hole to be darned, and notched all around its outside like a saw, upon which darning cotton is wound in two directions crossing each other, one thread in each notch, and thus at uniform intervals. The network thus formed is applied to the hole, the article is stretched upon the frame and held by its teeth, and then the apparatus is placed beneath the needle of a sewing machine adapted to make stiches enveloping and clasping the threads at their intersections and filling the spaçe with a firm and neat texture. When done, the frame is cut away, and the ends of yarn trimmed close with the scissors.

Useful Receipts.

Cements and Uniting Bodies.

In the preparation of cements and all substances intended to produce close adhesion, whether in a semi-fluid or pasty state, freedom from dirt and grease, without slovenliness, is a most essential and necessary condition.

A Temporary Cement, to fix optical glasses, stones, jewellery, etc., on sticks or handles for the purpose of painting, repairing, or ornamenting, is made by melting together at a good heat, two ounces of resin, one drachm of wax, and two ounces of whitening; with this applied to the article when heated, secure fixation may be obtained, unfixed at pleasure by the same means, viz., heat.

Rice Cement, which is made by mixing rice flour intimately with cold water, and then gently boiling it, forms a beautifully white preparation, and dries nearly transparent; it is capable of bearing a very high polish, and is very durable; it is in every respect far before the common paste made with wheat flour or starch; it may be formed, also, into a plastic clay.

For Uniting Stone, Derbyshire Spar, etc., etc., melt together four ounces of resin and half an ounce of wax, and about an ounce of finely-sifted plaster of Paris. The articles to be joined should be well cleaned, and then made hot enough to melt the cement, and the pieces then pressed together very closely, so as to leave as little as possible of the composition between the joints. This is a general rule with all cements, as the thinner the stratum of cement interposed the firmer it will hold.

Cement for Chemical Glasses.—Mix equal parts of wheat flour, finely-powdered Venice glass, pulverized chalk, and a small quantity of brick-dust, finely ground; these ingredients, with a little scraped lint, are to be mixed and ground up with the white of eggs; it must then be spread upon pieces of fine linen cloth, and applied to the crack of the glasses, and allowed to get thoroughly dry before the glasses are put to the fire.

Puzzuolana Cement.—A kind of earth thrown out of volcanoes, of a rough, dusty, granular texture; its most important property consists in making a cement when mixed with one third of its weight of lime and water, which hardens very suddenly, and is more durable under water than any other. Manganese, is found to be a valuable ingredient in water cements. Four parts of grey clay are to be mixed with six parts of the black oxide of manganese, and about ninety of good limestone, reduced to fine powder, the whole to be calcined to expel the carbonic acid; when well calcined and cooled, to be worked into the consistence of a stiff paste, with sixty parts of washed sand.

The Diamond Cement for glass or china is nothing more than isinglass boiled in water to the consistency of cream, with a small portion of rectified spirit added. To be warmed when used.

Leaky Skylights may be stopped and cured with Dutch rushes, bedded in and covered with good white lead. On wet making its appearance it quickly attacks the rush, which swells up so tight and firm that all progress of wet and droppings is effectually stayed.

Lemery, the chemist, used the following lute for stopping retorts, etc.: Fine flour and fine lime, of each one ounce, potter's earth half an ounce; make a moist paste of these with white of egg, well beaten up with a little water, and this will be found to stop exceeding close.

Philosopher Boyle recommends, on experience, the following for the same purpose: Some good fine quicklime and scrapings of cheese, pounded in a mortar, with as much water as will bring the mixture to soft paste; then spread on a piece of linen rag, and apply it as occasion requires.

A most valuable glue for photographers, and extensively used by first-class book-binders, is made from bottle india-rubber. This must be dissolved in highly rectified spirits of turpentine: the highly rectified spirit extracts every particle of grease, which is of the greatest consequence. As I have somewhere before remarked, it is not exactly what you do, but the way in which you do it; grease, above all things, is a most determined enemy to any of these preparations.—*Photographic News.*

Silvering Powder.

Silvering Powder, &c., for silvering copper, covering the worn parts of plated goods, &c—1. Nitrate of silver 30 gr., common salt 30 gr., cream of tartar 3½ dr. Mix. Moistened with water, and rubbed on dial plates or other copper articles, it coats them with silver.

2. Silver precipitated from its nitric solution by copper 20 gr., alum 30 gr., cream of tartar 2 dr., salt 2 dr.

3. Precipitated silver ½ oz, common salt 2 oz, muriate of ammonia 2 oz, corrosive sublimate 1 dr. Make it into a paste with water. Copper utensils are previously boiled with tartar and alum, and rubbed with this paste, then made red hot, and afterwards polished.

4. Dissolve muriate of silver in a solution of hyposulphite of soda, and mix this with prepared hartshorn, or other suitable powder.

New Glue.

A German chemist, M. C. Puscher, has discovered that if "glue or gelatine be mixed with about one-fourth of its own weight of glycerine, it loses its brittleness, and becomes useful for many purposes for which it is otherwise unfit." M. Puscher uses mixtures of this kind for dressing leather, preparing artificial bones, for giving elasticity to porcelain, parchment or enamelled paper, and for bookbinding.

A New Styptic.

The *Antwerp Journal* says that the perchloride of iron combined with collodion is a good hæmostatic in the case of wounds, the bite of leeches, etc. To prepare it, one part of crystallized perchloride of iron is mixed with six parts of collodion. The perchloride-of-iron should be added gradually, and with care, otherwise such a quantity of heat will be generated as to cause the collodion to boil. The composition when well made is of a yellowish-red color, perfectly limpid, and produces on the skin a yellow pellicle, which retains great elasticity.

Toilet Soap.

To four quarts slacked lime, add two pounds sal soda. Dissolve the soda in two gallons of soft water. Then mix in the lime, and stir it occasionally for one hour. Then let it settle; pour off the clear liquor, then add two pounds of clean grease. Boil until all is desolved, then pour it off into some vessel to cool, and cut into such shape as suits the fancy. You can flavour this soap with anything you desire. This soap will make the hands soft, and will prevent them from cracking, and it is far better and cheaper than any toilet soap that can be bought at the stores. Try it.

Whitewash and Starch.

The *Chemical News* promises that a strong solution of sulphate of magnesia will give a beautiful quality to whitewash, and a little of it used with starch will add considerably to its stiffness and render cotton or linen garments to a certain degree incombustible.

Bleaching Glue.

Soak in moderately strong acetic acid for two days, drain, place on a sieve, and wash well with cold water. Dry on a warm plate. This method is given in *Dingler's Journal.*

To solder Tortoise-shell

Bring the edges of the pieces of shell to fit each other, observing to give the same inclination of grain to each, then secure them in a piece of paper, and place them between hot irons or pincers; apply pressure, and let them cool. The heat must not be so great as to *burn* the shell, therefore try it first on a piece of white paper.

Pink for Wollen or Cotton.

For three pounds of goods, one gallon of soft water, or enough to cover the goods. Steep two ounces of cochineal in the water for two hours, keeping it warm; when the cochineal is abstracted, add one ounce of cream of tartar, wet the goods in clean water, wring them dry, and put into the dye. Bring it to a scalding heat, stir and air until it is done. It will require but a few minutes to color. When dry rinse in weak suds.

Practical Memoranda.

Weight of one foot length of Malleable Iron.

SQUARE IRON.		ROUND IRON.	
Scantling.	Weight.	Diameter.	Weight.
Inches.	Pounds.	Inches.	Pounds.
1/4	0·21	1/4	0·16
3/8	0·47	3/8	0·37
1/2	0·84	1/2	0·66
5/8	1·34	5/8	1·03
3/4	1·89	3/4	1·48
7/8	2·57	7/8	2·02
1	3·36	1	2·63
1 1/8	4·25	1 1/8	3·33
1 1/4	5·25	1 1/4	4.12
1 3/8	6·35	1 3/8	4·98
1 1/2	7·56	1 1/2	5·93
1 5/8	8·87	1 5/8	6·96
1 3/4	10·29	1 3/4	8·08
1 7/8	11·81	1 7/8	9·27
2	13·44	2	10·55
2 1/4	17·01	2 1/4	13·35
2 1/2	21·00	2 1/2	16·48
2 3/4	25·41	2 3/4	19·95
3	30·24	3	23·73
3 1/2	41·16	3 1/4	27·85
4	53·76	3 1/2	32·32
4 1/2	68·04	3 3/4	37·09
5	84·00	4	42·21
6	120·96	4 1/2	53·41
7	164·64	5	65·93

Expansion of Atmospheric Air by Heat.

Degrees of Fahrenh.	Bulk.	Degrees of Fahrenh.	Bulk.	Degrees of Fahrenh.	Bulk.
32°	1000	65°	1077	100	1152
35	1007	70	1089	120	1194
40	1021	75	1099	140	1235
45	1032	80	1110	160	1275
50	1043	85	1121	180	1315
55	1055	90	1132	200	1364
60	1066	95	1142	212	1376

The pressure or gravity of the atmosphere, being equal to a column of water 34 feet in height, is the means or principle on which rests the utility of the common pump, also of the syphon, and all other such hydraulic applications. In the pump, the internal pressure on the surface of the liquid is removed by the action of the bucket; and as by degrees the density becomes lessened, so the water rises by the external pressure to the above-named height; and at such height it will remain, unless by some derangement of construction taking place, the atmospheric fluid is allowed to enter and displace the liquid column. But observe, if the temperature of the water or other liquid be so elevated that steam or vapor arise through it, then, according to the vapor's accumulation of density, may the action of the pump be partially or wholly destroyed; and the only means of evasion in such cases is to place the working bucket beneath the surface of the liquid which is required to be raised.—*Haslett.*

Air Treatment for Wounds.

M. Boisson has introduced a method of treating superficial wounds by a jet of air from the common bellows, immediately forming a dried film over the exposed flesh, beneath which healing is greatly facilitated and other obvious advantages secured. Burns which have removed the skin may be treated advantageously in this way.

The Pollution of Streams.

At the Salmon Fishery Congress recently held at Kensington, England, the secretary of the river Dee Fishery Board testified that since the establishment of a petroleum refinery on the banks of that river, every fish in the entire length of the stream, from salmon of 20 pounds downwards, has been killed by a poisonous refuse matter which floats out from the refinery. The water supply for the town of Chester has been drawn from this river, but a skillful analyst has examined the fluid and declares that no filtration can purify water polluted by a poison so subtle and powerful as this.

Economy in Fuel.

Economy in fuel might be greatly promoted, if consumers would imitate a practice of a good fireman with a steam boiler, in sprinkling over the surface of the fire a thin layer only of coals, as often as required. By this method the gases from the fresh coal are not roasted out in such great volume that nearly all go off unconsumed, as the case is when a large mass of fresh coal is roasted at once.

Solder.

Deville has lately made the observation that the addition of a little zinc amalgam to ordinary solder makes it applicable at low temperatures to aluminum bronze, cast iron, and also, no doubt, to other work in which quicksilver would not be objectionable.

Westphalia Hams.

These usually come by the way of Hamburg, and owe their fine flavour to being "cold-smoked." The hams are hung in the upper part of the building, the smoke is generated in the cellar and carried up to the smoking-room through tubes. During its ascent it deposits all moisture, and when it comes in contact with the hams it is both dry and cold, so that no undue change occurs in the meat while being smoked.

Cutting Glass.

Take an old three-cornered file, heat it red hot and suddenly plunge it into a previously prepared mixture of salt and ice, stirring it about so as to cool as rapidly as possibly. Now grind the point on a stone preserving the three sides as much as possible, when it is ready for use. The glass to be cut is nicked on the edges, then laid on a perfectly smooth surface, and the point of the file is, with a moderate pressure, drawn over its surface, the direction being guided by a rule. Such an instrument will be found serviceable, for cutting glass for windows and all ordinary puposes. So says an exchange.

Photography.

EMPLOYMENT OF CARBOLIC ACID IN PHOTOGRAPHY.*

BY DR. P. J. KAISER.

"During the past twelve months my attention has been occupied in experimenting with iodized collodion, for the purpose of discovering, if possible, a product which, besides possessing the essential qualities of sensitivenes and adhesion of the film, would remain unaltered and in good condition for a lengthened period. For some time the results obtained were very unsatisfactory, and led me to believe that the object of my search would prove to be a myth; but a careful study and examination of the ingredients generally used in the preparation of collodion encouraged me in my undertaking, and finally resulted in conclusions of some importance. Although my investigation is at present incomplete, I have succeeded in establishing certain facts which as they materially alter some of our ideas in respect to the theory and practice of photography, may prove sufficiently interesting for publication. I will, however, at present merely record the results arrived at, reserving for a future opportunity the publication of minor details.

In the first place, then, I found that the admixture of any substance which arrests the decay of organic matter to collodion will completely preserve the same from decomposition. The material known to be most effacious in this respect is carbolic acid, and for this reason my experiments were mostly confined to that substance. I began by preparing a quantity of plain collodion, which was made by dissolving 600 centimétres of a mixture of alcohol and ether in equal proportions, and 6-grms. of gun-cotton: owing to the inferiority of the materials used, a perfectly clear solution could not be obtained. To this collodion I added 4-grms. of carbolic acid, which had the effect of producing a complete dissolution of the gun-cotton, and of removing all turbidity, rendering the product quite clear and transparent. Four grammes of iodide and 2-grms. of bromide of cadmium were then mixed with the collodion, the latter continuing to be perfectly colorless, in which state it has remained for a period of eight months.

I now proceed to test the working qualities of my collodion, and the result was exceedingly satisfactory. A fine, vigorous negative was obtained with an exposure of fifteen seconds, at six o'clock in the afternoon, in November last, and this in a studio in which the lighting arrangements were very defective. The developer used on the occasion was of a perfectly novel description, and composed as follows:—

Protosulphate of iron	25-grms.
Distilled water	1,000 "
Carbolic acid	1-grm.

To counteract any prejudicial action which the carbolic acid contained in the collodion might have on the dipping bath, I added to the latter an appreciable quantity of the acid. Its action did not interfere with the sensitiveness of the iodized plates nor did it in any way affect the bath injuriously: but, on the contrary, added to the efficiency of the same by preventing the decay of any particles of organic matter which, from time to time accumulate in it. It is evident that when working with dry plates the addition of carbolic acid to the collodion will be found to possess great advantages.

Carbolic acid, I have found, likewise exerts a beneficial influence when mixed in minute quantities with albumen, the essential qualities of which may thus be preserved in good condition for an indefinite period.

In conclusion, I append the formulæ of the collodions which have given the most favourable results:—

Plain Collodion.

Alcohol	300 cub. centimètres.
Ether	300 "
Gun-cotton	6 grammes.
Carbolic acid	4 "

Iodized Collodion.

Plain collodion	600 cub. centimètres.
Iodide of Cadmium	4 grammes.
Bromide of Cadmium	2 "

* "Bulletin Belge de la Photographie."

A Photographic Group.

The *Scientific American* says:—A. H., of Pennsylvania, sends us a copy of a photographic group of six young men, each having upon his head a stove-pipe hat. The position of the group is such that, in some instances, the face of one of the individuals is directly behind, and covered by, a hat in front. One of the faces of the party is seen through the hat in front, which conveys the idea of a transparent hat. On the back of the picture is printed the following affidavit, purporting to be sworn to by the six:—

The undersigned being duly sworn, depose and say, that the photograph on the reverse was taken without any attempt at fraud or deception; the transparent hat being a common cassimere hat, and no opera or glass hat, and was not moved during the process.

Our correspondent says:—"I am anxious to know how it is possible that, under the existing circumstances, the photograph can show the face of one gentleman through the hat of another. If there had been anything of the mirror nature in the room, it might not be so hard to explain."

The "transparent" hat evidently had a movable crown, which was put on after the face behind had been partly photographed. It would be difficult to explain how a mirror could have been used.

Glaze for Photographs.

Three ounces of white wax and one-half ounce of elem are fused together at a low temperature, and then stirred up with sufficient oil of lavender or perfumed spirits of turpentine to give when cold. A sample has the consistence of an ointment. Before hardening the mass is mixed with forty drops of a concentrated solution of shellac in alcohol. The varnish is applied by means of flannel.

Notman's Portraits Amid Snow and Ice Scenery.

We have recently noticed the admirable winter effects obtained by Mr Notman, not only in pictorial photographic compositions, but in the backgrounds and accessories of his photographic portraits. A selection of cabinet portraits we received a day or two ago furnishes us with further variety of effect of this kind. We have here figures—ladies and gentlemen—Skating in every variety of position and action belonging to this graceful exercise. Some are apparently gently gliding over the ice; others suggest the action of pulling up and arresting extreme velocity; whilst others are apparently flying along at a tremendous pace, poised on one leg, the other being raised ready to descend and give another forcible stroke. A lady, in a charming short-skirted skating costume, just raising one foot while she glides along on the other, is exceedingly graceful. In all these, the snowy background and the perfect effect of ice, secured in the studio, are most wonderful. The figures are partially reflected in the ice, the reflections broken, however, by the cracks or lines, or fissures, cut in every direction by the skates in the ice, and by the snow blown here and there. Other figures are walking in the snow-covered scenes, their feet sinking deep in the snow; others, wearing huge snow shoes, tread lightly on the surface; others are breasting a pitiless snow storm, which, descending in heavy flakes, seems to half obscure the picture. The variety of winter costume is admirably suited to enhance pictorial effect and add interest to the photographs.

Much curiosity has been expressd as to the mode in which many of the effects have been produced with so much of nature and so little effect of contrivance, And here we find another illustration of an apothegm we never fail, when occasion serves, to press on the attention of our readers; namely, that excellence is due to the man rather than the method; that personal skill is of even more value than perfect formula. The best materials and the best processes are undoubtedly of the utmost value in securing good work: skill, judgement and taste in applying them are not less important.

Mr. Notman says; "To produce the effect of fallen snow, I have tried many ways, such as carded wool, white furs—that from the arctic fox, for instance—but latterly salt, which I find by far the best, as you can throw it on and about stones, rocks, etc.; and it so easily takes any desired form—such as a drift. When thrown upon the figure, it adheres to the cloth; in fact, as a representative of snow, it leaves nothing to be desired.

"To represent falling snow: after the negative is dried and varnished, I take some Chinese white and mix it with water to the consistancy that experience alone can dictate as best suited, put it into a vial, introduce one of those perfume blowers, and blow into the air a shower of the liquid Chinese white, and, as it falls, catch as much of it as is desirable on the varnised side of the negative; by judiciously holding the negative, you can so direct it as to give the effect of a slant to the falling snow.

"To represent ice, I use sheet zinc, over which I have polished plate glass. At first I was in hope that the zinc of itself would be sufficient, but a short trial convinced me that the zinc required protection from the action of the salt, which I use to represent the snow on the banks at the side." —*Photographic News*.

Tin Types.

Tin Types, as they are popularly called, are small ambrotypes taken on varnished tin, many repetitions upon the same negative being taken by having a camera with numerous lenses. This necessarily costly apparatus has recently been superseded by a very simple expedient. The sitter is posited opposite a box provided with pieces of looking glass, in which his figure is multiplied any number of times, and the pictures are thus obtained by a single-tube camera directed toward them.

Gem Pictures.

An artist in Lyons (France) takes two hundred and eighty gem pictures at one sitting. That is a wonderful reduplication surely.

Photographic Phantoms.

One summer's day, in 1844, as a Scotch photographer was taking a daguerreotype of York cathedral, a child sat down on one of the steps in front of the principal entrance, and the operator was afterwards surprised to find that the child's figure was transparent on the plate. The stones of the edifice having been impressed on it before, were visible *through* the portrait of the accidental sitter. This singular occurrence was soon forgotten, and it is only lately, since the invention of the "lenticular telescope," that efforts have been made to apply such transparencies to some definite purpose —such as the photographic representations of phantoms or apparitions.

The process by which such effects are obtained is very simple. The photographer arranges the actors he is to represent in their proper order, and fixes the place where the phantom is to appear. The actors turn their eyes toward the spot with various attitudes of joy, fear, or horror, which the apparition is supposed to produce. When there are but a few seconds left of the time required for producing the complete effect of light on the plate, the person representing the phantom rapidly steps into the proper place, in an attitude previously agreed upon, and is thus reproduced in a transparent state, everything behind being more or less dimly visible through the body of the person.—*Mechanic's Magazine.*

Ornamenting Glass, Porcelain, &c.

A method of ornamenting glass, porcelain ware, &c. with photographic pictures, has been invented by W. Grüne, of Berlin, which also contains a new method of preparing negatives so that positive films may be readily printed and removed from the negative. The negative, after being fixed and toned with chloride of platinum, is dried and varnished with a glassy flux which is annealed upon the negative by heat in a common muffle. The photographic film being now protected the negative may be dipped in water, acids, and other solutions with impunity. To produce positive prints one side of the negative plate is covered with collodion, sensitized, exposed to light, fixed and toned in the usual manner. The positive film may be then detached by loosening one corner with a soft brush and floating it off in a vessel containing water and a little glycerin. Any number of films may be thus printed and floated. The film may now be floated upon the surface of the glass or porcelain which is introduced into the water vessel, a soft brush being used to spread the film nicely. The film is now covered with the glass flux, and then annealed in a muffle as before described.

By toning the film prior to annealing with different metallic salts, a variety of colors may be produced on the picture. For example, if gold color is wanted, the films are treated with chloride of gold; steel color, chloride of platinum; black, chloride of iridium; baown, chloride of palladium.

If the different salts are applied to different parts of the film, the various colors will be seen combined in the picture after it is annealed, and beautiful effects may be produced. The pictures may be polished and burnished subsequent to the annealing process in the usual manner.

Miscellaneous.

Preservatives of Animal Food.

The results of the labours of the Food Committee are more within the reach of ordinary understanding. Within the compass of the evidence a great many curious and suggestive facts are collected. It is a sort of inquiry that stimulates investigation, invention, and production. We learn from good authorities the comparative value of food. The most remarkable statement with respect to the preservation of food brought before the notice of the committee is a circular of Messrs. Bailey and Medlock; it sounds too good to be all true, but deserves a trial that every housekeeper can make on meat or eggs.

Messrs. Medlock and Bailey say their " process for the preservation of animal substances possesses manifold advantages over all others hitherto proposed, but more especially those of economy and simplicity of application. By its means the meat, poultry, game, fish, &c., of a large household, or wholesale establishment, can be effectively preserved for months in any weather, at a nominal expenditure of time and money; no soldered tin cases are required; no complex apparatus is necessary; no want of flavour or nutritive power is the result; and, finally, whether the edibles thus treated are eaten in two days or two months time, nobody, save the actual manipulator, need know anything about it.

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" In the case, say of a small family who wish to keep a leg of mutton, or a sirloin of beef, for a week in sultry thundery weather, with the thermometer at 90°, take a teaspoonful of ' Medlock and Bailey's Patent Bisulphite of Lime Solution, a dessert spoonful of common salt, and about a quart of cold water, mixing the same in an earthen pan, basin, or other suitable vessel. Dip the meat in this mixture for a few minutes, taking care with the end of a cloth to wet it all over, then hang the joint up as usual. A dip night and morning will ensure its keeping sweet and fresh for any length of time. If the weather is unusually hot, a cloth soaked in the solution may be wrapped round it with advantage.

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" Game or poultry may be treated in precisely the same manner, having been first plucked and drawn. Fish, too, should be previously gutted. Eggs may be retained in the fresh or ' new laid ' conditions, simply by being completely covered with bran soaked with the same liquid mixture; while bacon can be prevented from getting ' rusty ' by this simple plan. If the joints are large and numerous the proportions should be thus:—

Bisulphite of lime	2 quarts.
Common salt	1 pint.
Water	4 gallons.

" When the meat, &c, is required for cooking, all that is necessary is to lay it in cold water for a few minutes, and afterwards to dry it thoroughly in a cloth; on a close inspection no odour or other alteration whatever will be apparent—the lean will not be reddened, nor the fat changed to the deep yellow tint so often apparent with ' hung ' meat, and the texture will be as at first, firm and consistent. Nay, more, if, not content with the evidence of our ordinary senses, we place a portion under the microscope, we shall observe that the general structure of the tissues has not suffered in the slightest degree; and if we went further, and delivered the whole to an analyst, his report would be that the various nutritious principles were present as usual, and had not sustained the slightest injury.

" With the view of testing the effects of the new preservative in tropical climates, some beef, mutton, fowl, salmon, lobsters, &c., were treated by Medlock and Bailey's patent process, and exposed in a chamber, specially arranged for the purpose, to a temperature varying from 80° to 110° Fahr. Portions of the same joints, fowls, &c., not prepared in any way, began to emit an unpleasant odor in about 16 hours, and were absolutely putrid in 12 more, while those treated with the preservative mixture showed no sign of decay whatever during the whole period of twelve days; from the very high temperature to which they were subjected, a little oily matter separated from the fish, but the original odour and flavour remained unimpaired to the end of the time, even the lobsters being pronounced 'delicious, evidently just boiled,' by those who partook of the same. The eggs which had not been treated with the bisulphite, &c., all, more or less, decomposed under the influence of the heat, while the others remained 'new laid' throughout. In a word, these experiments, intended to test, in the most severe manner, animal food treated with bisulphite of lime, at a tropical temperature, simply afforded still further evidence of its practical use.

"At the time at which we write, some three months since the trials we have just recorded, all the meats, fowls, &c., remaining uneaten are perfectly good and sweet, although exposed to the ordinary changes of temperature, &c., in a rather warm room."—*London Gas Journal.*

Disinfectants.

The British *Journal of Gas Lighting* says:—" Dr. Voelcker has reprinted from the *West of England Agricultural Journal* his treatise on disinfectants, which contains within a short compass, in very plain language, a mass of information of a very useful nature on a very disagreeable subject. It tells us how to extinguish not only stinks, but the poison of which stinks give notice. Dr. Voelcker gives the preference to carbolic acid as a real disinfectant." He says:—"My experiments have shown me that meat just covered with an aqueous solution of carbolic acid, containing only one per cent. of acid may be kept for many months—for all I know for years—without giving off the slightest disagreeable smell. A weaker solution does not prevent decomposition. The doctor does not agree with those who recommend the addition of any disinfectant to stable manure, with the view of improving its manurial powers, although it checks foul smells. Charcoal absorbs sulphuretted hydrogen, ammonia, and other strong-smelling gases produced during the decomposition of meat, and also hasten the destruction of animal matter. As an illustration of this power, the doctor mentions that a fox was sent to him to dissect. He placed the hind quarters in a wooden box, and covered them with charcoal rather less than an inch in thickness, and left the box on his work-table in the laboratory. During four months no disagreeable smell was noticed, and when the remains were examined at the end of that time, he found, to his surprise, that the flesh had disappeared to a greater extent than it would have done had the fox been buried in the ordinary way. The remaining flesh, after the removal of the charcoal, on being cut, gave out a horrid stench, showing that putrefaction was actively at work. As to dry earth, Dr. Voelcker says, if a sufficient quantity of earth is employed to absorb the mixture of urine and fæces, the contents of privies can be removed periodically—say once a month—in the dry-time, with little or no inconvenience. They should be removed at once under a roofed shed, and spread out as much as space admits, and left exposed to the drying influence of air. When dry it may be used again in the privy like fresh soil, and the same process may be repeated three or four times. During the drying in the shed no appreciable amount of fertilizing matter is lost; and as the earth after each removal from the privies becomes charged with an additional quantity of manuring matter, a very useful manure is finally produced, with little trouble, and at a mere trifling expense (*in rural districts*). Carbolic acid destroys all stench and bad odours generated by the decay of animal refuse, and kills vitality of living cells, and its value as a disinfectant is unquestionable. *Direction for use*. Mix one pound of carbolic acid with five gallons of warm, soft water, and stir well together. This may be used with advantage for disinfecting sewers, drains, the contents of liquid manure tanks, water-closets, stables, and cow-houses. To impregnate the atmosphere of stables and cow-sheds with carbolic acid vapours, mix equal parts of water and carbolic acid together, and soak up the liquid completely with dry sawdust; or pour two gallons of the mixture over a sack of sawdust. This may be handled with perfect safety, and when spread about will charge the air with the volatile vapours of the most powerful known antiseptic. This, if it does nothing else, will keep down the taint of putrid urine and decomposing dung. In the course of experiments a quarter of a pound of fresh beef was immersed in a solution of *one part of carbolic acid in one hundred of water*, on the 27th of December. The beef remained for two months perfectly free from any disagreeable smell; the liquid turned slightly acid, and its colour became slightly unsightly, but no gas bubbles or trace of fungoid growth could be detected. By degrees the liquid evaporated, and after having been kept ten months, without giving off the faintest putrid odour, the meat dried into a tough, leathery mass, still faintly smelling of carbolic acid. For water-closets, a solution of sulphate of iron or Condy's disinfectant are the best."

Oxygen.

Another oxygen process is reported in the *Chemical News*. On heating a concentrated solution of chloride of lime, with only a trace of freshly prepared moist peroxide of cobalt, the hypochlorite of lime was entirely decomposed into chloride of calcium and oxygen and no chloric acid was formed. The evolution of oxygen commences about 70° or 80° and continues in a regular stream, with a slight frothing of the liquid. The peroxide made use of in one experiment may be employed again to decompose a fresh quantity of hypochlorite of lime.

Artificial Agate.

Agate when polished is sometimes seen to bear markings which have a curious resemblance to a variety of natural objects, such as trees, bushes, and occasionally animals. These natural appearances, it seems, may be easily imitated artificially in various shades of color on common chalcedony. It is only necessary to draw the design on the polished stone, using a common goose quill, with a tolerably strong solution of nitrate of silver, and then drying it in direct sunlight. The drawing will at first be of a brownish color, but if it be dried and touched over two or three times it will be reddish. The same solution of nitrate of silver mixed with 12½ per cent. of soot and 12½ per cent. of bitartrate of potash will give a greyish-brown color. A violet color may be obtained by mixing one part of alum with three parts of the silver solution. Gold dissolved in *aqua regia*, or a solution of chloride of gold, gives a light-brown color. White and opaque appearances will be given by a solution of nitrate of bismuth. All these colors are unaffected by the atmosphere, and will bear washing. They can, in fact, only be destroyed by a very high temperature. They may be discharged by treatment with strong acids, but will reappear after washing and a fresh exposure to sunlight.—*Mechanic's Magazine.*

Cutting Glass with Scissors.

The London *Photographic News* says:—" In order to insure success, two points must be attended to; first and most important, the glass must be quite level while the scissors are applied; and second, to avoid risk, it is better to begin the cutting by taking off small pieces at the corners and along the edges, and so reduce the shape gradually to that required, for if any attempt is made to cut the glass all at once to the shape, as we should cut a piece of cardboard, it will most likely break just where it is not wanted. Some kinds of glass cut much better than others; the softer glasses cut best. The scissors need not be at all sharp, as their action does not depend much upon the state of the edge presented to the glass. When the operation goes on well, the glass breaks away from the scissors in small pieces in a straight line with the blades. This method has often proved very useful in cutting ovals, etc., which would be very expensive if ground cut; and though the edges are not so smooth as may be desired for some purposes, the method is worth knowing."

Beef-Curing by Venous Injection.

Beef curing by venus injection is practised by a firm at Corpus Christi, Texas, according to report, with perfect success. The blood is withdrawn by tapping the right ventricle of the heart —the animal having been stunned—after which the veins are forcibly injected with brine through a hose the nozzle of which is tightly inserted in an orifice in the left ventricle while the orifice in the right ventricle is closed. After filling, the right ventricle is opened, and allowed, under a continued pressure of brine, to run clear of the remaining blood. On making an incision at any point in the carcase, the brine spirts out the same as blood from the living animal, only with greater force. Even the hide is perfectly salted, and the carcase can be kept or transported whole as it stands, or skinned, cut up and packed, with perfect safety from decomposition.

Microscopic Furnace Dust.

Mr. Dancer has executed a very curious and certainly minute sort of inquiry into the composition of furnace dust, *i. e.*, the extremely fine powder which accumulates in flues from the burning of coal, apart from sooty or carbonaceous accumulations. He washed the dust carefully, to separate the purely mineral ingredients, and by placing it on a slightly inclined glass, made the spherical particles to separate themselves from those of irregular shape, by rolling down the incline. These, examined under the microscope, were found to be quite interesting objects. Many of them appear to be perfectly spherical though less than $\frac{1}{100}$ of an inch in diameter, solid or hollow, with a brilliant polish, and in beautiful variety, crystalline, white, yellow, brown, black, agate or carnelian of various shades, and some like rusty cannon balls. Mr. Dancer supposes that these are mostly silicates, or various kinds of glass, colored, when not transparent, with different oxides, carbon, etc. He accounts for their shape by supposing that they have been thrown off in scintillations, of course in a molten state, in which by a law of matter they assume a spheriodal form. Many of them appear to be ferrous oxides or " iron ore," probably formed by the action of heat on the iron pyrites in the coal, and afterwards, in many cases, found to have been reduced to metallic iron and encased with an enamel of silicate. Hence the proportion of iron in the coal dust is much greater than is revealed by the analysis of coal ashes.

The Poison of the Cobra-di-capella.

" The melancholy accident which so lately happened with the cobra-di-capella induced me to make some experiments and observations upon the action of the reptile's poison. When a person is mortally bitten by the cobra-di-capella, molecules of living 'germinal' matter are thrown into the blood, and speedily grow into cells, and as rapidly multiply; so that, in a few hours, millions upon millions are produced at the expense, as far as I can at present see, of the oxygen absorbed into the blood during inspiration; hence the gradual decrease and ultimate extinction of combustion and chemical change in every other part of the body, followed by coldness, sleepiness, insensibility, slow breathing, and death. The cells which thus render in so short a time the blood unfit to support life are circular, with a diameter on the average of one seventeen-hundredth of an inch. They contain a nearly round nucleus of one two thousand-eight-hundredth of an inch in breadth, which, when further magnified, is seen to contain other still more minute spherules of living 'germinal' matter. In addition to this, the application of magenta reveals a minute colored spot at some part of the circumference of the cell. This, beside, its size, distinguishes it from the limp corpuscle. Thus, then, it would seem that, as the vegetable cell requires for its growth inorganic food and the liberation of oxygen, so the animal cell requires for its growth organic food and absorption of oxygen. Its food is present in the blood, and it meets the oxygen in the lungs; thus, the whole blood becomes disorganized, and nothing is found after death but dark fluid blood, the fluidity indicating its loss of fibrine, the dark color its want of oxygen, which it readily absorbs on exposure after death. It results, then, that a person dies slowly asphyxiated by deprivation of oxygen, in whatever other way the poison may also act, and so far as the ordinary examination of the blood goes, the *post-mortem* appearances are similar to those seen after drowning and suffocation. I have many reasons for believing that the *materies morbi* of cholera is a nearly allied animal poison. I hope also to show the presence of the poison of our snakes in the blood of bitten and inoculated animals, and to make some experiments on the possibility of saving life.—*Dr. G. B. Halford, in the Melbourne Argus, April 26th.*